Final Documentation and Assessment of the
Coastal Resources Management Project
Community-Based Sites of Talise, Blongko, Bentenan and Tumbak
in the District of Minahasa, North Sulawesi Province, Indonesia

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By
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Executive Summary and Conclusions

The USAID-BAPPENAS NRM II coastal resources management project, locally known as *Proyek Pesisir*, established a field office in North Sulawesi Province in 1997. This is one of three provincial-level field programs contributing to the program objective to strengthen and decentralize coastal resources management in Indonesia. Four village-level field sites in the Minahasa Regency of North Sulawesi were selected in 1997 for development of models of community-based coastal resources management.

This report provides a final assessment of community-based coastal resources management activities that have been ongoing in the four villages since the Coastal Resources Management Project started in 1997. Planning activities were initiated in the villages in October 1997 with the placement of a full time extension officer in each field site. After a two-year participatory planning process and development of an issue-based profile, coastal resources management plans were approved by local government and through a village ordinance. Small-scale marine protected areas (MPAs) were also established in each of the villages at varying times and were formally approved through village ordinances. The process for establishing the community-based management plans and marine sanctuaries has been well documented. Implementation of the management plans by community management committees has been ongoing since 1999. Community committees formed after the establishment of the MPAs also manage the MPAs.

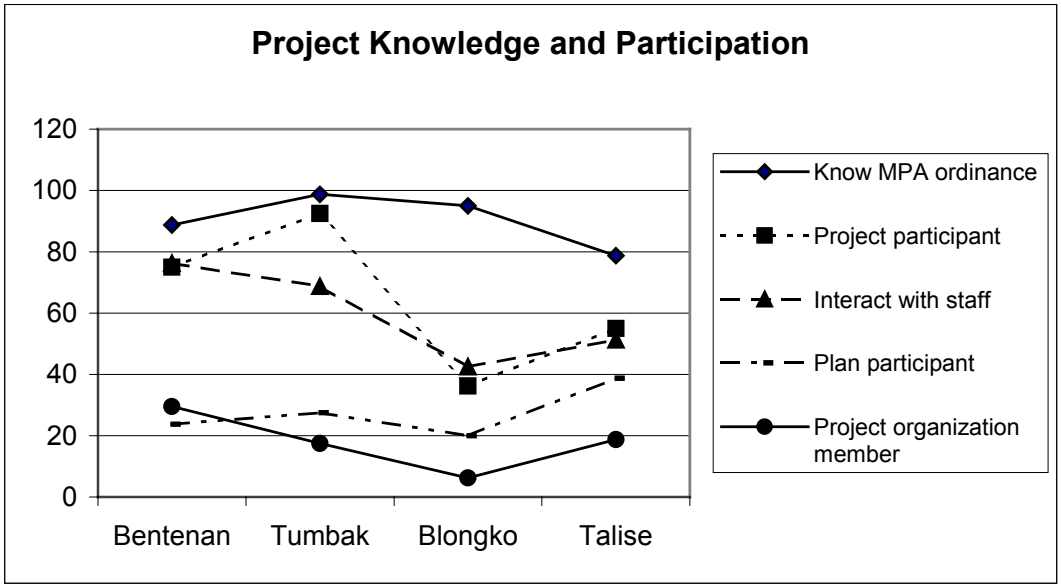
Baseline assessments were conducted in 1997 and 1998. Interim assessments of project and community activities were conducted in 200. This report provides a summary of project inputs (e.g. staffing effort, activities, community grants) and outputs (e.g. number of persons trained, reports produced, physical works constructed) as well as a review of implementation activities that have taken place since the 2000 assessment. The report also provides an assessment of demographic and socio-economic changes, as well as changes in community knowledge and perceptions that have occurred over the life of the project. Participation and gender issues are highlighted. Where appropriate, it compares project sites with similar information from adjacent control sites following a format similar to that used in the interim assessment reports. A summary of key findings are provided below.

There has been a considerable amount of progress on addressing coastal resources management problems as outlined in the village management plans and implementation activities taking place as documented in this report. We can conclude that at all sites, greater engagement and action by the communities in identifying problems and taking actions has occurred relative to adjacent control sites and relative to pre-project activities. However, there is also a great deal of variation among the communities in the amount of effort and success levels of individual activities. For instance, while an agreement was reached in Talise concerning fishing near pearl farming areas, there is still much confusion and resentment among fishers concerning the rules and enforcement by the pearl farm. This demonstrates that while there has been progress, issues and problems are still present. We should not expect an end to all problems, and they change and evolve over time. We should also not expect that all issues and activities would always be successful. Some degree of failure should be expected. Therefore, what is important is that communities are actively working to address the issues, learning from their experience and adapting actions and strategies to improve performance over time.

In all the villages, some form of action has occurred for almost every issue highlighted in the management plans. This is a very positive sign. For instance, the management committee in Bentenan seems very active and has evolved a unique financial management system grafted from the *arisan* system. They have developed a detailed marine and coastal spatial use scheme to address conflicts arising from the expansion of seaweed farming. Tumbak has developed a more autonomous management committee that provides an additional example for other villages to consider. Tumbak and Bentenan have been successful at obtaining outside local government resources to finance implementation activities, especially for drinking water supply issues. All the communities have maintained marker buoys and signs for the marine sanctuaries and while some violations have occurred from time to time, the communities have been addressing the violations and discovering ways that enforcement can best be handled. Bomb fishing and coral mining seems to be on the decline. Hence, there has been very good progress and we can consider these efforts at this stage to be successful with regards to MPA management and plan implementation. However, it remains to be seen how sustainable these actions will be after project support has been withdrawn. For example, in Talise the absence

of additional block grants or outside funding for implementation activities over the last year has slowed the pace of progress.

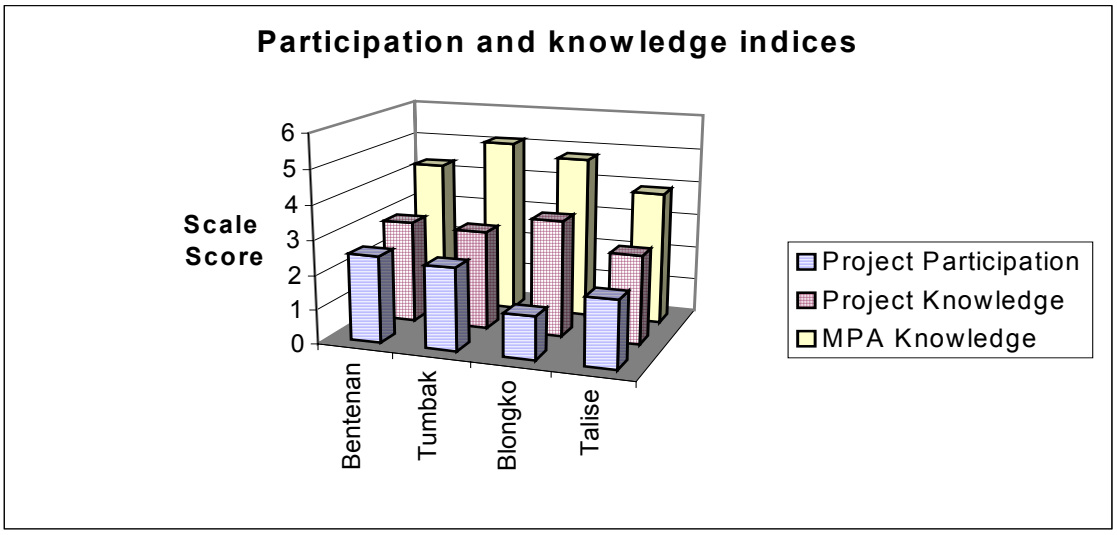
Intermediate indicators of success including the establishment of management committees and initial behavior changes demonstrating a wealth of community actions taken to address these issues are important. However, more importantly over the long run are the implications of these activities with respect to community knowledge, perceptions as well as on impacts on economic well being of the community and environmental quality of resources adjacent to the villages. The analyses of impacts make it clear that there are between project village differences in project participation and knowledge as illustrated in the figure below. In terms of



knowledge concerning an MPA ordinance in their village, almost all the respondents in Blongko and Tumbak are aware of the ordinance, and the lowest level of awareness is in Talise. This difference cannot be fully accounted for by time of establishment of the MPA because although Blongko was the earliest, the MPAs at Tumbak and Talise were established at almost the same time. The MPA at Bentenan was most recently established. There are also significant differences in interaction with field staff across the four villages. Bentenan manifests the greatest percentage of respondents who had discussed project activities with field staff, and Blongko the lowest. Project participation has the greatest variance across the various villages, with a maximum of 92 percent in Tumbak and a low of 36 percent in Blongko. With regard to specific activities, there are significant differences with respect to project organization membership. Thirty percent of respondents from Bentenan claimed membership in contrast to a little less than 20 percent in Tumbak and Talise and only 6 percent in Blongko. Significant differences also exist with respect to participation in management plan development, with a high of 39 percent in Talise and a low of 20 percent in Blongko. Part of these differences can be explained due to the length of time the extension officers have been withdrawn from the project site. In Blongko, the extension officer was withdrawn from full time assignment in 1999 and in Talise in 2000, then followed by withdrawal of the extension officer in Bentenan and Tumbak in 200. The extension officer in Blongko was withdrawn in 1999, with the extension officer in Talise withdrawn in 2000 and then followed by the extension officer in Bentenan and Tumbak. Declines in project participation indicators would be expected to decline somewhat as the project phased out of the villages. However, knowledge indicators remained high indicating retention of information transmitted as part of the participation process, which is one of the results expected. In addition, percentages of individuals with knowledge was higher than those participating, indicating a diffusion of information within the community from those who participated to those that had not.

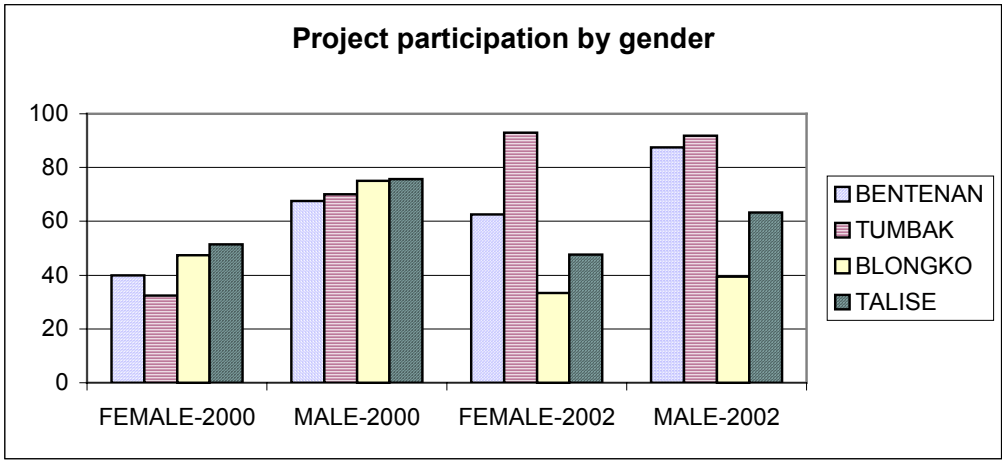
Several composite indices of project participation and knowledge also varied across the project villages. With regard to the participation index, Bentenan had the highest mean score and Blongko the lowest. In contrast, Blongko scored highest on the project knowledge index, and Talise scored lowest. Talise also scored lowest on the MPA knowledge index while Tumbak manifested the highest average score. These

aspects of project participation and knowledge that varied significantly across the villages are illustrated in figure below.



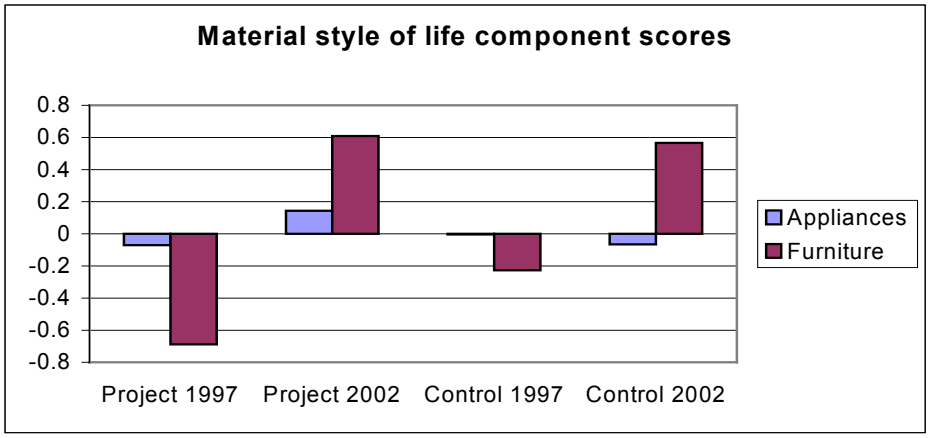
The analysis of factors influencing participation identified education and gender as being the most significant predictors of project participation. Years of formal education manifested the strongest correlations with the project knowledge and participation indices. This was expected since formal education has long been noted as a variable variously influencing behavior, with the more highly educated being more likely to participate in new activities and acquire new information. The division of labor by gender in many societies impacts participation as well. For example, in societies where women's work is strictly defined and limited, if the project activities fall outside these limits, female participation may be minimal or absent. Religion may have an influence on participation in several ways. In most Islamic societies adult females tend to avoid interaction with males outside their family and tend to have strictly defined roles, including allowable activities. This may influence their participation in project activities, as we hypothesized for our findings in Bentenan and Tumbak in 2000.

Identification of the gender differences in participation in the mid-term evaluation resulted in increased efforts to involve more women in project activities. Our success in this endeavor is illustrated in the following figure, which indicates that the relative differences in female and male participation decreased between 2000 and 2002.



One question for evaluation concerns whether or not project activities have improved the coastal environment (both natural and human) to the extent that existing productive activities have increased their

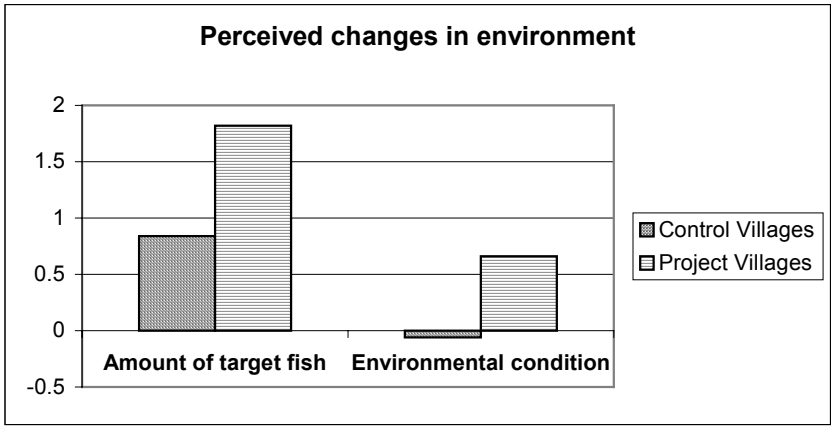
livelihood (both monetary and non-monetary income). In the absence of reliable income data, material style of life is used as an indicator of level of livelihood; thus, changes in this indicator are assumed to reflect parallel changes in livelihood. Analyses of material style of life changes over the life of the project indicates that, overall, the project villages manifested an increase in household appliances and furniture. While the control villages also manifested increases in furniture, their increase was not as great. These changes are illustrated in the figure below. This suggests the project has had some impact on overall quality of life and economic well being of residents in the project communities.



With respect to impact indicators, success and sustainability of a project are based in large part on participants' reactions to the project. In turn, these reactions are based on user perceptions of impacts, which are not always in accord with objective, quantifiable evidence. Hence, if there is an interest in understanding success and sustainability of a CRM project, it is essential to understand perceptions of the present and possible future impacts of the project. Perceptions of impacts may explain some of the variance in long-term, as well as short-term, project success. Impacts of interest with respect to Proyek Pesisir are the following:

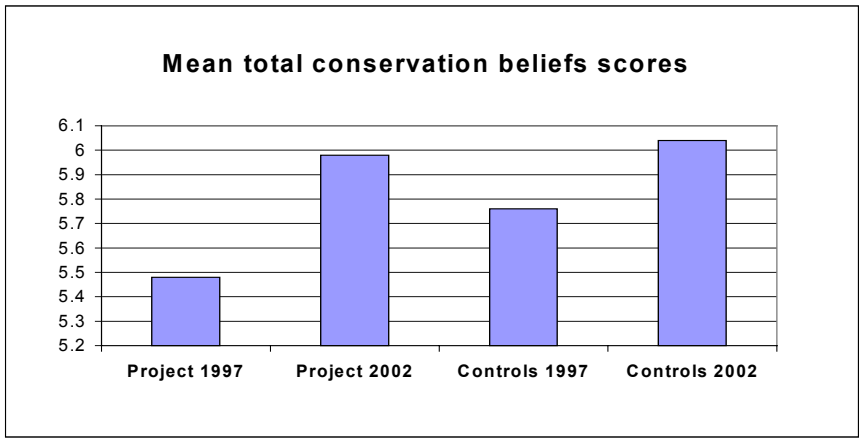
- Overall family well-being.
- Control over coastal resources.
- Ability to influence community affairs.
- Amount of traditionally harvested fish in the sea.
- Coastal resource health.
- Compliance with fishery regulations.
- Enforcement of fishing regulations.
- Prosecution of violators of the MPA.
- Support for the MPA from the local government.

Analyses of differences between control and project sites with respect to these nine indicators indicated statistically significant differences for two as illustrated in the figure below. Residents of project villages perceived larger positive changes in amount of target fish and environmental condition—two important goals of



coastal zone management projects. In addition, it is significant to note that within the project villages, project and MPA knowledge are significantly correlated with an indicator reflecting increasing community control of coastal resources. This indicator is a scale composed of a weighted sum of perceived changes in control over coastal resources, ability to influence community affairs, compliance with fishery regulations, enforcement of fishing regulations, prosecution of violators of the MPA, and support for the MPA from the local government. This indicates that villagers having knowledge of project activities perceive that they have increasing control over their resources, an important, first step in community based resource management.

It is also expected that coastal resource management project activities would have impact on community members' beliefs about factors that impact the quality of the coastal environment. Analyses conducted clearly indicate project impacts in the expected direction as illustrated in the figure below. While the total conservation beliefs score increased in both the project and control sites, it increased to a greater degree in the project sites, as would be expected if the project had the desired impacts. Hence project villages perceive greater benefits to collective community action for resources management and conservation compared to the control sites.



The analysis of individual characteristics related to resource beliefs confirms the finding that Proyek Pesisir had a positive influence on villagers' environmental knowledge. While years of formal education manifest the strongest correlations with the conservation beliefs scale, the project and MPA knowledge scales are also significantly correlated with environmental knowledge. There is, however, significant inter-community variation with respect to the total conservation beliefs scale with Bentenan residents scoring highest and Talise scoring lowest. This inter-community variation might be explained by the fact that Talise residents in the sample manifest the lowest level of formal education, while those from Bentenan manifest the highest, and education is strongly related to scores on the conservation and other resource beliefs scales.

Finally, we would expect that Proyek Pesisir activities would influence villagers' response to illegal fishing activities. Analyses presented in indicate that those in project villages say that they would take harsher actions against violators than those in the control villages, supporting our expectations. It is interesting to note that across all villages (both project and control), males, those who believe that humans can have an impact on marine resources and those who believe that their resources and quality of life have improved over the past few years are more likely to report that they would take more stringent action against illegal fishers. Within the project villages, as we would hope, knowledge of project activities also contributes to a more negative response to illegal fishing.

Overall, the analyses of the survey data clearly indicate that although there is a fair amount of inter-project village variation with respect to project impacts, the project has had significant positive impacts in the project communities. Comparisons with control villages allow one to attribute the changes to project activities. Impacts include increased project participation, positive changes in material well-being, perceptions of improvement in the coastal environment, and increases in environmental knowledge—all impacts that indicate that the coastal management processes initiated will be sustained.

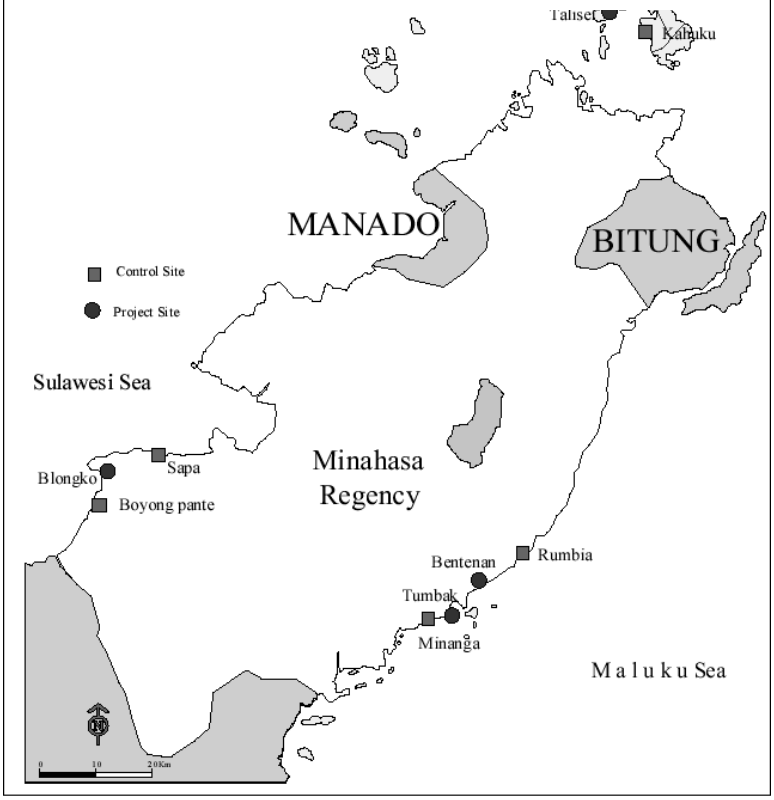
Continuing support needs to be provided to these communities by local institutions to enhance the probably of sustained coastal resources management efforts. While a provincial and district coastal law have been enacted that legitimize and encourage community-based management, local institutions have not yet developed program strategies and budgets to provide continuing support to these villages as well as other coastal communities. This has been demonstrated to be a critical success factor for sustainability of community-based efforts in the Philippines. As the project has now phased out of these project sites, working to develop local community support systems and linkages with NGOs, local universities and government agencies such as *Dinas Perikanan dan Kelautan* should be priorities.

These sites have been extensively documented over the life of the USAID project. As such they represent a wealth of information and experience concerning community-based management in Indonesia. Post project monitoring to gauge the sustainability of these examples should take place. In addition, these villages should be promoted as field schools and training sites where other communities can learn from their experience and view first hand the richness and diversity of experience that they represent. While current project support has been fully withdrawn, these sites should also be considered as locations for other projects, for further development and refinement of community-based coastal management practices. In particular, these sites can serve as living laboratories for further pilot testing and development of community-based management practices. This could include community-based tourism development, development of supplemental livelihoods, incorporation of population and demographic issues into the long term community vision and management of coastal resources, and for enhanced integration of gender considerations with ongoing management and decision making processes.

1. INTRODUCTION

The USAID-BAPPENAS NRM II coastal resources management project, locally known as *Proyek Pesisir*, established a field office in North Sulawesi Province in 1997. This is one of three provincial-level field programs contributing to the program objective to strengthen and decentralize coastal resources management in Indonesia. Four village-level field sites in the Minahasa Regency of North Sulawesi (see Figure 1) were selected in 1997 for development of models of community-based coastal resources management (Tim Kerja Proyek Pesisir, 1997). Subsequently, socio-economic and environmental baseline surveys and technical studies were carried out at each site (Pollnac et al. 1997a, 1997b; Kusen et al. 1997; 1999a; 1999b; Mantjoro, 1997a, 1997b; Kasmidi, 1998; Kussoy, 1999; Crawford et al. 1999; Lee and Kussoy, 1999,). Surveys were also conducted in villages adjacent to project sites. These villages are being used as control sites (Pollnac et al. 1998, Fakultas Perikanan, 1999, 2000) for monitoring and assessment of long-term socio-economic and environmental outcomes.

Figure 1: Location of Project and Control Sites



This report provides a final assessment of community-based coastal resources management activities that have been ongoing in the four villages since the Coastal Resources Management Project started in 1997. Planning activities were initiated in the villages in October 1997 with the placement of a full time extension officer in each field site. After a two-year participatory planning process and development of an issue-based profile, coastal resources management plans were approved by local government and through a village ordinance (Tankilisan et. al. 1999, Kasmidi et. al. 1999, Dimpudus et. al. 1999). Small-scale marine protected areas (MPAs) were also established in each of the villages at varying times and were formally approved through village ordinances. The process for establishing the community-based management plans and marine sanctuaries has been well documented (Crawford et al. 1998, Tulungen et al. 2000) and therefore will not be repeated here. Implementation of the management plans by community management committees has been ongoing since 1999. Community committees formed after the establishment of the MPAs also manage the MPAs.

Baseline assessments were conducted in 1997 and 1998 (see Appendix IV). Interim assessments of project and community activities were conducted in 2000 (Crawford et al. 2000a, 2000b, Sukmara et al. 2001, Pollnac et al. 2002). This report provides a summary of project inputs (e.g. staffing effort, activities, community grants) and outputs (e.g. number of persons trained, reports produced, physical works constructed) as well as a review of implementation activities that have taken place since the 2000 assessment. The report also provides an assessment of demographic and socio-economic changes, as well as changes in community knowledge and perceptions that have occurred over the life of the project. Participation and gender issues are highlighted. Where appropriate, it compares project sites with similar information from adjacent control sites following a format similar to that used in the interim assessment reports. Methodology for the baseline and subsequent surveys and data analysis are contained in Pollnac and Crawford (2000).

The report summarizes socioeconomic changes in the community, perceptions concerning resource impacts of human activities, perceived quality of life and problems, and the extent to which these changes may be due to project activities. It contains a summary of findings and recommendations for follow up in the project sites as well as for future projects of a similar nature. Separate technical reports assess biophysical changes on reefs in project and control sites over the life of the project (Siahainenia et al. 2002, Rotinsulu 2003) and are not discussed in this report.

2. PROJECT OVERVIEW

2.1 Project Inputs, Activities and Outputs

The four anchor field sites of Blongko, Talise, Bentenan and Tumbak have benefited from a continuing series of project interventions starting in 1997 and ending with closing ceremonies held in each village in December of 2002. The interim assessment reports (Crawford et. al. 2000a, 2000b, Sukmara et. al. 2001, Pollnac et. al. 2002) documented and summarized those interventions through May 2000. During this period which covered the management planning process and initial plan implementation activities, field extension officers were assigned to each village full-time, except for Blongko where the full time extension agent was withdrawn in 1999. Project activities continued in these communities through 2002. Project inputs, activities and resulting outputs that occurred during this six year period are listed in Appendices I through VII and are summarized below. Maps of the Marine Protected Areas (Marine Sanctuary) established in each village are contained in Appendix X along with maps of each project and control village.

A total of 15 village ordinances pertaining to coastal resources management were developed and approved (Appendix I). These ordinances formalized adoption of coastal resources management and development plans, village marine sanctuaries, and management committees as well as addressed specific management issues within each community. As of October 2002, eight additional ordinances were in draft form, awaiting final approval by the communities and village government (Appendix II).

During the period of November 1997 to May 2000, a total of RP 115,000,000 in project funds and RP 50,500,000 in local government funds were provided to these four communities as grants for implementation activities (Appendix III). During the period of June 2000 to September 2002, an additional RP 140,000,000 was provided to these villages by the project for implementation activities. In addition, some of the communities have secured additional funds for plan implementation projects. All of these implementation actions are described in more detail in the appropriate sections below.

A large number of reports were produced on these sites (Appendix IV). This included participatory profiles and management plans, environmental and socio-economic baselines, interim assessments, as well as consultant, internship and training reports. A total of 35 reports were produced that provide a wealth of documentation on these communities including environmental and socioeconomic conditions and changes, as well as the types of technical studies, technical assistance and training that were provided to support management planning, plan implementation and community capacity building.

Interns and research assistants also contributed to the overall effort (Appendix V). Interns that assisted field extension officers with various planning and training activities and/or implementation activities contributed a total of 564 person days of effort. Research assistants that contributed to the interim assessments totaled 347 person days in the villages. On average, interns and research assistants in these sites contributed approximately 200 person days of effort.

At each site dozens of meetings, environmental education activities, training events and presentations were implemented (Appendix VI). The total number of participants who attended these events in Blongko was 4,346 persons over the six-year period (35 percent female). In Bentenan and Tumbak the total number of participants was 8,863 persons (36 percent female). In Talise the total number of participants was 4261 persons (45 percent female). In Talise, there was a significant decrease in female participation after May 2000. This may be a result of withdrawal of the female extension officer in 2000, and continuing activities in the site were mainly coordinated by the male field assistant. There were negligible differences between male and female participation after the extension officers were withdrawn from Blongko, Bentenan and Tumbak. This may be due to the use of female field assistants in Blongko and Bentenan, and both a male and female field assistants in Tumbak. Hence it would seem that gender balance among field assistants and extension officers may help increase female participation rates.

The above mentioned process indicators provide an understanding of the considerable level of investment that has been made in these pilot sites including the types and amount of activities and inputs provided as well as the outputs and products developed. The following section details what the community was

and is doing with respect to implementation actions to address the multifaceted socio-economic and environmental problems and opportunities within their respective village. These are behavioral indicators of what the community is now doing as a result of project interventions. However, the more important question that needs to be addressed in this assessment is what was the result of both the project and community investments. Changes in impact indicators with respect to individual knowledge, quality of life, well-being, and perceptions are detailed in a later section of this report.

2.2 Management Plan Implementation Activities Since 2000

The planning process and initial implementation activities at each field site were evaluated in 2000 (Crawford et. al. 2000a, 2000b, Sukmara et. al. 2001, Pollnac et. al. 2002). This report builds on the previous assessments and describes activities that have been implemented by the community since 2000 or are ongoing. Information on each activity was obtained from key informant interviews of project staff, field assistants, village officials and individuals directly involved with implementation activities. In addition, direct observations were made of the tangible manifestations of the activities (e.g. constructed dike, planted trees). Recommendations are provided in the last section of this report for local government, community and/or action by project staff prior to completion of the project.

2.2.1 Talise Project Site

The Talise Coastal Resources Development and Management Plan was formally approved in 1999 by village ordinance after a two-year participatory planning process. The plan addresses twelve coastal resources management issues where specific objectives were set to achieve a vision of sustainable community development over a 30-year period. A number of activities are proposed in the plan to address each issue. In addition, the plan calls for the establishment of a management committee and a marine sanctuary committee to carry out implementation under the supervision of village government.

The major components of the management plan are:

1. Land Tenure
2. Resolving Sea Use Conflicts
3. Sustainable Forestry Management and Protection of Wildlife
4. Prevention of Coastal Erosion and Flooding
5. Drinking Water Supply
6. Improving Environmental Sanitation
7. Human Resources Development
8. Improving Farming Productivity
9. Management of Mangroves and Coral Reefs
10. Developing Eco-Tourism
11. Strengthening Community Awareness Concerning Natural Resources
12. Establishment of a Management Plan Implementation Committee
13. Monitoring and Evaluation

Descriptions of activities undertaken by the community that are related to each of the above mentioned plan components are provided below.

Land Tenure

In Jaga 1 and 2 all 220 participating households obtained certificates for their house plots, a giant step forward for the villagers. The process in Kinabohutan (Jaga 3 and 4) seems to be stalled. The National Land Board came to Kinabohutan and discussed the process; e.g., the necessary application forms, the household information that needs to be completed, etc. They refer to this as the socialization process. Additionally, BAPPEDA allegedly allocated 20 million RP, but the Hukum Tua has received only 16 million because the preparation process has not been completed. Nevertheless some problems exist. Photos had to be taken of each landholder, but the Kepala Jaga reports that the quality is not high enough. It is alleged that the community is ready to go through the process, and that they had discussed this with the Hukum Tua, but

nothing has happened. Residents stated that the Hukum Tua has to come to Kinabohutan in order to restart the process. Each household must contribute 100,000 RP to the process but they have not yet done this since they are waiting for the process to start again. Approximately 200 families are involved. The Kepala Jaga said that families against the MPA are not involved. The Kepala Jaga reports that "it is hard to find the Hukum Tua" because he no longer lives in the village.

Resolving Sea Use Conflicts (Talise declaration/community-pearl farm agreement)

In 2000 pearl farm representatives met with three representatives each from Kinabohutan, Jaga 1 and Jaga 2 to discuss the sea use conflicts between village fishers and the pearl farm. This resulted in a letter of agreement concerning fishing activities adjacent to the pearl farm area. Net fishing is not allowed within 75 meters of the outer boundary of the pearl farm. Hook and line fishing is allowed within the boundary, but boats are not allowed to tie-up to the pearl farm buoys. The issue of spear fishers never came up. This is a huge concession by the pearl farm whereas before fishers were not allowed near the farmed area, now they have access to a large area that actually attracts fish with its rafts & buoys. A later amendment to the rules allows *funai* bait fishing around the pier during non-work hours. Gleaners are also allowed under the pier. When the agreement first went into effect, some fishers from Kinabohutan violated the rules, but these violations have ceased.

There is, however a great deal of confusion among the fisher population with respect to application of this declaration. Some report that they are unaware of its existence. For example a group of several fishers in Jaga 1 say that they can fish only during the day because some pearl oysters were reported missing and pearls will be harvested soon. At night they have to be at least 50M from a raft. Another Jaga 1 fisher reported that villagers who work at the pearl farm told him that fishers are not allowed in the area.

Fishers in Kinabohutan seem especially confused. They say that they must report to authorities before they fish, but when they begin fishing, the guards become aggressive and chase them by shooting in the air. A purse seiner from Kinabohutan got too close to the boundary and was aggressively chased away. This incident resulted in some community members threatening to burn down the pearl farm. The pearl farm management reportedly called in police to guard their area while community leaders cooled down the population. Net fishers asked what they should do if their nets, along with the fish, start to drift into the buffer zone around the pearl farm rafts. They were told that they have to rapidly lift their nets, which they claim is impossible.

Even the hook and line fishers are confused. They say that they ask permission and follow the rules, but are still aggressively chased by the guards. Some have blamed this aggressive behavior on pearl farm employees (most from Jaga 1 and 2), whom they claim encourage the guards to chase them. Some attribute the problem to the lack of information transfer at guard personnel changes. It is alleged that when the new guards come on duty they do not know who has permission and who does not. One ex-official goes so far as to claim that his signature was forged on the agreement with the pearl farm.

Boat Engine (katinting) revolving fund

The project started with five motors, and three were added by the revolving fund as originally planned. The group is still obligated to provide two more. The project is still ongoing, and payments are going into the revolving fund. A second recipient group was formed soon after the first. When the rotating fund resulted in three new motors, they went to 6 members of the second group. Bad weather has reduced the ability of two of the earlier motor recipients to effect payback.

Sustainable Forestry Management and Protection of Wildlife

An agroforestry group was created that consists of eight members. They originally planted a full hectare (100X100M), but there has been high mortality due to fires and drought. Three *kemiri* trees remain (a round nut used in sauces). Out of fifty mango trees only about ten remain. There are now about 20 cashew

trees, and the entire area is inter-planted with cassava. Group members sell the cassava harvest in the community. They have seedlings to replace trees that died, but they are waiting for the drought to end.

The Kepala Jaga of Jaga 1 has been keeping records of turtle hatchlings on the beach in front of his house, in a new settlement area to the north of the Jaga 1 main settlement area. He has reported that over 7000 have hatched in the last year. He helps hatchlings by keeping predators away from nests. He has also been planting trees in the hills above his house.

Prevention of Coastal Erosion and Flooding

Sand Mining Ordinance: An ordinance was passed that regulates sand mining in the village. Signs are posted in both Jaga 1and Jaga 2 that indicate locations where mining is allowed and prohibited. Sand mining in areas in front of the village has been limited to small amounts by villagers only. The pearl farm is restricted to mining sand for their anchors from a special area.

Flood Control Dike on Kinabohutan: Construction of the dike was completed. There has been no high tide flooding since it was finished, but very high waves sometimes splash over. Banana plants that are growing in an area previously flooded and too saline for that crop provide evidence of its effectiveness.

Drinking Water Supply

Water System: The new Hukum Tua went to the water authority in Tondano and requested help. He was given a bundle of pipes that were never used until the gardening group requested some for irrigation. Then several families requested some for bringing water to their homes. Drinking water is piped from a box (not completely closed) at the spring to a few areas in the village. Pipes are simply laid on the surface.

Watershed Greening: As part of the block grant, money was provided for plantings around the wells and springs. Reportedly, the trees weren't cared for and less than 20 percent survived. The village secretary reported that in Jaga 1 there was planting of trees and other plants around the watershed. An estimated 40% survived the drought and heat.

Improving Environmental Sanitation

The senior extension officer reported that several beach clean-ups have been organized over the past several years. In addition, Tambun (Jaga 1) reportedly conducts periodic clean-ups. However, on several occasions, dumping of household garbage on the beach (organics and non-biodegradable plastics) was observed during the field survey work by the survey team in the area near the team's residence in Tambun.

Human Resources Development

Retention of teachers at the junior high school is problematic. Six teachers have been lost and not replaced. The school is planting bananas and other crops on the premises in order to raise funds for building maintenance.

Improving Farming Productivity

A gardening project was directed at providing vegetables for the market in Talise. Prior to the project, residents had to purchase their vegetables in Likupang. Proyek Pesisir provided an internship to a female student from Pattimura University to teach vegetable and fruit gardening skills to 15 female participants from Jaga 1 and ten from Jaga 2. The intern worked in the community from October 2001 to March 2002. Five participants from Jaga 2 dropped-out when they realized they would not be paid and 3 males joined the group.

Plantings included cucumber, *popare*, long green beans, *cai sin*, chili peppers, tomatoes, spinach (*bayam*), *kankung* (dry *kankung*), and eggplant. Fruit tree seedlings were rooted from existing fruit trees in Talise. Types included oranges, limes, starfruit, and guava. The fruit tree rooting and planting was restricted to Jaga 2. Originally, the vegetable gardening was conducted in a communal garden in Jaga 2. This failed, and participants developed private gardens in the hillside farms or near their houses. Fruit trees were planted near the group members' private dwellings. First harvests of vegetables were sold in Talise and Gangga. The 2002 drought resulted in failure of the vegetable crop, but the fruit trees are being maintained by watering.

In Jaga 1, the vegetable garden group began with 15 female members split into 5 groups of 3. Soon after they started to till the soil 10 women left the group because they felt that they didn't have the required time due to other responsibilities. Since then, another woman dropped-out, reducing the group to 4. The Jaga 1 group has not planted any fruit trees.

In Jaga 1 there are group gardens in two areas: a small plot near the Hukum Tua's office and a 3/4 hectare plot close to the spring. They have had several harvests, providing additional vegetables for the home as well as income received from selling the crops in markets in Kinabohutan, Gangga 2, Kahuku, and Libas. People from Kinabohutan stopped buying *kankung*, however, because they heard that pigs frequented the area where it was cultivated. The 2002 drought severely limited activities, even though they have extended water pipes to the plot near the Kepala Jaga's office. The biggest problem they have is getting the crop to other markets due to lack of transportation.

Management of Mangroves and Coral Reefs

Informal Mangrove/Beach Sanctuary: An informal mangrove and beach sanctuary was declared by the Hukum Tua on the beach side of the information center in Jaga 2. It is called the Tambun Beautiful Beach Area. Community leaders in Kinabohutan proposed a similar declaration, but residents rejected the idea.

Mangrove Replanting: Mangrove replanting was done in Jaga 1 and 2 and Kinabohutan. In Kinabohutan most of the year 2000 plantings died. In 2000 they used the polybag procedure. They then tried to use a pipe (PVC) around the plant, and this also failed. In 2001 they poked a hole in the sand and stuck 3 seedlings in. They figured that at least one would survive. The Kepala Jaga and his brother are caring for the replanted area. They wipe off fungus and snails, and attribute the success to the new planting procedure as well as the continuing care of the growing plants. Stakes mark the planted area so that the seedlings are not run over by boats when submerged at high tide. An area 60 by 5 meters seems to be growing well. They still have a nursery area, and they are obtaining some seedlings from both Talise and Gangga. The Kepala Jaga for Jaga 2 alleged that the earlier plantings failed in Kinabohutan because the people did not really care. In Kinabohutan only 2 families continue to plant mangrove. In Jaga 1 and 2, some replanted mangrove survived to the south of Jaga 1 and behind the mangroves in Jaga 2. Seedlings planted by the Kepala Jaga north of Jaga 1 are doing well. Mangrove replanting in front of the school in Jaga 2 reportedly failed due to boats running over the area. However, this is also a more exposed coastline. Plantings near the MPA in Jaga 1 survived. Replanting continues, but seedling mortality remains high.

Marine Protected Areas: The MPA established off Jaga 1 still has marker buoys but there allegedly have been many violations by Kinabohutan residents fishing for cuttlefish and other small species. Residents of Jaga 1 also occasionally fish in the area. Early violations by outsiders (Lembe and Airbanua) were reported, but they have ceased. There is reportedly a lack of surveillance.

The village secretary, however, who is also head of the MPA group, reported that there has been no illegal fishing in the MPA since June. In June a fisher from Kinabohutan, who allegedly was a frequent violator of the MPA, was illegally fishing and got into an argument with the Hukum Tua. The fisher said that the Hukum Tua could not stop him from fishing in the MPA and the Hukum Tua slapped him. This action allegedly ended the illegal fishing. Several informants from Kinabohutan validated this report. Perhaps the most blatant violation reported occurred in March or April 2002. A *funai* was caught in the MPA in the act of receiving bait fish illegally captured in the sanctuary. A military man from the post in the village began firing his weapon in the air, and the *funai* sped away. Passage through the core zone of the MPA although illegal, was

observed on many occasions during the field visit. This was usually boats carrying people between Kinabohutan and Jaga 1. The shortest route is through the sanctuary.

Committee members conduct surveillance of the MPA. The committee received a block grant from BAPPEDA for two *katinting* that MPA group members use for fishing. They are required to patrol the MPA while on their way fishing. This is done at least once daily. When someone is apprehended fishing in the MPA, they are required to write a letter of apology and pay a 25,000 RP fine. These fines go into a fund, 50 percent of which goes to MPA maintenance, 20 percent to the MPA committee as a fee for services provided, and 30% goes to the village. In the past year they collected 225,000 RP from fines.

The MPA also earned 800,000 RP over the past year from fees and "donations". This money is distributed in the same manner as that collected from fines. These fees were collected from people who wanted to dive in the MPA for various reasons--some to study the MPA and some tourists. The set fee is 10,000 RP, but people often donate a little more. The MPA committee hopes to stimulate more tourism with the development of a brochure for tourism.

An MPA committee was formed in Kinabohutan, an area selected, and a floating guardhouse built. A number of community members (one source said 10 families, another said 50-60 agitators), however, strongly opposed its establishment. They said that enough area had been removed from their fishing grounds by the pearl farm and the Jaga 1 MPA. They also objected to the punishment of community members for violating the Jaga 1 MPA; e.g., the slapping of a violator by the Hukum Tua and the fining of a fisher who was unaware of the rules. They said that they did not want to be involved in an institution that dealt out such harsh punishments. Finally, they were afraid that they would be subject to offensive behavior by visiting tourists (e.g., naked sunbathing and swimming).

Developing Ecotourism

A youth group composed of both males and females was funded for cross-visits to Bunaken and Tangkoko national parks. The group leader said that the cross visits to Tangkoko were very beneficial. They returned and identified three wildlife sites each in Jagas 1 and 2. They also identified one in Kinabohutan. They put up signs in the sites in an attempt to preserve them for future ecotourism. Residents reportedly removed the sign in Kinabohutan, but the others reportedly remain. A visit to Kinabohutan indicated that this information is inaccurate. Signs are still up, and the partial tearing of some of the thin metal signs was attributed to wind.

The group from Jaga 1 was composed of four people and was formed in 2000. They identified three (actually two, with one a dual purpose site) sites. Rumah Angin for tarsier and birds and the bat caves at the northern end of the island. Signs have been erected at all sites.

The group from Jaga 2 consisted of 18 members. 13 went to Tangkoko, one to Bunaken and two to Togian. Upon return, they selected three areas for ecotourism based on forest cover and wildlife: Sawang, which has deer, tarsier, and macaque; Kobong Tinggi, with macaque, couscous, and birds; and Selong, which has birds, snakes, lizards, macaque, tarsier, squirrel (*tupai*), and deer. Kobong Tinggi is located 1960M from Tambun (Jaga 2), and Selong is 700M further. Sawang is 300-400 meters from Kobong Tinggi on a different path. A path to Selong is also accessible by boat from an area south of Airbanua. There are signboards at Kobong Tinggi and at the start of the path to Selong just above the settlement area. The group has made a proposal to the forestry office to obtain tree seeds for planting and have informally proposed that the forestry office declare the areas as protected.

Strengthening Community Awareness Concerning Natural Resources

Information Center: The building is used for community meetings and the electric service collects bill payments there. When these activities are going on, villagers are exposed to CRM material posted in the center. Children also use the center as a quiet, cool place to study. The center's electric bill is paid by a 500 RP. surcharge on residents' electric bills. There are some reported management problems. For instance there is no

maintenance program for the building. Another complaint is that there are not enough books in the center's collection. However, junior high school teachers use the books that are there in their classes.

Management Committee

The coastal resources management committee still meets but not every 3 months as originally planned. In October there will be a meeting to elect new officers as well as new members to replace inactive participants. Yearly, coastal management plan activities are integrated into the village development plan.

Monitoring and Evaluation

Most monitoring and evaluation is either facilitated by or conducted by the project. For instance, the project facilitated a workshop on the evaluation of block grants in 2000 (CRMP Sulut 2001). Meetings were also facilitated by the project in July 2002 to undertake a review of management plan and marine sanctuary implementation. The meetings started with a self-assessment by the management committees followed by public review. The results of these meetings are contained in a technical report (Dimpudus 2002). The marine sanctuary committee does not conduct any systematic coral reef or fish abundance surveys in the marine sanctuary. On occasion, they do observe changes in a very qualitative manner with respect to general fish abundance and changes in key species composition. For instance, the head of the sanctuary management committee reported an increase in the abundance of squid and occasional presence of jacks. He also indicated that fish in the sanctuary tend to be less skittish around humans.

2.2.2 Blongko Project Site

The Blongko Marine Protected Area was established by village ordinance in 1998. This was followed by the development of a Marine Sanctuary Management and Coastal Resources Development Plan that was formally approved in 1999 by village ordinance after a two-year participatory planning process. The plan addresses nine general coastal resources management issue areas where specific objectives were set to achieve a vision of sustainable community development over a 15-year period. A number of activities are proposed in the plan to address each issue. In addition, the plan calls for the establishment of a management committee and a marine sanctuary committee to carry out implementation under the supervision of village government.

The major components of the Blongko management plan are:

1. Management of the marine sanctuary
2. Protection and rehabilitation of coral reef, mangroves, seagrasses
3. Increasing community incomes
4. Raising awareness of community concerning environmental protection
5. Community health and sanitation
6. Preventing coastal erosion and stream flooding
7. Improving community livelihood/production
8. Reducing erosion/sedimentation from land and farm areas
9. Implementation of the management plan by the village Coastal Management Board.

Descriptions of activities undertaken by the community that are related to each of the above mentioned plan components are provided below.

Marine Sanctuary Management

Maintenance of Hardware: Six signboards were placed in the village concerning protection of coastal resources and explaining the rules and location of the marine sanctuary. One has been completely destroyed due to a motor vehicle accident. Another by the river diversion dike had its support poles eroded and was in danger of falling into the estuary. It was removed and placed along the street but leans against a tree. We were told that it will be reinstalled along the road shortly. Sign boards at the MPA boundaries (2), on the highway (2), in Jaga 5, and adjacent to the old information center are still in good shape.

Surveillance and Enforcement: The Surveillance and Monitoring Group (SMG) has not been very active since it was formed according to its leader. He suggests that the inactivity might be the consequence of two factors: lack of free time and lack of pay for effort. The group is scheduled to change its composition after project phase out and closing ceremony ("graduation"), and this may influence activity levels. The old bamboo and wood information center located on the beach front in Jaga 1 is now reportedly used as the guard post. The building is in good condition and has a sign posted on the outside indicating it is a surveillance post. Supplies for marker buoys are also stored in one of the small rooms in the building.

The group's leader says that they regularly watch the area, not by boat but by walking along the coast. Sometimes someone may borrow a boat to go around the area. If a violation is observed, and if they are close, they may yell at the person. In some cases they hurry to the Hukum Tua's house and use the public address system to tell the violator to cease his/her activity. If they observe other illegal fishing activity they report it to the Hukum Tua who reports it to the Kecamatan. The leader of the SMG said that since formation of the MPA there has been no dynamite fishing observed in Blongko waters.

Since 2000 there have been between approximately 12 violations of the sanctuary. Very minor violators (e.g., walking on the reef flat) are simply warned. Harvesting violations (e.g. fishing, gleaning) are punished by requiring the violator to write a letter of apology and promise never to do it again. Only one local violator (a spear fisher) was referred to the Camat for punishment because he threatened the head of the SMG. There is some concern because some community members think that the MPA will be open to fishing after the graduation.

Monitoring: The head of the SMG reported that they had done no manta tow monitoring until recently when the project conducted another training program in December 2002. Prior to this, all monitoring was done on an ad hoc basis, such as when repairing a buoy or accompanying visitors to the MPA. Seagrass monitoring has also been conducted (see section below on rehabilitation of habitats).

Management Committee: The head of the MPA Management Committee (MPAMC) reported that they have not had regular meetings until they recently began planning for the graduation ceremony. Up until then, they would simply meet informally with the Surveillance and Monitoring Group (SMG) to determine the status of the marker buoys, violations, etc. In their most recent meeting, they talked about revitalizing sections to work more effectively together. In terms of reorganization activities, the public relations group has become a part of the environmental education panel of the Environmental Management and Village Development Board. The MPAMC has two remaining sections: SMG and the fund raising group.

Income and Expenditures: There has been no formal agreement concerning the allocation of income from the MPA. There are plans to prepare a letter of agreement allocating 50 percent to community development and the other half to MPA needs (e.g. replacement of buoys, surveillance, etc.). According to MPA Committee records, total income since 1999 was RP. 10,592,550. It is important to note that the majority of the income was from two awards: one from the COREMAP Project in Jakarta (7.5 million RP) and one from the Minister of Marine Affairs (National Coastal Award for a Community -- 1 million RP) presented at the 2000 National Coastal Conference held in Makassar. Other sources of revenue have come from donations provided by study tour visitors to Blongko. Of this total 9,559,900 had been spent as of 7 October 2002. About 300,000 was spent to purchase rope for anchoring a marker buoy since the 7 October accounting, leaving about RP. 700,000 in the account.

Some examples of expenditures include about 380 thousand Rupiah spent to install electricity in the information center, 2.5 million for materials to finish the water supply system (as of yet not completed), a one million Rupiah loan to the village government for a satellite phone, and 1.5 million Rupiah for purchase of land occupied by the old information center. They plan to renovate the old information center and use it for meetings and a place for visitors to change before diving or snorkeling in the MPA.

Protection and Rehabilitation of Marine Resources

Monitoring Seagrass: Faculty of fisheries personnel from UNSRAT trained a group of three community members to monitor the sea grass areas of Blongko and prepare monitoring reports. The training

took place in July 2002, and UNSRAT personnel conducted only one monitoring session with the community group members. A formal community sea grass monitoring group has not yet been formed, but there are plans to include them in the MPA surveillance and monitoring group (MPA-SMG). Community members have not yet conducted monitoring on their own.

Mangrove Replanting: Some mangroves have been planted at the area of the river diversion dike, and they are growing. Perhaps more important, the Dinas Perikanan sponsored a mangrove replanting project in 2001. A mangrove replanting group (MRG) of ten were formed and asked to collect mangrove from the wild for replanting. About 30 community members joined the MRG during seedling collection and replanting. They were paid 500Rp for each tree replanted. They allegedly received no instructions from Dinas Perikanan, and all the replanted mangroves subsequently died. One informant said that the only benefit was the money received by community members for the replanting. There are no signs of replanted mangroves in the replanted areas—not even a dead branch.

Subsequent to this failure, the MRG did not disband, but tried to figure out what happened. Since most of the fishers in Blongko are also accomplished farmers, the group leader suggested trying to grow the trees from seed rather than digging up the wild ones. They made a nursery and experimented with polybag and non-bag planting in muddy areas. Through experimentation they selected the one kg. sugar bag as the ideal bag. They also found that seeds spread in muddy areas could be easily transplanted at an early age. Direct seeding in the area to be replanted is also practiced. Observed replantings seem to be thriving, and the evaluators were impressed by the fact that the MRG is observing replantings from the various techniques (e.g., polybag, seedlings from seeds planted in muddy areas, direct seeding, etc.) to determine which is the most effective. The MSG understands the reasons for replanting and remains committed to the process even though they are no longer reimbursed for their work. They have developed a scientific research design to select the approach most effective in their locale. They have also identified non-botanical reasons for failure (e.g., plantings in areas of heavy boat traffic will not succeed, etc.) and are avoiding these factors in present replantings. The Blongko MRG should be encouraged and observed to determine if outside change agents can stimulate this type of "bottom-up" research activity elsewhere rather than simply "teaching" community members techniques which are achieving only limited success elsewhere.

Artificial Reefs: The Dinas Perikanan (Fisheries Office) also had an artificial reef construction and deployment component along with the 2001 mangrove replanting project discussed above. It is reported that seven units of artificial reef have been deployed, with units composed of 6 truck tires tied together and others from wrecked vehicles. There is some controversy concerning how many artificial reefs actually remain in the area—some report that they have all been destroyed by weather and others say they all remain. At least one tire unit has been destroyed by wave action as residents' report they did clean up some tires that washed ashore. Three tire units were observed during a dive in the area where the artificial reefs were placed. There was very little coral growing on the tires that were covered in sediment and algae. A few small colonies were growing on the lines used to tie the modules together. The three tire reefs observed were placed in very shallow waters of approximately 5 meters depth or less. They were also on top of a splendid natural living reef, not in deeper water on the sand/mud bottom beyond the fringing reef base. One loose tire was observed approximately 20 meters from the reef footing and located on the sandy bottom area. No car modules were seen during the dive.

Increasing Community Incomes

T-shirt Printing: A group of 12 was formed and trained in the process of preparing and printing designs on t-shirts. Six dropped out but the remaining six have sold a first printing of t-shirts to visitors to the MPA (gross 590,000Rp, net 200,000Rp). The group plans to acquire workspace in the new information center. They also have plans to design and print 100 more t-shirts to be sold at the Proyek Pesisir graduation ceremony.

MPA Transportation and Guiding: Some community members have also earned additional income by boating visitors out to the marine sanctuary. Small boats charge 25 thousand Rupiah and larger boats charge between 50 and 100 thousand Rupiah, depending on the number of visitors. No fees are currently asked or received for diving in the marine sanctuary but visitors on study tours have often given donations as mentioned previously.

Raising Awareness of Community Concerning Environmental Protection

Information Center: A new information center has been constructed in Blongko. It is located near the Hukum Tua's office, an elementary school and the soccer field, a more central and highly visited area. Hence, it now has more visibility than in the past. It is not yet officially opened (October 2002), but a visit indicated 25 educational and/or informative posters and photographs and two framed awards posted on the walls and signboards. There is a bookcase with a small stack of unorganized books and reports on one shelf, a small room (approximately 3.5m by 3.5m) that may be used for the T-shirt printing workshop, and a toilet. Graphs illustrating differences between resources inside and outside the MPA, which were posted in the old information center, are absent.

***Environmental Education Activities*:** The MPA signboards and the information center provide environmental education to community members who visit the center or view the signboards. In 2000 there was an environmental conservation drawing contest for school children coordinated by the Public Education Section under the MPA Management committee. This section is now part of the Village Coastal Resource Management and Development Board, with the same members.

A temporary group of three was formed for a study tour to the Togian Islands. The purpose of this trip was to share Blongko experience with a project supported by Conservation International. There were no follow-up activities after the trip was completed.

The Environmental Sanitation Group (ESG) within the Village Coastal Resource Management and Development Board is coordinating a beach cleanup among elementary school children. They plan to have a competition between the five Jaga (sub-villages) to determine which has the cleanest beach. This competition will be part of the Proyek Pesisir graduation ceremony. The ESG is also reported as conducting environmental sanitation education in the village.

Community Health and Sanitation

Water Supply: The water supply project was a part of a World Bank project. Community members were supposed to pay RP. 8,000 each and the Project contributed this amount. The water tank is still incomplete and water is flowing only to Jaga 1, 2 and part of 3 and 4. The MPA Management Committee provided 2.5 million Rupiah in materials to finish the project. The community wants the MPA Management Committee to take over the completion of the project, but the committee is reluctant, saying that the village government should do it because they can order people to work. Work groups have been formed in each Jaga, but the village government has not ordered the work to begin. Only the Hukum Tua has the authority to order the labor, but he only instructed the Kepala Jaga, and they have not been able to get it done. This is perhaps due to the fact that community members are disappointed by the lack of progress that has brought water to only a portion (about half) of the village. If the work does not commence soon, the cement may harden in the bags.

The problem of leaking spigots on the standpipes remains and the spigots have been completely removed. Water now runs constantly from the standpipes. The water comes from a constantly flowing spring in the foothills, so it isn't a waste of water, the water is simply redirected. However, this does affect the water pressure and delivery to residents at the end of the system in Jaga 3 and 4. The standing puddles around the pipes may still pose a problem as mosquito breeding areas.

A water supply ordinance, which is being developed, may address some of these issues as well as others. It proposes to expand water to the entire community, eliminate illegal tap-ins, and eliminate bathing and washing at the standpipes (water will have to be carried to the homestead to carry out these activities). The proposed ordinance has proposed sanctions to be associated with specific violations and a small monthly fee to pay for maintenance.

MCK (public bathing/washing/latrine unit): Funds were provided for the construction of eleven MCK. Nine were completed and are used, and two were never completed. Out of the nine, two have been enclosed in individual household expansion activities. The original intention was for all the units to be used and

maintained by groups of households. One is included in the home of the father of one *Kepala Jaga* and the other is now included in the house of the *Hukum Tua*, who says anyone can use it.

In a previous meeting to discuss the issue of unfinished MCKs, it was decided that the village government should take responsibility for the two incomplete units. In this meeting with the *Hukum Tua*, they agreed that users of the MCK should finish them, but the Hukum Tua never told them to do it, and no actions have been taken to complete the final two units.

Preventing Coastal Erosion and Stream Flooding

River/Estuary Diversion Dike: The river diversion is completed and a dike made of large and small stones and held in place by woven wire animal fencing is in place. The eroding area and the built-up area of the dike have been planted with mangroves and *batatas pante*, a vine with morning glory-like flowers that grows naturally on beaches and reduces erosion. Other vegetation is growing in the area as well. The diversion and dike appear to be working. While the river has again diverted to the south, it is a considerable distance from its previous path by the road and settlement area were it previously resulted in several houses almost collapsing into the river bed, These houses were moved to safer locations. No houses have been at risk since the dike was constructed.

Improving Community Livelihood/Production

Backyard Vegetable Gardening: An intern tried to teach farming methods, such as filling the empty spaces around dwellings with spices and other small food plants for daily subsistence. She also provided training in ketchup making for women. Gardening was suspended during the dry season but there were two areas observed where some planting of vegetables was continuing, but the gardens did not look as well tended as in Talise. It is unclear how many participants are continuing to plant and raise vegetables as a result of this effort.

Katinting Project (boat engine revolving fund): There have been no changes in the results of the *katinting* (small fishing boat motor) project since the mid-term evaluation. The recommendations made following the interim assessment have not been implemented, and it is extremely difficult to find anyone who knows anything about the status of the motors. There is only one *katinting* that is operational. The rest are broken. The last one has not yet been used. The head of the MPAMC said they could do nothing about it. Plans as described in the interim report were not realized. At a meeting with the Hukum Tua, it was decided to collect the broken *katinting* but it was never done. No plan was developed to deal with the remaining unused *katinting*.

Reducing Erosion/Sedimentation from Land and Farm Areas

Dike and Drainage Culvert in Foothills: The dike and drainage culvert eliminated most of the flooding, but some leaking in the dike occurs at the lower end of the section inundating the yards of several households in that area. Settlements in the upper end of the dike have been protected from recent flooding. The impressive 240m dike is constructed of mortared large stones and capped with a flat of cement that diverts the water rushing down the hills to a culvert leading to the river. The leaking area has been packed with a backing of soil, but this patching at the lower end has not prevented leaking from the underside of the dike. One resident that lives adjacent to the leaking section stated that the dike was built on top of the ground with no subsurface foundation. He reported that a section for about twenty meters area needs to be repaired to include a subsurface dike to prevent the leaking. He also reported that the dike needs to be extended for another 20 meters as the water leaks around the very end as well. There have been meetings to discuss this problem. The residents in the area where the flooding still occurs were promised twenty bags of cement by the village government and they had promised the labor to complete and repair the end section. However, the cement has not yet been provided.

Agroforestry Project: There is no current activity, but the group still exists. The problem concerning replanting on private lands was never solved, and of the 500 trees planted along the river, only 10 are reported

to have survived. Most were either eaten by animals or torn down by the ropes with which grazing animals are tethered.

Reforestation of Critical Land Areas: As noted above, soil and sand holding plants (e.g. *batatas pante*) and trees (mangrove) were planted in the area of the dike and river diversion to reduce coastal erosion. These plantings are growing well despite the drought.

Blongko Village Coastal Management and Development Board

The board continues to be active despite the fact that the chair is currently on leave in Manado obtaining his Masters' degree. The board's secretary has taken over the chair's duties in his absence. Sections of the board (e.g. education, coastal erosion, environment and health, coastal management, etc.) meet monthly to discuss activities, and the full board meets every three months to share information. Activities include actions directed at raising community awareness of environmental protection and conservation through educational activities such as the Kecamatan wide coastal environment drawing competition that involved children in 42 elementary schools. This year they are sponsoring a beach clean-up competition for elementary school children in Blongko. They also invited speakers from the Minahasa Health and Social Departments and a member of the Faculty of Law, UNSRAT to give a public presentation on environment, health, environmental law, and land tenure issues**.** Additionally, the appropriate sections are providing input to the four new ordinances being developed by the village legislative committee.

At the present time board members are elected for a two-year term. It is being proposed that the term be increased to four years. This is in response to board members' observation that the current term length is insufficient to carryout identified activities.

2.2.3 Bentenan Project Site

The Bentenan Coastal Resources Development and Management Plan was formally approved in 1999 by village ordinance after a two-year participatory planning process. This plan is a joint management plan developed in coordination with Tumbak village. The plan addresses eight coastal resources management issues where specific objectives were set to achieve a vision of sustainable community development over a 25-year period. A number of activities are proposed in the plan to address each issue. In addition, the plan calls for the establishment of a management committee to carry out implementation under the supervision of village government.

The major components of the management plan are:

1. Managing coral reefs
2. Managing water supply and facility maintenance
3. Managing flooding/erosion in swamp/estuary
4. Improving environmental sanitation and health
5. Development of public tourism
6. Improving community awareness and education
7. Improving fisheries and farming production
8. Managing seaweed farming and sea space areas

Managing Coral Reefs

Marine Protected Area: A marine protected area was formally established as part of the sea use zoning scheme and is included in the ordinance that was formally approved in October 2002. The sections of the ordinance that apply to the marine protected area establish allowable and prohibited uses, establish a management group as part of the overall sea use zone management committee, and details fines and penalties for violations. Marker buoys and flags have been placed on the reef area demarcating the MPA core and buffer zones as well as other marine zones. Signboards have also been placed in the village. The MPA is fully integrated into the overall sea use zone scheme and ordinance. The MPA is quite large by community-based MPA standards. It runs the entire length of the reef in front of Jaga V starting just south of the small inlet and

boat mooring area and ending at the northern edge of Jaga IV (see map in Appendix X, p A-68). A boat access channel is maintained on the inner reef flat adjacent to the shoreline so that boats can freely move in and out and moor in this area.

Preventing Bomb Fishing: The Hukum Tua reported that bomb fishing is rare at present but is still practiced by Tumbak villagers. The Bentenan Government has informed the police in Bentenan and the Hukum Tua of Tumbak of continued bomb fishing by Tumbak fishers. The Hukum Tua in Tumbak has informed Bentenan that he has passed the warning that bomb fishers will be arrested and prosecuted on to the community via the Mosque and in public meetings. A police sub-office in Bentenan has been established and operated since June 2002 and uses one of the rooms in the Information Center as an office for five police officers. Two officers work 24-hour shifts and are rotated every 2 days. According to one of the police officers, they randomly patrol the surrounding waters twice a week. However, the patrol is limited because they do not have their own boat and engine for patrol operations. They borrow a boat and engine from community members for patrols. One officer said that they still hear bombing occasionally but are unable to catch the bombers because they cannot respond quickly without their own boat. By the time they borrow a boat and put to sea, the suspects are long gone. One fisher said he has not heard of any bombing for almost a year now where previously bombing was heard almost everyday. He felt that the existence of the police sub-office has contributed to the reduction in bombing.

Reducing Coral Mining*:* There are still many piles of coral along the beaches of Bentenan. A member of the BPD (village representative council) said that none of this coral was recently mined and has remained on the beach for a long time. We saw no evidence of fresh coral piles as were observed in 2000. There was at least one pile of rocks (terrestrial) that indicates some substitution of rocks for coral. One of the new houses under construction had a majority of the foundation made of rock and one section out of coral. A member of the information center management committee said they have a plan to set up a group that will buy and stock rocks for sale in the community. This is being proposed as an income-generating project. Supplies of rocks must be trucked from inland locations as they are not available anywhere in the village.

Managing Water Supply and Facility Maintenance

The administrative and financial reports for the water supply grant were incomplete, but 80 percent of the physical works were completed. Broken pipes for water distribution were replaced. Reforestation was carried out surrounding the springs by planting approximately 300 trees. Two billboards that ask the community to take care of the environment surrounding the springs were also installed. The message on the billboards specifically mentions that for water source protection, keep the water source clean, and do not destroy the public taps. One of the billboards is placed at the water source (4 km up in the hill on the border with Wiau village), and the other is placed in the village of Bentenan. The pipes are in good condition so far. However there was no group to manage the water supply facilities after the block grant fund was implemented. The BPPD treasurer and two people from the previous UPS (Facility Service Unit) assigned on the previous water supply project funded by the World Bank carried out management in an ad hoc manner. An ordinance on management of water supply was passed in October and requires the creation of a management unit. The roles of the unit as well as collection and management of maintenance funds are detailed in the ordinance. In 2002, PPK (sub-district development funds) amounting to15 million Rupiah for Jaga V were used specifically for water tank and filter tank construction. Some people in Jaga V made their own water system by digging a well covered with permanent concrete, using an electric pump to distribute water to several houses.

Trees were planted in the main spring area located in Tinamapon/Kakanggolung. The varieties planted included *Sengon* (*Albicia* sp), *Nantu, Cempaka* and *Kemiri*. The planting was conducted by the agroforestry group (28 people), the water supply group (4 people), village government (6 people), community volunteers (2 people), students from the UNSRAT, agriculture faculty (14 people) and four UNSRAT lecturers. The location is approximately 3 km from Bentenan and the spring which supplies Bentenan with water is located in Wiau and Wongkai village area. Three people from Wiau and three people from Wongkai also participated in the planting. Bentenan government officials and others who participated in the planting have encouraged Wiau and Wongkai villagers that participated in the planting to inform their fellow villagers to take care the trees because the spring is essential for the life of future generations in Bentenan. In addition to verbal encouragement, they also installed a billboard at the main spring and in the village to remind people to take care of the living

environment including the spring, forest, watershed and especially the trees surrounding the spring and the holding tank close to the village. The planting was carried out in December 2001. Trees planted around the main spring extended 60 meters in radius, with very close distance between the trees (2 trees planted every 3 meters in the first 20 meter radius and 2 trees planted every 6 meters in the next 20 – 60 meter radius).

Planting was also done by the community around a water holding tank near the village, about 1.5 km up in the hills. Trees planted there were *cempaka*, *cocoa* and *nantu*. Some of the trees grew rapidly and were already quite high. They were approximately 25 cm in diameter and the canopy enclosed approximately 75-80% of the area surrounding the holding tank and the dam up river. The water tank construction was funded by the World Bank project whereas the pipes, broken after years of neglect, were replaced through the block grant fund. The dam was also broken by illegal logging around the area. However, the dam was reconstructed and improved through the block grant. A second holding tank was planned as a reserve tank, but because the spring is not strong enough to supply the entire community this idea was abandoned.

Managing Flooding/Erosion in Swamp and Estuarine Areas

The Public Works Office surveyed the swamp between Jaga III and IV, and is planning a flood control project as detailed in the village management plan. The reclamation component is not being considered at the moment out of concern that it may acerbate flooding in other areas of the village. It is uncertain when the project will start, but it is expected that it may begin in the 2003 fiscal year.

The mangroves planted on the reef flat have all died and no additional planting on the reef flat has been undertaken. Mangroves used as a nursery area near the school and those planted in the area to the south of the river mouth have survived and done well. Those near the school in the old nursery area have done exceptionally well and now provide a green belt between the school and the estuary area. Plantings in the estuary area close to the main settlement areas have been minimal.

Improving Environmental Sanitation and Health

One MCK was built in each Jaga for a total of five. Originally, it was proposed that two MCK be built in each Jaga. This was not implemented because the 1,250,000 Rp. of block grant funds were transferred to the agroforestry group by the BPPD (village coastal resources management and development board*)* treasurer. The transfer was ordered by the head of BPPD without consulting the Sanitation and MCK group. The head of BPPD is actively involved in the agroforestry work. This became a controversial issue within the community. The transfer of funds to other activities also resulted in failure to construct a proposed 15 garbage tanks (3 in each Jaga). The MCK are used by the community but are still in short supply. Sometimes, people line up to use them. It was reported that one of the MCK in Jaga IV is already full and cannot be used anymore because too many people use that facility. The septic tank attached to this MCK is located near the estuary and was observed leaking slightly. The controversy surrounding this program was one of the reasons why the BPPD has been disbanded. While 5 toilet facilities were constructed, the sanitation and MCK program has not been successful because some of the funds for those activities were transferred to the agroforestry program.

The beach in Bentenan is relatively clean particularly in Jaga V (Nunuk). However, some plastics are found over the high tide mark in Jaga III and IV. The estuary behind Jaga III is quite dirty with large quantities of plastics scattered throughout the area.

Development of Public Tourism

The Manager of the Bentenan Beach Resort (BBR) set up a Dive Center that has been managed by a professional Indonesian Dive Instructor for almost two years. In the past two years, there have been approximately 200 foreign tourists who stayed at BBR. There are 15 dive sites spread around Bentenan, Pakolor, Baling-Baling and Punten islands. (http://bentenan.com.diving.html). According to the BBR manager, since 2001 there were 10 dive tourists each month. However, after the Bali bomb incident 30 reservations for the October – December period were canceled. The BBR manager said that a German tourist admitted that some of the dive sites show amazing recovery from the damage he saw two years ago. He said that new fast

growing corals have started to take over the reef damaged previously from bomb fishing. None of the dive sites are currently located in the MPAs established by Bentenan and Tumbak.

The community has discussed plans for developing tourism for local tourists but no programs have been established yet. The Hukum Tua has been promoting the greening of the beach area, and several new shade trees have been planted and are growing well. Other than through employment at BBR, the rest of the community has not yet benefited from either local or foreign tourism in Bentenan.

Improving Community Awareness and Education

Information Center: The Information Center in Bentenan has been in operation since 2001. The Information Center management group is now functionally under the KPL-DPL management committee. A volunteer from UNSRAT provided training for the community in the management of the information center. He stayed with the community for 4 months (February-May 2001). The information center is well stocked with environmental educational materials and books and also has snorkel gear and glass bottom buckets for use by the monitoring committee or for rental. The information center committee maintains excellent records of revenues and expenses, books borrowed, inventory and a visitors log.

The Information Center is open twice a week for four hours between 8.00 AM and noon. Anyone who wants to borrow a book from the center library is requested to provide a contribution of 1000 Rupiahs to be used for management of the center. A member of the Information center management group said that people who come and read books at the center find it a comfortable place and often go outdoors to the beach and to read under the shady trees while enjoying the sea breeze. *Arisan* (community revolving fund) meetings are held at the center, and some members of the *arisan* group read the books while waiting for their turn to pay the *arisan* money. Any event held in the information center must contribute 5,000 Rupiahs for the electric bill. Usually, there are 40,000 Rupiahs each month contributed to the information center. The information center also receives money from 30 chairs that are rented for public events such as weddings at a cost of 500 Rupiahs/chair. The center also sells calendars with the Bentenan DPL pictured on the top for Rp. 10,000 each. The money collected is saved by the KPL-DPL treasurer because the Information Center Management Group does not have treasurer yet. So far there is no set aside of funds for maintenance of the information center and for the purchase of new books.

Public Education: An intern from Hassanudin University (UNHAS) spent three months in the village teaching environmental education to elementary and junior high school students. The intern also helped facilitate the sea use zoning process.

Improving Fisheries and Farming Production

Agroforestry. A 2.8 hectare demonstration plot was established in a field belonging to the village. Training was conducted by Agriculture Faculty from UNSRAT. The training included agricultural techniques on cultivation methods, as well as making and use of fertilizer. The main tree crops planted were cashew and "*kemiri*" (candlenut). Tree crops were interplanted with seasonal crops of chili, green beans and corn. There were 70 *kemiri* trees planted but only 50 survived, and out of approximately 200 cashew trees planted, about 150 survived. The corn crop was harvested twice, and the others just once. However, the harvest did not meet expectations. This was attributed to the drought even though crops were watered with bottles placed by each plant. The cashew trees and *kemiri* that survived have grown well. Money from the sale of corn and chili was to be transferred for use in the sanitation and MCK program; however, the funds were never transferred, and the additional MCK garbage tanks planned were never installed.

Aquaculture: A fish pond (0.8 ha) located behind Nunuk sub-village was stocked in 2002 with 5000 milkfish fry. Over 1000 were harvested in the only harvest so far. The milkfish were sold in the Langowan market. Tilapia were also stocked but did not survive.

Seaweed Farming: The seaweed revolving fund is no longer used for seaweed farming but for other activities since seaweed farming is no longer practiced. The fund is now managed with the KPL-DPL *arisan* group. The group's capital has increased from 5 million to 8 million Rupiah.

Fisheries: UNSRAT conducted training courses on cage culture of finfish; however, no demonstration culture site was established, and no-one has taken up cage culture since the training was conducted.

Managing Seaweed Farming and Sea Space Areas

In the past everyone freely occupied any marine area of any size they wanted for seaweed farming as long as another person did not occupy it. The informal system was one where the first claimant to occupy an area had rights to the area. With the rapid increase of seaweed farming between 1997 and 2000, sea use conflicts erupted among multiple users including gillnet fishers, seaweed farmers and *pajeko* boats. The gillnet (*kalenda*) fishers complained they had no access to fishing areas as they were taken over by seaweed farms. The *pajeko* fishers complained that traffic lanes for boats became too narrow and too much space had been taken over by the extensive seaweed farming activities. To resolve these conflicts the community started a process of formulating a sea use zoning scheme for the waters along the village. Initially, project staff suggested forming only a marine sanctuary but this idea quickly evolved into a process that would address the multiple use conflicts. Therefore, the community decided to establish a sea use zoning scheme that would establish areas for seaweed farming, boat lanes, anchorage, traditional fishing, tourism and a marine sanctuary. This process took more than two years from the start of the concept in early 2000 to the enactment of the ordinance in October 2002. The process was stalled on several occasions due to internal village politics and village elections that resulted in new village representative committee members and a new head of village.

The sea use zoning scheme (Kawasan Perlindungan Laut-KPL) and marine sanctuary (Daerah Perlindungan Laut-DPL) were inaugurated at the closing ceremony of Proyek Pesisir in December 2002. The ordinance was developed with an extensive public consultation process. The ordinance includes a map of the zoning scheme, details the allowed and prohibited uses for each zone and establishes a management committee to oversee implementation. The ordinance was formally approved by village government in October 2002. This is probably the first marine spatial plan formally created at the village level in Indonesia and serves as an excellent model for other villages. However, the ordinance has just been approved so experience with implementation has not yet been tested. This ordinance will be especially tested when seaweed farming starts up again.

The Hukum Tua said that permission for construction of seaweed farms has been delegated to the Kepala Jaga and to the KPL-DPL management committee. However, he said that the village ordinance listed only general regulations as to where seaweed can and cannot be farmed. He quoted from the new ordinance that, "seaweed farming in the KPL is limited to the utilization zone either individually or by a company but must follow the regulations made by the village government." While there is no seaweed farming at present, conflicts over farming areas are anticipated when it starts up again. There has been discussion of limiting individual farm plots to only 0.5 hectares, allowing for a maximum number of households to profit from seaweed farming and preventing any one farmer or company from dominating production.

KPL-DPL boundary markers (marker buoys) have been installed since early August. The marker buoys mark the location of the DPL, the boat traffic lanes and marine-culture areas. The markers were installed by the community and coordinated by the KPL-DPL group with assistance of a local intern. Some marker buoys/boundary signs broke away and drifted by current to Rumbia and Ipus during the south wind season. However, members of the KPL-DPL group retrieved most of them. The KPL-DPL group gave a reward to a resident in Ipus because he retrieved a stranded marker buoy and returned it. The marker buoys have been reinstalled since the wind and waves have calmed down. Two KPL-DPL billboards have been installed. One is located across from the information center in Jaga V and the other is located close to the village office in Jaga III.

KPL-DPL Management Group: The KPL-DPL management group consists of three senior officials: a Head, Secretary and Treasurer. There are four sub-committees: Fund Rising, Surveillance, Information Center/Education and Public Relations. Overall, the KPL-DPL has 41 members within these sub-committees, which meet weekly (every Wednesday). The KPL-DPL management committee also organizes an *arisan* meeting as an event to gather the members in addition to its function of saving money for mutual purposes. At

the end of the *arisan* meeting, important announcements concerning the KPL-DPL activities are made. The meetings are held in the information center.

One boat with a *katinting* engine belongs to the KPL-DPL that is used for KPL-DPL surveillance and monitoring. The boat and *katinting* may also be rented for livelihood purposes (e.g., fishing). The rental fee is Rp. 100.000 / month. So far, 3 people rented the *katinting* and the fees collected were deposited in the KPL-DPL treasury. Some have not fully paid the rental fee yet. The *katinting* engine can be rented separately for Rp. 75.000/month. One individual who rented both the engine and the boat for 3 months has already been able to buy his own new boat and *katinting*. He used the rented *katinting* and boat as a light boat for fishing in conjunction with the FADs and *pajeko*.

Arisan KPL-DPL: The permanent members of this *arisan* (community self help revolving fund) are the 41 members of the KPL-DPL committee. There are another 40 non-permanent members, for a total of 81 people participating in the *arisan* program. Every week one member receives approximately 800,000 Rupiahs. When a permanent member's turn to receive funds occurs, he/she is required to contribute 35,000 Rupiahs back to the group (Rp. 5,000 for the electric bill, Rp. 10,000 for supplies, Rp. 10,000, for *arisan* contribution, and Rp. 10,000 for working capital). Non-permanent members contribute only Rp. 10,000. The permanent members can use the group's facilities such as chairs loudspeaker at no charge but must give their weekly contribution. For non-permanent members they must rent the group's facilities if used. Some of the money collected was used as a reward to the villager from *Ipus* who returned a KPL-DPL marker buoy that drifted away. There is no honorarium for the management committee that manages the money collected. At present, the balance of funds of the KPL-DPL organization is approximately Rp. 1,026,000.

Village Coastal Resources Management and Development Board (BPPD)

The village coastal resources management and development board (BPPD) has not conducted any meetings since last year. The Kepala Jaga IV mentioned that in the last meeting of the village government, it was agreed that the BPPD would be dismissed since it was not functioning anymore as well as due to abuse of finances of block grants that were not spent properly or transparently. There are no plans to reconstitute this group at present. The functions of the BPPD have been replaced by the LKMD (Village Development Board) for infrastructure and development projects (e.g. water and sanitation projects) and by the Marine and Coastal Management Group (Kelompok Pengelola Pesisir dan Laut –KPPL) for implementation of the marine zoning scheme, marine sanctuary, monitoring and environmental awareness.

2.2.4 Tumbak Project Site

The Tumbak Coastal Resources Development and Management Plan was formally approved in 1999 by village ordinance after a two-year participatory planning process. This plan is a joint management plan developed in coordination with Bentenan village. The plan addresses nine coastal resources management issues where specific objectives were set to achieve a vision of sustainable community development over a 25-year period. A number of activities are proposed in the plan to address each issue. In addition, the plan calls for the establishment of a management committee to carry out implementation under the supervision of village government.

The major components of the management plan are:

1. Managing coral reefs
2. Managing water supply and facility maintenance
3. Improving road infrastructure
4. Managing flood prone areas
5. Environmental sanitation
6. Development of public tourism
7. Improving community awareness and education
8. Managing mangroves
9. Improving fisheries and farming

Managing coral reefs

Crown-of-Thorns: The community continues to clean up Crown-of-Thorns Starfish (COTs) if they are seen on the corals. This was done regularly, almost weekly, but not in the last three months because the south winds generate dangerously high waves. The community reports that the number of COTs around Punten Island is still high. The COTs near Tumbak such as in Sompini Bay and around Bentenan Island are almost all gone. COTs have been regularly controlled by the community while fishing, especially the underwater spear fishers and surface fishers who use *tagaho* (a trident-like fish spear). They collect the COTs and bury them on the beach.

Marine protected Area: Monitoring and surveillance in the MPA is done collectively according to the Proyek Pesisir Field Assistant. Almost weekly a member of management committee monitors the MPA. Monitoring is done in an ad hoc manner by visual survey of the coral growth from time to time, without any systematic survey or data recording. The head of the village coastal resources management committee said that since the establishment of the sanctuary, the number of fish inside the MPA has increased, particularly reef fish.

There are two remaining MPA marker buoys. Several have been lost as the broke away from the moorings during the south winds and heavy wave season. The remaining MPA marker buoys have been removed during the south winds. The committee said they would replace the lost marker buoys with the spare ones in December after the *Idul Fitri* Holiday once the south wave season calms down. They are planning to dive with compressors around the MPA to find the rope and re-install the marker buoys. MPA signs showing location and rules have been installed in Jaga 3 and Jaga 1. There is one broken billboard. It has a corroded pole. They are planning to repair and replace the corroded pole.

In addition to the surveillance run by the management committee, the community also voluntarily watches the DPL. If someone passes through the MPA they are warned and yelled at from the beach to get out of the sanctuary immediately. Some people report violations directly to the MPA management committee. In September 2002 at about 7.00 PM, when the south winds caused high waves, there was an accident. A *pajeko* being used as a freight boat was stranded on the reef inside the MPA. The engine of the boat stopped running, the boat drifted onto the reef and capsized right in front of the village. The boat was loaded with approximately 20 cubic meters of logs and 10 passengers. One witness reported that the corals where the boat stuck were damaged. A brief survey on site confirmed evidence of coral damage, but the damage is minimal because the boat was stranded on the reef flat where it is mostly coral ruble and sea grass). The passengers were rescued. No penalties were assessed to the boat captain because it was an accident.

There has been some discussion of expanding the MPA by designating several other no-take areas. The locations under discussion are the area around Baling-Baling Island, half of Bentenan Island and a patch reef between Baling-Baling Island and Bentenan Island. There is a plan to formalize these new areas in 2003.

The head of the Coastal Resources Management Committee said he is confident that in the next three years the MPA will continue to be managed. However, he feels that the village government needs to provide strong support to enforce the prohibition on bomb fishing and to encourage the community through formal and informal meetings about the importance of the MPA and the coastal resources. He is uncertain about the new *Hukum Tua's* attitudes towards coastal resource management and does not feel that he motivates people as much as the former *Hukum Tua*.

Bomb Fishing: The *Hukum Tua* expressed concern that police in the Bentenan sub-office may be protecting bomb fishers and extracting bribes consisting of fish from them (there was no indication from Bentenan residents that this was the case). The *Hukum Tua* reported that bombing activities by Tumbak villagers increased in frequency after the police sub-office was established in Bentenan. He said that the police always have plenty of fish when they want to have a family party and this is why he suspects they may be both encouraging and protecting the bombers. The *Hukum Tua* reported that there are about 20 households still active in bomb fishing including some that received the *katinting* subsidy. The *Hukum Tua* is a bit hesitant to take direct action because the bomb fishers voted for him in the recent election. While diving in the marine sanctuary, no bomb damage was observed. However, during the dive, a bomb blast was heard. Upon surfacing, people on the boat reported that they were unable to hear the blast and no boats were in sight that could have

been bombing. Therefore, while it is clear that bombing is occurring most people say it is done behind the offshore islands or in areas away from the village to the north or south of Tumbak

Managing water supply and facility maintenance

The Water Supply Project (Rp. 125 million) was started in 2001 as part of the Sub-District Development Program funded by the World Bank. When the project was first completed, water reached all subvillages (Jaga) though roadside standpipes. However, after five months water pressure declined in Jaga I and a part of Jaga II and at present no longer reaches Jaga I. The sub-village head for Jaga I attributed this problem to illegal household connections in the other Jaga, which reduced water pressure.

Maintenance and improvement of facilities is generally going well, but one part on the pump is easily broken and needs to be replaced monthly. The pump is serviced monthly; however, because of the long distance from the pump house to the village and very little gravity feed, the pump is reportedly overworked. This was the reason given by the *Hukum Tua* as to why no water was supplied to Jaga I and Jaga II. The households in Jaga I and Jaga II were reluctant to pay their water contributions since September 2002 because they have little or no water. The water runs well in Jaga III, IV and V only. They are constructing a second water tank and water filter tank in Jaga IV at the entrance to the village but is it not yet finished. They also have bought a new pump to be installed at the new water tank. The new pump was bought with excess money from the second PPK program for road construction. A village ordinance regulating water supply maintenance and management is in the process of being drafted.

Improving Road Infrastructure

The second Sub-District Development Program allocation was provided to Tumbak and used for new road construction between Jaga III and Jaga IV parallel to the main village road. They saved some budget for labor of Rp. 6 million and used this to buy the water pump and construct a second water tank. The labor fee for road construction was an in-kind contribution by the community. The second PPK allocation for the road was for Rp. 50 million. The community was supposed to receive Rp. 55 million but they only received Rp. 50 million from the sub-district. According to the sub-district official this was due to mismanagement in the accounting of PPK funds, therefore all 14 villages in Belang sub-district were treated the same and received somewhat less than the original budgeted allocation. Some people in Tumbak suspect that there was illegal skimming of funds from the project.

The road that was constructed with the PPK funds is 375 m long, paved with rocks (not coral), pebbles and sand. The 186 cubic meters of rocks were taken from the offshore islands. The village government did not allow the use of coral for road construction as was done in the past. The Hukum Tua also said the village government now encourages people not to use coral for any kind of construction.

Managing Flood Prone Areas

There was Rp. 2 million in excess funds after the road project was finished. This was used to continue road culvert construction that was not finished with the initial block grant provided by the project. The dike is built on the edge of the roadside to prevent road erosion and flooding associated with high tides. The head of the village CRM committee said that the dike for flood and road erosion control is very effective at keeping road material intact, particularly on the road in Jaga I and II compared with other village roads where flooding continues. Before the dike was built, salt water covered the road during the highest tides (full moon/new moon). Today the road does not flood or erode. He felt that the dike construction project achieved its purpose of reducing flooding and preventing road erosion.

Environmental Sanitation

No activities have been reported for this management plan objective.

Development of Public Tourism

Two members of the community undertook an observational study tour on ecotourism in the Togian Islands. There are no plans for ecotourism development in Tumbak compared to the interest exhibited in Bentenan. The experience of the study tour was shared and socialized in the community both formally and informally.

Improving Community Awareness and Education

An Information Center was constructed in the village. It also serves as the Village Meeting Hall and for wedding ceremonies. The information center is managed by a sub-group of the coastal resources management committee. Facilities in the center such as chairs and the building space are rented for special ceremonies such as weddings. The chair and room rental fee is Rp. 100,000. The money is used for operational expenses including the electric bill as well as maintenance of MPA marker buoys. Books and other education materials have been provided by the project; however, they do not seem to be readily available or in much use. The management committee has conducted several educational campaigns in the elementary school with the assistance of a project intern.

Managing Mangroves

The mangroves planted in 1997 behind the village have a 75 % survival rate. Some of the mangroves were eaten by goats when the fence was broken. Another 10,000 mangroves were planted in Jaga I, but only about 10 percent survived. Most of them died because boats ran over the seedlings at high tide. There is no mangrove nursery in Tumbak. Seeds are collected from the mangrove forest behind the village and naturally planted.

A mangrove sanctuary was formally approved on November 15, 2002 by village ordinance. The size of the mangrove sanctuary is approximately 22.5 hectares. The community is organizing the installment of markers for the core and buffer zones. A national intern from Papua University assisted the community with the consultation process, measuring the area using GPS and ordinance drafting. Public consultations were held in every Jaga. Initial reaction was negative because many people use the area as crab fishing grounds and to get wood for roofing, firewood. However, the community finally agreed since they still have other areas specified as limited exploitation zones. In the limited exploitation zones people can deploy crab traps, take mangrove wood for firewood and house construction (not for sale) in limited quantities. Trees cannot be cut entirely. Only the over growth branches can be cut. Individuals who cut mangrove wood for daily needs are obligated to plant new mangrove seedlings as a "fee" for forest use to ensure sustainable utilization. A sub-committee under the CRM Management Committee manages the management of the Mangrove Sanctuary.

The CRM committee head mentioned that sale of mangrove wood outside the community is much less than what he observed ten years ago. He reported that the village of Tatengesan also is designing a village ordinance concerning mangrove protection in the mangrove forests adjacent to Tumbak. This village has also conducted mangrove planting events.

Improving Fisheries and Farming Production

Seaweed farming: At the peak of seaweed farming activity in 2000 and prior to the decline from disease in 2001, there were conflicts over seaweed farming plots. Individuals were claiming large areas wherever they wanted and often overlapping other farming claims. At present, the Hukum Tua is in the process of designing rules for seaweed farming with maximum plot sizes of 25 X 60 m per household. This scheme will be initiated prior to re-establishment of farms. The village government is also planning to design a sea use zoning scheme similar to Bentenan that includes boat traffic lanes, and restricting seaweed farming over coral areas.

Management Committee

The Village CRM committee has been converted to *Kelompok Swadaya Masyarakat* (KSM) a Self Supportive Community Group called "*Lambos*". *Lambos* is the local word (Bajo language) for mangrove root exposed to the air. It was established in 2001 and replaces the old management committee. The members of

the KSM are identical to the members of the former village coastal resources management board. However, KSM's status is similar to an NGO, and it is an organization independent of village government. It is more accurately identified as a people's organization such as those existing in the Philippines. The village government has formally approved the KSM *Lambos* to implement coastal resources management programs in the village through an executive letter signed by the village head. The KSM has the authority to raise and manage funds independently for the implementation of the management plan. The impression from community residents is that this form of organization provides more autonomy to the group from local government, and there is a sense of more community ownership compared with the previous committee. Recent activities implemented by the KSM include the following:

- Facilitated the public consultation process for drafting the mangrove sanctuary ordinance in every Jaga.
- Conducted public education activities in the elementary school in Tumbak, and plans to facilitate school children visits to the MPA, Mangrove Sanctuary and the information center.
- Visual observation/monitoring of corals and fish in the MPA (without scientific methods) once a month.
- Plans to replace some of MPA committee members that are no longer active.
- Uninstall the MPA marker buoys during the south wind season and re-install after the sea calms

The organizational structure of the KSM is similar to the former board. It has a Head, Secretary and Treasurer as well as sub-committees on MPA management (mangrove sanctuary management and information center management) and education. The KSM regularly holds meetings. Recently they discussed education program issues. They were concerned about school children dropping out of school before completing their studies. They plan to accommodate these children in a village children's playgroup. They will be taught religious, environmental, and public speaking to build their self-confidence. The program will include the counseling of teenagers concerning illegal drugs, alcohol and pornography. In the last three months the KSM met on average twice monthly. Most recently they met to discuss the management of fees collected from the rental of information center facilities (chairs and the building). They are planning a meeting in November 2002 to propose actions for CRM plan implementation in 2003. This will include village re-greening to provide a shady walk along the village road.

Another intern from a Papua NGO facilitated community training on organization management and helped the community with environmental education and the awareness programs. He also helps the KSM with training for information center management and proposal development for funding agencies. He has been helping to link the KSM with the foreign funding agency "CORAL" (Coral Reef Alliance) Micro Grant Program for the planned extension of the MPA.

3. DEMOGRAPHIC, ENVIRONMENTAL AND ECONOMIC CHANGES

3.1 Introduction

A basic project premise is that coastal management initiatives will eventually lead to improved quality of life within the community as well as improved or stabilized environmental conditions. This is the long-term goal expected from implementation of the marine sanctuary and management plan. The purpose of the baseline surveys and subsequent monitoring in the project and control sites is to determine to what extent project activities are impacting on the quality of life and environmental conditions within the community. However, socio-economic changes are constantly occurring in any community. Macro-economic and large-scale ecological and political factors can often have major influences on socio-economic conditions within any given community and may be greater than those due to project interventions. It is difficult to distinguish between impacts from project initiatives and these larger scale changes unless there are time series information and comparisons between project and non-project locations. Even with such information we should not expect to prove conclusively any causality. However, we may be able to infer with a reasonable degree of certainty what impacts have likely occurred and possibly quantify the magnitude of such changes. Another challenge for monitoring strategies is that it may take years before a socio-economic impact resulting from project interventions becomes noticeable. Therefore, by monitoring socio-economic changes periodically, we can start to learn how long it may take before such impacts can be measured using the indicators selected.

Indonesia and North Sulawesi faced several large-scale economic, political and environmental events since the project started in 1997. In the later part of 1997, the whole Asian region, including Indonesia, started to fall into deep recession caused by the large-scale currency devaluation and the banking sector crisis. In Indonesia, the Rupiah fell from approximately 2,500 to the dollar in mid-1997 to over 10,000 to the dollar in the early part of 1998. While many parts of the country were severely affected, especially the banking and manufacturing sectors, the devaluation resulted in large increases in prices paid (Rupiah) to farmers for many export commodities. While inflation for basic commodities and imported goods skyrocketed, prices soared for many export crops produced (seaweed, copra, cloves, and vanilla) in rural communities of North Sulawesi (Pollnac et al. 1998). Rural communities highly dependent on export commodities did not feel the recession as much as other groups or areas of the country and the devaluation may have been beneficial for them. Over the last several years the economy has settled down and the currency has increased in value and remained relatively stable averaging around 8,250 Rupiah to the dollar.

This period also saw one of the strongest El Nino events on record in 1997. Forest fires swept the country creating a regional haze. Many short-term crops failed in coastal areas of North Sulawesi, and in areas such as the project site in Bentenan, many coconut and clove trees withered and died. The project sites had almost no rain for 13 months and traditional water sources in some villages were reduced to a trickle or ran dry. In 1998, the marine environment was also hit by a strong La Nina event. This triggered elevated sea surface temperatures and widespread coral bleaching in the months of October through November 1998. In mid-2002 another El Nino event resulted in drought once again. Once again crops were failing and fires swept the tinder-dry hillsides in many of the project and control areas. The survey for the final assessment was conducted during and at the end of this drought, probably impacting community members' perceptions of well-being and progress.

This period of time also saw political turmoil in the country. Riots broke out in Jakarta and other locations around the country but North Sulawesi remained calm and peaceful. This turmoil led to the fall of President Suharto, who had ruled the nation for over 30 years. In 1999, violence broke out in neighboring Maluku province and many refugees have poured into Manado and surrounding communities. On the positive side, Indonesia became the third largest democracy in the world with the election of Abdurrahman Wahid in September 1999 and the peaceful transition of power to Sukarnoputri Megawati in 2000. Such events can have major implications for local communities, and it compounds the challenge of determining project impacts on socio-economic aspects at our project sites. Therefore, these regional and national scale changes that have occurred over the life of the project must be kept in mind when considering the site specific changes mentioned below.

3.2 Project Sites

3.2.1 Talise

POPULATION: The *Jaga* 1 Kepala Jaga reports the population (current) as 511 spread over 134 households. He reports that this is about the same as in 2000. The status of the Jaga in terms of productive activities and income has also remained about the same. There are 13 new houses adjacent to his stretch of the beach. All residents are from Talise, with 8 from Kinabohutan in the past year. These new residents do not yet have land certificates. The village secretary claims that there is a population decline as a result of family planning. There was just a little migration of technical people from Manado to Jaga 2 to work on the pearl farm. Major productive activities in Jaga 1 changed little since 2000.

The population of Jaga 2 has increased from 558 in 2000 to 614 in 2002 (162 families plus 18 widow(er)s). The secretary attributed the growth to immigration from Jakarta (a few retirees), the Malukus, and Bolongmongondo. Some have also left; for example the junior high school lost six teachers that have not yet been replaced. There are fewer grow out cages in the sea off Jaga 2 than in 2000. This was attributed to heavy waves and non-replacement of broken cages. The remaining one is used to hold *udang* and *bia lola* (trochus). Overall, there have been no significant changes in the fishery--boats and gears remain the same.

On Kinabohutan the population for Jaga 3 was 483 in 2000. The Kepala Jaga says it has probably increased to over 500 now, but he has no recent data. This estimated increase was attributed to 3 new families from Sanghir and 5 new couples in the sub-village. Jaga 3 and 4 together have an estimated 270 households combined. This figure was estimated from a food distribution procedure (2002). No information concerning population could be obtained for Jaga 4.

OCCUPATIONS: Villagers in the sample were requested to name all sources of household income. They were then requested to rank each source in terms of relative importance. The results of these analyses are in tables 1 through3. Fishing and farming are the predominant occupations in Talise, with slightly more households reporting fishing as a source of income. It is important to note that over 70 percent of the households rank fishing as first or second, while a similar percentage of farming is distributed over the first three ranks, indicating that fishing is most important. This relative significance of fishing disappears, however, when we look at the separate sub-villages (*jagga*). One hundred percent of Kinahobutan (Talise sub-villages 3 and 4) households rank fishing as either first or second in importance in contrast to only 45 percent of the households in the other sub-

Table 1. Percent distribution of occupations in Talise (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	6th	TOTAL
FISHING	47.5	25	5	5	--	--	82.5
GLEANING	--	2.5	12.5	--	--	--	15
TRADE FISH	5	7.5	7.5	--	2.5	--	17.5
TRADE OTHER	--	7.5	--	--	--	--	7.5
PROCESS FISH	--	--	7.5	2.5	--	--	10
PROCESSING	--	2.5	2.5	--	--	--	5
FARMING	20	30	20	7.5	--	--	77.5
SMALL SHOP	5	5	--	2.5	--	--	12.5
OTHER	22.5	15	5	10	15	5	72.5
TOTAL	100	95	60	27.5	17.5	5	

N= 40

Table 2. Percent distribution of occupations in Kinahobutan.

OCCUPATION	1st	2nd	3rd	4th	5th	TOTAL
FISHING	80	20	--	--	--	100
GLEANING	--	--	20	--	--	20
TRADE FISH	10	10	5	--	--	25
TRADE OTHER	--	5	--	--	--	5
PROCESS FISH	--	--	5	--	--	5
PROCESSING	--	5	--	--	--	5
FARMING	5	40	20	5	--	70
SMALL SHOP	5	10	--	--	--	15
OTHER	--	10	5	15	10	40
TOTAL	100	100	55	20	10	

N= 20

villages of Talise. A miscellaneous group of "other" occupations[1], largely absent in Kinahobutan, account for a significant proportion (45 percent) of the occupations ranked first and second in these sub-villages.

Table 3. Percent distribution of occupations in Talise Jagga 1 and 2 (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	6th	TOTAL
FISHING	15	30	10	10	--	--	65
GLEANING	--	5	5	--	--	--	10
TRADE FISH	--	5	10	--	5	--	20
TRADE OTHER	--	10	--	--	--	--	10
PROCESS FISH	--	--	10	5	--	--	15
PROCESSING	--	--	5	--	--	--	5
FARMING	35	20	20	10	--	--	85
SMALL SHOP	5	--	--	5	--	--	10
BOAT BUILDER	5	--	--	5	5	--	15
OTHER	40	20	5	--	15	10	90
TOTAL	100	90	65	35	25	10	

N= 20

In comparison to the baseline (1997) and mid-term evaluation (2000), the occupation of fishing has gradually increased in importance (Sukmara, et al 2001). Sixty percent of the households ranked fishing first or second in 1997. This increased to 65 percent in 2000 and 73 percent in 2002. Similarly, while only 39 percent of respondents ranked farming as first or second in 1997, this increased to 53 percent in 2000, and dropped slightly to 50 percent in 2002. In contrast, the occupations classified as "other" in this report decreased in importance (e.g., ranking as either first or second) since 1997, declining from a total of 72 percent to 37.5 percent. This indicates that there has been an increase in reliance on the basic occupations of fishing and farming at the expense of other occupations, although many of these other occupations still exist in the project communities.

With regard to fishing, there were reported increased catches of *cakalang* (skip jack tuna) during the period 2000-2001. From 2001 to 2002, the catch has not been too good so far. Community members, however, have seen such variation before and remain optimistic. Their optimism is reflected in their behavior. Since 2000 some fifteen *soma roa* (nets for capturing halfbeaks) have been converted to soma *cakalang* (skipjack tuna nets) at a cost of some 30 million RP per conversion. Also 9 boats capable of deploying either *soma roa* or *soma cakalang* have been replaced (average life of this type of boat when motorized is approximately 5 years). Eight of these boats deploy *soma cakalang*. The number of these boats (30), however, has not changed since 2000 (validated by vessel count). The shift to *cakalang* (skipjack) was stimulated by both higher prices and reported decrease in amount of *roa* (halfbeak). The decrease in amount of *roa* harvested is reflected in the fact that the number of families processing *roa* have also decreased. Five years ago five families were involved in contrast to only two today. The shift to *soma cakalang* has also had an impact on employment. While average crew size for *soma roa* is nine, *soma cakalang* requires from 15 to 25 fishers, for a total increase in fishing employment between 90 to 240 crew.

Although employment at the pearl farm falls into the "other" category, it's impact on fishing area (discussed in 3.2.1 below) makes it important to indicate its relatively small impact on village livelihood. The pearl farm employs only 86 people (73 males and 13 females) from Talise, approximately 40 persons each from Jaga 1 and 2, and five persons from Kinabohutan. There have been few changes in overall employment levels by the pearl farm in the last few years although one key informant mentioned that the ratio of temporary to full time laborers has increased.

3.2.2 Blongko

POPULATION: Population in Blongko increased to 1743 from 1545 in 2000, an increase of 198, or 12.8 percent over 2 years. This is an average of 6.4 percent per year. About half of this increase can be attributed to the immigration of 22 farming families into Blongko from the upland villages of Pakuure (Kec. Tenga) and Karibouw (Kec. Motoling) and Ternate (only 2 families). The remainder must be natural increase. As a reflection of this increase in population, thirty new houses have been built in the community. A

[1] Other occupations include those reported by 10 percent or fewer of the households. Those on the tables with less than 11 percent are presented for comparative purposes. Other occupations included carpenter, teacher, tailor, sales person, coconut tree climber, pearl farm employee, water taxi, coconut transporter, meal vendor, and electronic shop and service.

considerable amount of the new housing of immigrants has been built on the northern side of the river. No housing existed here previously and it represents a significant expansion of settlement areas (as if there is a new *Jagga* within the village). This new settlement area is also spreading in the direction of the community-based marine sanctuary. One resident suggested that this immigration pattern is the result of a lack of land and employment opportunities in the upland areas.

OCCUPATIONS: Rank importance of occupations in Blongko are found in table 4. Farming and fishing remain the top two sources of household income. About 85 percent of households ranked farming as one of the first three sources in importance (a ranking of 1, 2 or 3) since 1997, indicating little change in relative importance. Forty-one percent of the households ranked fishing among the first three in 1997. This increased to 60 percent in 2000 and decreased to 43 percent in 2002, suggesting a temporary decline in the importance of fishing. This observation is supported by the fact that while 21 percent of the households indicated fish trading as a source of income in both 1997 and 2000, only about 8 percent do so in 2002. There has been a large increase in households listing occupations that are lumped in the "other" category. While only about 45 percent were in this category in 1997 and 2000, 87.5 of the households in 2002 list occupations which are classified as "other." This category includes sources of income mentioned by less than 10 percent of the households (including various types of petty traders, carpenter, tailor, teacher, mechanic, construction, driver, day worker, priest, umbrella repair, and meal vendor).

Table 4. Percent distribution of occupations in Blongko (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	TOTAL
FISHING	10	17.5	15	5	7.5	55
GLEANING	--	2.5	5	7.5	2.5	17.5
TRADE FISH	2.5	--	5	--	--	7.5
TRADE OTHER	2.5	--	2.5	--	--	5
PROCESSING	--	2.5	2.5	2.5	--	7.5
FARMING	40	25	20	7.5	--	92.5
RAISE ANIMALS	5	7.5	2.5	5	--	20
PICK COCONUT	7.5	2.5	5	--	--	15
OTHER	32.5	37.5	7.5	2.5	2.5	87.5
TOTAL	100	95	65	30.0	12.5	

N= 40

With regard to the fishery, the Hukum Tua reports that 20 new *londe* and four *pelang* have been built in the past two years. Four of the former and one of the latter are replacement craft. Eight new *soma pukat* have been purchased in the last two years. Additionally, a relatively new beach seine was observed in a *pelang* on the beach. The only *pajeko* (mini purse seine boat) in the community became inoperative in 2000. This is a major loss due to the fact that *pajeko* typically employ between 10 and 20 crew and land large quantities of pelagic fish. The net (a major investment) is still good, and the owner plans to build a new boat. The *Hukum Tua* also reported that about ten farmers became fishers. No fishers were reported to convert to farming.

One spear fisher interviewed stated that fish catches for spear fishers has increased substantially from several years ago. He indicated that in the 1970s, catches could be as high as 20-25 kg. per fisher per night. Prior to the establishment of the marine sanctuary in the late 1990s, they were down to approximately 5 kg. per fisher per night. Currently, he stated that catches average between 7.5-10 kg. per spear fisher, per night.

NEW ORDINANCES: Four new ordinances are in preparation for Blongko: 1) security and order, 2) coastal and marine area management, 3) water supply management, and 4) family contribution for village development. These ordinances are still being discussed and are not final. The one of most interest to us is the Coastal and Marine Area Management Ordinance. Apparently the MPA will be included in this new ordinance. It must be renewed now that there is a legislative board in the village. The new ordinance will also cover areas outside the MPA as well as watershed management (e,g., laws concerning tree cutting and forest burning). Marine laws will cover mangrove harvesting, coral mining, illegal fishing, etc.

NON-PROYEK PESISIR PROJECTS: In terms of projects, the only recent government project reported by the Hukum Tua is the ongoing repair of the small bridge for the highway, which crosses the small river that flows through Blongko. The Hukum Tua reports that the government has not even been able to pay his salary recently. Nevertheless, after observing a new walkway another key informant was interviewed and reported that 1.8km of improved walkway was constructed with a grant from the Social Department. A community initiative resulted in the opening of a new kindergarten in mid-2002, which has enrolled some 60

children. The school meets in the town meeting hall, and the parents of the children pay a fee. The teacher is a village resident. Finally, a campaign to raise funds for a new church is underway, and a restaurant along the highway reputed to support illegal activities (e.g., prostitution) has closed.

3.2.3 Bentenan

POPULATION: The population of Bentenan in 2000 was 1287 individuals contained in 338 households. The village secretary reported that in 2002, it increased to 1359 individuals and 357 households. The Village Secretary explained that the population temporarily increased in 2001 by approximately 15 households for the election of the Hukum Tua (approximately 70 individuals came back to vote in the election). Most of them returned to their previous residences (Bitung, Bolaang Mongondow, Kema and Manado) after the election but some stayed in Bentenan. The Hukum Tua said that the population increase since 2000 resulted primarily from birth and the return of ex-Bentenan residents to Bentenan. He said that individuals that returned and stayed in Bentenan returned because their income declined due to declines in the natural resources potential of the areas where they settled. Most of the population increase is in Jaga IV, a coastal fishing household. The number of households increased from 63 in 2000 to 74 in 2002. Three households are immigrants from outside the village and 8 households are composed of new families from within the village.

The former project field assistant said that 13 new houses had been added to the village and approximately 33 houses have been renovated. This housing development has occurred mostly in Jaga IV next to the mosque and part of Jaga III. Eighty percent of the new and renovated houses are in the fisher settlement. Several have been built in the flood hazard zone. While some are elevated on stilts or high foundations, others have low foundations and most likely will be susceptible to flooding during the raining season.

OCCUPATIONS: Rank importance of occupations in Bentenan are found in table 5. Fishing and farming remain important as in 1997, but milkfish fry collection has decreased from 75 and 68 percent in 1997 and 2000, respectively, to only 18 percent in 2002. Seaweed farming, which was the single most important source of income in 2000 has disappeared from the list in 2002. The reasons for the drop off of seaweed farming are explained later in the report. Sources of income classified into the "other" category have almost doubled, including occupations such as tailor, teacher, animal husbandry, meal vendor, government employee, baker, construction worker, copra seller, day laborer, palm wine processing, milkfish pond operator, and pension.

Table 5. Percent distribution of occupations in Bentenan (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	6th	TOTAL
FISHING	35	12.5	5	7.5	--	--	60
MILKFISH FRY	--	2.5	2.5	5	5	2.5	17.5
TRADE FISH	7.5	17.5	7.5	--	--	--	32.5
TRADE FRY	--	2.5	5	--	2.5	--	10
TRADE OTHER	--	2.5	--	--	2.5	--	5
PROCESSING	--	--	2.5	--	--	--	2.5
FARMING	27.5	15	2.5	12.5	--	2.5	60.0
SMALL STORE	5	7.5	10	--	--	--	22.5
OTHER	25	20	25	7.5	5	--	82.5
TOTAL	100	80.0	60	32.5	15	5	

N=40

The Hukum Tua reported that incomes have increased since two years ago, particularly for fishers. Fish prices increased and fish catch increased due to a number of *pajeko* boats (as many as 20 at one time) from outside (Bitung, Kema, Watuliney, Belang, Likupang, Molompar and Mongondow) staying several months in Bentenan using their anchorage and fish landing site. This provided more economic opportunities for fish traders. The Village Secretary also felt that people's income increased particularly for fishers. In 2000, there were four *pajeko* in the village and this has now doubled to eight. Three old boats were replaced and at least four others are new additions to the fleet.

An important technological innovation in the *pajeko* fishery has occurred in Bentenan. There are five *pajeko* that now use a power winch for hauling nets (*takal*). The winch is operated by a generator and makes lifting the net quicker and easier. However, the *pajeko* boats still hire approximately 15 people as daily crew and usually have five permanent crew for a total crew complement of about twenty persons. The cost of a *takal* is approximately 2.5 million Rupiah. If paid in installments, the total payments including interest reach 7

million Rupiah. Even though the fishing operation uses this new mechanized system (*takal*), the manpower has not changed since daily crew are still needed to load fish from the net into the *pajeko* boat. The introduction of *takal* has probably increased fish catch per vessel, and the addition of new boats has increased overall employment. The introduction of the *takal* has also reportedly changed share systems on these vessels with the *takal* getting a certain percentage in a similar manner that boat, net and engines get shares. However, several different share systems were reported so it is unclear whether several systems are being used or whether this was conflicting information of how the shares are distributed.

Another informant reported a slightly different crew size for *pajeko* with *takal*. He said the maximum permanent crew sizes are 10 persons, and daily crew who work on a temporary basis are usually 15 persons, for a total crew size of 25 persons. For daily crew, their shares are set aside before other shares are divided into three parts for FAD, gear owner and permanent crew. They usually use a 10-2 rule in which for every 10 boxes of fish, two must be set aside for daily crew. The share for permanent crew is usually accumulated monthly and paid with cash. Permanent crew shares are also divided for the boat, engine and *takal*. For example, if there are 10 permanent crew, their one-third share is split as follows: the crew leader (*tonaas*) gets four shares, *takal* gets two shares, engine gets two shares per engine, and permanent crew get one share each.

The Hukum Tua reported that the number of small boats have decreased in Bentenan as they are no longer used for seaweed farming. The Hukum Tua said that in 2000, there were approximately 100 smaller boats but now there are only 60 left. He said that even land farmers in Jaga I and II owned small boats such as *pelang, londe* and *bolotu* for seaweed farming but not anymore. However, the head of sub-village IV said the number of smaller boats (*londe*, *pelang*) increased and only the number of *bolotu* used for seaweed farming decreased. He said *katinting* increased to 75 vessels from 20 in 2000, indicating a significant shift from non-motorized to motorized small vessels. A fisher said that the number of small boats (*pelang*, *londe*) decreased as they were replaced with larger size *pelang* that could use *katinting*. He said that in 2000 there were only four *pelang* with *katinting* and this has now increased to approximately 40. He also felt some boats such as *bolotu* and *pelang* that were used for seaweed farming decreased because of no more seaweed farming. Despite these conflicting figures, there appears to be a definite shift in fishing from smaller to somewhat larger vessels, accompanied by motorization. Coupled with the increase in the number of *pajeko*, this represents a significant increase in investment in fishing capital within the village. The sources of capital are multiple. It is likely that capital and savings from seaweed farming is shifting to fishing. One informant in Tumbak said that with the decline in seaweed farming, seaweed farmers sold boat engines used for seaweed farming to fishers. In addition, the increase in *pajeko* boats using Bentenan as a harbor has increased employment and income among residents. Some of those involved with *pajeko* fishing have earned enough to purchase their own *katinting*. Hence, capital earned from commercial pelagic fishing and seaweed farming is moving into the small-scale fishery as well. The Hukum Tua also said that farmer income has increased due to the increased priced for corn. There has been rain only once in the last four months but this has not affected farm crops yet.

The number of pick-up vehicles transporting fish to markets in Langowan, Ratahan, Tomohon, Manado and Bitung has increased from six in 2000 to eleven vehicles in 2002. This is a clear indicator of increased fish production.

One of the most striking changes to have occurred in Bentenan and Tumbak between 2000 and 2002 is the demise of seaweed farming. In 2000, seaweed farming area expanded more than two fold from the area farmed in 1997 (Pollnac, et. al. 2001). The loss of over four hundred hectares of seaweed farms has transformed the seascape and significantly changed the productive activities of households in these villages. The suspension of seaweed farming is reportedly due to disease ("*ice ice*") that has completely wiped out the stock of *Euchuma cottini* in Bentenan and Tumbak. Disease problems were mentioned in 2000 as a problem, but at that time production was at its peak. The loss of brood stock and suspension of farming occurred in 2001.

This seaweed disease problem has been reported throughout Indonesia. For example seaweed farms have been wiped out in *Pulau Seribu* near Jakarta (Achmad Fauzi, pers. comm.), and seaweed dealers in Manado report that seaweed farming in Nain Island (located in Bunaken National Park) has also been affected. One buyer stated that production has dropped from an average of 20 tons per week to less than 1 ton per month on Nain. The buyer stated that the number of farmers has declined from over 90 percent of households previously to less than 75 percent now. He explained that those that have dropped out of farming have returned

to fishing on Nain. The ex-Hukum Tua in Tumbak and several other residents in Tumbak and Bentenan also said that they rely more on fishing now without the supplemental income from seaweed farming. Another dealer buying from Nain explained that only *Euchuma cottonii* has experienced disease problems and that not all the stock has been wiped out. He felt that the remaining stock is not experiencing major disease problems and may be used to restock the farms to previous production levels. The other species of seaweed grown in Nain, *E. spinosum* has not been as severely affected. However, the price of this variety on the world market is quite low and not as profitable as *E. cottonii*.

Some people in Bentenan were trying to start planting seaweed again, but herbivorous fish, particularly siganids (rabbit fish) consumed the crop. The ex-Hukum Tua in Tumbak felt that a large amount of seedlings needs to be brought in to reestablish farms – as much as one to two tons. If a large enough number of people start planting again, the quantity of seaweed will be large enough to withstand significant grazing by rabbit fish. The head of Bentenan sub-village IV felt that seaweed farming stopped not only due to disease, but also due to a drop in price and unavailability of seedlings in the area. Many people are unwilling to plant again because seaweed growth is not the same as before. He did not feel that rabbit fish is a problem for restarting seaweed farming. He feels they benefit the growth of the seaweed because they stimulate the buds of seaweed to grow more.

It is surprising that despite the total suspension of seaweed farming in Bentenan, the perceptions of village officials are that incomes have increased. These perceptions are supported by the number of new houses in the coastal sub-villages, and the numerous older houses that have been refurbished with shining new galvanized roofs, particularly in Jaga III and IV. These household improvements are in the sub-village where the new *pajeko* boats anchor. Since these vessels employ large crews and require shore based support services (e.g. fish marketing), much of the improved income can probably be attributed to this increase in pelagic fishing effort as well as improved prices for farmed crops such as corn. The rise and fall of seaweed farming and the resilience and adaptability of the community to rapidly switch to other productive activities such as fishing and farming is remarkable. It demonstrates the value of diversified livelihoods as an important strategy for maintaining stable income and employment in these rural coastal communities. The decline in seaweed farming has been commensurate with an increase in fishing effort, so over the long term, increasing pressure on open access fisheries may lead to overfishing and eventual declines in income and employment opportunities. However, it is likely that seaweed farming will also be reestablished again as has happened in the past.

One consequence of the demise of seaweed farming is that there are areas of reef flat, particularly between Pulau Bentenan and Sompini Point, where a large amount of abandoned seaweed lines litter the sea floor. Many are on top of live reef. While the lines are being overgrown with algae, hydroids and some small coral colonies, some damage to existing live reef is also occurring. This was predicted by Pollnac et al. (1997:3-4)

NON-PROYEK PESISIR PROJECTS: The Hukum Tua mentioned that there are a number of projects planned or underway in Bentenan. The Public Works Office surveyed the swamp between Jaga III and IV and is planning a reclamation project for the village settlement expansion and flood control, as detailed in the village management plan. The *PPK* Project for sub-district development program has been distributed twice for Bentenan in 2000 and 2001. A Junior High School building was constructed (120 million Rupiahs). In the project proposal, the village also planned other activities such as *MCK* facilities and water supply but the budget was only sufficient for the high school building and an additional building constructed for a teacher's room. In 2002, a *PPK* grant of 15 million Rupiah for Jaga V was used specifically for water tank and filter tank construction.

The Hukum Tua is also preparing 50 bags of *linggua/angsana* tree seedlings for a village re-greening project to plant trees along the village road as shade trees. There is a social safety net program (JPS) subsidized by the Social Services Department to distribute two tons of rice for community on a monthly basis, but the demand has increased to three tons a month because of an increase in requests for assistance. The subsidized price for a liter is supposed to be 1000 Rupiahs but it is sold 1250 Rupiahs in order to raise funds for the rehabilitation of the village office, and for other village government operational costs. A grant from *Bappeda* for 20 million Rupiahs for village road rehabilitation was supposed to be awarded but only 15 million Rupiahs was received. This was used by the community for increasing road height by adding soil along a 700 meter

stretch of the village main road. Bentenan also received a subsidy of 4 million Rupiah for installation of a satellite telephone in the village. The village paid a matching contribution of 1 million rupiah.

NEW ORDINANCES: Nine new village ordinances have been drafted recently and five were approved in October 2002. Two are related to the coastal management plan (water supply and marine use zoning). The ordinances were all approved simultaneously in one formal village meeting after an extensive consultation process that was ongoing for over two years. These ordinances are:

1. Marine use zones and marine protected area (KPL-DPL) (approved).
2. Watershed protection and water supply management (approved)
3. Public security and order (approved).
4. Conduct of village official in village administration (approved)
5. Household monthly financial contributions for village government (approved)
6. Contributions/ fees for village administrative services (pending)
7. Contributions/fees from traders in the village market (pending)
8. Contributions/fees from agricultural and marine products (pending)
9. Special contribution from land measurement and sale (pending)

3.2.4 Tumbak

POPULATION: The population of Tumbak in 2002 as reported by the Village Secretary is 1337 individuals and 333 households compared to 1311 individuals and 317 households in 2002. Tumbak has recently been divided into five Jaga. The new Jaga boundaries are based on an attempt to have an equal number of households in each Jaga. The Hukum Tua said that the population increase was mainly from local births. No one moved into the village but 2 households and 7 individuals left the village and moved to Kalimantan and Kendari. The village secretary reported that there have been improvements of existing houses in the village with about 40 to 50 houses renovated from impermanent material (e.g., wood, nipa) to concrete structures.

OCCUPATIONS: Rank importance of occupations in Tumbak are found in table 6. Fishing remains the single most important occupation, with fish trading being second most important. Fish trading replaces seaweed farming, which was second most important in 2000. In 2000 seaweed farming contributed to the 93 percent of household incomes, increasing from 23 percent in 1997. In 2002 seaweed farming has disappeared as an occupation. Forty-five percent of the households gain some income from occupations coded into the "other" category which includes carpenter, tailor, teacher, petty trading, small shop operator, meal vendor, driver, construction worker, ornamental fish capture, farming and trading, beauty parlor operator, boat motor repair and selling used boat engines.

Table 6. Percent distribution of occupations in Tumbak (2002).

OCCUPATION	1st	2nd	3rd	4th	TOTAL
FISHING	50	35	5	2.5	92.5
GLEANING	--	--	2.5	2.5	5
TRADE FISH	27.5	15	7.5	--	50
PROCESS FISH	2.5	5	--	--	7.5
PROCESSING	--	--	2.5	--	2.5
FARMING	--	5	5	2.5	12.5
BAKING CAKES	--	5	10	--	15
OTHER	20	10	10	5	45
TOTAL	100	75	42.5	12.5	

N=40

The Hukum Tua felt that incomes in the community may have increased slightly but are more or less the same due to the suspension of seaweed farming. This is in contrast to Bentenan where most key informants reported income increases attributed to farming price increases and an influx of *pajeko* boats to the community.

One fisher interviewed also felt that incomes have not increased much because people have quit seaweed farming. He said that two years ago people could easily save money because seaweed was harvested every month. On the other hand, he stated that in the last several months the *giop* fisherman have been harvesting large quantities of *malalugis, deho* and *cakalang* of high quality and this has been profitable for that group of fishers. He also mentioned that early next year there are four people from Tumbak who plan to make the pilgrimage to Mecca (Saudi Arabia). He mentioned that in the last ten years they have never had so many

persons from the village have go in one year and this is an indicator that at least some households are doing quite well economically.

The Hukum Tua felt that fish catch (scad, skip jack, halfbeak, deho/ mackarel) is still good particularly with *giop* gear. The number of *giop* boats has not changed (18 boats) but the number of soma *giop* (*giop* gears) has increased. Some of *soma giop/roa* have converted to *soma cakalang* in August 2002. This is similar to the conversion of *roa* nets to *calalang* nets that also occurred in Kinabohutan. Some fishermen bought new *soma giop* because the halfbeak season returned and the fish are now abundant in local waters. The soma *giop* that were converted to *soma cakalang* can not be reconverted to *soma giop*. There are five fishermen who have both *soma roa* and *soma cakalang*.

There is one fisherman in Tumbak that owns a *pajeko* boat and gear but it is currently operated in Maluku. It has been in operation for five months with a hired crew of 20 from Tumbak. The *soma* has been mechanized with "*takal*" similar to conversions that occurred in Bentenan. In 2000 no one had a *pajeko* in Tumbak. The Hukum Tua also said there are about 30 people from Tumbak that work as crew in Bentenan, Kema and Molompar who usually come home every two weeks. The number of small boats (smaller *pelang, bolotu*) has not changed. There is another *pajeko* seen occasionally in Tumbak, but it does not belong to Tumbak residents. The owner is from Watuliney, a village near Belang to the south. Tumbak villagers operate the boat and make up most of the crew (approx. 15 people).

As in Bentenan, seaweed farms were attacked by a disease, and farming has totally ceased now in Tumbak. A concern mentioned by one past farmer was that to start seaweed farming again, all the people have to start simultaneously so that the herbivorous rabbit fish (siginaids) cannot have a significant impact on the seaweed. Sporadic cultivation or only a few small farms may only provide food for rabbit fish; hence, no income for the farmers.

NON-PROYEK PESISIR PROJECTS: There are a number of new projects in Tumbak as a result of the sub-district development program funded by the World Bank in the sub-district of Belang. PPK (Sub-district Development Program) funds have been distributed twice in Tumbak. These included a drinking water supply project and a road construction project, both of which are key issues outlined in the coastal resources management plan and are discussed below under the respective sections concerning management plan implementation. There was a subsidy for satellite telephone installation in the village. The village paid 1 million Rupiah of the total 5 million price for the telephone.

NEW ORDINANCES: Several village ordinances are in the process of being drafted and formalized. They include the following:

1. Mangrove Protection area. (drafting stage)
2. Village contribution from economic activities: loading and unloading copra, logs, ornamental fish and other trading supplies from and into boats and from marine catches/production (fish, salted fish, sea weed, etc). (drafting stage)
3. Regulation for water supply management and (finalized and pending approval)

3.3 Adjacent Non-Project Control Sites

3.3.1 Airbanua (Talise control site)

POPULATION: The Hukum Tua reported that the total population for 2002 is 886 with 437 in Jaga 1 (Airbanua) and 449 in Jaga 2 (Wawunian). The Kepala Jaga for Jaga 2 reports that the sub-village has a population of only 393 individuals that are spread across 94 households. The Hukum Tua said that no people have moved into or left the Jaga 1 since 2000 and that there were only five births. The Kepala Jaga (Jaga 2) reports one new family, with five leaving temporarily for farm labor.

OCCUPATIONS: Rank importance of occupations in Airbanua are found in table 7. Fishing and farming are the most important occupations as in past surveys, with plantation work and "other" occupations ranking second. There have, however, been some changes in gears used and amount harvested. Eight fishers

in Jaga 1 obtained *katinting* for their boats. A slight increase in catches for *soma paka paka* was reported. Six new *soma paka paka* (which can be converted for *lolosi*) were introduced into Jaga 2, and five new *pelang* were constructed (two to replace old boats). Harvests were reported to have increased in Jaga 2 as a response to increased demand created by two new fish buyers (*tibo-tibo*). Previously there were none in Jaga 2, and the fishers had to sell their catches through a *tibo-tibo* in Jaga 1.

Table 7. Percent distribution of occupations in Airbanua (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	6th	TOTAL
FISHING	25	35	20	10	--	5	95
GLEANING	--	--	--	5	10	--	15
TRADE FISH	5	--	--	--	--	--	5
TRADE OTHER	--	5	--	--	--	--	5
PROCESS FISH	--	5	--	--	--	--	5
FARMING	25	35	30	5	--	--	95
PLANTATION	35	--	5	--	--	--	40
OTHER	10	20	--	10	--	--	40
TOTAL	100	100	55	30	10	5	

N= 20

CHANGES IN PROJECT ACTIVITIES: Perhaps the most significant change in the community is that it is now one of the Proyek Pesisir "scaling-up" projects. This, of course, means that it has lost some of its value as a control site. "Scaling-up" activities have included training, mangrove replanting, and preparation of a plan to develop MPAs in each of the sub-villages. Trainings have included how to hold meetings, MPA development and ordinance preparation, reef assessment (manta tow training), mangrove culture, and report writing. An extension officer from Proyek Pesisir moved to the community in March 2002 and averaged a week residence per month since that time. The agent trained community organizers (three for each Jaga) in preparing work-plans, reporting and coordinating with the Project Pesisir office.

MPA core groups have been formed in each Jaga, and a draft ordinance (one) has been prepared to cover the MPAs planned for both Jaga. The areas *Pintu Kota* (16 Ha in Airbanua) and *Kiaeng* (13 Ha off Wawunian) were selected on the basis of coral cover and community participation. Several meetings were held during which the merits of selected locations were debated, and one to the north of Wawunian, which was selected by the Hukum Tua on the basis of high coral cover, was rejected in favor of *Kiaeng*, which is relatively close (50m) to the proposed MPA site in Jaga 1 located off of *Pintu Kota*. Dive tourists from the Gangga Resort and other places (Thalassa Dive Center's live-aboard) are already visiting the areas selected about once or twice a week, and the MPA groups are discussing the question of fees. The MPA committees will hold a meeting including community members from both sub-villages to familiarize them with the plans and locations.

The entire community in Jaga 2 is reportedly involved in mangrove replanting. There is no single mangrove group—it is too difficult to get them together because of other commitments. There was an agreement with community members that each family would be responsible for planting 25 mangroves. Given the figure of 94 families in Jaga 2, this would amount to 2350 mangrove trees. The first mangrove replanting was a joint church—Proyek Pesisir sponsored activity in March 2002. One family fenced off an area they planted to keep goats from eating the plantings. Mangrove plantings are wide spread around most of the mangrove areas visited.

3.3.2 Kahuku (Talise control site)

POPULATION: Population has changed little over the years in Kahuku. This year it was reported by the ex-village secretary to be 1046, a drop of 54 from the figure provided in 2000, and two fewer than the 1997 population of 1048.

OCCUPATIONS: Rank importance of occupations in Kahuku are found in table 8. Fishing and farming are the most important occupations as in past surveys, with "other" occupations ranking second and employment at the pearl farm and small shop keeper ranking third.

Fishing gear has changed with the addition of eight new *pelang* to the fishing fleet. The number of vessels deploying *cung* has dropped from five to one due to increased costs. The remaining *cung* is rarely deployed. Most of the catch is now derived from fish traps (*igi*), *soma paka paka* and *soma lolosi*. Fish catches

have reportedly declined. Blast fishing still occurs in the area, but by fishers from Bulutui rather than Kinabohutan, which was formerly alleged to be the source of bomb fishers. Some infrastructure, such as the village pier, has deteriorated significantly since 2000. It can no longer be safely used due to erosion of cement supports and missing segments in the walkway. Coastal erosion was evident, but most of the village coastline is beautifully greened with large trees. Some collecting of dead coral (no fresh coral was noted) was observed for lining septic tanks.

Table 8. Percent distribution of occupations in Kahuku (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	TOTAL
FISHING	32	28	16	8	4	88
GLEANING	--	--	4	8	--	12
TRADE FISH	8	--	--	8	--	16
TRADE OTHER	--	4	--	--	--	4
PROCESS FISH	--	--	--	4	--	4
PROCESSING	--	4	--	--	--	4
FARMING	12	32	32	4	8	88
PEARL FARM	24	4	--	--	--	28
SMALL SHOP	4	12	4	8	--	28
OTHER	20	16	12	--	--	48
TOTAL	100	100	68	40	12	

N= 20

NEW PROJECTS: Kahuku has a new Hukum Tua who is doing his best to upstage the previous village chief by using his own money to subsidize village projects such as improvement of the path connecting the sub-villages, which has been eroded by the sea, and providing loans for new fishing gear. Villagers provided labor and the Hukum Tua provided materials for path improvement. He reported that he provided loans for four of the eight new *katinting* (small externally mounted boat engines).

The hillsides of Kahuku, and the entire island of Bangka, seemed to be relatively free of the fires that raged on Talise. The Hukum Tua attributed this to sanctions he applies, such as sanctioning fire starters and making them pay damages. He reports that they plan to "re-green" the entire area, and he has ordered a total of seven kilograms of "*Jati Super*" tree seeds from Makkasar, which they plan to begin planting when the rains return. It is alleged that the trees can begin to be harvested after the 6th year, but are bigger and better after 14 years. The Hukum Tua said that they have plans to export the wood. As a part of his "greening" activities, he has also prohibited the cutting of trees. Violators will suffer from "social sanctions."

The village of Kahuku also has problems with the pearl farming activities. A pearl farm shore-side installation is located just north of the village and extensive portions of the offshore waters are taken up by pearl farm activities. The fishers from Kahuku must also put up with overly aggressive guards who chase them away from the area. The pearl farm has operated in the area since 1991, and employs some 60 villagers (45 men and 15 women).

The new Hukum Tua made several unfavorable comparisons between his administration and the previous one. He said that the former Hukum Tua let the pearl farm management take advantage of the community—that he feels that too much fishing area was taken away from the community. He also alleged that people freely cut trees along the coastline as long as they paid bribes to the former Hukum Tua. He said he works with the people, he does not just tell them what to do.

3.3.3 Sapa (Blongko control site)

POPULATION: The village secretary reported that the 2002 population of Sapa is 2361. This is a substantial decrease from the 2532 reported for 2000. When questioned concerning this discrepancy, he said that the 2000 census was inaccurate. Another census, performed for electoral purposes shortly after the official census, indicated a population of 2326. If correct, this indicates a slight population increase, which is consonant with the report that there was neither movement into or out of the village since 2000. There were reportedly no government projects since 2000. There were only community-generated projects such as collecting funds for church and mosque construction. The village secretary reported that there are no environmental projects or ordinances.

OCCUPATIONS: Rank importance of occupations in Sapa are found in table 9. Fishing and farming remain as the major contributors to household income as in previous surveys. Fish trading is also important in about one-half the households.

Table 9. Percent distribution of occupations in Sapa (2002).

OCCUPATION	1st	2nd	3rd	4th	TOTAL
FISHING	35	15	20	5	75
GLEANING	--	--	5	5	10
TRADE FISH	20	20	10	--	50
FARMING	35	25	25	5	90
CONSTRUCTION	5	15	--	--	20
OTHER	5	15	--	10	30
TOTAL	100	90	60	25	

N= 20

While no significant changes have occurred in the agricultural sector, both the village secretary and the fishers report positively concerning the fishery. One group of fishers reported substantial increases in the number of *katinting*, increasing from two to three in 2000 to more than 50 today. They report that a count they made a few days before our assessment indicated that there are 54. Several other groups estimate the number of *katinting* at around 30. Some fishers report that non-fishers own some of these motors, and that they obtain one share (usually one-third of the catch) as payment for use of the motor. The secretary of the village attributes fishers' increasing incomes to the increase in motors. He said that in 2000 it was hard for a fisher to earn 50,000Rp a day. Today, that is the lower end, with 75 to 100 thousand Rp being more common. While one group of fishers reported increases in income, several other groups reported that the increases in costs, negate these increases in earnings.

The reported changes, however, can be attributed to more than just additional motors. Fishers report new markets for marine products. For example, they report that they have a new market for squid, and they have applied their considerable ingenuity to the capture of more of this species. They tie colored synthetic fibers on a length of fishing line that is weighted at one end and suspend it in an appropriate place in the nearshore water column. The color of the fiber depends on what attracts the squid's prey, as well as what will attract the squid. The fibers act as an attractant for the small organisms that squid like, and the squid begin to concentrate around the line. The fishers simply scoop the squid from the water with a scoop net. Different colored fibers are used depending on the squid's current prey.

Numbers of boats and some gears have also increased, according to the fishers. Our vessel count in 1998 indicated 71, and in 2002 we counted 93. With respect to gear, the number of *soma antoni* (flying fish nets) have increased from 10 to 30 since 2000. There have been no increases in or introductions of other, more powerful gears since 2000. For example, the number of beach seine remains the same (one) and no compressors, *funai*, *pajeko* or other powerful gears are found in the fishery.

The contrast between Boyangpante (described below) and Sapa is striking. They are separated along the coastline by only one village, Blongko, yet the trends in their fisheries are opposite. They both focus some effort fishing with *katinting* powered, small boats for pelagics around offshore FADs, but one has reduced effort while the other has increased. Granted, the reported sailing time to the FADs are shorter for the Sapa fishers (one FAD is 2 hours away and another is 4, in contrast to almost 6 for Boyangpante fishers). This can be significant for wear and tear on both the fisher and his under-powered boat, and perhaps it can account for the differences in the trends in the two fisheries. Sapa fishers, however, feel that they are simply better fishers than those from Blongko and Boyangpante whom they scorn as also being farmers. Some evidence for this may be found in their differential adaptation to the problem of reduced visibility, which makes shore-side reference points invisible from the offshore FADS. As reported below, some Boyangpante fishers have reduced their fishing at the FAD because they do not like being out of sight of land. Sapa fishers purchased compasses (2 fishers reportedly have compasses), stick close by fishers with compasses, or use the sun's direction to bring them in sight of familiar landmarks--two completely different responses.

PROJECTS: The village government has established a relationship with a bank in Amurang to obtain small loans for village residents. As a part of this process, they are also encouraging and assisting villagers to obtain certificates or letters of ownership for their land, which reportedly can be used as collateral for loans from the bank. The village secretary said that several people have already participated and obtained loans, but one group of fishers on the beach said that the program has not been implemented yet. Several other groups had

not even heard of the program, despite the fact that the village secretary said that fishers formed most of the participants.

3.3.4 Boyongpante (Blongko control site)

POPULATION: The village population was reported as 1912 in 2000. In 2002 the population dropped to 1852. The new Hukum Tua had no explanation for the change. She said that it was, perhaps, due to deaths and some people leaving.

OCCUPATIONS: Rank importance of occupations in Boyongpante are found in table 10. Farming remains the most important source of household income with fishing ranking second.

There are no *pajeko*, *funai*, beach seines or other large gears deployed by village fishers. Perhaps the most advanced gear is represented by 3 boats with compressors. The first was introduced by a fisher from Bolongmongondo who moved to Boyongpante last year (2001). Early this year, two more compressors were added to the fleet. One is owned by a Blongko fisher, but he hires his crew and fishes from Boyongpante. He was originally from Boyongpante, but he moved to Blongko when he married to a woman from there. Two of the compressor boats employ 6 spear fishers (*jubi*) each, targeting reef fish. The other targets lobster, which are held in a small cage anchored just off shore, until there is a sufficient number to justify a trip to Manado where they are sold. This boat is used for *jubi* when not targeting lobster.

Table 10. Percent distribution of occupations in Boyongpante (2002).

OCCUPATION	1st	2nd	3rd	4th	TOTAL
FISHING	10	40	15	5	70
GLEANING	--	--	15	--	15
TRADE FISH	5	10	5	--	20
FARMING	65	30	--	--	95
OTHER	20	10	--	--	30
TOTAL	100	90	35	5	

N= 20

Reportedly, there are no other new gears being used in the fishery. As a matter of fact, there has been a substantial decrease in the *katinting*, a relatively new improvement in the fleet. From a high of about 100 (reports varied between 50 and 100) in 2000, there are now less than 50--one informant said 20. Whatever the amount of decrease, there are now roughly 50 percent or fewer *katinting* today than two years ago. Other gears, e.g., nets, hook and line, etc. have, reportedly changed little. They are simply now being deployed from unmotorized *londe*. This change is allegedly attributed to a poor *cakalang* season, which some fishers blame on the amount captured by *pajeko* gear (mini purse seine). The *londe* used the *katinting* to travel for almost six hours out to sea to fish for *cakalang* around a FAD deployed by a *pajeko* owner. In addition to fewer fish, some fishers report that the *pajeko* are fishing the FADs more frequently, thus denying them access. A final, convincing reason provided is that the haze and smoke associated with the El Nino weather obscures the hills and mountains the fishers use for navigation to and from the FAD, which is relatively far out in the ocean. Traditional use rights and share systems for FADs in Minahasa are discussed in more detail in the Appendices. However, at this time, it is not recommended that any policies or formalization of FAD management systems be pursued.

NEW PROJECTS The Hukum Tua reported only two government projects since 2000. One is an Agriculture Department project directed at cultivation of rambutan, a tree which bears a popular fruit. It involved a water system for irrigation that the Hukum Tua hopes can later involve drinking water. A small kiosk was also provided to sell the fruit at the side of the Trans-Sulawesi Highway. The other government project provided 10 million Rp, 5 million for a cooperative store and 5 million for a rotating fund, which provides small business loans at low interest rates. The Kepala Jaga from Jaga 1 reported that some walkway was constructed since 2000.

The Hukum Tua said that there were no environmental conservation programs of any type. Nevertheless, Boyongpante's dark pebble beach is practically litter free. Some illegal fishing, however, has been reported (bomb and cyanide), but it is attributed to fishers from elsewhere, "...possibly Amurang." A new set of village ordinances, initiated by the former Hukum Tua, which have not been implemented and are in the process of revision, includes an environmental and a fishery ordinance among the 9 ordinances. The

environmental ordinance states that the community has an obligation to conserve the environment and has sections prohibiting tree cutting or removal of other living things from protected forest, watersheds and mangrove areas. There are provisions for fines (50,000Rp) and possible confiscation of gear used. The fishery ordinance prohibits the usual illegal, bomb, cyanide, and electrode fishing in both fresh and marine waters. Here the fine is only 25 thousand Rp, but there is also a definite provision for confiscation and destruction of gear.

3.3.5 Rumbia (Bentenan and Tumbak control village)

POPULATION: The Hukum Tua for Rumbia reported the current (2002) population of the village as 243 individuals. He is a newly elected Hukum Tua. He couldn't explain the significant drop in population compared the figure of over 400 persons in 2000 because he said he didn't have the past data. We were unable to confirm this drop in population with other key informants.

The Hukum Tua informed us that there are three new households in the village. Two households are fishers and one household is a farmer (12 individuals total) who moved from Bentenan, Motongkat (Bolaangmongondow) and Temboan respectively. The expansion of residences on the beach has been to the north where they were built around 2000. There is another new household from Langowan that did not yet register with the Hukum Tua. They live in Jaga I, and the husband works as a fisher. This information suggests a slight increase in population of approximately 15 persons in contrast to the figures provided by the Hukum Tua.

OCCUPATIONS: Rank importance of occupations in Rumbia are found in table 11. Fishing and farming are the most important occupations, with occupations in the "other" category and milkfish fry collection ranking third and fourth, respectively. The Hukum Tua stated that community income dropped slightly because of weather. Farmers cannot plant in the dry season and fish catch also dropped. Seaweed farming, present in 2000 has now been suspended because of disease. Several fishers said they plan to farm seaweed again but have been unable to find seed in the area. The Hukum Tua believes that the disease is caused by pollution from Newmont Gold Mining Corporation. However, seaweed disease has wiped out seaweed farms in several areas throughout Indonesia in the past two years. Some farmers have abandoned the lines and the floats for seaweed farming and others have retrieved their lines and have hung them in their back yards.

Table 11. Percent distribution of occupations in Rumbia (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	TOTAL
FISHING	50	35	--	10	--	95
MILKFISH FRY	--	5	--	15	15	35
GLEANING	--	--	--	--	5	5
TRADE FISH	--	5	--	--	--	5
TRADE FRY	--	--	5	--	--	5
FARMING	30	30	15	5	--	80
OTHER	20	15	25	--	--	60
TOTAL	100	95	45	30	20	

N=20

One key informant expects that the next time seaweed farming starts, anyone (a villager or non-villager) who wants to farm must register with the village government so there will be no conflict on utilization areas. He reported that previously, village government was controlling the installation of anchors and ropes. However, this policy is not supported by village ordinance.

There has been an increase in fishing effort. One *katinting* engine has been added to the fleet of four in 2000 for a total of five now. Small boats (*pelang/londe*) have increased from approximately 30 boats in 2000 to 40 now. The Hukum Tua felt that compared to 2000, bombing has declined and not even heard anymore. One fisher reported that the catch of Marlin fish has decreased because their prey fish (*malalugis*) are now abundant farther off shore. He felt that household incomes have slightly decreased compared to three years ago because of the suspension of seaweed farming. This fisher reported that bombing is still heard on average three times a week (in contrast to the opinion of the Hukum Tua) and carried out by people from Tumbak and Bentenan. Another fisher reported that bombing is still heard around Bentenan and Pakolor islands and believes it is carried out by Tumbak fishers. He also mentioned that some people still use "bori" (a poison produced by the root of a certain species of tree) to catch fish in the river particularly people from Rumbia.

Milkfish fry harvesting is still carried out even though the price is low (Rp. 15/piece). Although the price is low compared to 2 years ago (Rp. 50) they collect the fry because they have no alternative income sources.

NEW PROJECTS: There have been several development projects in the community over the past two years. There have been rice subsidies to poor families provided from Social Services Department. A satellite phone was installed with a subsidy provided from the Minahasa government. Subsidies have also been provided for simple farming equipment (hand tools) and building material for 30 substandard houses. Materials for housing subsidies included plywood, wood, tin roof, and cement for upgrading of houses constructed mainly of bamboo and nipa. The East Minahasa ring road project is still ongoing but is currently focused on bridge construction. The road has not yet reached Rumbia. However, a direct road from Bentenan to Rumbia has been bulldozed.

The community has built a spring box and small dam for water supply on their own without outside support. The village has also held bi-weekly general clean-ups including water and drainage systems and the beach area.

NEW REGULATIONS: The village is in the process of drafting a number of village ordinances that were discussed by village government officials and submitted to the BPD (Village Parliament). Proposed ordinances are as follows:

1. Contributions for village development.
2. Contributions for water supply.
3. Contributions from public transportation and boat moorings.
4. Contributions from crop trading.
5. Regulations to control livestock (cow, goat, pig).
6. Contributions for village administration
7. Contributions from land measurement
8. Regulation on protected forest including forest surrounding the spring.
9. Regulation concerning a general marine sanctuary for Rumbia. A violator engaged in coral mining will be fined Rp. 500,000. Bomb fishers or violators that use poison will be referred to the police. There is also a plan to establish DPL like in Bentenan and Tumbak.

This latter ordinance shows the diffusion of marine resources management concepts from Bentenan to Rumbia. Many of the other ordinances have themes similar to the five new ordinances recently passed in Bentenan. One fisher expressed interest in creating a marine sanctuary like in Bentenan, but he is not aware of the process to be used.

3.3.6 Minanga (Bentenan and Tumbak control village)

POPULATION: The newly elected Hukum Tua reported that the population for Jaga V (the coastal sub-village) is 66 households. He stated that the total population of Minanga I in 2001 was 359 households with 1265 individuals. The village secretary reported that in 2000, there were 1212 individuals and 353 households for the whole village. For Jaga V in 2000, he reported that there were 246 individuals in 64 households. Population increases were attributed to birth and migration. He reported that there are three new households in the village. One fisher reported that three new households moved from inland sub-villages to the coastal sub-village. He also mentioned four new households built on the north side of the Jaga V toward Tumbak. The head of the coastal sub-village (*Kepala Jaga*) said there are 62 households in Jaga V (coast) with no record on individuals. He said that there is one new household from Manado, two households from inland sub-villages, and no one moved out of the village. In sum, while there is some disagreement with regard to exact numbers, the population of the coastal jaga increased only slightly over the past two years.

OCCUPATIONS: Rank importance of occupations in Minanga are found in table 12. Fishing, trading of fish, and farming are the most important sources of income. A surprising 75 percent of the households also listed a variety of occupations that are lumped into the "other" category. These other sources of income include animal husbandry, selling ice, harvesting coconuts, small shop keeper, construction worker,

daily laborer, and remittances. Generally, the Hukum Tua felt that people's incomes decreased slightly because of the severe dry season this year (2002). The rice fields were dry for three months, and fishers could not fish for about three months because of the strong south winds and high waves. The village secretary also reported that community incomes dropped slightly because of the dry season. Rice fields are still productive even though less water has been supplied due to the drought. Copra and cloves have been less productive due to the drought. He felt that fisheries are about the same as before. While there was a seasonal interruption due to strong south winds, the winds have now shifted from the north and fishers are starting to go out again.

The Kepala Jaga V reported that economic conditions have improved slightly (in contrast to the Hukum Tua). In year 2000 only three *katinting* were owned by the fishers. Today the number has increased to 20. There is also a new *pajeko* boat owned by a fisher in the coastal sub-village. It began operations in 2001 with 13 crewmembers from Minanga. The number of *soma dampar* (beach seine) have not increased from the three observed earlier. In 1998 there were 49 small *pelang*, 10 large *pelang* and 7 *londe*. Today this has increased to 60 small boats. There are 10 small *pelang* and another 10 *londe* that were modified to a larger size so that they could be outfitted with *katinting* engine. Milkfish fry are still collected and sold to a broker in Minanga at a price of Rp. 15/fry.

Table 12. Percent distribution of occupations in Minanga (2002).

OCCUPATION	1st	2nd	3rd	4th	5th	6th	TOTAL
FISHING	65	20	5	5	--	--	95
MILKFISH FRY	--	5	10	--	--	--	15
TRADE FISH	20	30	20	--	--	5	75
TRADE FRY	5	--	--	--	--	--	5
PROCESS FISH	--	--	5	--	--	--	5
FARMING	--	25	30	5	--	--	60
OTHER	10	15	10	25	10	5	75
TOTAL	100	95	80	35	10	10	

N=20

Seaweed farming stopped in 2000 because of wave action, too open a location and disease. They want to start farming again if they can get seed. The rope and some of the buoys are still hanging in the water. Previously, fishers could plant seaweed freely wherever they wanted without permission from village government. However, the Hukum Tua stated his desire for the village government to design a village ordinance regulating location and size of seaweed plantings. This is a result of previous conflicts experienced among fishers and seaweed farmers, especially complaints concerning boat entry lanes to the village being restricted by seaweed farms as well as disputes over rights to seaweed farm locations. The Kepala Jaga V reported that ex-seaweed farmers have shifted to fishing in offshore waters. Some of them became *pajeko* crew.

NEW PROJECTS: There have been several development projects in the village. A Sub-District Development Project (PPK) for road construction and road hardened with gravel and sand was implemented along a two km. stretch of road. Also road culvert construction initiated in July 2002 has been completed. The PPK funds were just for road hardening, but the community provided funds to buy cement for culvert construction and contributed labor. The total PPK budget was Rp. 115,000,000 with a 10 percent community self-support contribution.

Village office construction was also initiated with a community self-support subsidy of Rp. 100 million for the building and the land. An office for the coastal sub-village of Jaga V is under construction. The Social Services Department provides rice subsidies for 97 poor households every month. The community proposed to add supply for 100 households. The 97 poor households are supposed get 20 kg / each but obtain only 15 kg so that subsidies can be provided to other unregistered poor households. Like all other villages in Minahasa, a satellite phone from the Minahasa Government has been provided to the village.

NEW REGULATIONS: Several new village ordinances have been established in the village:

1. Contributions of Rp. 1000/household/month for honorarium for village officials and a transport fee for the Hukum Tua and other village officials.
2. Peace and order to prevent crime.
3. Regulation to control livestock from roaming freely
4. Contributions from small shops (e.g. canteen - Rp. 10.000/month) but this has not been implemented yet.

5. Restrictions on burning the forest or farmland and restrictions on destructive activities in fishing (e.g. bomb fishing), but not yet implemented.

The Hukum Tua mentioned that most of the ordinances have not yet been implemented because they are still new. However, he stated that they are planning on their gradual implementation. The Kepala Jaga V said that bomb fishing is still practiced by people from Tumbak especially during the season when there are many small pelagic fish near the patch reef in Minanga waters. He stated that on average, bomb fishing occurred three times a week since July 2002. The village secretary felt that law enforcement is not effective because the police do not cite offenders if the bombers give them fish for daily subsistence.

The beach in Minanga is quite dirty at the upper highest tidemark. Woodchips from the construction of dug out boats as well as inorganic material is distributed along the beach.

4. PROJECT IMPACTS

Coastal resource management projects like Proyek Pesisir require a great deal of human and financial resources for their design and implementation. For example, the North Sulawesi component of Proyek Pesisir cost over $200,000 annually in terms of financial investment and involved more than a dozen staff over the past 7 years. Additionally, scores of villagers in the project communities contributed their time and efforts to achieve project goals. It is easy to describe the activities carried out, numbers of participants, and costs. The really important questions, however, involve impacts. What changed in the communities as a result of Proyek Pesisir activities? Where was the project successful and where did it fail? What other, non-project factors contributed to the successes and failures? It is only by answering questions such as these that we can learn to replicate successes and avoid failures in future projects.

In preparation for evaluating the project in such a manner that we could answer these questions, we designed a project that included an initial rapid assessment of coastal villages in Minahasa (Pollnac, et al. 1997), baseline assessments of targeted project and control villages (see a list of reports in Appendix IV), mid-project monitoring assessments (see Appendix IV), and the final evaluation presented here.[2] Control villages were assessed in an attempt to control for effects of macro-changes (e.g., climate, political, economic) that might have confounding effects on village-level project impacts. Assessments at the various stages from baseline to post-evaluation were conducted with the use of sample survey methodology in the project and control villages. The senior male and female in each randomly selected household were interviewed, and their responses to the questions were recorded for analysis. Questionnaires used in the project and control sites are contained in Appendices VIII and IX.

Impacts evaluated include material style of life (an indicator of income), perceptions of changes in household well-being, beliefs about coastal resources, attitudes toward and changes in occurrence of destructive fishing methods, and perceptions of post-management plan changes in a set of resource, management, and family well-being variables. We also examine project participation and knowledge at the individual level as an impact variable intermediate between project activities and ultimate impacts at the household and village environment levels. Finally, information concerning respondents' age, education, religion, and gender were recorded to determine if any of these variables influenced project participation and or impact. The remainder of this section of the report examines these impacts.

4.1 Project Participation and Knowledge

4.1.1 Cross Community Analyses

Respondents were asked several questions concerning project knowledge and participation. Turning first to the simple, yes/no questions, they were asked; 1) if they had heard of Proyek Pesisir, 2) if they knew an ordinance was approved establishing an MPA in their community, 3) if they ever had informal discussions with extension officers or field assistants concerning project activities, 4) if they participated in project activities, 5) if they participated in management plan development activities, 6) if they participated in MPA establishment, and 7) if they belonged to an organization associated with project activities. Percent of respondents responding "yes" to these questions is indicated in table 13.

Table 13. Percent distribution of "yes" responses concerning Proyek Pesisir knowledge and participation.

	Bentenan	Tumbak	Blongko	Talise	Total
Heard of Proyek Pesisir	95.0	98.8	98.8	92.5	96.3
Know about MPA ordinance	88.8	98.8	95.0	78.8	90.4
Interact with field staff	76.3	68.8	42.5	51.3	59.7
Participate in project	75.0	92.5	36.3	55.0	64.7
Participate in management plan	23.8	27.5	20.0	38.8	27.5
Participate in MPA development	31.3	30.0	21.3	31.3	28.4
Member of project organization	29.5	17.5	6.3	18.8	17.9
N	80	80	80	80	320

[2] For an overview of methods used see Pollnac and Crawford (2000).

Ninety-six percent of respondents in the 4 project villages report that they had heard of Proyek Pesisir. Differences between the villages with respect to this question are minimal and not statistically significant. In terms of knowledge concerning an MPA ordinance in their village, almost all the respondents in Blongko and Tumbak are aware of the ordinance, and the lowest level of awareness is in Talise. Between community differences in response patterns to this question are statistically significant (χ^2=20.967, df=3, p<0.001). This difference cannot be fully accounted for by time of establishment of the MPA because although Blongko was the earliest, the MPAs at Tumbak and Talise were established at almost the same time. The MPA at Bentenan was just established.

There are also statistically significant differences in interaction with field staff across the four villages (χ^2=24.040, df=3, p<0.001). Bentenan manifests the greatest percentage of respondents who had discussed project activities with field staff, and Blongko the lowest. Project participation has the greatest variance across the various villages, with a maximum of 92 percent in Tumbak and a low of 36 percent in Blongko (χ^2=14.547, df=3, p=0.002). With regard to specific activities, there are significant differences with respect to project organization membership (χ^2=20.967, df=3, p<0.001). Thirty percent of respondents from Bentenan claimed membership in contrast to a little less than 20 percent in Tumbak and Talise and only 6 percent in Blongko. Statistically significant differences also exist with respect to participation in management plan development (χ^2=7.900, df=3, p0.048), with a high of 39 percent in Talise and a low of 20 percent in Blongko. Differences in participation in MPA development are not statistically significant (χ^2=2.749, df=3, p>0.05).

Several other indices of project knowledge and participation formed part of or were constructed from information derived from the survey instrument. Respondents were requested to list the coastal resource and management activities going on in their village. The number of activities mentioned is used as an index of knowledge of village CRM activities. They were also asked the purpose of and rules associated with a MPA. The number of purposes and rules mentioned were used as two separate indices. The number of Proyek Pesisir related organizations the respondent belonged to is also used as a participation index.

Additional indices were constructed by combining some of the basic indicators. For example, a project participation index was constructed by assigning a positive one value to a "yes" response to the questions concerning the following: 1) if they ever had informal discussions with extension officers or field assistants concerning project activities, 2) if they participated in project activities, 3) if they participated in management plan development activities, and 4) if they participated in MPA establishment. These values were summed for each respondent and added to the total number of Proyek Pesisir organizations joined. This summary measure is referred to as the project participation index.

A project knowledge index was created by assigning a value of one to positive responses to the questions concerning if the respondent heard of Proyek Pesisir and if they knew that an MPA ordinance had been established for their community. These values were summed and added to the total number of CRM activities they knew of in their village. This summary measure is referred to as the project knowledge index.

An MPA knowledge index was constructed by summing the total number of purposes of an MPA mentioned, the total number of MPA rules mentioned, and the response to the question concerning if they knew that their village had an MPA ordinance (yes=1, no=0). Finally, respondents were requested to indicate their degree of participation in specific project activities. The project activities investigated varied from village to village and the lists can be found in tables 14 through 17.

Each respondent was requested to indicate degree of involvement in each activity according the following categories: Frequently, sometimes, rarely and never. Values 3, 2, 1 and 0 were assigned to the respective responses. A level of participation index was created for each respondent by summing these values for all activities investigated. Since the number of activities varied from village to village, it was necessary to weight the summary measure so that a village with a larger number of activities would not appear to have a greater level of participation. This was accomplished by dividing the total score for each respondent in each village by the number of activities in their village. This resulted in an index that theoretically varies between 0 and 3, with a value of 0 indicating no participation in any of the activities and 3 indicating frequent participation in all the activities.

Table 14. Percent distributions of frequency of participation in various project activities in Bentenan.

Activity	No	Rare	Some	Freq
Managing coral reefs	76	10	14	0
Managing water supply & facilities	49	25	25	1
Manage flooding/erosion in swamps/estuaries	69	16	15	0
Improve environmental sanitation & health	31	51	18	0
Develop public tourism	95	3	3	0
Improve community awareness & education	54	26	19	1
Improve fisheries and farming production	64	25	10	1
Manage seaweed farming and sea space areas	73	16	11	0

Row totals may not equal 100 due to rounding

Table 15. Percent distributions of frequency of participation in various project activities in Tumbak.

Activity	No	Rare	Some	Freq
Managing coral reefs	58	20	23	0
Managing water supply & facilities	34	30	34	3
Improve road infrastructure	41	33	24	3
Manage flood prone areas	68	15	15	3
Improve community health & sanitation	19	53	24	5
Develop public tourism	98	1	0	1
Improve community awareness & education	65	13	21	1
Managing mangroves	46	36	16	1
Improving fisheries and aquaculture	60	23	15	3

Row totals may not equal 100 due to rounding

Table 16. Percent distributions of frequency of participation in various project activities in Blongko.

Activity	No	Rare	Some	Freq
Managing marine sanctuary	86	5	6	3
Coral reef, mangrove, seagrass protection	79	8	13	1
Increase community incomes	91	5	4	0
Raise environmental protection awareness	80	11	9	0
Improve community health & sanitation	53	29	18	1
Prevent coastal erosion & stream flooding	49	29	21	1
Improve community livelihood & production	75	11	14	0
Reduce land & farm erosion/sedimentation	54	25	21	0

Row totals may not equal 100 due to rounding

Table 17. Percent distributions of frequency of participation in various project activities in Talise.

Activity	No	Rare	Some	Freq.
Land tenure	53	16	16	15
Sea use conflicts	73	9	8	11
Forest management	75	9	6	10
Protection of wildlife	81	6	6	6
Erosion control	50	23	11	16
Drinking water supply	76	9	8	8
Improved sanitation	24	43	28	6
Human resources development	63	15	10	13
Improved farming practices	86	4	5	5
Coral reef & mangrove management	56	16	15	13
Tourism development	96	0	3	1
CRM awareness	69	10	13	9

Row totals may not equal 100 due to rounding

Tables 14 through 17 provide an indication of the degree of participation in the various project activities within each community. In Bentenan the activity with the most respondents indicating no participation is development of public tourism; the activity with the most individuals indicating participation is improvement of environmental sanitation and health. Activities manifesting least and most participation for Tumbak are basically the same—development of public tourism and improvement of community health and sanitation respectively. In Blongko the activity with the least participation is improvement of community incomes and the one with the most is prevention of coastal erosion and stream flooding. Finally Tourism development manifests least participation in Talise and improved sanitation the most. Overall, improvements in sanitation manifest relatively high rates of participation in all the communities, and tourism activities the least. Tables 14 through 17 should be consulted for more details about specific activities.

Differences in mean values for the 8 indices discussed above can be found in Table 18. Analyses of variance across the four project villages for each of the indices indicates that there are statistically significant differences for all except number of MPA purposes mentioned. Table 18 indicates that Talise is lowest with respect to number of CRM activities mentioned while Blongko is highest. Talise is also lowest with regard to number of MPA purposes and rules mentioned (Tumbak is highest on both), and the project and MPA knowledge indices (Blongko is highest on the former and Tumbak on the latter). Overall Talise is lowest on 5 of the 8 measures and highest on none.

Table 18. Analyses of variance of differences in mean project participation and knowledge indices across project villages.

	Bentenan	Tumbak	Blongko	Talise	F-ratio	Prob.
Number of CRM activities mentioned	1.15	0.91	1.46	0.89	6.876	<0.001
Number of MPA purposes mentioned	1.08	1.30	1.08	0.98	2.256	0.082
Number of MPA rules mentioned	2.33	2.81	2.73	2.13	4.622	0.004
Number of organizations joined	0.46	0.23	0.06	0.20	6.754	<0.001
Project participation index	2.53	2.41	1.26	1.96	9.388	<0.001
Project knowledge index	2.99	2.89	3.40	2.60	7.712	<0.001
MPA knowledge index	4.29	5.10	4.75	3.89	5.733	0.001
Level of participation index	0.51	0.69	0.44	0.63	5.219	0.002

N=320 df=3 316 for all F-ratios

Blongko scores lowest on three indices: number of organizations joined, project participation index, and the level of participation index. Bentenan scores highest on the former two and Tumbak on the latter. Neither Tumbak nor Bentenan score lowest on any measure. Bentenen scores highest on two (number of organizations joined and the project participation index) and Tumbak on four (number of MPA purposes and rules mentioned and the project and MPA knowledge indices.

While it is clear that there are inter-village differences in project participation and knowledge an important question to be answered is, "who participates?" There is a long history of research that makes it clear that certain socioeconomic characteristics might be related to project participation (e.g., Rogers 1995). Formal education has long been noted as a variable variously influencing behavior, with the more highly educated more likely to participate in new activities and acquiring new information. It has long been noted that younger people are more likely to become involved in new activities; hence, we would expect that project participation would be negatively correlated with age. The division of labor by gender in many societies impacts participation as well. For example, in societies where women's work is strictly defined and limited, if the project activities fall outside these limits, female participation may be minimal or absent. Religion may have an influence on participation in several ways. In most Islamic societies adult females tend to avoid interaction with males outside their family and tend to have strictly defined roles, including allowable activities. This may influence their participation in project activities, as we hypothesized for our findings in Bentanan and Tumbak in 2000 (Pollnac, et al. 2001). Additionally, exchange of information occurs most frequently and effectively between

individuals who are similar (Rogers 1995), suggesting that religion of the extension officer may influence the frequency and effectiveness of his or her interactions with community members concerning project activities.

Different household sizes may also influence participation. This relationship can go either way. For example, individuals from large households may find it easier to participate because someone else in the household might perform duties such as child care, farming, or fishing while the senior members of the household attend project meetings, etc. Conversely, those with large households may have to spend so much time taking care of household members and working to obtain additional funds to support a large household. Hence, our examination of this variable is exploratory in nature. Finally, a household's primary source of income may influence participation due to incompatible work hours or interest in community affairs. For example, fishers often find it hard to participate in shore side activities due to the odd and variable hours that characterize their job. Conversely, fishers or farmers may have a greater interest in participating in project activities that may directly influence resources they exploit.

Formal education, age, religion, number of household members and gender are measured by direct questions in the interview form. Degree of dependence on farming and fishing are determined by their reported rank importance in household income. Occupations ranked 1st are assigned a score of 3, 2nd a score of 2, and 3rd or more, a score of 1. If the occupation does not contribute to household income, it is assigned a score of zero. Correlations between these independent variables and the various project participation and knowledge indices are in table 19. Table 19 also includes the project villages, which were coded as dummy variables, since the analyses above indicated that there are inter-village differences.

Table 19. Correlations between independent variables and project participation and knowledge indices in all project villages.

Independent Variable	Participation index	Participation level	Project knowledge index	MPA knowledge index
Education	0.266***	0.145**	0.273***	0.351***
Gender male	0.273***	0.037	0.101	0.234***
Age	0.033	-0.017	-0.048	-0.121*
Christian	-0.200***	-0.082	0.045	-0.045
Household size	0.122*	0.100	0.037	0.011
Fishing	0.108	0.108	-0.077	0.057
Farming	-0.140*	-0.132*	-0.002	-0.066
Bentenan	0.161**	-0.070	0.010	-0.063
Tumbak	0.124*	0.159**	-0.043	0.170**
Blongko	-0.259***	-0.164**	0.227***	0.070
Talise	-0.026	0.075	-0.194***	-0.177**

N=320 ***=p<0.001 **=p<0.01 *=p<0.05

It is clear in table 19 that years of formal education is the most important predictor of project participation and knowledge as measured by the indices used. Formal education is statistically significantly correlated with all four indices, manifesting some of the highest correlations in the table. The analysis also indicates that males tend to participate more and have greater knowledge about MPAs. Age is weakly, but statistically significantly related to MPA knowledge. Older individuals tend to have less knowledge about MPAs than younger. Christian religion and farming are negatively related to the participation index. Farming is also negatively related to participation level. Household size is positively related to the participation index, indicating that those from larger households tend to participate more. Turning to the village dummy variables, Bentenan and Tumbak are positively related to the participation index. Tumbak is also positively related to participation level and the MPA knowledge index. In contrast, Blongko manifests a negative relationship with both participation indices, indicating that Blongko manifests a lower level of participation than the other villages. Blongko, however, manifests a statistically significant positive relationship with the project knowledge index. Finally, Talise manifests negative correlations with both knowledge indices, indicating that residents of Talise tend to score lower on these indices than respondents from the other villages.

The next question concerns the relative importance of the predictor variables in terms of their individual and combined ability to account for variance in the project participation and knowledge indices. This can be accomplished with regression analyses, and most efficiently with stepwise regression analysis. In the

application used here, all independent variables (the independent variables in table 19) are intercorrelated with the dependent variable (the specific project participation and knowledge index). The one with the highest correlation (the one that explains the most variance in the project participation and knowledge index) is entered first into the multiple regression equation. Then the effects of the entered variable are controlled, and the variable with the highest partial correlation with the project participation and knowledge index is entered into the equation. The R^2 (squared multiple correlation coefficient, which is equal to the amount of variance explained in the project participation and knowledge index) for the two independent variables and the dependent is then calculated. The next step enters the independent variable that has the highest partial correlation with the project participation and knowledge index controlling for variables already entered. This stepwise procedure is continued until some pre-set criterion is reached. In this case the criterion was that the variable to be entered has a $p < 0.05$. Another criterion was that upon the entry of each new variable into the equation, variables already entered whose beta coefficient dropped below the criterion of $p<0.05$ were dropped from the equation. Partial correlations were carefully examined at each step to insure that multi-collinearity did not have an effect on the analysis. The results of these analyses for the four project participation and knowledge indices can be found in Table 20.

Table 20 indicates that five of the independent variables account for 22 percent of the variance in the Participation Index. This is a relatively modest amount, but statistically significant. As indicated by the standardized beta coefficient, education accounts for the most variance, followed by gender male. Blongko also accounts for a fair amount of variance, but it is negatively weighted, meaning that Blongko has a negative impact on the participation index. Being a Christian also impacts this index negatively, but the relationship is relatively weak, although statistically significant. Finally, age manifests a relatively weak, statistically significant relationship with the Participation Index.

Three variables account for a relatively low, although statistically significant amount of variance in the Participation Level measure. Once again, education contributes the greatest amount of positive variance (it is the only variable with a positive beta coefficient), while coming from either Blongko or Bentenan has a negative impact on the participation level measure.

Only two independent variables account for 12 percent of the variance in the Project Knowledge Index. Most of the variance is contributed by years of formal education, followed closely by Blongko residence.

Table 20. Stepwise regression analyses of project participation and knowledge indices (N=320).

TOTAL SAMPLE

DEPENDENT VARIABLE: PARTICIPATION INDEX

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.317	<0.001
Gender male	0.237	<0.001
Age	0.117	0.033
Christian	-0.145	0.011
Blongko	-0.206	<0.001
R=0.49 R^2=0.0.24 Adj. R^2=0.22	F=19.309	p < 0.001

DEPENDENT VARIABLE: PARTICIPATION LEVEL

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.174	0.002
Blongko	-0.227	<0.001
Bentenan	-0.167	0.004
R=0.27 R^2=0.07 Adj. R^2=0.07	F=8.455	p < 0.001

DEPENDENT VARIABLE: PROJECT KNOWLEDGE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.264	<0.001
Blongko	0.216	<0.001
R=0.35 R^2=0.12 Adj. R^2=0.12	F=21.830	p < 0.001

DEPENDENT VARIABLE: MPA KNOWLEDGE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.347	<0.001
Gender male	0.226	<0.001
Importance of fishing	0.110	0.049
Blongko	0.154	0.005
Tumbak	0.177	0.001
R=0.47 R^2=0.22 Adj. R^2=0.21	F=17.872	p < 0.001

Finally, five variables account for about one-fifth (21 percent) of the variance in the MPA Knowledge Index. Once again education contributes most, followed by gender male, Tumbak residence, Blongko residence, and importance of fishing in descending order of importance.

4.1.2 Within Community Analyses

All the villages manifested statistically significant relationships with at least one of the project participation or knowledge indices (tables 19 and 20), and at least one village dummy variable is found in each statistically significant regression equation. These statistically significant correlations may be the result of inter-village differences in the predictor variables and or relationships between the predictor variables and the indices. As a first step in exploring these differences, we will examine the distribution of the predictor variables across the four villages. The result of this analysis for education, age, and family size can be found in Table 21. Table 21 indicates that respondents in the sample from Talise have the lowest levels of education, while those from Bentenan have the highest. Blongko has the lowest household size and Tumbak the largest. The inter-village differences are statistically significant for both of these variables. Age does not vary significantly across the four project villages.

Table 21. Analysis of inter-village differences in age, education, and family size.

	Bentenan	Tumbak	Blongko	Talise	F-ratio	p
Education years	7.64	7.16	7.20	5.95	4.468	0.002
Age	41.29	38.85	41.93	42.93	1.464	0.224
Household size	4.45	5.25	4.03	4.78	8.354	<0.001
N	80	80	80	80		

df=3 316 for all F-ratio analyses

Inter-village differences in relative importance of fishing and farming to household income can be found in tables 22 and 23. In these tables, rank 1 indicates the indicated occupation is ranked first in importance, 2 indicates second in importance, and 3 indicates third or less in importance. Zero indicates that the indicated occupation does not contribute to household income.

The villages differ quite a bit with respect to the distribution of the relative importance of fishing. Most community members in both Tumbak and Talise depend on fishing as the first or second most important source of household income. Bentenan and Blongko depend the least on fishing. These intercommunity differences are statistically significant.

Table 22. Percent distribution of relative importance of fishing to household income across project villages.

	Bentenan	Tumbak	Blongko	Talise
None	40.0	7.5	45.0	17.5
Rank >2	12.5	7.5	27.5	10.0
Rank=2	12.5	35.0	17.5	25.0
Rank=1	35.0	50.0	10.0	47.5
Total	100	100	100	100
N	80	80	80	80

χ^2=92.272 df=9 p<0.001

Bentenan and Tumbak depend least on farming for household income. Tumbak depends the least, and Blongko depends the most on farming. The inter-villages differences in dependence on farming are also statistically significant.

Table 23. Percent distribution of relative importance of farming to household income across project villages.

	Bentenan	Tumbak	Blongko	Talise	Total	N
None	40.0	87.5	7.5	22.5	39.4	126
Rank >2	17.5	7.5	27.5	27.5	20.0	64
Rank=2	15.0	5.0	25.0	30.0	18.8	60
Rank=1	27.5	0.0	40.0	20.0	21.9	70
Total	100	100	100	100	100	
N	80	80	80	80		320

χ^2=131.025 df=9 p<0.001

Finally, turning to inter-community differences in religious preference, we find that Tumbak has the greatest percentage of Muslims and Blongko the least. Bentenen and Talise are approximately evenly split between Christians and Muslims. These inter-village differences in religious preference are statistically significant (table 24).

Table 24. Percent distribution of religion across project villages.

	Bentenan	Tumbak	Blongko	Talise	Total	N
Islamic	45.0	100.0	10.0	48.8	50.9	163
Christian	55.0	0.0	90.0	51.3	49.1	157
Total	100	100	100	100	100	
N	80	80	80	80		320

χ^2=131.984 df=3 p<0.001

The inter-village differences with respect to the predictor variables suggest that intra-village analyses of the project participation and knowledge information may enhance our understanding of both inter-individual and inter-village differences with respect to implementation of project activities. The following sections examine these relationships within each project village.

Bentenan:

Table 25. Correlations between independent variables and project participation and knowledge indices in Bentenan.

	Participa-tion index	Participa-tion level	Project knowledge index	MPA knowledge index
Education	0.169	0.145	0.163	0.457***
Gender male	0.397***	0.257*	-0.010	0.324**
Age	-0.009	-0.097	-0.103	-0.176
Christian	-0.453***	-0.385***	-0.217	-0.162
Household size	0.121	0.065	0.177	0.060
Fishing	0.237*	0.376**	-0.009	0.113
Farming	-0.268*	-0.322**	-0.213	-0.092

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

Correlations between independent variables and project participation and knowledge indices for Bentenan are in table 25. Within the Bentenan sample, which has the highest overall number of years of formal education (table 9), education is only related to the MPA Knowledge Index. This contrasts with the total sample analysis where education is related to all the indices. However, the strength of the correlation is relatively high. Relationships between gender and project participation are stronger in Bentenan than the total sample, suggesting that some factors influence more male participation in the village. None of the relationships between age and the four indices are statistically significant, which is similar to the total sample where only one index is statistically significantly related to age, but at a very low level.

Religion manifests a relatively strong relationship with the two project participation indices in Bentenan, the negative relationship with Christian indicating that Muslims participate more. It is interesting that we find similar relationships between importance of farming to household income and the two participation indices. However, the relationships between the importance of fishing and the two participation indices are in the opposite direction. This suggests that there may be a relationship between religious preference and the relative importance of fishing and farming to household income. The analyses presented in tables 26 and 27 support this hypothesis. The correlation between religious preference and the importance of farming to household income is relatively strong (contingency coefficient, C=0.58) and statistically significant—Christians are more likely to depend on farming than Muslims. The relationship is in the opposite direction for fishing—Muslims are more likely to depend on fishing than Christians. Finally, household size manifests no statistically significant relationships with any of the four indices. It is interesting to note that none of the independent variables are statistically significantly correlated with the Project Knowledge Index.

Table 26. Percent distribution of relative importance of fishing to household income across household religious preference.

	Islamic	Christian	Total	N
None	11.1	77.3	47.5	38
Rank >2	22.2	18.2	20.0	16
Rank=2	33.3	4.5	17.5	14
Rank=1	33.3	0.0	15.0	12
Total	100	100	100	
N	36	44		80

χ^2=42.452 df=3 p<0.001 C=0.59

Table 27. Percent distribution of relative importance of farming to household income across household religious preference.

	Islamic	Christian	Total	N
None	72.2	13.6	40.0	32
Rank >2	22.2	13.6	17.5	14
Rank=2	5.6	22.7	15.0	12
Rank=1	0.0	50.0	27.5	22
Total	100	100	100	
N	36	44		80

χ^2=39.716 df=3 p<0.001 C=0.58

Once again, step-wise multiple regression was used to determine the combinations of independent variables that impact project participation and knowledge. The analyses were conducted only for indices statistically significantly related to at least two of the independent variables. The results of these analyses can be found in table 28. Table 28 indicates that three of the independent variables—education, gender, and religious preference—account for 38 percent of the variance in the Project Participation Index. The zero-order correlation between education and the Project Participation Index was not statistically significant (table 25), but

when the effects of religious preference are controlled, the partial correlation increases to 0.25 (p=0.02). When the effects of gender are also controlled, the correlation increases only slightly (0.26; p=0.02), but the probability is still less than 0.05; hence, education is entered into the regression equation. Two variables, gender and religious preference account for 19 percent of the variance in the Participation Level Index. Finally, education, gender, and religious preference account for almost one-third (32 percent) of the variance in the MPA knowledge index—a modest, but respectable amount.

Table 28. Stepwise regression analyses of project participation and knowledge indices in Bentenan (N=80).

DEPENDENT VARIABLE: PARTICIPATION INDEX

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.207	0.023
Gender male	0.387	<0.001
Christian	-0.478	<0.001

R=0.64 R^2=0.41 Adj. R^2=0.38 F=17.245 p < 0.001

DEPENDENT VARIABLE: PARTICIPATION LEVEL

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.257	0.013
Religion	-0.385	<0.001

R=0.46 R^2=0.21 Adj. R^2=0.19 F=10.483 p < 0.001

DEPENDENT VARIABLE: MPA KNOWLEDGE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.468	<0.001
Gender male	0.302	0.002
Christian	-0.217	0.023

R=0.59 R^2=0.35 Adj. R^2=0.32 F=13.462 p < 0.001

Tumbak: Correlations between independent variables and project participation and knowledge indices for Tumbak are in table 29. Religious preference is not an independent variable in the Tumbak sample because all respondents are Muslim. Formal education is related to the Project Participation Index and both the project knowledge indices. The relationship is positive indicating that more education results in greater project participation and knowledge. Gender is positively related to the Project Participation and MPA Knowledge Indices, indicating, once again, that some factors influence more male involvement in project activities. The Participation Level Index is statistically significantly related to only one independent variable in Tumbak—relative importance of fishing to household income. In Tumbak, the more important fishing is, the lower the level of participation. Finally, age, household size, and relative dependence on farming are not related to any of the project knowledge or participation indices in Tumbak.

Table 29. Correlations between independent variables and project participation and knowledge indices in Tumbak.

	Participation index	Participation level	Project knowledge index	MPA knowledge index
Education	0.354**	-0.092	0.226*	0.314**
Gender male	0.338**	-0.132	0.032	0.310**
Age	0.159	0.084	-0.082	-0.111
Household size	-0.001	-0.110	0.087	-0.049
Fishing	-0.048	-0.251*	0.038	0.029
Farming	-0.031	0.049	-0.012	0.044

N=80 **=p<0.01 *=p<0.05

Stepwise multiple regression was used to determine the combinations of independent variables that impact project participation and knowledge in Tumbak. The analyses were conducted only for indices statistically significantly related to at least two of the independent variables. The results of these analyses can be found in table 30. As expected from our examination of the zero-order correlation analyses, education and gender are the principal determinants of project participation and knowledge in Tumbak. These two variables, together, account for 21 and 17 percent of the variance in the Project Participation and MPA

Table 30. Stepwise regression analyses of project participation and knowledge indices in Tumbak (N=80).

DEPENDENT VARIABLE: PARTICIPATION INDEX

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.340	0.001
Gender male	0.323	0.002

R=0.48 R^2=0.23 Adj. R^2=0.21 F=11.496 p < 0.001

DEPENDENT VARIABLE: MPA KNOWLEDGE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.301	0.004
Gender male	0.297	0.005

R=0.43 R^2=0.19 Adj. R^2=0.17 F=8.837 p < 0.001

Knowledge Indices, respectively. These relatively modest findings are statistically significant.

Blongko: Correlations between independent variables and project participation and knowledge indices for Blongko are in table 31. Blongko differs from the other project villages in terms of the usefulness of the independent variables for predicting project participation and knowledge. Only one independent variable—degree of household dependence on fishing—is statistically significantly correlated with any of the project participation and knowledge indices. And it is only correlated with one—the Project Participation Level Index. Since only one independent variable is related to the indices no regression analyses are conducted.

Table 31. Correlations between independent variables and project participation and knowledge indices in Blongko.

	Participation index	Participation level	Project knowledge index	MPA knowledge index
Education	0.193	0.097	0.177	0.194
Gender male	0.067	-0.044	0.078	0.175
Age	0.086	0.070	0.040	-0.148
Christian	0.086	0.186	0.055	-0.093
Household size	0.155	0.049	0.038	-0.066
Fishing	0.180	0.262*	-0.043	0.119
Farming	0.147	0.114	-0.059	-0.039

N=80 *=p<0.05

Talise: Two of the sub-villages of Talise are located on a very small island just offshore from the main island of Talise. These sub-villages, known as Kinabohutan, are very distinct in terms of a differential emphasis on fishing and farming (tables 32 and 33) and religious preference. Kinahobutan places less emphasis on farming, more on fishing, and 97.5 percent of its inhabitants are followers of Islam while the respondents from other sub-villages of Talise are 100 percent Christian. Because of these differences, we have used Kinabohutan as a dummy variable in our analyses to see if there are any differences that can be attributed to the cultural differences between these distinct sectors of the village of Talise.

Table 32. Percent distribution of relative importance of fishing to household income Talise Dusun 1 and 2 versus Kinabohutan

	Talise	Kinabohutan	Total	N
None	35	0	17.5	14
Rank >2	20	0	10.0	8
Rank=2	30	20	25.0	20
Rank=1	15	80	47.5	38
N	40	40		80

χ^2=40.589 df=3 p<0.001 C=0.58

Table 33. Percent distribution of relative importance of farming to household income Talise Dusun 1 and 2 versus Kinabohutan

	Talise	Kinabohutan	Total	N
None	15	30	22.5	18
Rank >2	30	25	27.5	22
Rank=2	20	40	30.0	24
Rank=1	35	5	20.0	16
N	40	40		80

χ^2=13.848 df=3 p=0.003 C=0.38

Correlations between independent variables and project participation and knowledge indices for Talise are in table 34. It is revealing that in Talise, where we found the lowest average years of formal education (table 21), education appears to be the most important predictor of project participation and knowledge. Education is significantly (p<0.001) related to all four indices, indicating that respondents with higher levels of education tend to participate and know more about Proyek Pesisir. Gender is significantly related to the Project Participation and Knowledge Indices, once again indicating that in some villages there are factors that result in males tending to participate and know more about the project. Finally, in contrast to Blongko and Bentenan, and similar to Tumbak, the degree that fishing contributes to

Table 34. Correlations between independent variables and project participation and knowledge indices in Talise.

	Participation index	Participation level	Project knowledge index	MPA knowledge index
Education	0.402***	0.426***	0.429***	0.391***
Gender male	0.307**	0.093	0.304**	0.184
Age	-0.004	-0.089	-0.051	-0.006
Christian	0.193	0.367**	0.009	0.244*
Kinabohutan	-0.207	-0.400***	0.021	-0.254*
Household size	0.046	0.193	0.072	0.031
Fishing	-0.158	-0.314**	0.131	0.006
Farming	0.132	0.055	0.043	0.120

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

household income is negatively related to the Project Participation Level Index. It should be noted that the correlations of Kinabohutan with the indices are almost the mirror image of the correlations with Christian (e.g., one is negative where the other is positive at similar levels). This is due to the differences in religious preference between Kinabohutan and the rest of Talise; hence, it will be impossible to separate the effects of these two variables.

Once again, stepwise multiple regression is used to determine the combinations of independent variables that impact project participation and knowledge in Talise. Results of these analyses are in table 35. Education is once again the principal predictor of the project participation and knowledge indices. There is no multiple regression presented for the MPA Knowledge Index due to the fact that once education was entered into the regression equation, the partial correlations for religious preference and Kinabohutan reduced to 0.16 ($p>0.05$); hence, they were not entered into the equation in the stepwise process. Once again the analyses indicate that males and those with higher education tend to participate in and know about the project. The relative importance of fishing to household income also influences knowledge about the project. Overall the multiple regressions are modest, but statistically significant.

Table 35. Stepwise regression analyses of project participation and knowledge indices in Talise (N=80).

DEPENDENT VARIABLE: PARTICIPATION INDEX

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.381	<0.001
Gender male	0.277	0.007

$R=0.49$ $R^2=0.24$ Adj. $R^2=0.22$ $F=12.050$ $p < 0.001$

DEPENDENT VARIABLE: PARTICIPATION LEVEL

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.341	0.001
Kinabohutan	-0.305	0.004

$R=0.52$ $R^2=0.27$ Adj. $R^2=0.25$ $F=14.025$ $p < 0.001$

DEPENDENT VARIABLE: PROJECT KNOWLEDGE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.450	<0.001
Gender male	0.280	0.005
Importance of fishing	0.228	0.022

$R=0.56$ $R^2=0.31$ Adj. $R^2=0.28$ $F=11.270$ $p < 0.001$

4.2 Changes in Material Style Of Life

The question for monitoring concerns whether or not project activities have improved the coastal environment (both natural and human[3]) to the extent that existing productive activities have increased their livelihood (both monetary and non-monetary income). In the absence of reliable income data, material style of life is used as an indicator of level of livelihood; thus, changes in this indicator are assumed to reflect parallel changes in livelihood. This section of the report analyses the impacts Proyek Pesisir on material style of life.

4.2.1 Material Style of Life Scale

As a means of developing a standardized material style of life scale for all project and control sites, a principal component analysis was conducted for the 28 material style of life variables[4] for all ten project and control villages across the three time periods (N = 1099 households). Five of the items manifested very low component loadings in the first analysis of the data, so they were eliminated, and the analysis, using varimax rotation of components, was conducted once again. The scree test (Cattell 1966) was used to determine the number of components, resulting in 4 components which account for a total of 49 percent of the variance in the data set. The results of this analysis are found in Table 36. Items loading highest on the first component indicate a relatively well-constructed house with adequate furnishings. Items loading highest on component two reflect modern appliances, and those with high positive loadings on factor three are associated with a solid, permanent structure (e.g., cement wall and floor and tin roof) while those loading a high negative are associated

[3] The natural environment includes the non-human aspects of the sea and its adjacent land-mass. The human environment includes the human populations, their multiple behaviors and the material aspects of these behaviors (e.g., their occupations, tools, housing, social behavior, etc.).

[4] See Pollnac and Crawford (2000) for a discussion of the use of principal component analysis with this type of data.

with a less permanent structure (wood walls, floor, and window). Finally, those loading highest on component four (cupboard, chairs and modern stove) are furnishings usually associated with a modern house.

Component scores representing the position of each household on each component were created for each household. The component scores are the sum of the component coefficients times the sample standardized variables. These coefficients are proportional to the component loadings. Hence, items with high positive loadings contribute more strongly to a positive component score than those with low or negative loadings. Nevertheless, all items contribute (or subtract) from the score; hence, items with moderately high loadings on more than one component (e.g., tin roof and concrete wall in the analysis presented here) will contribute at a moderate level, although differently, to the component scores associated with each of the components. This type of component score provides the best representation of the data. In this paper, for this data we will refer to these scores as Material Style of Life (MSL) Component Scores. They are standardized scores with a mean of zero and a standard deviation of one.

Table 36. Principal component analysis of material style of life variables.

Variable	Modern Structure & Furnishings	Appliances	Permanent Structure	Furniture
Bamboo wall	-0.777	-0.007	-0.065	-0.231
Nipa roof	-0.720	-0.078	-0.332	-0.157
Dirt floor	-0.718	-0.070	0.130	0.045
Open window	-0.709	-0.255	0.038	0.077
Glass windows	0.674	0.253	0.286	0.115
Concrete floor	0.615	0.003	0.378	0.318
Concrete wall	0.613	0.104	0.604	0.161
Tin roof	0.604	0.024	0.386	0.358
Satellite dish (TV)	0.083	0.671	0.074	-0.076
Television	0.235	0.645	0.065	0.150
Refrigerator	0.004	0.580	0.002	0.009
Fan	0.008	0.534	0.026	0.035
Radio cassete	0.159	0.500	-0.015	0.316
Wooden walls	-0.002	-0.162	-0.697	0.311
Wooden floor	-0.111	0.028	-0.680	-0.198
Cupboard	0.172	0.209	0.118	0.668
Chairs	0.120	-0.085	0.040	0.649
Modern stove	0.139	0.344	0.062	0.562
Cabinet	0.451	0.393	0.052	0.280
Electricity	0.461	0.134	-0.095	0.278
Livingroom set	0.424	0.356	0.076	0.128
Indoor toilet	0.245	0.462	0.235	0.095
Wooden windows	-0.020	-0.072	-0.481	-0.070
Percent Variance	19.709	11.326	9.369	8.649

4.2.2 Cross Community Analyses of Changes in Material Style of Life

The question for monitoring concerns whether or not project activities have impacted the natural and human environment to the extent that the changes have influenced the level of livelihood and, subsequently, the material style of life in the project communities. As a means of testing for this impact, mean component scores for each component are calculated for each time period in the project and control villages (table 37). Difference of means tests (Student's t-test) indicate that the appliances and furnishings principal component scores increased statistically significantly in the project communities. Only the change in the furnishings score is statistically significant in the control villages. Overall, the results indicate that changes in material style of life were greater in the project villages, a result suggesting positive project impacts.

Table 37. Mean MSL component scores for project and control sites for 2 time periods (baseline and final-evaluation).

	Project			Control		
	1997	2002	t-test	1997	2002	t-test
Modern	-0.009	0.131	1.426	-0.080	0.000	0.675
Appliances	-0.070	0.143	2.198*	-0.004	-0.066	0.514
Structure	-0.036	-0.048	0.112	-0.005	-0.087	0.736
Furniture	-0.688	0.609	15.902**	-0.226	0.566	6.422**
N	283	160		161	125	

** = P<0.001 * = p<0.05

As a next step in the analysis we examine factors related to MSL within the project and control villages. First we examine correlations between the independent variables discussed above and MSL component scores during the post-evaluation. The results of this analysis are in table 38. Years formal education and living in a project village are positively correlated with the appliances component. Although

statistically significant, the correlation with project village is rather weak. Relative dependence on fishing or farming as a source of household income is negatively related to this component, suggesting that other occupations have a greater influence on ability to purchase the appliances included in the component. Permanent house structure is positively correlated with age, being a Christian, and degree of dependence on farming. It is negatively correlated with degree of dependence on fishing. Although statistically significant, these correlations are relatively weak.

Table 38. Correlations between independent variables and MSL component scores in project and control villages.

	Modern	Appliance	Structure	Furniture
Education	0.079	0.330***	0.050	0.012
Gender male	-0.005	0.009	-0.014	-0.010
Age	0.052	-0.053	0.136**	0.044
Christian	-0.015	-0.020	0.094*	-0.018
Project village	0.076	0.099*	0.018	0.028
Household size	0.077	0.030	-0.031	-0.031
Fishing	-0.076	-0.167***	-0.172***	0.024
Farming	-0.050	-0.113**	0.123*	-0.014

N=570 ***=p<0.001 **=p<0.01 *=p<0.05

Perhaps it would be more revealing to examine the relationships of these variables within the project villages. We also examine the relationships between the MSL component scores and the project participation and knowledge variables. In this analysis, the specific project villages are also used as dummy variables to determine if there are any inter-village differences in MSL component scores. The results of this analysis are in Table 39.

While only one of the project variables, the Project Knowledge Index, is statistically significantly correlated with two of the MSL component scores, all the non-project variables are correlated with at least one. Years of formal education, household size, and living in Tumbak are positively related to the modern house component score. Religious preference, degree of dependence on farming, project knowledge, and living in Blongko are negatively related to this component.

Table 39. Correlations between independent variables and MSL component scores in project villages.

	Modern	Appliance	Structure	Furniture
Education	0.124*	0.315***	0.046	-0.023
Age	0.049	-0.050	0.117*	0.057
Christian	-0.122*	-0.038	0.143*	0.090
Household size	0.141*	0.031	-0.068	-0.030
Fishing	0.017	-0.094	-0.136*	0.007
Farming	-0.158**	-0.149**	0.110	0.012
Proj. participation	0.051	0.094	0.001	0.033
Level participation	0.078	-0.027	-0.001	0.056
Proj. Knowledge	-0.115*	0.179**	0.072	0.048
MPA knowledge	-0.081	0.068	-0.041	0.036
Blongko	-0.142*	-0.028	-0.092	0.162*
Talise	-0.051	-0.125*	0.220***	-0.079
Bentenan	0.049	0.218***	0.211***	-0.076
Tumbak	0.144*	-0.065	-0.339***	-0.007

N=320 ***=p<0.001 **=p<0.01 *=p<0.05

Years of formal education and residing in Bentenan are positively related to the appliances component score, while degree of dependence on farming and living in Talise manifest negative correlations. Village is one of the important correlates of the permanent structure component. Talise and Bentenan are positively correlated with this component, while Tumbak manifests a negative correlation. Other variables statistically significantly correlated with the permanent structure component are degree of dependence on fishing (negative) and household size and Christian (both positive). Finally, only one variable is statistically significantly correlated with the furniture component—Blongko. Residents of Blongko tend to score higher on the furnishings component.

Stepwise multiple regression, as discussed above, is used to determine the combinations of independent variables that impact MSL component scores in the project villages. Results of these analyses are in table 40. Five independent variables account for 7 percent of the variance in the modern house component. Education, age and household size contribute positively to this component score, while dependence on farming and project knowledge contribute negatively. Overall, the amount of variance explained in this component by the 5 independent variables is quite small, but statistically significant.

Fifteen percent of the variance in the appliances component score is accounted for by four independent variables—education, living in Bentenan, project knowledge (all 3 positive), and relative dependence on

farming (negative). Once again, the total amount of variance explained is rather small, but statistically significant. Finally, three variables account for 17 percent of the variance in the permanent structure component: residence in Blongko or Tumbak (both negative) and project knowledge (positive). As with the other regression analyses, the amount of variance explained is minimal, but statistically significant.

4.2.3 Within Community Analyses of Changes in Material Style of Life

All the villages manifested statistically significant relationships with at least one of the MSL Component Scores (table 39), and at least one village dummy variable is found in two of the three statistically significant regression equations. An intervillage analysis of variance of the between village differences in principal component scores is in table 41. As can be seen in table 41 two of the four MSL Component Scores are statistically significantly different across the four project villages. Focusing only on those with statistically significant differences, Bentenan scores highest on the appliances component while Talise scores lowest. Both Talise and Bentenan score relatively high on the permanent structure component, while Tumbak scores lowest. These differences in combination with the intervillage differences in potential predictor variables (tables 21 to 24) indicate that it will be important to conduct within project area analyses of project impacts on MSL.

Table 40. Stepwise regression analyses of MSL component scores in the project sites (N=320).

DEPENDENT VARIABLE: MODERN HOUSE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.199	0.001
Age	0.138	0.020
Household size	0.137	0.016
Farming	-0.115	0.039
Project knowledge	-0.168	0.003

$R=0.30$ $R^2=0.09$ Adj. $R^2=0.07$ $F=6.070$ $p < 0.001$

DEPENDENT VARIABLE: APPLIANCES

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.252	<0.001
Bentenan	0.191	<0.001
Farming	-0.137	0.008
Project knowledge	0.108	0.045

$R=0.40$ $R^2=0.16$ Adj. $R^2=0.15$ $F=15.127$ $p < 0.001$

DEPENDENT VARIABLE: PERMANENT STRUCTURE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Blongko	-0.257	<0.001
Tumbak	-0.420	<0.001
Project knowledge	0.112	0.033

$R=0.42$ $R^2=0.17$ Adj. $R^2=0.17$ $F=22.206$ $p < 0.001$

Bentenan and Tumbak: Bentenan and Tumbak are considered a single project site so differences between the two villages combined and the control sites are examined. Nevertheless, since the two villages are culturally and socially distinct, we also examine each separately. As a means of testing for project impacts on MSL in Bentenan and Tumbak, mean component scores for each component are calculated for each time period in the project and control villages. If the project has had a positive impact we would expect that mean component scores would increase more in Bentenan and Tumbak than in the control sites. The results of these analyses are found in Table 42. Focussing only on statistically significant differences, the appliances and furniture component scores increased in the project sites, while only the furniture score increased in the control sites. The permanent structure score

Table 41. Analysis of inter-village differences in MSL Component Scores

	Bentenan	Tumbak	Blongko	Talise	F-ratio	p
Modern	0.202	0.341	-0.076	0.056	1.852	0.140
Appliances	0.577	0.014	0.086	-0.105	2.808	0.041
Structure	0.353	-0.690	-0.222	0.368	10.064	<0.001
Furniture	0.521	0.601	0.796	0.517	1.535	0.208
N	40	40	40	40		

df=3 156 for all F-ratio analyses

Table 42. Mean MSL component scores for Bentenan/Tumbak and control sites for 2 time periods (baseline and final-evaluation).

	Bentenan/Tumbak			Control		
	1997	2002	t-test	1997	2002	t-test
MODERN	0.335	0.272	0.521	-0.082	-0.457	1.879
APPLIANCES	-0.079	0.295	2.132*	0.301	-0.077	1.514
STRUCTURE	-0.390	-0.169	1.155	-0.240	-0.750	2.488*
FURNITURE	-0.811	0.561	5.108**	-0.286	0.565	4.173**
N	81	80		51	40	

** = P<0.001 * = p<0.05

decreased in the control sites but not in the project sites. Overall, observed changes are in the predicted direction in the project sites. If we examine differences in scores in 2002, we also find that they are in the expected direction (table 43). The modern house and permanent structure scores are higher for the project sites.

Since the two project sites are culturally and social distinct we will examine differences between them on the MSL Component Scores. Tables 44 and 45 indicate that Bentenan manifested significant increases in three of the four MSL components between 1997 and 2002. Bentenan scores on the appliances, permanent structure, and furniture components increased between the pre-project period and the time near project completion. Tumbak showed a significant increase only on the furniture component during this same time period. Finally, a comparison of the two project villages in 2002 indicates that Bentenan scores higher than Tumbak on both the appliances and modern structure components.

Table 43. Mean MSL component scores for Bentenan/Tumbak and control sites in 2002.

	Control	Project	t-test
MODERN	-0.457	0.272	4.691**
APPLIANCES	-0.077	0.295	1.678
STRUCTURE	-0.750	-0.169	2.610*
FURNISHINGS	0.565	0.561	0.030
N	40	80	

** = P<0.001 * = p<0.05

Table 44. Mean MSL component scores for Bentenan and Tumbak for 2 time periods (baseline and final-evaluation).

	Bentenan			Tumbak		
	1997	2002	t-test	1997	2002	t-test
MODERN	0.342	0.202	0.785	0.348	0.341	0.079
APPLIANCES	-0.190	0.577	2.887**	0.035	0.014	0.095
STRUCTURE	-0.162	0.353	2.368*	-0.623	-0.690	0.231
FURNITURE	-0.553	0.521	7.011***	-1.076	0.601	11.266***
N	41	40		40	40	

*** = p<0.001 ** = P<0.01 * = p<0.05

As a next step in the analysis we examine factors related to MSL within the project and control villages. First we examine correlations between the independent variables discussed above and MSL component scores during the post-evaluation (table 46). First, none of the independent variables are statistically significantly correlated with the furniture component. Focusing only on statistically significant relationships ($p<0.05$) we find that education is positively correlated with the appliances component, as is coming from a project village, especially Bentenan. Relative dependence on fishing for household income is negatively correlated with the appliances component. Religious preference (Christian) and relative dependence on farming are negatively correlated with the modern house component and positively correlated with project village. The correlation with project village is relatively strong. The permanent structure component is positively correlated with age, Christian, dependence on farming, and Bentenan. It is negatively correlated with dependence on fishing and Tumbak.

Table 45. Mean MSL component scores for Bentenan and Tumbak in 2002.

	Bentenan	Tumbak	t-test
MODERN	0.202	0.341	1.161
APPLIANCES	0.577	0.014	2.925**
STRUCTURE	0.353	-0.690	5.962***
FURNISHINGS	0.521	0.601	0.873
N	40	40	

*** = P<0.001 ** = p<0.01

Table 46. Correlations between independent variables and MSL component scores in Bentenan Tumbak, and control villages.

	Modern	Appliance	Structure	Furniture
Education	0.105	0.324***	0.071	-0.054
Age	0.078	0.025	0.171**	0.089
Christian	-0.202**	-0.017	0.132*	-0.115
Household size	0.140*	-0.019	-0.104	-0.114
Fishing	-0.102	-0.172**	-0.278***	0.070
Farming	-0.140*	-0.088	0.157*	-0.040
Proj. village	0.401***	0.160*	0.232***	-0.009
Bentenan	0.144*	0.253***	0.431***	-0.045
Tumbak	0.257***	-0.094	-0.199**	0.036

N=240 ***=p<0.001 **=p<0.01 *=p<0.05

Turning to correlations between MSL and the independent variables within the two project villages (table 47), we find no statistically significant correlations with either the modern house or furniture components. Once again, education is positively correlated with the appliances component as are the project knowledge and participation indices. Relative dependence on farming and Christian are positively related to the permanent

structure component, while relative dependence on fishing and household size manifest negative correlations with this component.

Perhaps it would be illuminating if we examine the relationships between the independent variables and the MSL scores within each of the two project villages in this area. Within Tumbak, only two variables are statistically significantly related to the MSL component scores (table 48). Household size is negatively related to the furniture component and degree of dependence on fishing is negatively related to the appliance component. None of the project participation or knowledge indices are correlated with the MSL component scores in Tumbak. Religious preference is not a variable in this analysis since all respondents from Tumbak reported that they are Muslim.

Table 47. Correlations between independent variables and MSL component scores in Bentenan and Tumbak.

	Modern	Appliance	Structure	Furniture
Education	0.073	0.276***	0.080	-0.114
Age	-0.083	-0.022	0.154	0.108
Christian	-0.102	-0.021	0.300***	-0.126
Household size	0.116	0.047	-0.168*	-0.132
Fishing	0.054	-0.128	-0.280***	0.027
Farming	-0.048	-0.046	0.229**	0.041
Proj. participate	0.040	0.187*	-0.090	0.037
Level participate	0.094	0.032	-0.113	-0.031
Proj. Knowledge	-0.129	0.184*	0.031	0.007
MPA knowledge	-0.027	0.059	-0.108	0.042

N=160 ***=p<0.001 **=p<0.01 *=p<0.05

Table 48. Correlations between independent variables and MSL component scores in Tumbak.

	Modern	Appliance	Structure	Furniture
Education	-0.006	0.217	0.068	-0.095
Age	-0.065	-0.124	0.154	0.202
Household size	0.159	-0.091	-0.135	-0.331**
Fishing	-0.019	-0.226*	-0.057	-0.204
Farming	-0.200	0.112	0.129	0.125
Proj. participate	-0.115	-0.033	-0.141	0.147
Level participate	0.017	-0.170	-0.017	0.046
Proj. Knowledge	-0.007	0.098	-0.107	-0.151
MPA knowledge	-0.067	-0.025	-0.021	0.085

N=80 **=P<0.01 *=P<0.05

Table 49. Correlations between independent variables and MSL component scores in Bentenan.

	Modern	Appliance	Structure	Furniture
Education	0.137	0.290**	0.027	-0.121
Age	-0.084	-0.012	0.059	0.018
Christian	-0.074	-0.232*	0.111	-0.151
Household size	0.040	0.252*	0.064	0.083
Fishing	0.031	0.069	-0.161	0.169
Farming	0.062	-0.251*	-0.067	0.086
Proj. participate	0.140	0.271*	-0.107	-0.043
Level participate	0.126	0.222*	-0.034	-0.146
Proj. Knowledge	-0.197	0.213	0.193	0.133
MPA knowledge	-0.037	0.154	-0.030	-0.007

N=80 **=P<0.01 *=P<0.05

Turning to Bentenan, the independent variables are only statistically significantly correlated with the appliances component score (table 49). Education, household size and the two project participation indices are positively correlated with the appliance component score. Relative dependence on farming and Christian manifest negative correlations with this component. The relationship between religion and this component is most likely the result of the strong relationship between dependence on farming and religion. Seventy-two percent of Muslims in the sample report that farming does not contribute to their household income, 22 percent say it contributes a little, and only 6 percent rank it second in importance. In contrast, 50 percent of Christians rank farming first, 23 percent second, 13 percent less than second, and 14 percent report no income from farming. Needless to say, these differences are statistically significant (χ^2=39.716, df=3, p<0.001).

Blongko: As a means of testing for project impacts on MSL in Blongko, mean component scores for each component are calculated for each time period in the project and control villages. If the project has had a positive impact we would expect that mean component scores would increase more in Blongko than in the control sites. The results of these analyses are found in Table 50. Focusing only on statistically significant differences, we find that both Blongko and the control sites (Boyangpante and Sapa) manifest statistically significant increases in furniture component scores between 1997 and 2002. Blongko shows a larger increase than the controls, but there is no significant difference between the project and control sites in 2002 (table 51).

As a next step in the analysis we examine factors related to MSL within the project and control villages. First we examine correlations between the independent variables discussed above and MSL component scores during the post-evaluation (table 52). None of the independent variables are statistically significantly correlated with the modern house component. Focusing only on statistically significant relationships ($p<0.05$) we find that education is positively correlated with the appliances component. Christian and relative dependence on fishing are negatively correlated with the permanent structure component. In contrast, relative dependence on fishing is positively correlated with the furniture component. The correlation of religion with an MSL component is, at least in part, due to religion's correlation with occupation. Only 9 percent of Christians, in contrast to 26 percent of Muslims rank fishing first in terms of importance to household income ($\chi^2=8.286$, df=1, $p<0.05$).

Turning to relationships between the independent variables, including project participation and knowledge, and MSL component scores within Blongko (table 53), we find that education is positively and degree dependence on farming is negatively correlated with the appliances component. The project knowledge index is positively correlated with the permanent structure component, and Christian is positively correlated with the furniture component.

Talise: If the project has had a positive impact we would expect that mean component scores would increase more in Talise than in the control sites. The results of this analysis are found in Table 54. The analysis indicates that

Table 50. Mean MSL component scores for Blongko and control sites for 2 time periods (baseline and final-evaluation).

	Blongko			Control		
	1997	2002	t-test	1997	2002	t-test
MODERN	0.039	-0.076	0.606	0.089	0.214	0.646
APPLIANCES	-0.133	0.086	1.243	-0.099	-0.035	0.331
STRUCTURE	-0.378	-0.222	0.761	0.027	0.074	0.249
FURNITURE	-1.176	0.796	12.915**	-0.583	0.813	7.983**
N	90	40		50	40	

** = P<0.001

Table 51. Mean MSL component scores for Blongko and control sites in 2002.

	Control	Project	t-test
MODERN	0.214	-0.076	1.545
APPLIANCES	-0.035	0.086	0.507
STRUCTURE	0.074	-0.222	1.450
FURNISHINGS	0.813	0.796	0.100
N	40	40	

Table 52. Correlations between independent variables and MSL component scores in Blongko and control villages (2002).

	Modern	Appliance	Structure	Furniture
Education	0.063	0.330***	0.051	0.056
Age	0.089	-0.118	0.023	0.032
Christian	0.077	0.094	-0.266**	0.135
Household size	-0.054	0.011	0.113	0.063
Fishing	-0.001	-0.098	-0.191*	0.295***
Farming	0.065	-0.081	-0.063	-0.060

N=160 ***=p<0.001 **=p<0.01 *=p<0.05

Table 53. Correlations between independent variables and MSL component scores in Blongko.

	Modern	Appliance	Structure	Furniture
Education	0.149	0.374**	0.073	0.029
Gender male	-0.052	0.109	-0.064	0.025
Age	0.233*	-0.052	-0.017	0.138
Christian	-0.176	-0.007	-0.014	0.288*
Household size	-0.031	-0.084	0.124	0.047
Fishing	-0.026	-0.109	-0.215	0.249
Farming	-0.040	-0.254*	-0.126	-0.009
Proj. participate	0.146	-0.064	0.066	0.161
Level participate	0.135	-0.156	0.032	0.137
Proj. Knowledge	0.032	0.127	0.313**	-0.046
MPA knowledge	0.054	-0.018	0.009	-0.068

N=80 **=P<0.01 *=P<0.05

Table 54. Mean MSL component scores for Talise and control sites for 2 time periods (baseline and final-evaluation).

	TALISE			CONTROLS		
	1997	2002	t-test	1997	2002	t-test
MODERN	-0.296	0.056	1.902	-0.219	0.216	2.115*
APPLIANCES	-0.012	-0.105	0.554	-0.183	-0.085	0.530
STRUCTURE	0.495	0.368	1.050	0.168	0.359	1.211
FURNITURE	-0.207	0.517	5.108**	0.121	0.347	0.969
N	112	40		60	45	

** = P<0.001 * = p<0.05

the MSL values for the furnishing component increased in the project site while those on the modern house and furnishings component increased slightly in the control sites. Other differences in the scores between the two time periods are not statistically significant.

Table 55 compares MSL scores across the project and control sites during the evaluation period (2002). As can be seen in table 55, none of the differences between the project and control villages at the time of final evaluation are statistically significant.

Table 55. Mean MSL component scores for project (Talise) and control sites in 2002.

	Control	Talise	t-test
MODERN	0.216	0.056	0.782
APPLIANCES	-0.085	-0.105	0.098
STRUCTURE	0.359	0.368	0.062
FURNITURE	0.347	0.517	1.301
N	45	44	

As a next step in the analysis we examine factors related to MSL within Talise and the control villages. First we examine correlations between the independent variables discussed above and MSL component scores during the post-evaluation (table 56). None of the independent variables are statistically significantly correlated with either the modern house or the furniture components. Focusing only on statistically significant relationships ($p<0.05$) we find that education is positively and degree of dependence on fishing negatively correlated with the appliances component. Years of formal education are also positively correlated with the permanent structure component.

Table 56. Correlations between independent variables and MSL component scores in Talise and control villages (2002).

	Modern	Appliance	Structure	Furniture
Education	0.085	0.327***	0.187*	0.013
Age	-0.027	-0.049	0.119	-0.008
Christian	0.120	-0.009	-0.005	-0.048
Household size	0.104	0.143	-0.075	0.135
Fishing	-0.123	-0.262**	-0.017	-0.145
Farming	-0.075	-0.123	-0.026	-0.144
Kinabohutan	-0.109	-0.005	0.006	0.042
Airbanua	-0.019	-0.033	0.033	-0.028

N=170 ***=p<0.001 **=p<0.01 *=p<0.05

Turning to relationships between the independent variables, including project participation and knowledge, and MSL component scores within Talise (table 57), we find that household size is positively and MPA knowledge is negatively related to the modern house component. Years of formal education and the project knowledge index are positively correlated with the appliances component. Three project related variables, the project participation, knowledge and MPA knowledge indices, are positively correlated with the permanent structure component score. Finally, household size is positively and degree dependence on farming is negatively related to the furniture component score.

Table 57. Correlations between independent variables and MSL component scores in Talise (2002).

	Modern	Appliance	Structure	Furniture
Education	0.130	0.278*	0.180	-0.012
Gender male	-0.038	0.006	-0.003	-0.022
Age	0.104	-0.060	0.176	-0.159
Christian	0.122	0.092	0.003	0.059
Household size	0.257*	0.120	-0.098	0.250*
Fishing	-0.141	0.058	0.000	-0.022
Farming	-0.213	-0.159	-0.006	-0.274*
Proj. participate	-0.175	-0.089	0.231*	0.051
Level participate	-0.058	-0.001	0.170	0.206
Proj. Knowledge	-0.159	0.250*	0.233*	0.070
MPA knowledge	-0.298**	0.117	0.322**	0.087

N=80 **=P<0.01 *=P<0.05

4.3 Changes in Resource Beliefs

4.3.1 Resource Beliefs Scale

As one means of obtaining information concerning community member's perceptions of the coastal resources and potential human impacts on these resources, household members from the 10 project sites and control sites (N = 2158) were requested to provide a statement concerning the degree of their agreement or disagreement with nine statements. These questions were posed at the baseline (1997/98), monitoring (2000)

and final evaluation (2002) phases of the project to determine if project activities had any influence on these perceptions. Each of the nine statements involves some aspect of relationships between coastal resources and human activities. The following are the statements used:

1. We have to take care of the land and the sea or it will not provide for us in the future.
2. Fishing would be better if we cleared the coral where the fish hide from us.
3. If our community works together we will be able to protect our resources.
4. Farming in the hills behind the village can have an effect on the fish.
5. If we throw our garbage on the beach, the ocean takes it away and it causes no harm.
6. We do not have to worry about the air and the sea, God will take care of it for us.
7. Unless mangroves are protected we will not have any small fish to catch.
8. There are so many fish in the ocean that no matter how many we catch, there will always be enough for our needs.
9. Human activities do not influence the number of fish in the ocean.

The statements were arranged in the interviews so as to limit interference between similar statements (e.g., statements number 8 and 9 were separated by 6 other statements). It will also be noticed that agreement with some would indicate an accurate belief, while agreement with others would indicate the opposite. This was done to control for responses where the respondent either agrees or disagrees with everything. Statements were randomly arranged with respect to this type of polarity. Respondents were asked if they agree, disagree, or neither (neutral) with respect to each statement. If they indicated either agree or disagree, they were asked if they agree (disagree) strongly, agree (disagree), or just agree (disagree) a little with the statement. This resulted in a scale with a range from one to seven. Polarity of the statement is accounted for in the coding process, so as a score value changes from one to seven it indicates an increasingly stronger and accurate belief concerning the content of the statement.

The scale values associated with the nine statements involving beliefs concerning relationships between the coastal resources and human activities were factor analyzed using the principal component analysis technique and varimax rotation. One of the statements ("Farming in the hills behind the village can have an effect on the fish") manifested very low loadings on all factors, so it was eliminated from the final analysis. The scree test was used to determine optimum number of factors to be rotated (Cattell 1966). The result of this final analysis can be found in Table 58.

Table 58. Principal component analysis of conservation attitudes.

Statement (abbreviated)	Vastness	Efficacy
God will take care of the sea for humans	0.695	0.071
Humans do not impact the number of fish	0.634	-0.031
There will always be enough fish	0.597	-0.153
The ocean can harmlessly absorb beach garbage	0.588	0.236
We have to take care of the land and sea	0.016	0.718
Working together can protect our resources	0.045	0.677
We must protect mangroves for small fish	-0.147	0.542
If we clear coral it will improve fishing	0.304	0.502
Percent of Total Variance	21.298	20.060

Statements loading high positive on the first component involve perceptions of the lack of human control (God will take care of it), inexhaustibility (endless supplies of fish) and vastness (it can absorb all the rubbish) of the ocean. Statements loading highest on the second component involve the efficacy of human actions (we have to take care, protect, not clear coral, and work together) with respect to health of the resource. Thus, the first component is labeled *"Vastness"* and the second *"Efficacy*." Component scores (see above discussion) were calculated for each individual on each component.

4.3.2 Cross Community Analyses of Resource Beliefs

In terms of resource beliefs, it is important to determine if project activities have had any impact on community members' beliefs about the coastal environment. As a means of testing for this impact, we first examine distributions in responses to the resource conservation attitude questions across time and between project and control villages. As a first step in this analysis we will examine the specific statements

dichotomized at level 4 and the sample median.[5] With respect to the former dichotomy, respondents providing a response greater than 4 (a value reflecting a conservation oriented response) are identified as having a "correct" conservation response. With respect to the latter, those responding at a level equal to or above the median are identified as having a "high" response relative to the sample median score. Comparisons between the baseline and post-evaluation data for these values can be found in tables 59 and 60.

Table 59. Changes in percent distribution of conservation attitudes (dichotomized) in project sites (1997-2002).

	Percent>4			Percent>(median-1)		
Statement (abbreviated)	T-1	T-3	*p*	T-1	T-3	*p*
God will take care of the sea for humans 3	59	41	*<.001*	70	43	*<.001*
Humans do not impact the number of fish 3	30	43	*<.001*	56	48	*.044*
There will always be enough fish 2	16	16	*>0.05*	87	93	*.028*
Ocean can harmlessly absorb beach garbage 2	63	74	*.001*	59	73	*<.001*
We have to take care of the land and sea 6	93	97	*.016*	90	97	*<.001*
Working together can protect our resources 6	95	99	*.003*	93	98	*.001*
We must protect mangroves for small fish 6	82	93	*<.001*	79	91	*<.001*
If we clear coral it will improve fishing 6	82	92	*<.001*	79	91	*<.001*
Farming in the hills can effect fish 4	27	44	*<.001*	61	60	*>0.05*
N	526	320		526	320	

Probability based on χ^2. *Yates corrected χ^2. Number following statement is median for all 10 project and control villages.

Table 60. Changes in percent distribution of conservation beliefs (dichotomized) in control sites 1997-2002.

	Percent 4			Percent>(median-1)		
Statement (abbreviated)	T-1	T-3	*p*	T-1	T-3	*p*
God will take care of the sea for humans	57	29	*<.001*	65	31	*<.001*
Humans do not impact the number of fish	45	44	*>0.05*	71	49	*<.001*
There will always be enough fish	22	20	*>0.05*	68	93	*<.001*
The ocean can harmlessly absorb beach garbage	74	80	*>0.05*	71	79	*.034*
We have to take care of the land and sea	94	99	*.007*	91	97	*.007*
Working together can protect our resources	97	100	*.042**	96	100	*.003*
We must protect mangroves for small fish	84	94	*<.001*	80	93	*<.001*
If we clear coral it will improve fishing	85	93	*.003*	82	93	*<.001*
Farming in the hills can effect fish	17	44	*<.001*	35	60	*<.001*
N	322	250		322	250	

Probability based on χ^2. *Yates corrected χ^2.

As can be seen in table 59 almost all changes in the project communities are statistically significant and in a direction which indicates an increasing amount of correct conservation responses (e.g., percent increases between 1997 and 2002). The only relatively large change that is not in the desired direction involves a greater percentage of people responding positively to the statement "We do not have to worry about the air and the sea, God will take care of it for us" in 2002 than 1997. Another statistically significant, but minor change that appears to be in an undesirable direction is a lower percentage of responses greater than the median in 2002 than in 1997 for the statement "Human activities do not influence the number of fish in the ocean." In this case the median is 3, which indicates a weak agreement with the statement, a non-conservation response. Fifty-six percent of respondents in the project communities responded with a response coded 3 or higher in 1997. This decreased to 48 percent in 2002, but it includes non-conservation responses; hence, we are better-off focusing on the change in percent that gave a conservation-oriented response (percent disagreeing with the statement) which increased from 30 percent in 1997 to 43 percent in 2002. What is really important for determining project impacts, however, is to compare changes in project sites with those in the controls. With respect to the statement "We do not have to worry about the air and the sea, God will take care of it for us," changes in both the project and control sites were in a non-conservation response direction. But the changes in the control sites are greater than those in the project sites—28 versus 18 percent respectively. With respect to human impacts on the number of fish, there was no significant change in the control sites while the percent of conservation related responses increased by 13 percent in the project sites. With respect to other statements that differed statistically significantly between 1997 and 2002, the degree of change was almost the same in both the project and control villages. With respect to differences between the project and control villages in 2002, the

[5] The median was calculated for the total sample for all three time periods (n=2158). See table 23 for median values.

only difference that is statistically significant is the percent of correct conservation responses to the statement "We do not have to worry about the air and the sea, God will take care of it for us." The control communities gave fewer correct conservation responses than the project communities (29 versus 41 percent, χ^2=8.578, df=1, p=0.003).

Thus far we have been examining project and control village differences for each of the statements included in the individual conservation beliefs data set. It is important to determine if the same differences are found with respect to the data set as a whole. To do this, a new variable was constructed by summing the number of "correct" conservation responses (a coded response greater than 4—see discussion above) for each respondent. This variable is referred to as the conservation beliefs score. In addition, we will analyze the data to determine if the project sites differ from the control villages with respect to scores on the vastness and efficacy components derived from the principal component analysis of the conservation beliefs data set.

The results of these analyses are found in tables 61 and 62. With respect to the total conservation beliefs score, scores increased statistically significantly in both the project and control sites, but they increased to a greater extent in the project sites. While there was no change in the vastness component score in the project villages, it decreased significantly in the control sites. Finally, the efficacy component increased statistically significantly in the project sites but not in the control sites.

Table 61. Mean resource beliefs scores for project and control sites for 2 time periods.

	Project			Controls		
Measure	1997	2002	t-test	1997	2002	t-test
CONSERVE	5.475	5.981	4.341***	5.761	6.036	1.438*
VASTNESS	-0.003	-0.034	0.425	0.302	-0.066	4.288***
EFFICACY	-0.342	-0.039	5.342***	0.138	0.039	1.188
N	526	320		322	250	

*p<0.05 ***=p<0.001

Table 62. Differences in mean resource beliefs component scores for project and control sites (2002).

MEASURE	Project	Controls	t-test
CONSERVE	5.981	6.036	0.487
VASTNESS	-0.034	-0.066	0.380
EFFICACY	0.039	0.039	0.004
N	320	250	

As a next step in the analysis we examine factors related to resource beliefs within the project and control villages. First we examine correlations between the independent variables discussed above and MSL component scores during the post-evaluation. Project village and each of the project sites are entered into the analysis as dummy variables to determine their effects, if any. The results of this analysis are in table 63.

Table 63. Correlations between independent variables and resource beliefs in project and control villages.

	Vastness	Efficacy	Conserve
Education	0.342***	0.096*	0.378***
Gender male	0.023	-0.003	0.109**
Age	-0.252***	-0.045	-0.201***
Christian	0.105*	0.147***	0.103*
Household size	-0.050	-0.040	-0.076
Fishing	-0.123**	-0.020	-0.142**
Farming	0.000	0.037	-0.008
Project village	0.016	0.000	-0.020
Bentenan	0.101*	-0.007	0.112**
Tumbak	-0.065	-0.043	0.006
Blongko	0.086*	0.071	0.063
Talise	-0.098*	-0.021	-0.211***

N=570 ***=p<0.001 **=p<0.01 *=p<0.05

As indicated in table 63, years of formal education are positively correlated with all three resource beliefs measures. Males tend to have higher scores on the total conservation measure, and age is negatively related to the vastness and total conservation measures. The negative correlation with age is probably a result of the fact that education is negatively correlated with age in the sample (r= -0.34, p<0.001, N=570). Christian is positively correlated with all three resource belief measures while degree of dependence on fishing for household income is negatively correlated with both the vastness and total conservation measures, as is Talise. Residence in Bentenan or Blongko is positively correlated with the vastness component score, and residence in the former is also positively correlated with the total conservation score.

If project activities actually have an impact on resource beliefs at the community level, we would expect that degree of involvement in project activities would impact resource beliefs at the individual level. To

explore this possibility, we will examine the relationships between resource beliefs and extent of involvement and knowledge about Proyek Pesisir in the project villages. Other variables potentially impacting resource beliefs such as age, education, sex (gender), religious preference, household size and degree of dependence on farming and fishing will also be examined to determine their separate effects, if any. The measurement of these variables was discussed above. The results of these analyses are in table 64.

Education is positively correlated with all three resource beliefs measures, as in the total sample. Age, once again, is negatively related to the vastness and total conservation measures. As discussed above, this is probably the result of the significant negative correlation between age and education in the sample. Christian is positively related to scores on the vastness component and degree of dependence on fishing for household income is negatively related to the vastness and total conservation measures. Project participation is positively correlated with the total conservation score, and both project knowledge indices are positively correlated with all three of the resource beliefs measures.

Table 64. Correlations between independent variables, project participation and knowledge, and resource beliefs in project villages.

	Vastness	Efficacy	Conserve
Education	0.353***	0.139*	0.411***
Gender male	0.011	0.044	0.093
Age	-0.269***	-0.108	-0.247***
Christian	0.115*	0.103	0.080
Household size	-0.032	-0.084	-0.066
Fishing	-0.176**	-0.030	-0.175**
Farming	-0.010	0.099	-0.048
Proj. participation	0.061	0.080	0.129*
Level participation	0.044	0.073	0.066
Proj. knowledge	0.238***	0.221***	0.302***
MPA knowledge	0.181**	0.193**	0.246***

N=340 ***=p<0.001 **=p<0.01 *=p<0.05

Education, age, relative dependence on fishing and the two project knowledge indices are the best predictors of two of the resource beliefs measures. The next question concerns the relative importance of these predictor variables in terms of their individual and combined ability to account for variance in the resource beliefs measures. This can be accomplished with regression analyses, and as described above, most efficiently with forward stepwise regression analysis. Since our most important questions involve the impact of project activities on resource beliefs, we focus on the project communities. We also enter the project communities as dummy variables to determine if some unmeasured aspect of the community has an impact on resource beliefs. The results of these analyses for two of the three resource beliefs measures are in table 65. Only one variable was entered in the regression equation for the efficacy component score (education) because once it was entered the probability associated with all other independent variables increased to more than our criterion (0.05). Hence, this analysis is not included in table 65.

Table 65. Stepwise regression analyses of resource beliefs measures in project villages (N=320).

DEPENDENT VARIABLE: TOTAL CONSERVATION SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.283	<0.001
Age	-0.152	0.004
Project knowledge	0.190	<0.001
Household size	-0.116	0.021
Talise	-0.167	0.001

R=0.52 R^2=0.27 Adj. R^2=0.25 F=22.615 p < 0.001

DEPENDENT VARIABLE: VASTNESS COMPONENT SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.215	<0.001
Age	-0.208	<0.001
Project knowledge	0.157	0.003
Fishing	-0.158	0.003

R=0.44 R^2=0.20 Adj. R^2=0.19 F=19.287 p < 0.001

Five of the independent variables account for one-fourth the variance in the total conservation score, a modest but respectable amount. Years education and project knowledge have independent, statistically significant, positive impacts on the total conservation score. Age, household size, and Talise have negative impacts. Four variables account for about one-fifth the variance in the vastness component score. Once again, project knowledge and education have positive impacts, and age has a negative impact. Degree of household dependence on fishing also has a negative impact.

4.3.3 Within Community Analyses of Resources Beliefs

All the project villages except Tumbak manifested statistically significant relationships with at least one of the resource beliefs scores (table 63). An intervillage analysis of variance of the between village differences in the resource beliefs scores is in table 66. Focusing only on the two scales with statistically significant variation across the four project sites, we see that Bentenan scores highest on the vastness component and total conservation score while Talise scores lowest. These differences in combination with the intervillage differences in potential predictor variables (tables 21 to 24) indicate that it will be important to conduct within project area analyses of project impacts on resource beliefs.

Table 66. Analysis of inter-village differences in resource beliefs scores (2002).

	Bentenan	Tumbak	Blongko	Talise	F-ratio	p
Vastness	0.199	-0.208	0.162	-0.289	4.859	0.003
Efficacy	0.026	-0.046	0.180	-0.004	1.122	0.340
Conserve	6.375	6.025	6.212	5.312	9.633	<0.001
N	80	80	80	80		

df=3 316 for all F-ratio analyses

Bentenan and Tumbak: As a means of testing for project impact in Bentenan and Tumbak, we first examine distributions in responses to the resource conservation attitude questions across time in the project and control villages. As a first step in this analysis we will examine the specific statements dichotomized at level 4. Responses greater than 4 (values reflecting a conservation oriented response) are identified as "correct" conservation responses. The results of this analysis are in table 67.

Table 67. Changes in percent distribution of conservation attitudes (dichotomized) in project (Bentenan & Tumbak) and control sites (1997-2002).

	Project Percent>4			Control Percent>4		
Statement (abbreviated)	1997	2002	*p*	1997	2002	*p*
God will take care of the sea for humans	30	48	*0.004*	68	35	*<.001*
Humans do not impact the number of fish	17	43	*<.001*	48	56	*>0.05*
There will always be enough fish	11	17	*>0.05*	26	24	*>0.05*
Ocean can harmlessly absorb beach garbage	39	71	*<.001*	81	83	*>0.05*
We have to take care of the land and sea	83	99	*<.001*	93	99	*>0.05**
Working together can protect our resources	94	100	*0.007**	93	100	*0.045**
We must protect mangroves for small fish	70	97	*<.001*	71	90	*0.001*
If we clear coral it will improve fishing	67	93	*<.001*	87	96	*0.033*
Farming in the hills can effect fish	18	52	*<.001*	15	43	*<.001*
N	122	160		102	80	

Probability based on χ^2. *Yates corrected χ^2.

Table 67 indicates that all changes in response patterns in Bentenan and Tumbak are in the correct direction (a larger percent of "correct" responses in 2002), all except one are statistically significant ($p<0.05$). In the control villages only 4 that are statistically significant are in the correct direction. There has been a statistically significant decrease in correct responses to the statement "We do not have to worry about the air and the sea, God will take care of it for us." This analysis indicates that the project had a positive impact on resource beliefs in Bentenan and Tumbak.

Turning to the summary scales constructed from this data, we analyze differences between the project and control sites on the total conservation scale and the two components derived from the principal component analysis of the data (tables 68 and 69). Table 68 indicates that the project sites (Bentenan and Tumbak) increased

Table 68. Mean resource beliefs scores for Bentenan/Tumbak and control sites for 2 time periods.

	Bentenan/Tumbak			Controls		
Measure	1997	2002	t-test	1997	2002	t-test
CONSERVE	4.303	6.200	10.191***	5.824	6.250	2.072*
VASTNESS	-0.508	-0.004	4.176***	0.620	0.187	2.865**
EFFICACY	-0.781	-0.010	6.658***	0.130	-0.133	1.559
N	122	160		102	80	

*p<0.05 **=p<0.01 ***=p<0.001

their scores on all three scales between 1997 and 2002. In contrast the control sites increased their scores only slightly on the total conservation scale and decreased on the vastness component. This analysis also indicates that Proyek Pesisir had a positive influence on resource beliefs. Finally, the results in table 69 indicate that there are no statistically significant differences between the project and control village scores in 2002.

Table 69. Differences in mean resource beliefs component scores for Bentenan and Tumbak and control sites (2002).

MEASURE	Bentenan/ Tumbak	Controls	t-test
CONSERVE	6.200	6.250	0.294
VASTNESS	-0.004	0.187	1.418
EFFICACY	**-0.010**	**-0.133**	**1.329**
N	160	80	

The next question involves determining the effects of project participation and knowledge on resource beliefs within the project villages. To determine these effects we examine correlations between the project knowledge and participation indices, the set of other independent variables discussed above, and resource beliefs. The correlations are in table 70. MPA knowledge is positively and household size is negatively correlated with all three measures. Education and project knowledge are positively correlated with the vastness component and the total conservation measure. Age manifests a negative correlation with these same two measures. Finally, Bentenan and Christian are both positively correlated with the vastness measure.

The strongest predictors in table 70 are education and project knowledge. Stepwise regression, as described above, is used to determine the combined effects of the independent variables on the three resource beliefs measures. The results of this analysis are in table 71. Education, household size and project knowledge account for about one-fourth the variance in the total conservation and vastness component scores, a modest, but statistically significant amount. Two variables, household size and MPA knowledge account for only 6 percent of the variance in the efficacy component score, a slight, but statistically significant amount.

Table 70. Correlations between independent variables and resource beliefs in Bentenan/Tumbak.

	Vastness	Efficacy	Conserve
Education	0.369***	0.114	0.341***
Gender male	-0.099	-0.054	-0.053
Age	-0.235**	-0.013	-0.172*
Christian	0.168*	0.082	0.155
Household size	-0.193*	-0.201*	-0.238**
Fishing	-0.090	-0.065	-0.085
Farming	0.079	0.117	0.073
Proj. participation	0.091	0.043	0.127
Level participation	0.025	0.115	0.074
Proj. knowledge	0.313***	0.034	0.277***
MPA knowledge	0.178*	0.173*	0.156*
Bentenan	0.200*	0.057	0.137

N=160 ***=p<0.001 **=p<0.01 *=p<0.05

Table 71. Stepwise regression analyses of resource beliefs measures in Bentenan and Tumbak (N=160).

DEPENDENT VARIABLE: TOTAL CONSERVATION SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.293	<0.001
Household size	-0.266	<0.001
Project knowledge	0.251	0.001

R=0.48 R^2=0.23 Adj. R^2=0.22 F=15.756 p < 0.001

DEPENDENT VARIABLE: VASTNESS COMPONENT SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.316	<0.001
Household size	-0.224	0.002
Project knowledge	0.278	<0.001

R=0.50 R^2=0.25 Adj. R^2=0.23 F=17.026 p < 0.001

DEPENDENT VARIABLE: EFFICACY COMPONENT SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Household size	-0.211	0.007
MPA Knowledge	0.185	0.018

R=0.27 R^2=0.07 Adj. R^2=0.06 F=6.305 p = 0.002

***Blongko*:** As a means of testing for project impact in Blongko, we first examine distributions in responses to the resource conservation attitude questions across time in the project and control villages. As a first step in this analysis we will examine the specific statements dichotomized at level 4. Responses greater than 4 (values reflecting a conservation oriented response) are identified as "correct" conservation responses. The results of this analysis are in table 72. The results in Blongko are quite mixed. Looking only at statistically significant changes, responses to two of the statements in Blongko manifested negative changes and two manifested positive changes between 1997 and 2002. The rest of the changes are not statistically significant.

In the control villages we have two positive and one negative change.

Table 72 Changes in percent distribution of conservation attitudes (dichotomized) in project (Blongko) and control sites (1997-2002).

	Project Percent>4			Control Percent>4		
Statement (abbreviated)	1997	2002	*p*	1997	2002	*p*
God will take care of the sea for humans	84	45	*<.001*	55	21	*<.001*
Humans do not impact the number of fish	48	61	*0.045*	45	45	*>0.05*
There will always be enough fish	24	11	*0.015*	13	25	*0.039*
Ocean can harmlessly absorb beach garbage	84	76	*>0.05*	82	73	*>0.05*
We have to take care of the land and sea	99	98	*>0.05**	94	99	*>0.05**
Working together can protect our resources	98	99	*>0.05**	100	100	*>0.05*
We must protect mangroves for small fish	81	96	*0.001*	92	98	*>0.05**
If we clear coral it will improve fishing	95	95	*>0.05*	91	93	*>0.05*
Farming in the hills can effect fish	44	40	*>0.05*	21	51	*<.001*
N	180	80		100	80	

Probability based on χ^2 . *Yates corrected χ^2.

Turning to the summary scales constructed from this data, we analyze differences between the project and control sites on the total conservation scale and the two components derived from the principal component analysis of the data (tables 73 and 74).

Table 73. Mean resource beliefs scores for Blongko and control sites for 2 time periods.

	Blongko			Controls		
Measure	1997	2002	t-test	1997	2002	t-test
CONSERVE	6.578	6.212	1.946	5.930	6.037	0.533
VASTNESS	0.559	0.162	3.137**	0.177	-0.158	2.273*
EFFICACY	-0.045	0.180	2.022*	0.271	-0.005	2.076*
N	180	80		100	80	

*p<0.05 **=p<0.01 ***=p<0.001

Table 73 indicates that scores on the vastness component decreased in Blongko and the control sites between 1997 and 2002. Scores on the efficacy component increased in Blongko and decreased in the control sites during the same period of time. The latter finding is in the direction expected if the project had positive impacts on resource beliefs. Changes in the total conservation score are not statistically significant. Scores on all three measures in 2002 do not differ significantly between Blongko and the control sites (table 74).

The next question involves determining the effects of project participation and knowledge on resource beliefs within the project villages. To determine these effects we examine correlations between the project knowledge and participation indices, the set of other independent variables discussed above, and resource beliefs. The correlations are in table 75.

Table 74. Differences in mean resource beliefs component scores for Blongko and control sites (2002).

MEASURE	Blongko	Controls	t-test
CONSERVE	6.212	6.037	0.803
VASTNESS	0.162	-0.158	1.963
EFFICACY	0.180	-0.005	1.544
N	80	80	

Education, age, and relative dependence on farming are statistically significantly correlated with the vastness component and total conservation scores. Project knowledge is significantly related to the efficacy component score. Education and project knowledge manifest positive relationships while age and relative dependence on farming manifest negative relationships. Stepwise regression, as described above, is used to determine the combined effects of the independent variables on two of the resource beliefs measures. The regression for the efficacy component resulted in only

Table 75. Correlations between independent variables and resource beliefs in Blongko.

	Vastness	Efficacy	Conserve
Education	0.405***	-0.017	0.407***
Gender male	0.123	-0.021	0.178
Age	-0.444***	-0.072	-0.310**
Christian	-0.173	0.024	-0.158
Household size	0.158	-0.035	0.039
Fishing	-0.046	-0.011	-0.130
Farming	-0.237*	-0.197	-0.260*
Proj. participation	0.064	-0.035	0.093
Level participation	-0.044	-0.046	-0.042
Proj. knowledge	0.092	0.394***	0.201
MPA knowledge	0.178	0.089	0.161

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

one variable being entered—project knowledge; hence, the results are not included in the regression analyses. The results of these analyses are in table 76.

No project related variables are included in either regression analysis. The regression analyses indicate that education and age are the major predictors of both the vastness component and total conservation scores. Gender is entered into the equation for the total conservation score after education and age are entered because its partial correlation increased slightly resulting in a $p<0.05$. The regression analyses indicate that age and education separately account for significant amounts of variance in these two measures, while project knowledge and participation seem to have no influence. It must be noted, however, that project knowledge is strongly related ($R=0.394$, $R^2=0.16$, $p<0.001$) to the efficacy component score.

Table 76. Stepwise regression analyses of resource beliefs measures in Blongko (N=80).

DEPENDENT VARIABLE: TOTAL CONSERVATION SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.344	0.001
Gender male	0.202	0.047
Age	-0.242	0.022

$R=0.50$ $R^2=0.25$ Adj.$R^2=0.22$ $F=8.491$ $p < 0.001$

DEPENDENT VARIABLE: VASTNESS COMPONENT SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.312	0.002
Age	-0.364	<0.001

$R=0.54$ $R^2=0.29$ Adj.$R^2=0.27$ $F=15.554$ $p < 0.001$

Talise: As a means of testing for project impact in Talise, we first examine distributions in responses to the resource conservation attitude questions across time in the project and control villages. As a first step in this analysis we will examine the specific statements dichotomized at level 4. Responses greater than 4 (values reflecting a conservation oriented response) are identified as "correct" conservation responses. The results of this analysis are in table 77. The results in Talise are quite mixed. Three of the changes are statistically significant, and two of those are in the expected direction. We find an increase from 59 to 76 percent for "If we throw our garbage on the beach, the ocean takes it away and it causes no harm," and an increase from 19 to 31 percent for "Farming in the hills behind the village can have an effect on the fish." In contrast we find a decrease from 55 to 22 percent in correct responses (some level of disagree) to "We do not have to worry about the air and the sea, God will take care of it for us." In the control villages, 3 of the 5 statistically significant changes are in a positive, more environmentally correct, direction (table 77).

Table 77. Changes in percent distribution of conservation attitudes (dichotomized) in project (Talise) and control sites (1997-2002).

	Project Percent>4			Control Percent>4		
Statement (abbreviated)	1997	2002	*p*	1997	2002	*p*
God will take care of the sea for humans	55	23	*<.001*	50	30	*.004*
Humans do not impact the number of fish	23	25	*0.69*	42	32	*.16*
There will always be enough fish	13	20	*0.10*	27	13	*.02*
Ocean can harmlessly absorb beach garbage	59	76	*0.006*	61	83	*<.001*
We have to take care of the land and sea	93	91	*0.54*	95	99	*.24**
Working together can protect our resources	93	98	*0.26**	98	99	*.83**
We must protect mangroves for small fish	88	81	*0.11*	89	97	*.08**
If we clear coral it will improve fishing	79	86	*0.18*	79	91	*.02*
Farming in the hills can effect fish	19	31	*0.02*	17	40	*<.001*
N	224	80		120	90	

Probability based on χ^2. *Yates corrected χ^2.

Turning to the summary scales constructed from this data, we analyze differences between the project and control sites on the total conservation scale and the two components derived from the principal component analysis of the data (tables 78 and 79). With respect to the total conservation beliefs score, changes from pre-project to post project times do not differ for either Talise or the control villages. The control villages, however, have a higher mean score than Talise in 2002. Turning to the resource beliefs component scores, the control villages manifested a statistically significant decline on the "vastness" component between 1997 and 2002, while Talise manifested a statistically significant increase in the "efficacy" component score during that same time period.

We performed an identical analysis comparing Airbanua with Kahuku (the control sites) under the assumption that Airbanua's responses might have been influenced by their participation in the CRMP expansion project. The only statistically significant difference was that Airbanua's scores on the "vastness" component dropped significantly (from 0.375 to –0.054; t=2.012, df=98, p=0.047) between the pre-project and post-project assessment periods. This indicates that if the project had any effect in Airbanua, it was negative.

Table 78. Mean resource beliefs scores for Talise and control sites for 2 time periods.

	Talise			Controls		
Measure	1997	2002	t-test	1997	2002	t-test
CONSERVATION	5.228	5.312	0.441	5.567	5.844	1.438
VASTNESS	-0.180	-0.289	0.899	0.136	-0.207	2.451*
EFFICACY	-0.342	-0.004	2.325*	0.034	0.230	1.497
N	224	80		120	90	

*p<0.05

Table 79. Differences in mean resource beliefs component scores for Talise and control sites (2002).

MEASURE	Talise	Controls	t-test
CONSERVATION	5.312	5.844	2.658*
VASTNESS	-0.289	-0.207	0.573
EFFICACY	-0.004	0.230	1.544
N	80	90	

*p<0.05

The next question involves determining the effects of project participation and knowledge on resource beliefs within the project villages. To determine these effects we examine correlations between the project knowledge and participation indices, the set of other independent variables discussed above, and resource beliefs. As discussed above, Kinabohutan is a distinct area of Talise, so it is analyzed as a dummy variable in the correlation analysis. The correlations are in table 80.

Table 80. Correlations between independent variables and resource beliefs in Talise.

	Vastness	Efficacy	Conserve
Education	0.223*	0.292**	0.413***
Gender male	0.120	0.206	0.283*
Age	-0.134	-0.248*	-0.261*
Christian	0.151	0.073	0.178
Household size	0.241*	0.083	0.238*
Fishing	-0.300**	0.097	-0.175
Farming	-0.038	0.200	0.026
Proj. participation	0.075	0.280*	0.180
Level participation	0.241*	0.163	0.242*
Proj. knowledge	0.108	0.300**	0.307**
MPA knowledge	0.112	0.278*	0.331**
Kinabohutan	-0.132	-0.070	-0.166

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

Looking first at non-project variables we see that the analysis, once again, illustrates the importance of education as an independent variable. Education is statistically significantly correlated with all three of the resource beliefs measures. Gender male manifests a positive correlation with the total conservation score, indicating that males tend to score higher on this measure than females. Age is negatively correlated with the efficacy component and the total conservation scale, and degree of dependence on fishing is negatively correlated with the vastness component score. Household size is positively correlated with the vastness and total conservation measures. Neither Kinabohutan nor religious preference is related to the resource beliefs measures in Talise.

Turning to the project variables, the project participation index is positively correlated with the efficacy component score and the level of participation index is positively correlated with the vastness and total conservation measures, indicating that the project has had a positive impact on resource beliefs in Talise. Finally, both project and MPA knowledge are related to the efficacy and total conservation scores, another indicator of positive project impacts in Talise. Stepwise regression, as described above, is used to determine the combined effects of the independent variables on resource beliefs. The results of these analyses are in table 81.

Despite the fact that three of the project participation and knowledge indices are positively correlated with the total conservation score, once education is entered into the regression equation, these correlations reduce to a level where they are no longer statistically significant (p>0.05). This is related to the fact that level of formal education is strongly related to project participation in Talise (table 34). Education, however, is not strongly correlated with gender, so it becomes the next variable entered in the equation. After these two

variables are entered, no other variables meet the criterion for entry ($p<0.05$) so the process ends. The two variables, education and gender, account for 21 percent of the variance in the total conservation score, a modest, but statistically significant amount.

Turning to the vastness component score, relative dependence on fishing and household size account for only 10 percent of the variance, a slight, but statistically significant amount. The negative beta coefficient associated with dependence on fishing indicates that the more dependence the lower the score. Household size positively impacts the vastness component score. Finally, age and project knowledge together account for 12 percent of the variance in the efficacy component score—age has a negative impact and project knowledge a positive impact.

Table 81. Stepwise regression analyses of resource beliefs measures in Talise (N=80).

DEPENDENT VARIABLE: TOTAL CONSERVATION SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Education	0.393	<0.001
Gender male	0.252	0.014

$R=0.48$ $R^2=0.23$ Adj. $R^2=0.21$ $F=11.741$ $p < 0.001$

DEPENDENT VARIABLE: VASTNESS COMPONENT SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Fishing	-0.281	0.010
Household size	0.217	0.045

$R=0.37$ $R^2=0.14$ Adj. $R^2=0.11$ $F=6.101$ $p = 0.003$

DEPENDENT VARIABLE: EFFICACY COMPONENT SCORE

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Age	-0.234	0.030
Project knowledge	0.288	0.008

$R=0.38$ $R^2=0.14$ Adj. $R^2=0.12$ $F=6.490$ $p = 0.002$

4.4 Changes in Perceptions of Well Being

Perceived changes in overall well being are very important. If people feel that they are better off today than in some period in the past, it colors their entire outlook on life. In this section we examine perceived changes in well being over the past five years at two time periods, the baseline (1997) and post-evaluation (2002) in the project and control sites (tables 82 and 83).[6] According to the analyses in the two tables, the small changes noted for project sites are not statistically significant, while the control sites improved greatly, with most responses moving to the "better off" category. It is interesting to note that the control villages' profile across the response categories in 2002 moved in a direction that makes it quite similar to the project villages—there is no statistically significant difference between the two (see table 84).

Table 82. Percent distribution of perceived changes in well being in project villages 1997 and 2002.

	1997	2002	Total
Worse off	16	21	18
Same	22	19	21
Better off	60	58	60
Don't know	2	1	2
Total	100	100	100
N	526	320	846

$\chi^2=6.323$ df=3 p=0.097

Table 83. Percent distribution of perceived changes in well being in control villages 1997 and 2002.

	1997	2002	Total
Worse off	44	17	32
Same	32	23	28
Better off	23	60	39
Don't know	1	0	1
Total	100	100	100
N	322	250	572

$\chi^2=90.194$ df=3, p<0.001; Cor.$\chi^2=86.93$, df=2, p<0.001

Table 84. Percent distribution of perceived changes in well being in project and control villages 2002.

	Control	Project	Total
Worse off	17	21	19
Same	23	19	21
Better off	60	58	59
Don't know	0	1	1
Total	100	100	100
N	250	320	570

$\chi^2=4.817$ df=3 p=0.186; Cor.$\chi^2=2.46$, df=2, p=0.293

[6] The Chi-square values are corrected by removing rows containing two cells with frequencies less than 5 then recalculating the chi-square for the resulting frequency table.

Turning to changes in perceptions of future status, respondents were asked if they felt they would be worse off the same or better off five years in the future. Results of the analyses of these data are in tables 85 and 86. Changes in both the project and control villages are statistically significant. In both we find a larger percent saying that they will be better-off in 5 years and a lower percent saying that they do not know. The changes in the project villages are slighter than in the control, and once again we find the control villages becoming more like the project villages—an observation supported by the lack of statistical significance in the differences between them in 2002 (table 87).

Table 85. Percent distribution of perceived well-being 5 years in the future in control villages 1997 & 2002.

	1997	2002	Total
Worse off	1	0	0
Same	6	7	7
Better off	29	73	48
Don't know	64	20	45
Total	100	100	100
N	322	250	572

χ^2=121.836 df=3 p<0.001; Cor.χ^2=120.85, df=2, p<0.001

Table 86. Percent distribution of perceived well-Being 5 years in the future in project villages 1997 & 2002.

	1997	2002	Total
Worse off	2	0	1
Same	5	11	7
Better off	60	70	63
Don't know	34	19	28
Total	100	100	100
N	526	320	846

χ^2=35.831 df=3 p<0.001

Table 87. Percent distribution of perceptions of well-being 5 years in the future in project and control sites 2002.

	Control	Project	Total
Same	7	11	9
Better off	73	70	71
Don't know	20	19	19
Total	100	100	100
N	250	320	570

χ^2=2.684 df=2 p=0.261

Once again, it is important to examine other potential predictors of perceptions of well-being such as individual project knowledge and participation and the set of socioeconomic variables discussed above. To simplify the analyses, we will focus on only one of the potential responses to the well-being questions—better-off. Therefore, responses are dichotomized into better-off versus all other responses, with better-off assigned a value of 1 and all other responses a value of zero (a dummy variable). The correlations the socioeconomic variables and the well-being response for the project and control villages can be found in table 88.

Focusing on statistically significant correlations, people who think they are better off today have more years of formal education (7.3 versus 6.5 years), are younger (38.3 versus 45.1 years), and have a higher score on the MSL appliances component (0.162 versus –0.114). Those who feel that they will be better off 5 years in the future have more education (7.3 versus 6.1 years), are younger (39.2 versus 45.7 years), and tend to rank farming as either second or third or higher in relative importance to household income. Those who think they will not be better-off tend to be those who do not depend on farming at all or rank it as first in importance.

Table 88. Correlations between perceived changes in well-being in project and control villages 2002.

	Coefficient /sig. test	Better-off today	Better-off in 5 years
Education	r/f-test	0.138**	0.186***
Age	r/f-test	-0.257***	-0.229***
Modern house	r/f-test	-0.014	0.002
Appliances	r/f-test	0.127**	0.042
House structure	r/f-test	0.010	-0.004
Furnishings	r/f-test	0.069	0.071
Household size	r/f-test	-0.000	0.007
Gender male	ϕ/χ^2	-0.073	0.054
Christian	ϕ/χ^2	0.011	0.063
Fishing	C/χ^2	0.089	0.109
Farming	C/χ^2	0.094	0.159**

N=570 ***p<0.001 **p<0.01 *p<0.05

If the project influences well-being in the project villages, we expect that those who participate in and have knowledge concerning project activities would perceive greater changes in well-being from the past as well as into the future. To test this hypothesis we next examine relationships between the independent socio-

cultural variables, project participation and knowledge, and perceived changes in well-being. As we have seen above, there are significant differences between the project villages with regard to some of the socio-cultural variables; hence, we will also examine effects of project village on perceived well-being by entering the villages as dummy variables. Results of this analysis are in table 89. Focusing on statistically significant correlations, people who think they are better off today score higher on the project and MPA knowledge indices (3.1 versus 2.8 and 4.7 versus 4.2 respectively), lower on the modern house MSL component and higher on the appliances component (0.046 versus 0.251 and 0.314 versus –0.097 respectively). Those who think they are better-off today and will be better-off 5 years from today also have more years of formal education (7.3 versus 6.5 years), are younger (38.8 versus 44.6 years), are more likely to depend on farming than fishing for household income and tend to live in Blongko rather than Talise. Seventy-three percent of the Blongko respondents feel they are better-off today in contrast to 54 percent of respondents from the other villages combined. Less than half (46 percent) the respondents from Talise feel they are better off today.

Table 89. Correlations between perceived changes in well-being in project villages 2002.

	Coefficient /sig. test	Better-off today	Better off in 5 years
Education	r/f-test	0.131*	0.164**
Age	r/f-test	-0.222***	-0.187**
Modern house	r/f-test	-0.120*	-0.054
Appliances	r/f-test	0.177**	0.065
House structure	r/f-test	0.018	-0.003
Furnishings	r/f-test	0.071	0.022
Household size	r/f-test	0.000	-0.008
Gender male	ϕ/χ^2	-0.094	-0.015
Christian	ϕ/χ^2	0.092	0.083
Fishing	C/χ^2	-0.168*	-0.202**
Farming	C/χ^2	0.186*	0.177*
Project knowledge	r/f-test	0.149**	0.099
Project participation	r/f-test	0.075	0.055
Level participation	r/f-test	0.077	0.077
MPA knowledge	r/f-test	0.111*	0.090
Bentenan	ϕ/χ^2	0.077	0.094
Tumbak	ϕ/χ^2	-0.099	-0.094
Blongko	ϕ/χ^2	0.165**	0.157**
Talise	ϕ/χ^2	-0.143*	-0.157**

N=320 ***p<0.001 **p<0.01 *p<0.05

4.4.1 Within Community Analyses of Changes in Well Being

Table 89 indicates that Blongko and Talise differ from the other two project villages with respect to responses to the well-being questions. Intercommunity differences with respect to other project and socio-cultural variables suggest that it may be useful to analyze relationships between Proyek Pesisir and perceptions of well-being within each project area.

Bentenan and Tumbak: While there are no statistically significant differences between 1997 and 2002 in perceived changes in well-being over the past five years in Bentenan and Tumbak, the control villages manifest a significant decrease in respondents reporting "worse-off" and an increase in "better-off" responses (tables 90 and 91). The control villages are about the same as Bentenan and Tumbak in terms of "better-off" responses in 2002, and they have fewer "worse-off" and more "same" responses then the project villages.

Table 90. Percent distribution of perceived changes in well being in Bentenan & Tumbak 1997 and 2002.

	1997	2002	Total
Worse off	15	25	21
Same	20	18	18
Better off	64	58	60
Don't know	2	0	1
Total	100	100	100
N	122	160	282

χ^2=6.809 df=3 p=0.078 Cor.χ^2=4.176 df=2 p=0.124

Table 91. Percent distribution of perceived changes in well being in control villages 1997 and 2002.

	1997	2002	Total
Worse off	42	13	29
Same	25	33	29
Better off	32	55	42
Total	100	100	100
N	102	80	182

χ^2= 19.748 df=2, p<0.001

These differences are statistically significant (table 92). With regard to changes between the baseline and post-evaluation in perceived well-being five years in the future, Bentenan and Tumbak had more "same" and fewer "don't know" responses (table 93). The percent of "better-of" responses did not change. In contrast, the control sites had a significant increase in the percent of "better-off" and a significant decrease in the percent of "don't

know" responses (table 94). These changes resulted in the controls becoming more like the project sites. In fact, the differences between the project and control sites with respect to projected changes five years in the future are not statistically significant (table 95).

Table 92. Percent distribution of perceived changes in well being in project (Bentenan and Tumbak) and control villages 2002.

	Control	Project	Total
Worse off	13	25	21
Same	33	18	23
Better off	55	58	57
Total	100	100	100
N	80	160	240

χ^2=9.392 df=2 p=0.009

Table 93. Percent distribution of perceived well-Being 5 years in the future in Bentenan and Tumbak 1997 & 2002.

	1997	2002	Total
Same	2	9	6
Better off	70	70	70
Don't know	29	21	24
Total	100	100	100
N	122	160	282

χ^2= 8.739 df=2 p=0.013

Table 94. Percent distribution of perceived well-being 5 years in the future in control villages 1997 & 2002.

	1997	2002	Total
Worse off	1	0	1
Same	7	3	5
Better off	18	74	42
Don't know	75	24	52
Total	100	100	100
N	102	80	182

χ^2=57.997 df=3 p<0.001; Cor.χ^2=40.123 df=2 p<0.001

Table 95. Percent distribution of perceptions of well-being 5 years in the future in project and control sites 2002.

	Control	Project	Total
Same	3	9	7
Better off	74	70	71
Don't know	24	21	22
Total	100	100	100
N	80	160	240

χ^2=3.904 df=2 p=0.142

If the project influences well-being in the project villages, we expect that those who participate in and have knowledge concerning project activities would perceive greater changes in well-being from the past as well as into the future. To test this hypothesis we next examine relationships between the independent socio-cultural variables, project participation and knowledge, and perceived changes in well-being in the Bentenan and Tumbak. The results of this analysis are in table 96.

The only project variable statistically significantly related to perceived well-being is the project knowledge index. People who think they are better off today score higher on the project knowledge index (3.1 versus 2.7). They also have a higher level of education (7.8 versus 6.9 years), are younger (37.1 versus 44.0 years), and score higher on the appliances MSL component (0.495 versus 0.026). Those who tend to think they will be better off in five years tend to come from Bentenan (78 percent from Bentenan versus 63 percent from Tumbak) and acquire some, but not the major proportion of their household income from farming.

Table 96. Correlations between independent variables and perceived changes in well-being in project villages (Bentenan & Tumbak) 2002.

	Coefficient /sig. test	Better-off today	Better off in 5 years
Education	r/f-test	0.158*	0.145
Age	r/f-test	-0.292***	-0.080
Modern house	r/f-test	-0.050	0.013
Appliances	r/f-test	0.186*	0.092
House structure	r/f-test	0.140	0.091
Furnishings	r/f-test	0.018	-0.025
Household size	r/f-test	0.035	-0.002
Gender male	ϕ/χ^2	-0.133	0.030
Christian	ϕ/χ^2	-0.065	0.006
Fishing	C/χ^2	0.146	0.106
Farming	C/χ^2	0.183	0.249*
Project knowledge	r/f-test	0.162*	0.076
Project participation	r/f-test	0.111	0.133
Level participation	r/f-test	0.044	0.101
MPA knowledge	r/f-test	0.014	0.085
Bentenan	ϕ/χ^2	0.152	0.164*

N=160 ***p<0.001 **p<0.01 *p<0.05

Blongko: While there are no statistically significant differences between 1997 and 2002 in perceived changes in well-being over the past five years in Blongko, the control villages manifest a significant decrease in respondents reporting "worse-off" and a significant increase in "better-off" responses (tables 97 and 98). These

Table 97. Percent distribution of perceived changes in well being in Blongko 1997 & 2002.

	1997	2002	Total
Worse off	13	11	12
Same	18	15	17
Better off	66	73	68
Don't know	3	1	2
Total	100	100	100
N	180	80	260

χ^2=1.353 df=3 p=0.717 Cor.χ^2=0.775 df=2 p=0.679

Table 98. Percent distribution of perceived changes in well being in control villages 1997 and 2002.

	1997	2002	Total
Worse off	49	18	35
Same	34	18	27
Better off	16	65	38
Don't know	1	0	1
Total	100	100	100
N	100	80	180

χ^2= 46.185 df=3, p<0.001; Cor.χ^2=45.331 df=2 p<0.001

changes in the control villages result in a response pattern that is not statistically significantly different from Blongko in 2002 (table 99). Both Blongko and the control villages show significant increases in "better-off" and decreases in "don't know" responses concerning perceived status five years in the future (tables 100 and 101). The amount of change is greater in the control villages, resulting in a profile similar to that in the project villages in 2002 (table 102).

Table 99. Percent distribution of perceived changes in well being in project Blongko and control villages 2002.

	Control	Project	Total
Worse off	18	11	14
Same	18	15	16
Better off	65	73	69
Don't know	0	1	1
Total	100	100	100
N	80	80	160

χ^2=2.568 df=3 p=0.463 Cor.χ^2=1.562 df=2 p=0.458

Table 100. Percent distribution of perceived well-Being 5 years in the future in Blongko 1997 & 2002.

	1997	2002	Total
Same	3	5	4
Better off	59	83	67
Don't know	37	13	30
Total	100	100	100
N	180	80	260

χ^2= 16.255 df=2 p<0.001

Table 101. Percent distribution of perceived well-being 5 years in the future in control villages 1997 & 2002.

	1997	2002	Total
Same	4	9	6
Better off	23	69	43
Don't know	73	23	51
Total	100	100	100
N	100	80	180

χ^2=45.528 df=3 p<0.001

Table 102. Percent distribution of perceptions of well-being 5 years in the future in Blongko and control sites 2002.

	Control	Project	Total
Same	9	5	7
Better off	69	83	76
Don't know	23	13	18
Total	100	100	100
N	80	80	160

χ^2=4.104 df=2 p=0.128

If the project influences well-being in the project villages, we expect that those who participate in and have knowledge concerning project activities would perceive greater changes in well-being from the past as well as into the future. To test this hypothesis we next examine relationships between the independent socio-cultural variables, project participation and knowledge, and perceived changes in well-being in Blongko. The results of this analysis are in table 103. None of the project variables are statistically significantly correlated with perceptions of well-being. Age is the only variable that is statistically significantly correlated with the perceptions of well being measures. Younger as opposed to older respondents tend to say they will be better off in 5 years (40.2 versus 49.9 years respectively).

***Talise*:** According to the analyses in tables 104 and 105, the small changes noted for Talise are not statistically significant, while the control sites improved greatly, with most responses moving to the "better off" category. It is interesting to note that the control villages' profile across the 4 response categories in 2002

moved in a direction that makes it quite similar to Talise's—there is no statistically significant difference between the two (see table 106). Finally, the potential effect of Airbanua's status as an expansion site is examined. As can be seen in table 107, there is no statistically significant difference between Airbanua and Kahuku. In fact, the only large difference in table 107, the percent who feel they are better off today, is in the opposite direction than that predicted by Airbanua's status as an expansion site and statistically significant (χ^2=4.68, df=1, p<0.05).

Table 103. Correlations between independent variables and perceived changes in well-being in Blongko 2002.

	Coefficient /sig. test	Better-off today	Better off in 5 years
Education	r/f-test	-0.020	0.072
Age	r/f-test	-0.073	-0.258*
Modern house	r/f-test	-0.170	-0.205
Appliances	r/f-test	0.182	-0.051
House structure	r/f-test	-0.050	0.104
Furnishings	r/f-test	0.072	-0.066
Household size	r/f-test	-0.118	0.008
Gender male	ϕ/χ^2	0.025	-0.089
Christian	ϕ/χ^2	0.075	-0.044
Fishing	C/χ^2	0.257	0.278
Farming	C/χ^2	0.144	0.066
Project knowledge	r/f-test	0.087	-0.051
Project participation	r/f-test	0.145	-0.007
Level participation	r/f-test	0.052	-0.031
MPA knowledge	r/f-test	0.148	-0.101

N=160 ***p<0.001 **p<0.01 *p<0.05

Table 104. Percent distribution of perceived changes in well being in Talise 1997 and 2002.

	1997	2002	Total
Worse off	18	24	20
Same	26	28	26
Better off	54	46	52
Don't know	2	3	2
Total	100	100	100
N	224	80	304

χ^2=1.57 df=3 p=0.67; Cor.χ^2=1.557, df=2, p=0.459

Table 105. Percent distribution of perceived changes in well being in control villages 1997 and 2002.

	1997	2002	Total
Worse off	43	20	33
Same	35	20	29
Better off	20	60	37
Don't know	3	0	1
Total	100	100	100
N	120	90	

χ^2=36.38 df=3, p<0.001; Cor.χ^2=33.98, df=2, p<0.001

Table 106. Percent distribution of perceived changes in well being in Talise and control villages 2002.

	Control	Talise	Total
Worse off	20	24	22
Same	20	28	24
Better off	60	46	54
Don't know	0	3	1
Total	100	100	100
N	90	80	

χ^2=5.03 df=3 p=0.169; Cor.χ^2=2.76, df=2, p=0.252

Table 107. Percent distribution of perceived changes in well being in Kahuku & Airbanua 2002.

	Kahuku	Airbanua	Total
Worse off	12	30	20
Same	18	23	20
Better off	70	48	60
Total	100	100	100
N	50	40	90

χ^2=5.700 df=2 p=0.058

Table 108. Percent distribution of perceived well-being 5 years in the future in Talise 1997 & 2002.

	1997	2002	Total
Worse off	4	0	3
Same	8	21	12
Better off	54	58	55
Don't know	34	21	31
Total	100	100	100
N	224	80	304

χ^2=15.38 df=3 p=0.002; Cor.χ^2=11.84, df=2, p=0.003

Table 109. Percent distribution of perceived well-Being 5 years in the future in control villages 1997 & 2002.

	1997	2002	Total
Worse off	1	0	0
Same	8	10	9
Better off	43	77	58
Don't know	48	13	33
Total	100	100	100
N	120	90	

χ^2=29.94 df=3 p<0.001; Cor.χ^2=29.15, df=2, p<0.001

Turning to changes in perceptions of future status, respondents were asked if they felt they would be worse off the same or better off five years in the future. Results of the analyses of these data are in tables 108 and 109. While there were positive changes in perceived well being 5 years in the future in both Talise and the control villages,

it is clear that the big changes were a decrease in the "don't know" and an increase in the "same" categories in Talise in contrast to a big decrease in the "don't know" and an increase in the "better-off" categories in the control villages. Overall the profiles for Talise and the control villages are similar, but there are more responses concentrated in the "better off" category in the latter (Table 110).

Table 110. Percent distribution of perceptions of well-being 5 years in the future in Talise and control sites 2002.

	Control	Talise	Total
Same	10	21	15
Better off	77	58	68
Don't know	13	21	17
Total	100	100	100
N	90	80	

χ^2=7.361 df=2 p=0.025

If the project influences well-being in the project villages, we expect that those who participate in and have knowledge concerning project activities would perceive greater changes in well-being from the past as well as into the future. To test this hypothesis we next examine relationships between the independent socio-cultural variables, project participation and knowledge, and perceived changes in well-being in Talise. Because of socio-cultural difference between Kinabohutan and the rest of Talise, Kinabohutan is entered as a dummy variable. The results of these analyses can be found in table 111.

Focusing only on statistically significant correlations, the level of project participation index is positively correlated with both well-being measures. Those who report that they are better-off today and will be better-off 5 years in the future score higher on this index than those who do not (0.766 versus 0.506 and 0.719 versus 0.500 respectively). Younger in contrast to older respondents also tend to say that they are better-off today and will be better-off 5 years in the future (39.2 versus 46.1 and 39.4 versus 47.7 years respectively). Respondents from households that have a relatively high dependence on agriculture also have a tendency to say that they are better-off today than in the past. Unexpectedly, people scoring low on the MSL permanent structure component tend to be more optimistic about the future than those scoring high (0.235 versus 0.549). Finally, fewer respondents living in Kinabohutan report they are better-off today than those from the other sub-villages of Talise (35 versus 58 percent, respectively).

Table 111. Correlations between independent variables and perceived changes in well-being in Talise 2002.

	Coefficient /sig. test	Better-off today	Better off in 5 years
Education	r/f-test	0.170	0.206
Age	r/f-test	-0.256*	-0.306**
Modern house	r/f-test	-0.159	-0.019
Appliances	r/f-test	0.141	0.090
House structure	r/f-test	-0.095	-0.228*
Furnishings	r/f-test	0.058	0.088
Household size	r/f-test	0.178	0.093
Gender male	ϕ/χ^2	-0.129	-0.043
Christian	ϕ/χ^2	0.203	0.123
Fishing	C/χ^2	0.275	0.210
Farming	C/χ^2	0.389**	0.277
Project knowledge	r/f-test	0.017	0.074
Project participation	r/f-test	0.092	0.068
Level participation	r/f-test	0.269*	0.225*
MPA knowledge	r/f-test	0.172	0.128
Kinabohutan	ϕ/χ^2	-0.226*	-0.152

N=80 ***p<0.001 **p<0.01 *p<0.05

4.5 Perceptions of Post-Management Plan Changes

With respect to impact indicators, success and sustainability of a project are based in large part on participants' reactions to the project. In turn, these reactions are based on user perceptions of impacts, which are not always in accord with objective, quantifiable evidence. Hence, if there is an interest in understanding success and sustainability of a CRM project, it is essential to understand perceptions of the present and possible future impacts of the project. Perceptions of impacts may explain some of the variance in long-term, as well as short-term, project success. Impacts of interest with respect to Proyek Pesisir are the following:

- Overall family well-being.
- Control over coastal resources.
- Ability to influence community affairs.
- Amount of traditionally harvested fish in the sea.
- Coastal resource health.

- Compliance with fishery regulations.
- Enforcement of fishing regulations.
- Prosecution of violators of the MPA.
- Support for the MPA from the local government.

We are interested in determining project impacts since the time the project began implementation of management plans, including MPAs in the project villages; hence the baseline period for this segment of the evaluation was set at 3 years in the past. The method used for the evaluations took advantage of the human ability to make graded ordinal judgments concerning both subjective and objective phenomena. Human behavior is based on graded ordinal judgments, not simply a dichotomous judgment of present or absent. This level of measurement allows one to make more refined judgments concerning project impacts than the simple "better-off", "worse-off", or "same" evaluations used with the previous evaluation of well-being. It also permits use of more powerful statistical techniques to determine relationships between perceived impacts and potential predictor variables. The technique chosen for use in this study is a visual, self-anchoring, ladder like scale (cf. Cantril 1963) which allows for making relatively fine ordinal judgments, places little demand on informant short-term memory, and can be administered relatively rapidly. Using this technique, the respondent was shown a ladder-like diagram with 15 steps. The respondent was told that the first step represents the worst possible situation. For example, with respect to amount of traditionally harvested fish in the sea, the subject was informed that the first step indicates an area with no traditionally harvested fish. The highest step could be described as a sea filled with so many fish that the fisher could harvest as much as necessary in a short period of time. The respondent was then asked where on this ladder the local area is today, 3 years ago and where he/she thought it would be 3 years in the future. As a first step in the analysis, the data for 3 years in the past (t-3) was subtracted from the data for today (t-0), resulting in a figure representing perceived change between the past and today. Likewise, data for today was subtracted from the data for 3 years in the future (t+3), resulting in a figure representing degree of forecast, or predicted change. As a means of determining if respondents from project villages differed from those from the control villages, difference of means tests (Student's t-test) were calculated. Questions concerning prosecution of violators of the MPA and support of MPA by local government were not posed in the control villages since they did not have MPAs. The results of these analyses are in Table 112.

Table 112. Analysis of differences of means for perceived changes for Project and control villages.

	3 years ago to today			today to 3 years ahead		
	Proj	Cont.	t-test	Proj.	Cont.	t-test
Family well-being	1.29	1.55	1.179	2.41	2.27	0.685
Control of resource	2.39	2.43	0.187	2.04	2.04	0.007
Influence community	2.13	2.37	0.897	1.95	1.68	1.134
Amount of target fish	0.84	-0.06	2.974**	1.67	1.43	0.241
Environmental condition	1.82	0.66	4.151***	1.87	1.49	0.071
Amount illegal fishing	3.37	3.32	0.158	1.51	1.50	0.058
Enforcement of rules	2.65	2.68	0.123	1.88	1.80	0.405
N	250	320		250	320	

*=p<0.05 **=p<0.01 ***=p<0.001

Table 112 indicates that project sites differ statistically significantly from the controls on only two of the scales. Project sites perceive a positive change in the amount of traditionally harvested fish in the sea from the past to the present in contrast to the control sites negative perceptions. Project sites also perceive a greater positive change in coastal resource health today than the controls. Both of these changes suggest that the project had a positive impact on the environment.

While it is interesting to examine each of the indicators, one at a time, it is possible that there are relationships between the indicators that can be used to understand changes in more general factors in the project communities. As a means of discovering these more general factors, principal component analysis with varimax rotation was used to elucidate patterns of relationships between the degree of change from past to present in the 9 indicators. Since 2 of the indicators were used only in the project villages it was necessary to perform 2 analyses, one pooling the data for project and controls (with 7 indicators) and one for the project villages only (with 9 indicators). The scree test (Cattell 1966) was used to determine the number of

components, resulting in 2 components in each analysis. The 2 components account for 47 percent of the variance in the total data set and 44 percent in the project villages. The results of these analyses are in tables 113 and 114. Items loading highest on the first component in both analyses (those in bold print) are clearly related to control; thus, the component is named "control." On the second component items related quality of the coastal resource and family well-being load highly, resulting in identifying the component as indicating "quality" of both the coastal resources and fish as well as household quality of life. As a means of distinguishing between the analyses conducted for the project and control sites together and the project sites only, we refer to the components from the first analysis (table 113) as "control" and "quality" and those from the second analysis (table 114) as "control2" and "quality2".

Table 113. Principal component analysis of perceived changes over past 5 years in project and control villages.

Variable	CONTROL	QUALITY
COMMUNITY INFLUENCE	**0.687**	0.001
ENFORCEMENT	**0.661**	0.206
CONTROL OVER RESOURCE	**0.624**	0.051
COMPLIANCE	**0.579**	0.279
TARGET FISH ABUNDANCE	-0.017	**0.832**
RESOURCE HEALTH	0.151	**0.746**
FAMILY WELL-BEING	0.301	**0.446**
Percent variance	24.968	22.440

Table 114. Principal component analysis of perceived changes over past 5 years in project villages.

Variable	CONTROL2	QUALITY2
COMMUNITY INFLUENCE	**0.660**	0.084
ENFORCEMENT	**0.657**	0.236
PROSECUTION	**0.630**	0.272
LOCAL SUPPORT	**0.588**	-0.159
CONTROL OVER RESOURCE	**0.538**	0.173
TARGET FISH	-0.077	**0.782**
FAMILY WELL-BEING	0.160	**0.671**
RESOURCE HEALTH	0.224	**0.634**
COMPLIANCE	**0.424**	0.419
Percent Variance	24.009	20.352

These two components clearly reflect goals of Proyek pesisir—increasing community control over coastal resources and improving the quality of the resource and subsequently quality of life of village inhabitants. Component scores (as discussed above) were calculated for each respondent and analyses were conducted to determine relationships between these scores and project activities. As a first step in this portion of the analysis, difference of means (Student's t-test) were calculated for both components for the project and control villages. There is no statistically significant difference between the project and control villages on the control component (mean scores = -0.055 and 0.071 respectively, $t=1.491$, $df=568$, $p>0.05$). However, the project sites score significantly higher than the controls on the quality component (mean scores = 0.137 and –0.176 respectively, $t=3.756$, $df=568$, $p<0.001$). As a means of determining factors influencing these scores, we examined their relationships with a set of potential predictor variables. The results of this analysis are in Table 115.

Focusing only on statistically significant correlations, we see that Christians and those who live in houses with a more permanent structure score higher on the control component, while residents of Tumbak score lower. The quality component manifests more statistically significant relationships with the independent variables. Scores on the MSL modern house component and residing in Tumbak are negatively correlated with the quality component, while scores on the house structure component, coming from a project village, especially Bentenan or Blongko, are positively correlated.

Since project village had an impact on quality component scores in the analysis presented in table 115, it will be informative to examine the relationships between the independent variables, project participation and knowledge, and the two perceived changes components within the project sites. The components described for table 114 (control2 and quality2) are used in this analysis. The results of the analysis are in table 116.

Table 115. Correlations between perceived changes components and independent variables in project and control villages.

	Control	Quality
Education	0.059	0.048
Gender male	0.060	0.019
Age	-0.046	-0.010
Christian	0.110**	-0.004
Modern house	0.028	-0.106*
Appliances	0.033	0.051
House structure	0.102*	0.128**
Furnishings	0.028	0.002
Household size	0.005	0.020
Fishing	-0.066	-0.059
Farming	0.055	0.049
Project village	-0.062	0.156***
Bentenan	0.050	0.169***
Tumbak	-0.090*	-0.105*
Blongko	0.006	0.175***
Talise	-0.056	-0.016

N=570 ***=p<0.001 **=p<0.01 *=p<0.05

The project and MPA knowledge indices are the only project variables statistically significantly correlated with any of the perceived changes components. Both are positively correlated with the control2 component, indicating as project and knowledge increases so do perceived positive changes with respect to control over coastal resources. Education is also positively correlated with control2, possibly as a result of its significant correlation with both project knowledge indices (table 19). A larger number of independent variables are correlated with the quality2 component. None of the project participation or knowledge indices are, but two of the project village dummy variables have a positive correlation, indicating that residents of Blongko and Bentenan tend to score high on this component. In contrast, the negative correlation with Tumbak indicates that residents of this village tend to score lower on quality2. Years of education, Christian, scores on the appliances and house structure MSL components, and relative dependence on farming are all positively correlated with the quality2 component, while scores on the MSL modern house are negatively correlated.

Table 116. Correlations between perceived changes components and independent variables in project villages.

	Control2	Quality2
Education	0.111*	0.126*
Gender male	0.062	-0.010
Age	0.017	-0.072
Christian	0.060	0.141*
Modern house	-0.083	-0.144*
Appliances	0.017	0.142*
House structure	0.022	0.206***
Furnishings	0.039	0.017
Household size	-0.071	-0.018
Fishing	-0.085	-0.119*
Farming	-0.017	0.214***
Proj. participation	0.082	0.060
Level participation	0.094	0.016
Proj. knowledge	0.116*	0.110
MPA knowledge	0.154**	0.072
Bentenan	0.010	0.210***
Tumbak	0.076	-0.326***
Blongko	-0.004	0.191**
Talise	-0.082	-0.075

N=320 ***=p<0.001 **=p<0.01 *=p<0.05

As a next step in the analysis, step-wise multiple regression is used to tease out the combined and independent effects of the various independent variables on the perceived changes component scores. The results of these analyses are in table 117. There is no analysis for control2 in table 117 due to the fact that when the MPA knowledge index was entered into the regression equation the probabilities of all other variables exceeded the maximum criterion for entry ($p<0.05$). The analysis for quality2 indicates that 6 variables account for about 18 percent of the variance in the component score, a modest but statistically significant amount. As a reminder, these regression analyses were performed using only the project village data. Control2 and Quality2 are the variables constructed from the principal component analyses presented in table 117, which includes two variables evaluated only in the project villages. Given that information, the negative standardized beta coefficients associated with Tumbak and Talise indicate than among the project villages they perceived the least amount of positive changes on the Quality2 component. These villages are associated with the largest (absolute value) beta coefficients in the regression equation, indicating that they contribute most to the variance in the Quality2 component score. Age and the MSL modern house component score also manifest negative beta coefficients, indicating that as the values on these independent variables increase, the Quality2 score decreases. Finally, the MSL permanent structure component score and the project participation index manifest positive coefficients. Hence, project participation by individuals within project villages appears to enhance their perceptions of positive changes in the combination of items included in the Quality2 component.

Table 117. Stepwise regression analyses of perceived changes in project villages (N=320).

DEPENDENT VARIABLE: Quality2

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Age	-0.110	0.034
Modern house	-0.104	0.043
Structure	0.145	0.008
Project participation	0.108	0.036
Tumbak	-0.361	<0.001
Talise	-0.221	<0.001

$R=0.44$ $R^2=0.19$ Adj.$R^2=0.18$ $F=10.299$ $p < 0.001$

4.5.1 Within Community Analyses of Perceived Changes

The relative importance of specific project villages in the analyses presented above suggest that it would be instructive to examine predictors of perceived changes in project objectives within the project areas.

An analysis of variance across the four project villages indicates that they differ most significantly with regard to the Quality2 Component Score (table 118). Bentenan and Blongko have the highest mean scores for the Quality2 Component while Tumbak has the lowest.

Table 118. Analysis of inter-village differences in perceived changes in project objectives.

	Bentenan	Tumbak	Blongko	Talise	F-ratio	p
Control2	0.017	0.132	-0.008	-0.141	1.006	0.390
Quality2	0.363	-0.564	0.331	-0.130	15.367	<0.001
N	80	80	80	80		

df=3 316 for all F-ratio analyses.

Bentenan and Tumbak: Analyses of the differences between the project (Bentenan and Tumbak) and control sites (Rumbia and Minanga) with respect to individual scale items are in table 119. The only statistically significant differences are found in perceived changes between 3 years ago and today with respect to amount of target fish, condition of the resource and amount of illegal fishing. These three changes indicate perceptions of greater improvement in the project than control villages.

Table 119. Analysis of differences of means for perceived changes for Tumbak & Bentenan (project) and control villages.

	3 years ago to today			today to 3 years ahead		
	Proj	Cont.	t-test	Proj.	Cont.	t-test
Family well-being	1.01	0.99	0.045	2.24	2.33	0.273
Control of resource	2.27	2.00	0.683	2.24	2.15	0.282
Influence community	2.31	2.28	0.062	1.96	1.23	1.587
Amount of target fish	0.89	-0.06	2.139*	1.54	1.14	1.244
Environmental condition	1.58	0.46	2.535*	1.95	1.89	0.182
Amount illegal fishing	3.41	2.40	2.299*	1.79	1.43	1.240
Enforcement of rules	2.66	2.05	1.666	1.71	1.56	0.493
N	160	80		160	80	

*=p<0.05 **=p<0.01 ***=p<0.001

Turning to the composite measures, the project sites (Bentenan and Tumbak) do not differ significantly from the control sites (Rumbia and Minanga) with respect to mean scores on the Control Component (means = -0.049 and –0.193 respectively, df=238, t=0.974, p=0.331). However, the project sites have mean scores significantly higher than the controls on the Quality component (means = 0.079 and –0.225 respectively, df=238, t=2.536, p=0.012). Similarly, Tumbak does not differ significantly from Bentenan on the Control2 component (means = 0.132 and 0.017 respectively, df=158, t=0.725, p=0.469), but they differ on the Quality2 component (means = -0.564 and 0.363 respectively, df=158, t=6.051, p<0.001). Actually, Tumbak does not differ significantly from the control villages on either the Control or Quality Components (Control Component means = -0.222 and –0.193 and Quality Component means = -0.260 and –0.255 respectively; p>0.05 for both comparisons based on t-test). Clearly Proyek Pesisir seems to have had a positive impact on perceptions of changes in project objectives in Bentenan. As a means of determining factors influencing differences in these perceived changes, we will examine correlations between a set of independent variables (sociocultural and project knowledge and participation) and perceptions in changes in project objectives (Control2 and Quality2). The results of these analyses are in table 120.

Table 120. Correlations between perceived changes components and independent variables in Bentenan and Tumbak.

	Control2	Quality2
Education	-0.063	0.117
Gender male	0.110	-0.061
Age	0.067	-0.054
Christian	-0.071	0.204*
Modern house	-0.151	-0.190*
Appliances	-0.000	0.212**
House structure	0.032	0.340***
Furnishings	-0.008	-0.046
Household size	-0.161*	-0.041
Fishing	-0.036	-0.182*
Farming	-0.021	0.208**
Proj. participation	0.058	0.103
Level participation	0.082	0.014
Proj. knowledge	0.006	0.139
MPA knowledge	0.044	0.083
Bentenan	-0.058	0.434***

N=160 ***=p<0.001 **=p<0.01 *=p<0.05

None of the project knowledge or participation indices are statistically significantly correlated with either the Control2 or Quality2 component scores. Focusing on statistically significant correlations only one variable, household size, is related to the Control2 component—as household size increases, the scores on this component decrease. Several of the MSL scales are related to the Quality2 component—appliances and permanent house structure (positively) and modern house (negatively). Degree of dependence on farming is positively related to this component, while dependence on fishing manifests a negative correlation. Finally, Christian and Bentenan manifest positive correlations with Quality2. The correlation between Bentenan is rather large and probably has an influence on the correlation between Christian and Quality2 since there are no Christians in the Tumbak sample. As a next step in the analysis, step-wise multiple regression is used to tease out the combined and independent effects of the various independent variables on the perceived changes component scores. The analysis was only conducted for the quality2 component of perceptions of changes in project objectives since only one variable is statistically significantly correlated with control2. The results of the analysis are in table 121.

Table 121. Stepwise regression analyses of perceived changes component in Bentenan and Tumbak (N=160).

DEPENDENT VARIABLE: Quality2

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	-0.141	0.049
Modern house	-0.172	0.013
Structure	0.215	0.005
MPA knowledge	0.221	0.003
Bentenan	0.377	<0.001

$R=0.54$ $R^2=0.30$ Adj.$R^2=0.27$ $F=12.971$ $p < 0.001$

Five of the independent variables account for 27 percent of the variance in the Quality2 Component Score in Bentenan and Tumbak. The MPA Knowledge Index is the only project index entered into the equation, and it indicates that MPA knowledge has a positive influence on perceptions of changes in the quality of the environment and household in Bentenan and Tumbak. Gender male and scores on the MSL modern house component are negatively related to Quality2, and scores on the MSL permanent structure component are positively related. The strongest predictor of scores on the Quality2 component, however is Bentenan. Given the fact that the dummy variable village (Bentenan) has such a large correlation with the dependent variables, perhaps it would be best to examine relationships between the independent and dependent variables within each of the project villages. Results of these analyses are in tables 122 and 123.

Table 122. Correlations between perceived changes components and independent variables in Bentenan.

	Control2	Quality2
Education	-0.011	0.090
Gender male	0.066	-0.175
Age	-0.059	-0.040
Christian	-0.063	-0.159
Modern house	-0.113	-0.109
Appliances	0.080	0.238*
House structure	0.093	0.111
Furnishings	-0.039	-0.035
Household size	-0.146	0.064
Fishing	-0.098	0.019
Farming	-0.060	-0.089
Proj. participation	-0.022	0.160
Level participation	-0.055	0.049
Proj. knowledge	0.088	0.369**
MPA knowledge	0.023	0.261*

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

Focusing on statistically significant correlations, table 122 indicates that two of the project indices—project and MPA knowledge—are positively correlated with scores on the quality2 component in Bentenan. They are the strongest predictors. Scores on the MSL Appliances Component also manifest a positive correlation with quality2. A step-wise regression was conducted to determine the combined, independent effects of these three independent variables on quality2, but when the Project Knowledge Index was entered, none of the other variables met the criterion for entry. The probabilities associated with the partial correlations all exceeded 0.010.

Table 123. Correlations between perceived changes components and independent variables in Tumbak.

	Control2	Quality2
Education	-0.121	0.095
Gender male	0.160	-0.029
Age	0.190	-0.153
Christian	.	.
Modern house	-0.216	-0.233*
Appliances	-0.127	0.031
House structure	0.053	0.218
Furnishings	0.016	-0.007
Household size	-0.209	0.070
Fishing	-0.046	0.056
Farming	0.193	0.095
Proj. participation	0.168	0.055
Level participation	0.196	0.175
Proj. knowledge	-0.098	-0.061
MPA knowledge	0.048	0.165

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

The analysis of the Tumbak data (table 123) indicates that only one variable—scores on the MSL modern house component—is significantly correlated with quality2. There are no correlations with Christian in the table since the Tumbak sample contained no Christians.

Blongko: Analyses of the differences between the project (Blongko) and control sites (Boyangpante and Sapa) with respect to individual scale items are in table 124. With regard to changes from 3 years ago to today, Blongko residents perceive greater positive changes than the controls in amount of target fish and coastal environmental conditions. As a matter of fact, residents in the control villages perceive negative changes with respect to these items. Blongko residents are clearly more optimistic than residents of the control villages with regard to changes in variables associated with project objectives. They perceive greater positive change three years in the future with respect to five of the eight items in table 124.

Table 124. Analysis of differences of means for perceived changes for Blongko (project) and control villages.

	3 years ago to today			today to 3 years ahead		
	Proj	Cont.	t-test	Proj.	Cont.	t-test
Family well-being	2.04	2.06	0.082	2.64	1.80	2.747**
Control of resource	2.79	2.73	0.156	2.34	1.70	1.969
Influence community	1.99	1.96	0.068	2.50	1.61	2.669**
Amount of target fish	1.16	-0.61	3.170**	2.30	1.09	2.897**
Environmental condition	2.99	-0.24	7.021***	2.16	1.04	3.288**
Amount illegal fishing	3.56	4.01	0.784	1.21	1.54	1.012
Enforcement of rules	2.91	2.64	0.826	2.41	1.58	2.490*
N	80	80		80	80	

*=p<0.05 **=p<0.01 ***=p<0.001

Turning to the composite measures, Blongko does not differ significantly from the control sites with respect to mean scores on the Control Component (means = 0.016 and 0.178 respectively, df=158, t=1.273, p=0.205). However, Blongko residents have a mean score that is significantly higher than residents of the control villages on the Quality component (means = 0.432 and –0.330 respectively, df=158, t=5.567, p<0.001). Clearly Proyek Pesisir seems to have had a positive impact on perceptions of changes in project objectives in Blongko. As a means of determining factors influencing differences in these perceived changes, we will examine correlations between a set of independent variables (sociocultural and project knowledge and participation) and perceptions in changes in project objectives (Control2 and Quality2). The results of these analyses are in table 125. Only one of the independent variables is statistically significantly correlated with either of the dependent variables. In Blongko, as project participation increases, so do positive perceptions concerning changes in quality of the environment and living conditions.

Table 125. Correlations between perceived changes components and independent variables in Blongko.

	Control2	Quality2
Education	0.156	0.189
Gender male	0.103	0.092
Age	-0.025	0.012
Christian	0.103	-0.188
Modern house	-0.175	0.059
Appliances	0.031	0.028
House structure	-0.048	0.057
Furnishings	0.139	-0.027
Household size	-0.178	0.111
Fishing	0.064	0.111
Farming	0.020	0.143
Proj. participation	-0.047	0.307**
Level participation	-0.026	0.131
Proj. knowledge	0.184	0.084
MPA knowledge	0.189	0.082

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

Talise: Analyses of the differences between the Talise and the control sites (Kahuku and Airbanua) with respect to individual scale items are in table 126. Table 126 indicates that control village respondents perceived greater positive change than Talise over the past 3 years with respect to influence on community affairs and enforcement of fishing regulations. They also predict greater future changes with respect to influence on community affairs and control over coastal resources. This is clearly not in the direction expected if the project had its intended impacts.

Table 126. Analysis of differences of means for perceived changes for Talise and control villages.

	3 years ago to today			today to 3 years ahead		
	Proj.	Cont.	t-test	Proj.	Cont.	t-test
Family well-being	1.11	1.60	1.282	2.53	2.63	0.239
Control of resource	2.24	2.57	0.674	1.33	2.23	2.336*
Influence community	1.93	2.81	1.997*	1.36	2.16	2.429*
Amount of target fish	0.43	0.44	0.032	1.29	1.99	1.510
Environmental condition	1.14	1.62	0.876	1.41	1.54	0.326
Amount illegal fishing	3.08	3.52	0.841	1.23	1.52	0.971
Enforcement of rules	2.39	3.28	2.057*	1.68	2.22	1.876
N	80	90		80	90	

*=p<0.05

Turning to the composite measures, Talise residents have a mean score that is significantly lower than residents of the control villages on the Control component (means = -138 and 0.209 respectively, df=168, t=2.188, p=0.030). Talise does not differ significantly from the control sites with respect to mean scores on the Quality Component (means = -0.040 and 0.032 respectively, df=168, t=0.426, p=0.670). As noted above, the sub-villages of Talise known collectively as Kinahobutan are culturally distinct from the other sub-villages. Hence, it would be instructive to determine if Kinahobutan differs from the other sub-villages of Talise with regard to the composite measures. With respect to the Control2 component, Kinahobutan scores much lower than the other sub-villages of Talise (means = -0.558 and 0.276 respectively, df=78, t-test=3.526, p=0.001).[7] When we compare these other sub-villages of Talise with the control sites we find no statistically significant differences on neither the Control Component (means = 0.218and 0.209 respectively, df=128, t-test=0.043, p=0.996) nor the Quality Component (means = -0.181 and 0.032 respectively, df = 128, t-test=1.049, p=0.296).

As a means of determining factors influencing differences in these perceived changes, we will examine correlations between a set of independent variables (sociocultural and project knowledge and participation) and perceptions in changes in project objectives (Control2 and Quality2). The results of these analyses are in table 127. Focusing on statistically significant relationships, table 127 indicates that years of formal education and both the project and MPA knowledge indices are positively correlated with the Control2 component. Christian also manifests a relatively strong positive correlation, but that is most likely due to the fact that Kinahobutan is almost 100 percent Muslim and it has a strong negative correlation with this component. Degree of household dependence on fishing is also negatively correlated with the Control2 component score.

Table 127. Correlations between perceived changes components and independent variables in Talise.

	Control2	Quality2
Education	0.290**	0.088
Gender male	-0.053	0.025
Age	0.002	-0.203
Christian	0.347**	-0.094
Modern house	0.040	-0.138
Appliances	-0.017	0.109
House structure	0.175	0.082
Furnishings	0.015	0.059
Household size	0.181	0.115
Fishing	-0.253*	0.134
Farming	0.053	0.097
Proj. participation	0.178	0.021
Level participation	0.207	0.057
Proj. knowledge	0.241*	-0.079
MPA knowledge	0.273*	0.002
Kinahobutan	-0.371**	0.096

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

As a next step in the analysis, step-wise multiple regression is used to determine the combined and independent effects of the various independent variables on the perceived changes component scores. The analysis was only conducted for the control2 component of perceptions of changes in project objectives since no independent variables are statistically significantly correlated with quality2. The results of the analysis are in table 128. Two variables account for 18 percent of the variance in the Control2 component score in Talise—residence in Kinahobutan and project knowledge. While Kinahobutan negatively impacts the score, project knowledge has a positive impact. As expected, when Kinahobutan was entered into the regression equation, the

[7] Similar differences are found with respect to the Control and Quality components, but we are using Control2 and Quality2 when examining project villages only.

strong positive correlation between Christian and Control2 became statistically insignificant. The only remaining variable able to meet the criterion ($p<0.05$) was project knowledge.

Table 128. Stepwise regression analyses of perceived changes component in Talise (N=80).

DEPENDENT VARIABLE: Control2

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Kinahobutan	-0.376	<0.001
Project knowledge	0.249	0.017

$R=0.45$ $R^2=0.20$ Adj.$R^2=0.18$ $F=9.595$ $p < 0.001$

4.6 Destructive Fishing and Community Response

One of the project objectives was to decrease the amount of destructive extractive techniques used in the coastal area. Two of these techniques had direct impact on coral reefs—bomb fishing and coral mining. In an attempt to determine levels of change with respect to these two techniques, respondents were requested to evaluate each in terms of direction of change over the past three years (decrease, increase, or no change). It is expected that the project villages would show more positive change than the controls. The results of the analysis of this data are in table 129. In both project and control communities most of the respondents report a decrease in bomb and coral mining fishing. Differences between the project and control communities are statistically significant only with respect to bomb fishing, where we find a larger percent of the respondents from the project villages reporting a decrease, and a larger percent from the control villages reporting an increase.

Table 129. Percent distribution of perceptions in changes in destructive techniques in project and control villages.

	Bomb Fishing			Coral Mining		
	Control	Project	Total	Control	Project	Total
Decrease	82	89	86	85	90	88
No change	2	4	3	5	3	4
Increase	12	4	8	6	3	4
Don't know	3	3	3	4	4	4
Total	100	100	100	100	100	100
N	250	320	570	250	320	570
	$\chi^2=13.43$, df=3, p=0.004			$\chi^2=5.143$, df=3, p>0.05		

Community members' attitudes towards techniques for dealing with fishers who practice destructive fishing methods are an important indicator of the interrelationship between their sense of fairness to fellow villagers or outside fishers and their attitudes toward environmental protection. As a means of trying to evaluate these attitudes, respondents were requested to report what they would do in the following two situations: 1) if a resident of their community was bomb fishing; 2) if a resident of a neighboring community was bomb fishing in their village area. The response categories were as follows: 1) nothing; 2) talk to him and explain why he should not do it; 3) report the incident to the head of village; 4) report the incident to police; and 5) apprehend the violator and bring him to the head of village or police. The results of an analysis of this data are in table 130.

Table 130. Percent distribution of actions following observation of bomb fishing.

	Bomber from Village			Bomber from next village		
Action	Control	Project	Total	Control	Project	Total
Nothing	6	7	6	6	6	6
Consult	42	33	37	30	27	28
Report to Village Head	36	42	39	45	39	42
Report to Police	5	10	9	7	13	11
Apprehend	10	8	9	12	14	13
Total	100	100	100	100	100	100
N	250	320	570	250	320	570
	$\chi^2=10.27$, df=4, p=0.036			$\chi^2=7.653$, df=4, p=0.105		

In both the project and control communities, respondents are more likely to either consult with the offender or report him to the head of the village. Statistically significant differences between project and control villages are only found when the offender is an insider. In the control villages, respondents are more

likely to consult with the offender, while in the project villages they are more likely to report the offender to some authority, such as the village head or the police.

It is likely that the actions taken in the presence of illegal fishing are related to independent variables discussed above such as age, education, material style of life, place of residence, occupation, etc. It also seems likely that resource beliefs would impact responses to destructive fishing. People who are aware of the finiteness of marine resources and understand potential human impacts are expected to have more negatively to destructive fishing than those who have less awareness of the potential impacts. The Vastness, Efficacy, and Total Conservation Beliefs scales discussed above are used to evaluate these resource beliefs. We also expect that individuals who perceive improvements in control over the resource over the past 5 years will feel that they have the power to control destructive fishing. This variable is measured by the Control Component Score (also Control2 for project villages, see tables 113 and 114). It is also reasonable to hypothesize that individuals who have seen their quality of life and the quality of the resource increase over the past five years will also respond more negatively to threats to the resource, destructive fishing being such a threat. This variable is represented by the Quality Component Score (also Control2 for project villages, see tables 113 and 114). Finally, within project villages, it is expected that project participation and knowledge will influence reactions to destructive fishing methods. As a means of examining these relationships, we conceptualize each of the responses, from "nothing" to "apprehend" as indicating an increase in severity of action; hence, an increase in the strength of the negative attitude toward the violation. Scores of from 0 to 4 are assigned to these responses, with "nothing" assigned a score of 0, "consult a score of 1, etc. We have also created an additional variable by summing the values for both types of violators (villager and non-villager), resulting in a scale with a possible range from 0 to 8. Correlations between these "response to violations" variables and the independent variables are in tables 131 and 132.

Table 131. Correlations between independent variables and response to bomb fishing violation in project and control villages.

	Residence status of violator		
	Insider	Outsider	Either
Education	0.048	0.079	0.070
Gender male	0.154***	0.229***	0.209***
Age	-0.091*	-0.083*	-0.095*
Christian	0.074	0.073	0.080
Modern house	-0.045	-0.039	-0.046
Appliances	0.021	0.026	0.026
House structure	0.068	0.055	0.066
Furnishings	-0.014	0.014	0.001
Household size	0.001	0.036	0.021
Fishing	-0.034	-0.057	-0.050
Farming	0.054	0.069	0.067
Vastness	-0.004	0.055	0.029
Efficacy	0.127**	0.123**	0.136**
Conservation	0.030	0.085*	0.064
Control Score	0.081	0.106*	0.102*
Quality Score	0.143**	0.096*	0.129**
Bentenan	0.013	0.010	0.012
Tumbak	-0.146***	-0.121**	-0.145**
Blongko	0.123**	0.149***	0.149***
Talise	0.083*	0.042	0.067

N=570 ***=p<0.001 **=p<0.01 *=p<0.05

Analyses of the data for the total sample (table 131) indicate that males, younger respondents, and respondents from Blongko or Talise, but not Tumbak, are likely to have more negative responses to destructive fishing. Additionally, those who score higher on the Efficacy Component of resource beliefs and the Quality Component of perceived changes are more likely to have more negative responses. The Total Conservation Score and the Control Component of perceived changes are positively correlated with the degree of negative response to outsiders using destructive fishing techniques in village waters.

Turning to the within project villages analyses (table 132), we find similar patterns of correlation with the independent variables. Correlations between negativity of response to bomb fishing violations and many of the variables have increased (e.g., gender, age, Christian, MSL Modern House Score, dependence on farming, efficacy, conservation, Tumbak, and Blongko), while correlations with the Control Component have decreased. Finally, both the project and MPA knowledge indices are positively correlated with negative responses to destructive fishing. As a next step in the analysis, step-wise multiple regression is used to determine the combined and independent effects of the various independent variables on the responses to bomb fishing. The results of these analyses are in table 133. Table 133 indicates that 4 variables—gender male, age, score on the efficacy component of resource knowledge, and Tumbak—are important predictors of the degree of negative responses toward bomb fishing. Other project villages (e.g., Bentenan and Blongko) entered into two of the equations. As in the zero-order analyses, age and Tumbak are negatively related to the dependent variables, and

gender male and efficacy are positively related to negative responses to bomb fishing. Bentenan manifests a negative relationship, but it is very weak, and the zero-order correlation was not significantly different from zero. After Tumbak was entered into the stepwise regression equation, Bentenan's partial correlation increased from –0.01 to –0.11 and made it a candidate for entry into the equation.

The importance of village in all three analyses indicates that it will be important to look at these relationships within each project area. We thought it might be interesting to rerun the stepwise regression analyses without the village dummy variables. The results of these analyses are in table 134. Gender male and score on the efficacy component remain important predictors for all three dependent variables, but age was not entered into the regression equation for bombers from the same village. Religion of respondent (Christian) has taken the place of the village variables where the bomber is either from a neighboring village or from either the same or neighboring village combined. Finally, score on the perceived changes Quality2 Component has taken the place of the village variable where the bomber is from the same village. The amounts of variance explained by all these regressions is relative modest, but statistically significant.

4.6.1 Within Community Analyses of Destructive Fishing and Community Response

Bentenan and Tumbak: More respondents report a decrease in bomb fishing in Bentenan and Tumbak than in the control villages (91 versus 73 percent, χ^2=13.43, df=1, p<0.001), while there is no statistically significant difference in reports of a decrease in coral mining (90 versus 83 percent, χ^2=2.743, df=1, p=0.098). When we examine responses to bomb fishing, it is clear that respondents from Bentenan and Tumbak are more likely to take more negative actions than those from the control villages (table 135). The analyses above indicated that Tumbak

Table 132. Correlations between independent variables and response to bomb fishing violation in project villages.

	Residence status of violator		
	Insider	Outsider	Either
Education	0.062	0.097	0.087
Gender male	0.192**	0.257***	0.247***
Age	-0.088	-0.178**	-0.147**
Christian	0.128*	0.138*	0.145**
Modern house	-0.119*	-0.128*	-0.135*
Appliances	0.044	0.066	0.060
House structure	0.012	0.002	0.007
Furnishings	0.008	0.039	0.026
Household size	-0.014	0.054	0.024
Fishing	-0.075	-0.080	-0.084
Farming	0.129*	0.109	0.129*
Proj. participation	0.066	0.097	0.090
Level participation	0.048	0.053	0.055
Proj. knowledge	0.134*	0.155**	0.158**
MPA knowledge	0.140*	0.163**	0.165**
Vastness	0.060	0.116*	0.097
Efficacy	0.193**	0.199***	0.214***
Conservation	0.105	0.167**	0.150**
Control2 score	-0.006	0.016	0.006
Quality2 score	0.128*	0.111*	0.130*
Bentenan	-0.007	-0.015	-0.012
Tumbak	-0.239***	-0.197***	-0.236***
Blongko	0.152**	0.181**	0.182**
Talise	0.094	0.031	0.066

N=320 ***=p<0.001 **=p<0.01 *=p<0.05

Table 133. Stepwise regression analyses of response to bomb fishing violation in project villages (N=320).

DEPENDENT VARIABLE: Bomber from village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.209	<0.001
Age	-0.139	0.011
Efficacy	0.154	0.004
Tumbak	-0.241	<0.001

R=0.37 R^2=0.14 Adj. R^2=0.13 F=12.789 p<0.001

DEPENDENT VARIABLE: Bomber from next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.298	<0.001
Age	-0.245	<0.001
Efficacy	0.138	0.007
Tumbak	-0.170	0.002
Blongko	0.119	0.027

R=0.45 R^2=0.20 Adj. R^2=0.19 F=16.000 p<0.001

DEPENDENT VARIABLE: Bomber from village or next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.281	<0.001
Age	-0.217	<0.001
Efficacy	0.160	0.002
Bentenan	-0.111	0.038
Tumbak	-0.282	<0.001

R=0.45 R^2=0.20 Adj. R^2=0.19 F=16.003 p<0.001

is statistically significantly correlated with responses to bomb fishing; hence, we examine differences between Bentenan and Tumbak in table 136. It is clear in table 136 that respondents from Bentenan say they will take more negative actions against bomb fishers whether they are from the village or a neighboring village.

Table 134. Stepwise regression analyses without village dummy variables of response to bomb fishing violation in project villages (N=320).

DEPENDENT VARIABLE: Bomber from same village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.186	0.001
Efficacy	0.176	0.001
Quality2	0.116	0.032

$R=0.29$ $R^2=0.08$ Adj. $R^2=0.08$ $F=9.718$ $p<0.001$

DEPENDENT VARIABLE: Bomber from next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.298	<0.001
Age	-0.240	<0.001
Efficacy	0.145	0.006
Christian	0.149	0.005

$R=0.41$ $R^2=0.17$ Adj. $R^2=0.16$ $F=16.012$ $p<0.001$

DEPENDENT VARIABLE: Bomber from same or next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.279	<0.001
Age	-0.204	<0.001
Efficacy	0.164	0.002
Christian	0.150	0.005

$R=0.39$ $R^2=0.16$ Adj. $R^2=0.15$ $F=14.482$ $p<0.001$

Table 135. Percent distribution of actions following observation of bomb fishing in Bentenan and Tumbak and control villages (Rumbia and Minanga).

	Bomber from Village			Bomber from next village		
Action	Control	Project	Total	Control	Project	Total
Nothing	13	8	9	11	8	9
Consult	55	42	46	45	33	37
Report to Village Head	26	36	33	39	36	38
Report to Police	3	12	9	1	15	10
Apprehend	4	3	3	4	8	6
Total	100	100	100	100	100	100
N	80	160	240	80	160	240
	$\chi^2=10.70$, df=4, p=0.030			$\chi^2=13.77$, df=4, p=0.008		

Table 136. Percent distribution of actions following observation of bomb fishing in Bentenan and Tumbak.

	Bomber from Village			Bomber from next village		
Action	Tumbak	Bentenan	Total	Tumbak	Bentenan	Total
Nothing	8	8	8	8	9	8
Consult	51	33	42	40	25	33
Report to Village Head	38	35	36	41	33	37
Report to Police	1	23	12	4	26	15
Apprehend	3	3	3	8	8	8
Total	100	100	100	100	100	100
N	80	80	160	80	80	160
	$\chi^2=18.64$, df=4, p=0.001			$\chi^2=17.18$, df=4, p=0.002		

It is likely that the actions taken in the presence of illegal fishing are related to independent variables discussed above. Zero-order correlations between these variables and the dependent variables in the project villages are in table 137. Table 137 indicates that 8 of the independent variables—education, gender male, MSL appliances score, project participation index score, project and MPA knowledge indices scores, perceived changes Quality2 score, and Bentenan--are positively correlated with more stringent responses to bomb fishing. Two of these variables—gender male and project participation—are not statistically correlated with responses to bomb fishing by village members. As a next step in the analysis, step-wise multiple regression is used to determine the combined and independent effects of the various independent variables on responses to bomb fishing. The results of the analyses are in table 138.

Table 137. Correlations between independent variables and response to bomb fishing violation in Bentenan and Tumbak.

	Residence status of violator		
	Insider	Outsider	Either
Education	0.164*	0.189*	0.193*
Gender male	0.139	0.284***	0.235**
Age	-0.061	-0.104	-0.091
Christian	0.105	0.098	0.110
Modern house	-0.096	-0.118	-0.117
Appliances	0.158*	0.156*	0.170*
House structure	0.105	0.069	0.093
Furnishings	-0.046	0.036	-0.002
Household size	0.071	0.110	0.100
Fishing	-0.102	-0.055	-0.083
Farming	0.065	0.099	0.091
Proj. participation	0.142	0.262**	0.224**
Level participation	0.005	0.030	0.020
Proj. knowledge	0.211**	0.215**	0.231**
MPA knowledge	0.175*	0.243**	0.230**
Vastness	-0.018	0.038	0.013
Efficacy	0.139	0.124	0.142
Conservation	-0.029	0.057	0.019
Control2 score	-0.027	0.006	-0.010
Quality2 score	0.209**	0.189*	0.215**
Bentenan	0.227**	0.170*	0.212**

N=160 ***=p<0.001 **=p<0.01 *=p<0.05

Score on the MPA Knowledge Index and Bentenan account for 9 percent of the variance in response to bomb fishers from Bentenan. This is a relatively small amount of variance, but it is statistically significant. About 17 percent of the variance in response to bomb fishers from neighboring villages is related to gender male, age (younger respondents tend to have a stricter response), score on the Quality2 Component of perceived changes, and the project knowledge index. Finally, gender male, score on the Quality2 Component of perceived changes, and the project knowledge index account for 13 percent of the variance in response to bomb fishers in general.

Table 138. Stepwise regression analyses of response to bomb fishing violation in Bentenan and Tumbak (N=160).

DEPENDENT VARIABLE: Bomber from village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
MPA knowledge	0.232	0.003
Bentenan	0.275	<0.001

$R=0.32$ $R^2=0.10$ Adj. $R^2=0.09$ $F=8.999$ $p<0.001$

DEPENDENT VARIABLE: Bomber from next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.342	<0.001
Age	-0.176	0.022
Quality2	0.176	0.017
Project knowledge	0.172	0.021

$R=0.43$ $R^2=0.19$ Adj. $R^2=0.17$ $F=8.840$ $p<0.001$

DEPENDENT VARIABLE: Bomber from village or next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.246	0.001
Quality2	0.202	0.008
Project knowledge	0.200	0.008

$R=0.38$ $R^2=0.15$ Adj. $R^2=0.13$ $F=8.984$ $p<0.001$

Blongko: More respondents from Blongko than the control villages report a decrease in bomb fishing (100 versus 83 percent respectively, $\chi^2=15.34$, df=1, $p<0.001$) and coral mining (99 versus 84 percent respectively, $\chi^2=11.27$, df=1, $p=0.001$). When we examine responses to bomb fishing, the chi-square analysis indicates no significant differences between Blongko and control villages (table 139). Nevertheless, if we examine these tables carefully, we can see that respondents from the control villages are more likely than those from Blongko to let a village bomber off with just consulting or no action (48 versus 30 percent respectively, $\chi^2=5.161$, df=1, $p=0.023$).[8] Further, respondents from Blongko are more likely than those from the control villages to respond

[8] Percents in tables are rounded; hence, sums may differ from text. For example, in Blongko 2.5 percent said they would do "nothing" and 27.5 percent said they would "consult" with a Blongko bomb fisher. These

to bomb fishers from a neighboring village by apprehending them (29 versus 15 percent respectively, χ^2=4.43, df=1, p<0.05).

Table 139. Percent distribution of actions following observation of bomb fishing in Blongko and control villages (Sapa and Boyangpante).

	Bomber from Village			Bomber from next village		
Action	Control	Blongko	Total	Control	Blongko	Total
Nothing	5	3	4	5	1	3
Consult	43	28	35	24	24	24
Report to Village Head	38	48	43	48	41	44
Report to Police	9	5	7	9	5	7
Apprehend	6	18	12	15	29	22
Total	100	100	100	100	100	100
N	80	80	160	80	80	160
	χ^2=9.261, df=4, p=0.055			χ^2=6.427, df=4, p=0.169		

It is likely that the actions taken in the presence of illegal fishing are related to independent variables discussed above. Zero-order correlations between these variables and the dependent variables in the project villages are in table 140. Focusing only on the statistically significant correlations, gender male is positively correlated with all three dependent variables. The Vastness component score and the total conservation score are positively correlated with responses to non-village bomb fishers as well as violators in general. Age is negatively correlated with these two measures. Finally, household size manifests a positive correlation with the degree of negative response to bomb fishers from neighboring villages. As a next step in the analysis, step-wise multiple regression is used to determine the combined and independent effects of the various independent variables on responses to bomb fishing. The results of the analyses are in table 141.

Table 140. Correlations between independent variables and response to bomb fishing violation in Blongko.

	Residence status of violator		
	Insider	Outsider	Either
Education	0.006	0.040	0.027
Gender male	0.287*	0.241*	0.301**
Age	-0.200	-0.353**	-0.321**
Christian	-0.213	-0.111	-0.182
Modern house	0.006	0.006	0.007
Appliances	-0.017	0.072	0.034
House structure	-0.097	0.031	-0.035
Furnishings	-0.124	-0.158	-0.162
Household size	0.045	0.241*	0.169
Fishing	0.122	0.113	0.134
Farming	-0.010	-0.123	-0.079
Proj. participation	0.050	-0.047	-0.001
Level participation	0.070	0.045	0.065
Proj. knowledge	-0.018	0.076	0.036
MPA knowledge	0.161	0.169	0.189
Vastness	0.153	0.312**	0.271*
Efficacy	0.043	0.150	0.113
Conservation	0.159	0.322**	0.280*
Control2 score	-0.049	0.046	0.001
Quality2 score	0.084	-0.026	0.030

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

The results in table 141 are consistent for all three measures. Gender male contributes positively and age contributes negatively to the strictness of responses to bomb fishing. The results indicate that young males are most likely to respond negatively to bomb fishers no matter where they are from. The amount of variance explained by these two variables ranges from 11 percent for responses to village bombers to 20 percent for the combined measure.

Talise: It is interesting that more people in the control villages (Kahuku and Airbanua) perceive a decrease in bomb fishing than in Talise (90 versus 74 percent respectively, χ^2=7.696, df=1, p=0.006). The small difference with respect to the decrease coral mining is not statistically significant (89 versus 83 percent respectively, χ^2=1.426, df=1, p>0.05). Although fewer Kinabohutan respondents perceived decreases in bomb fishing and coral mining than those from the other two sub-villages of Talise (70 versus 78 and 80 versus 85

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percents round to 3 and 28 respectively, which sums to 31 percent. The non-rounded sum is 30, which accounts for the difference between the text and table 139.

percent, respectively), the differences are not statistically significant (χ^2=0.581 and 0.346, respectively, both p>0.05).

Table 141. Stepwise regression analyses of response to bomb fishing violation in Blongko (N=80).

DEPENDENT VARIABLE: Bomber from same village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.311	0.005
Age	-0.231	0.033

R=0.37 R^2=0.14 Adj. R^2=0.11 F=6.040 p=0.004

DEPENDENT VARIABLE: Bomber from next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.280	0.008
Age	-0.381	<0.001

R=0.45 R^2=0.20 Adj. R^2=0.18 F=9.744 p<0.001

DEPENDENT VARIABLE: Bomber from same or next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Gender male	0.337	0.001
Age	-0.355	0.001

R=0.46 R^2=0.22 Adj. R^2=0.20 F=10.559 p<0.001

When we examine responses to bomb fishing (table 142), the differences in response patterns between Talise and the control villages are statistically significant when the offender is from the same village. It appears that with respect to violators from the same village, residents of Talise are less likely to consult with the offender, more likely to report him to the police, and less likely to try to apprehend the bomb fisher. The minor differences with respect to treatment of a violator from another village are not statistically significant.

Table 142. Percent distribution of actions following observation of bomb fishing in Talise and control villages (Airbanua and Kahuku).

	Bomber from Village			Bomber from next village		
Action	Control	Talise	Total	Control	Talise	Total
Nothing	2	9	5	3	9	6
Consult	30	20	25	21	19	20
Report to Village Head	44	48	46	48	41	45
Report to Police	3	13	8	10	19	14
Apprehend	20	11	16	18	13	15
Total	100	100	100	100	100	100
N	90	80	170	90	80	170
	χ^2=11.87, df=4, p=0.018			χ^2=5.702, df=4, p=0.222		

It is likely that the actions taken in the presence of illegal fishing are related to independent variables discussed above. Zero-order correlations between these variables and the dependent variables in the project villages are in table 143. Focusing only on the statistically significant correlations, only two of the independent variables are correlated with responses to offenders from the same village—the efficacy component of resource beliefs and the total conservation score. Both of the correlations are positive, indicating that as the resource beliefs scores increase so does the degree of strictness with response to bomb fishers from the respondent's home village. With respect to responses to bomb fishing by fishers from neighboring villages, these same two resource beliefs scales are related along with three other variables—gender male, the MSL furnishings component score (both positive) and the MSL permanent house structure scale (negative). As a next step in the analysis, step-wise multiple regression is used to determine the combined and independent effects of the various independent variables on responses to bomb fishing. The results of the analyses are in table 144.

The regression analyses in table 144 indicate that because of the strong relationship between the efficacy component score and the total conservation score in Talise (r=0.505, p<0.001), when one is entered in the stepwise process, the partial correlation of the other with the dependent variable does not meet the criterion for entry into the regression equation. The only other variables entered into the regression equations for all three dependent variables are two of the MSL components—the modern house and permanent structure component scores. Both of these indicate a negative relationship between higher MSL and strictness of responses to bomb fishers in Talise. Finally, household size has a negative impact on responses to bomb fishers from the same village, and level of project participation has a positive relationship to strictness of response to fishers from a neighboring village. All three of these regression equations are relatively strong and statistically significant.

Table 143. Correlations between independent variables and response to bomb fishing violation in Talise.

	Residence status of violator		
	Insider	Outsider	Either
Education	0.076	0.082	0.083
Gender male	0.211	0.253*	0.245*
Age	-0.083	-0.174	-0.136
Christian	0.071	0.044	0.060
Modern house	-0.155	-0.166	-0.170
Appliances	-0.002	-0.094	-0.052
House structure	-0.192	-0.290**	-0.255*
Furnishings	0.197	0.225*	0.222*
Household size	-0.101	-0.083	-0.096
Fishing	-0.093	-0.122	-0.114
Farming	0.044	0.012	0.030
Proj. participation	0.188	0.189	0.199
Level participation	0.167	0.205	0.197
Proj. knowledge	0.113	0.043	0.081
MPA knowledge	0.143	0.060	0.106
Vastness	0.106	0.035	0.074
Efficacy	0.330**	0.292**	0.327**
Conservation	0.368**	0.263*	0.331**
Control2 score	0.103	0.045	0.077
Quality2 score	-0.053	-0.045	-0.052
Kinabohutan	-0.071	-0.068	-0.073

N=80 ***=p<0.001 **=p<0.01 *=p<0.05

Table 144. Stepwise regression analyses of response to bomb fishing violation in Talise (N=80).

DEPENDENT VARIABLE: Bomber from same village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Structure	-0.262	0.012
Conservation	0.452	<0.001
Household size	-0.234	0.027

R=0.49 R^2=0.24 Adj. R^2=0.21 F=8.010 p<0.001

DEPENDENT VARIABLE: Bomber from next village

INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Efficacy	0.256	0.013
Modern house	-0.208	0.043
Structure	-0.357	0.001
Level of proj. participation	0.212	0.042

R=0.51 R^2=0.26 Adj. R^2=0.22 F=6.463 p<0.001

DEPENDENT VARIABLE: Bomber from same or next village

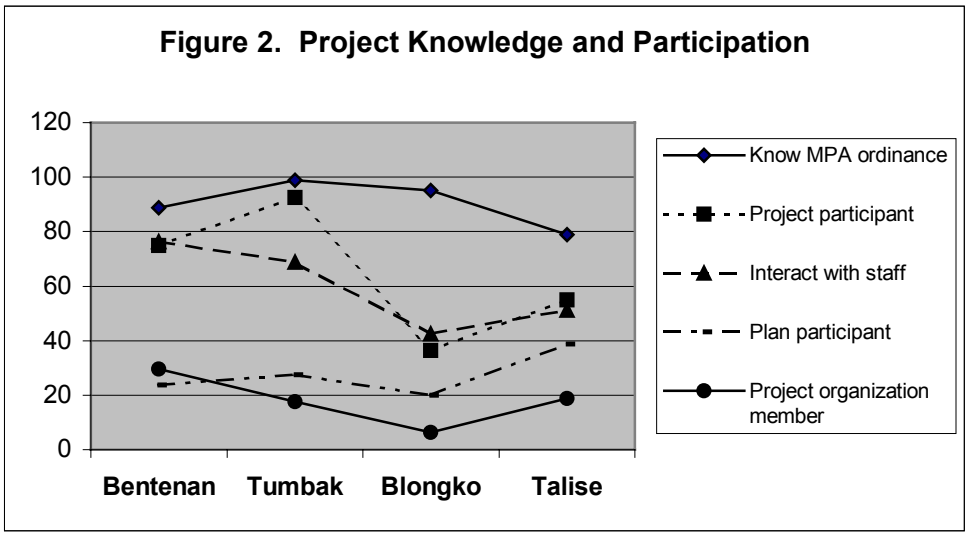
INDEPENDENT VARIABLE	STANDARDIZED BETA COEFF.	PROB.
Modern house	-0.245	0.017
Structure	-0.333	0.002
Conservation	0.382	<0.001

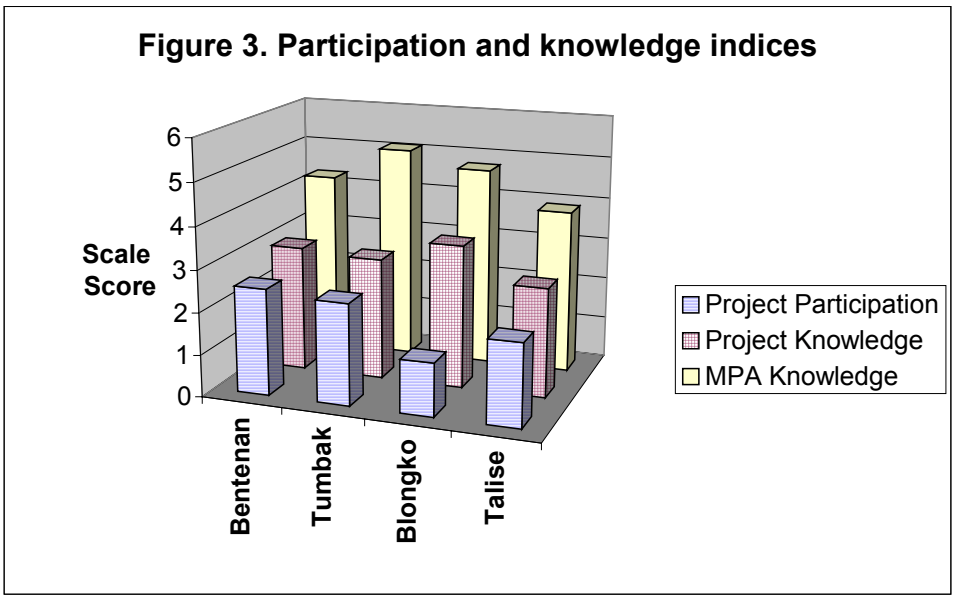
R=0.50 R^2=0.25 Adj. R^2=0.22 F=8.569 p<0.001

4.7 Summary and Conclusions

4.7.1 Project Participation and Knowledge

The analyses in section 4.1 make it clear that there are between project village differences in project participation and knowledge. In terms of knowledge concerning an MPA ordinance in their village, almost all the respondents in Blongko and Tumbak are aware of the ordinance, and the lowest level of awareness is in Talise. This difference cannot be fully accounted for by time of establishment of the MPA because although Blongko was the earliest, the MPAs at Tumbak and Talise were established at almost the same time. The MPA at Bentenan was most recently established. There are also significant differences in interaction with field staff across the four villages. Bentenan manifests the greatest percentage of respondents who had discussed project activities with field staff, and Blongko the lowest. Project participation has the greatest variance across the various villages, with a maximum of 92 percent in Tumbak and a low of 36 percent in Blongko. With regard to specific activities, there are significant differences with respect to project organization membership. Thirty percent of respondents from Bentenan claimed membership in contrast to a little less than 20 percent in Tumbak and Talise and only 6 percent in Blongko. Significant differences also exist with respect to participation in management plan development, with a high of 39 percent in Talise and a low of 20 percent in Blongko.

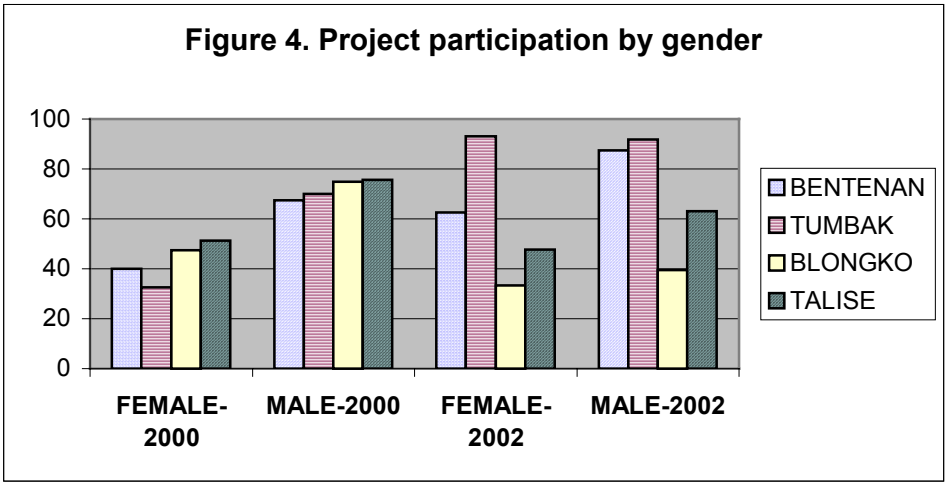




Several composite indices of project participation and knowledge also varied across the project villages. With regard to the participation index, Bentenan had the highest mean score and Blongko the lowest. In contrast, Blongko scored highest on the project knowledge index, and Talise scored lowest. Talise also scored lowest on the MPA knowledge index while Tumbak manifested the highest average score. These aspects of project participation and knowledge that varied significantly across the villages are illustrated in figures 2 and 3.

The analysis of factors influencing participation identified education and gender as being the most significant predictors of project participation (see tables 19 and 20, section 4.1). Years of formal education manifested the strongest correlations with the project knowledge and participation indices. This was expected since formal education has long been noted as a variable variously influencing behavior, with the more highly educated being more likely to participate in new activities and acquire new information. The division of labor by gender in many societies impacts participation as well. For example, in societies where women's work is strictly defined and limited, if the project activities fall outside these limits, female participation may be minimal or absent. Religion may have an influence on participation in several ways. In most Islamic societies adult females tend to avoid interaction with males outside their family and tend to have strictly defined roles, including allowable activities. This may influence their participation in project activities, as we hypothesized for our findings in Bentanan and Tumbak in 2000 (Pollnac, et al. 2001).

Identification of the gender differences in participation in the mid-term evaluation resulted in increased efforts to involve more women in project activities. Our success in this endeavor is illustrated in figure 4, which indicates that the relative differences in female and male participation decreased between 2000 and 2002.

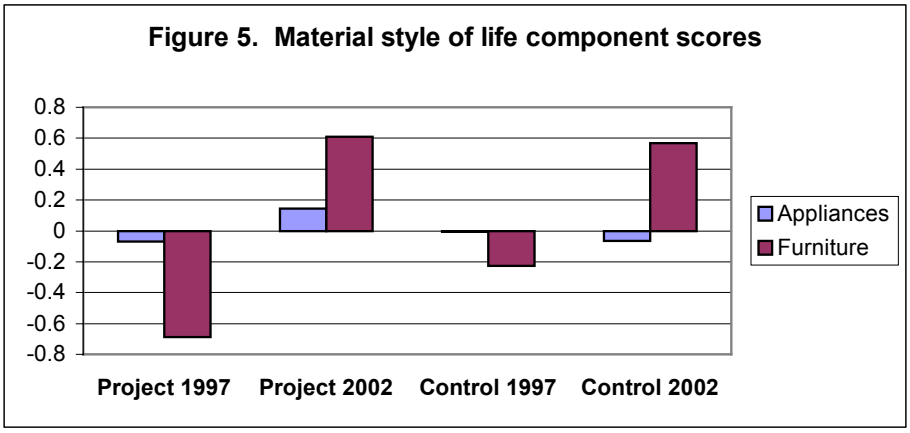


4.7.2 Project Impacts

One question for evaluation concerns whether or not project activities have improved the coastal environment (both natural and human) to the extent that existing productive activities have increased their livelihood (both monetary and non-monetary income). In the absence of reliable income data, material style of life is used as an indicator of level of livelihood; thus, changes in this indicator are assumed to reflect parallel changes in livelihood. Analyses of material style of life changes over the life of the project indicates that, overall, the project villages manifested an increase in household appliances and furniture (section 4.2). While the control villages also manifested increases in furniture, their increase was not as great. These changes are illustrated in figure 5.

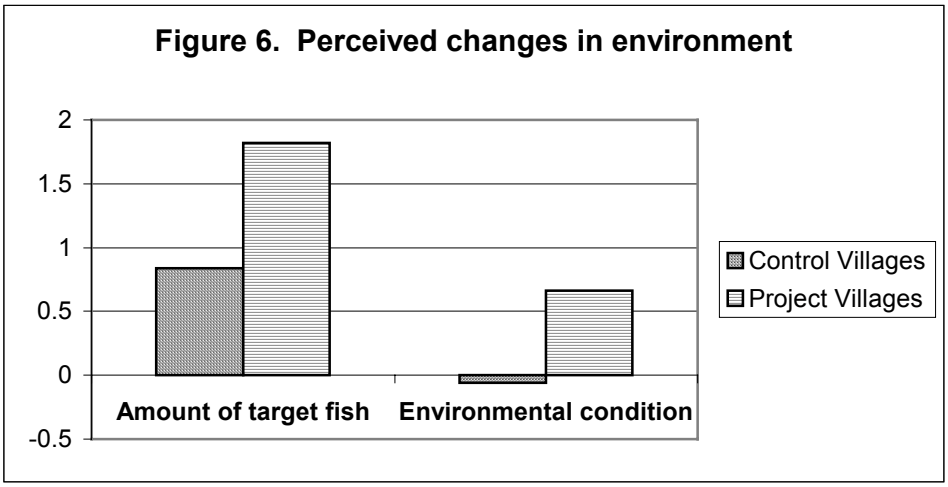
With respect to impact indicators, success and sustainability of a project are based in large part on participants' reactions to the project. In turn, these reactions are based on user perceptions of impacts, which are not always in accord with objective, quantifiable evidence. Hence, if there is an interest in understanding success and sustainability of a CRM project, it is essential to understand perceptions of the present and possible

future impacts of the project. Perceptions of impacts may explain some of the variance in long-term, as well as short-term, project success. Impacts of interest with respect to Proyek Pesisir are the following:



- Overall family well-being.
- Control over coastal resources.
- Ability to influence community affairs.
- Amount of traditionally harvested fish in the sea.
- Coastal resource health.
- Compliance with fishery regulations.
- Enforcement of fishing regulations.
- Prosecution of violators of the MPA.
- Support for the MPA from the local government.

Analyses of differences between control and project sites with respect to these nine indicators (section 4.5, table 112) indicated statistically significant differences for two. Residents of project villages perceived larger positive changes in amount of target fish and environmental condition—two important goals of coastal zone management projects (see figure 6) . In addition, it is significant to note that within the project villages, project and MPA knowledge are significantly correlated with an indicator reflecting increasing community control of



coastal resources. This indicator is a scale composed of a weighted sum of perceived changes in control over coastal resources, ability to influence community affairs, compliance with fishery regulations, enforcement of fishing regulations, prosecution of violators of the MPA, and support for the MPA from the local government (see tables 114 and 116). This indicates that villagers having knowledge of project activities perceive that they have increasing control over their resources, an important, first step in community based resource management.

It is also expected that coastal resource management project activities would have impact on community members' beliefs about factors that impact the quality of the coastal environment. Analyses conducted in section 4.3 clearly indicate project impacts in the expected direction. While the total conservation score increased in both the project and control sites, it increased to a greater degree in the project sites, as would be expected if the project had the desired impacts (figure 7). Figure 8 illustrates the fact that the efficacy component of environmental knowledge increased significantly in the project sites in contrast to the significant decrease in the vastness component in the control sites.

Figure 7. Mean total conservation beliefs scores

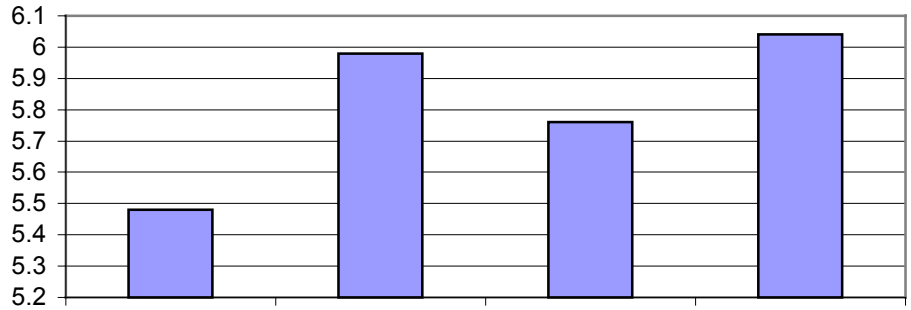
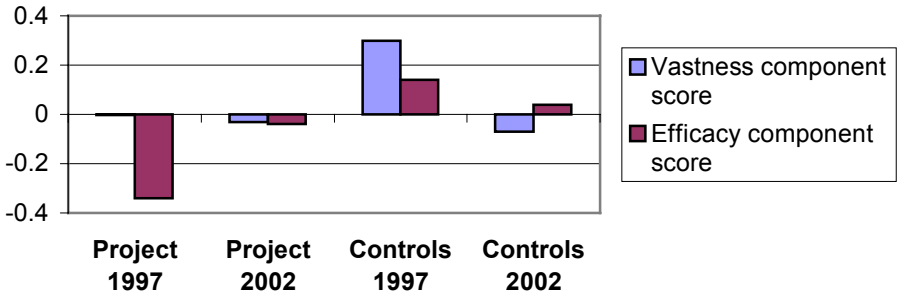


Figure 8. Mean vastness and efficacy component scores



The analysis of individual characteristics related to resource beliefs confirms the finding that Proyek Pesisir had a positive influence on villagers' environmental knowledge (section 4.3, tables 64 and 65). While years of formal education manifest the strongest correlations with the three resource beliefs scales, the project and MPA knowledge scales are also significantly correlated with environmental knowledge. There is, however, significant inter-community variation with respect to the total conservation and vastness resource beliefs scales (section 4.3, table 66), with Bentenan residents scoring highest and Talise scoring lowest. This inter-community variation might be explained by the fact that Talise residents in the sample manifest the lowest level of formal education, while those from Bentenan manifest the highest. (section 4.1, table 21), and education is strongly related to scores on the resource beliefs scales. It is significant to note, however, that while analyses conducted within all project villages indicate that project knowledge and education are significantly correlated with environmental knowledge, in Talise, project participation as well as education and project knowledge contribute significantly to this type of knowledge.

Finally, we would expect that Proyek Pesisir activities would influence villagers' response to illegal fishing activities. Analyses presented in section 4.6 indicate that those in project villages say that they would take harsher actions against violators than those in the control villages, supporting our expectations. It is interesting to note that across all villages (both project and control), males, those who believe that humans can have an impact on marine resources (higher efficacy score) and those who believe that their resources and quality of life have improved over the past few years are more likely to report that they would take more stringent action against illegal fishers (section 4.6, table 131). Within the project villages, as we would hope, knowledge of project activities also contributes to a more negative response to illegal fishing (section 4.6, table 132).

Overall, the analyses of the survey data clearly indicate that although there is a fair amount of inter-project village variation with respect to project impacts, the project has had significant positive impacts in the project communities. Comparisons with control villages allow one to attribute the changes to project activities. Impacts include increased project participation, positive changes in material well-being, perceptions of improvement in the coastal environment, and increases in environmental knowledge—all impacts that indicate that the coastal management processes initiated will be sustained.

5. RECOMMENDATIONS

5.1 Talise

Promote land certification on Kinabohutan Island. Follow-up with the head of village to re initiate the certification process which has already been started and ensure funds allocated do not "disappear" as happened on Talise during the first attempt at certification before the project facilitated process started.

Disseminate information on the content of The "Community-Pearl Farm Agreement". In general, it appears that the confusion regarding the agreement between the pearl farm and the community as well as opposition to the pearl farm by fishers could be reduced by several simple acts. First, the rules associated with the agreement could be placed in a pamphlet and distributed to the fishers (especially on Kinabohutan). Second, arrange a meeting with the farm manager and discuss perceptions of harsh treatment by guards of fishers. The manager needs to properly brief new guards on the existing rules and enforcement guidelines as well as post the agreement in the guard tower. The guards could act less aggressively and be kinder to the fishermen and simply explain what rules are being broken for first time offenders.

Do not promote the establishment of a marine sanctuary in Kinabohutan. There is considerable opposition to establishment of a marine sanctuary on Kinabohutan in spite of a large number of community residents being in favor of one. There is concern about additional sea space being restricted in addition to existing closed areas around the pearl farm and the existing sanctuary in Dusun 1. This is exacerbated by perceived harsh and disrespectful treatment for violations of the existing sanctuary and incursion into pearl farming areas (and in spite of concessions made by the pearl farm to open areas to some kinds of fishing -see Talise Declaration above). Concerns of social impacts of tourism in the community were also expressed.

Promote the direct election for Hukum Tua in Talise. The appointed Hukum Tua is no longer resident in the village and is based in Likupang. He has additional duties to perform in his military capacity in addition to Hukum Tua. The absence of a Hukum Tua makes village governance difficult. The current Hukum Tua is supportive of Talise obtaining rights to elect their own Hukum Tua. This issue should be raised with the Bupati.

Promote tourism development on Talise Island Develop an English, Italian and Indonesian brochure on the Talise marine sanctuary and eco-tour attractions. Connect the sanctuary management committee in Dusun 1 and the tourism group in Tambun with tourist operators on Gangga, Likupang and Manado including awareness of community fees (see below) for diving in the marine sanctuary. The proposed sanctuary in Airbanua is already a frequently visited dive spot and has immediate potential for revenue generation. The community and especially the tourism group should also be introduced to dive operators. The forest trek in Tambun does not guarantee that wildlife will be seen. Hence it would be better to advertise this as a hill trek, with views of the surrounding islands, to learn about hillside farming practices as well as the opportunity to see wildlife.

Address the issue of establishment and payment of fees for diving in community-based MPAs. This is a policy issue that needs to be discussed with the Badan Pengelolaan (Kabupaten Level) and Bupati. It may require a policy statement or executive order setting out guidelines that legitimize community's ability to ask for and accept contributions, which serve as de-facto dive fees. The lack of a policy may eventually lead to conflicts as communities could start restricting diving in sanctuaries if they so choose and if they see no benefit from allowing diving. This also represents a viable self financing mechanism for communities to recoup sanctuary management costs including maintenance of marker buoys and signboards as well as raise modest revenues for community development. However, transparent accounting systems also need to be established.

Incorporate "rules" signboards into the proposals being developed by communities for new marine sanctuaries coming on line in scaling-up sites (Airbanua). Draft proposals from both sub-villages of Airbanua contained plans for marker buoys but no signboards. In addition to marker buoys, signboards stating the rules should also be placed in each village and Dusun.

Ensure that rules governing marine sanctuary management committees are incorporated into the village ordinances under development. Their did not seem to be any discussion yet in Airbanua about how long

sanctuary committee members would serve and how members would be reappointed (by village vote, appointed by the Hukum Tua, or some consensus procedure).

Organize beach clean-ups in Kinabohutan and Airbanua as well as other scaling up sites. Beaches in Wawunian (Airbanua) were particularly dirty, and raising awareness on sanitation and cleanliness would be useful. Beach cleanups organized with the schools are recommended.

Conduct a final assessment of environmental conditions (particularly coral reefs) in the anchor field sites. A key objective of the community management plans, MPAs and the project is the improvement in environmental conditions. A final assessment of reef conditions is needed to determine to what extent project activities, perceptions of the community and the behaviors exhibited have resulted in changes in reef quality. This should include manta tow surveys that compare current conditions with conditions in 2000 and 1997. In addition, monitoring should include an assessment of conditions inside the marine sanctuaries compared to areas outside the sanctuary (coral cover and fish abundance). In Talise, forest cover should also be assessed (either from JICA project aerial photos or by taking GPS positions of boundaries around the forest edge) and compared to the 1994 and 1998 data. In addition, a monitoring training workshop should be conducted in each village both to feedback information obtained in the final evaluation as well as strengthen community capacity for self-monitoring.

Address land tenure in upland areas of Talise and develop fire suppression strategies. Forests on Talise Island continue to be lost. Issues of community forestry management will be need to be intensified otherwise it is likely rare and endangered wildlife will be extirpated and most of the secondary forest will disappear in the next 5 – 10 years. Certification of title to existing hillside farms and formal demarcation and reclassification of remaining forest from commercial to protected (as requested by the community) needs to be considered. Strategies for fire suppression are also needed in the dry season. Fires burn uncontrolled in the hillside farms below the forest and in the *alang-alang* grass-dominated hills. Community fire suppression strategies have been successful so far this season in Kahuku and could serve as a model for Talise.

Accelerate efforts at reforestation, watershed greening and forest fire prevention in Airbanua and Talise.

Assess mangrove replanting techniques and species and provide more technical training to communities.

Foster periodic monitoring of the MPA and plan implementation by the management committees, including monitoring of coral condition and fish abundance inside and outside the sanctuary.

Develop local government and village capacity to tap into existing programs for village implementation actions and consider development of specialized programs to fund village plan implementation. The block grants provided to the community by USAID and local government have been influential in fostering positive resources management behaviors. These funds have been used for local study tours by the community on tourism, construction of signboards, marker buoys, etc. It is likely that the level of community resource management activity will be greater with minimal funding provided periodically to support ($US 100-500) activities. In only a few cases will marine sanctuaries associated with tourism dive spots be able to earn this level of funding, but in most cases they will not. The development of policies on implementation grants should be raised with the Kabupaten Badan Pengelola and incorporated into budgets for implementation of the Kabupaten CB-CRM ordinance by the Fisheries Office.

Consider formalizing the Labuan traditional management system under the procedures stipulated in the new Minahasa coastal management law. The presence of "traditional use rights" on Kinabohutan (see Appendix VII for a description of the "*labuan*" system) raises an important policy issue with regard to the new district ordinance. The ordinance requires that "traditional use rights" be acknowledged and considered with respect to coastal resources management by communities and government. However, it is unclear what constitutes a "traditional use right" and whether the "*labuan*" use rights claimed in Kinabohutan would apply under this new district law. In addition, the claims to sea space for seaweed farming in Bentenan and Tumbak could also be considered a "traditional use right". Therefore, guidelines on what constitutes traditional use rights need to be developed by Dinas Perikanan and/or the Badan Pengelola Kabupaten. *Labuan* is a useful case model for discussion. It could be considered as the first traditional use practice considered for official acknowledgement

but only after consultation with the family claimants and community of Kinabohutan and their affirmation to proceed.

5.2 Blongko

Repair the sign boards for the marine protected area. The signboard destroyed by the automobile should be replaced. The other signboard which was moved to protect it from erosion needs to be re-cemented in a proper location next the road so that the information can be seen and read easily by community members and visitors.

Develop formal rules for management of revenues from the MPA. Policies need to be developed on how funds raised from fees from awards, study tour donations and fines of MPA violators are spent and accounted for. As part of these policies, consideration should be given to providing a small honoraria to management committee members or members of the monitoring and surveillance committee as an incentive for time spent on MPA management. Any decision along these lines should be debated and then approved or rejected by the community. Honoraria as suggested by some community members may be controversial and other residents may prefer that these positions remain voluntary community service positions. Honoraria for MPA committee members could set a precedent that other village committees could not provide.

Establish fees for diving and snorkeling in the marine protected area. There are no fees for allowed uses (snorkeling and diving) in the marine sanctuary. While some visitors provide donations for visits to Blongko to learn about their community based marine sanctuary establishment process, and fees for community visits have been established, there are no fees required for diving. Blongko now has extremely attractive reefs. While it is not now and may never be a substantial dive tourism location, some diver visitor use is occurring and can be expected to continue in the future. Hence, the community should take advantage of this opportunity to earn some revenues that will help defer expenses for marker buoy and signboard maintenance, and occasional surveillance patrols. Rules governing what the fees levels should be and how they are used also need to be developed.

Do not install additional artificial reefs in Blongko. Improper placement of artificial reef modules on top of living reef defeats the purpose of installing artificial reefs. Artificial reefs may be a useful tool to catalyze community action, or enhance fisheries production in areas where there are no healthy living reefs. However, they serve very little useful function in Blongko and have likely resulted in some damage to existing healthy reefs. Blongko is endowed with several kilometers of healthy, living fringing reefs where coral cover is improving due to community vigilance against destructive fishing methods such as bomb fishing and through the establishment of a marine protected area. Several modules of artificial reef, even if placed in a proper location, will not add a significant amount of new habitat to the area and do little to sustain fisheries or create addition reef habitat. In addition, there is much controversy concerning whether artificial reefs actually enhance fisheries production or just act as fish aggregating devices, making fishing on these reefs more efficient and in the long term possibly exacerbating overfishing problems.

Conduct public education campaigns that target the new immigrants in the community. The rapid increase of new immigrants to Blongko requires that they be targeted for public education activities concerning environmental protection and the purpose and rules of the marine protected area. As new arrivals, they may be ignorant of the marine sanctuary and its rules as well as have different attitudes and perceptions concerning human impacts on the marine environment. In particular, an education campaign in the new settlement area near the MPA needs to be initiated.

Repair the flood dike located on the upland side of the highway. While flooding has been eliminated in the upper areas of the settlement where the dike was constructed, several households located at the bottom end of the dike still experience flooding, but reportedly at a reduced level. This will require extension of the dike for approximately 20 meters and repair and reconstruction along another 20 meters of the end section to prevent leakage from under the dike.

Build community capacity for management and maintenance of water systems. The continued problems with water systems need to be addressed. Encourage the community to develop and pass the ordinance being discussed to establish a water system management committee. Link the community to government or other

institutions that can provide training to this group in how to manage and maintain their water system and manage a fee system for usage.

Acknowledge that the katinting revolving fund project was a failure. This project should be written off as a failure and no further effort dedicated to it. However, it would be wise for the community and local government to learn from this failure and consider ways to prevent it, especially if future livelihood projects are considered for Blongko residents that propose the use of revolving funds.

Do not follow up any more on construction of the final two MCK units. Nine out of 11 units proposed were constructed and are used. This should be considered a success in spite of the fact that two units were not built (an approximately 80 % success rate on construction). The fact that two communal units have been taken over by single family households is a bit disconcerting. Therefore the strategy of construction of communal MCKs (units shared by several families) should be reconsidered for similar projects of this nature in the future.

Provide training to the community in mangrove reforestation techniques. The continuing efforts of the community should be commended and rewarded in spite of limited success with replanting efforts. Encourage *Dinas Perikanan* to provide training to the community on reforestation and replanting techniques, and have Blongko participants attend trainings on mangrove replanting conducted for villages in the Likupang scaling-up sites.

Discuss with the community the possibility of formally acknowledging the bonor fishing method as a traditional use right. In addition to *labuang* in Kinabohutan, *bonor* (see Appendix VII) could be formally submitted to the Minahasa Coastal Resources Management Board for endorsement to the *Bupati* for approval as a officially recognized traditional use right. This would require consent by the family that "owns" the *bonor* as well as endorsement by the community. If formally accepted as a traditional use right by local government, it would add another useful example and lesson for community-based co-management of coastal resources in Indonesia. This would enhance further the value of Blongko as a demonstration site from which other communities and agencies can learn.

5.3 Bentenan

Revitalize the Traditional Ceremony known as *Labuang* in Bentenan as a means of Promoting Environmental Awareness. *Labuang* is a ritual ceremony that was celebrated yearly, but now it is no longer celebrated because funding sources are limited. In fact, it was agreed through a village meeting three years ago to reactivate and celebrate this event every April 4th, but again because of limited budget, the ceremony was not implemented this year. The purpose of this ceremony is to remind the community that natural resources, especially marine resources, are a blessing for them and they must give gratitude to God by protecting the marine environment. No cutting of trees on the beach, no garbage or litter on the beach and no damage to the marine habitat contribute to the accomplishment of this goal. In the 1960's this ceremony was practiced and current leaders feel this kept people from abusing the marine and surrounding environment. According to their belief, there is the spirit beyond human life that controls natural resources and gives livelihood. *Labuang* is explained as referring to a cove between two rivers in Bentenan which have never been used for fishing or other utilization activities (a traditional no-take reserve). Hence, the meaning of *Labuang* in Bentenan differs slightly from the term used in Kinabohutan. Both however, refer to deep harbor or cove areas. On the ceremony day, the Protestants slaughter a pig and Moslems slaughter a goat at the estuary and cook them separately. After the pig and the goat are cooked, ? is mixed with yellow colored rice, white rice, red colored rice, and the meat. It is then put in a small bowl made of *woka* (a young palm leaf). The village leader and elders then walk down the beach and throw pieces of food into the water. The ceremony is also accompanied with bamboo music and prayer to God for the blessing of life. This ceremony can provide more spiritual meaning to environmental conservation and protection and is easily linked to concepts that have been introduced including DPL, prevention of coral mining and bomb fishing.

Promote Bentenan as a learning site for scaling up and future cross visits. Bentenan has made remarkable progress over the last two years since the last assessment was made. The management and operation of the information center is outstanding and well above the other sites. In addition, the newly formed KPL-DPL and its *arisan* program is a good working model for self financing of resources management and development

activities. The sea use zoning ordinance is an outstanding comprehensive model of marine spatial planning and can serve as a model for other communities. A meeting packet, as has been established by the other sites such as Talise and Blongko, should also be developed for Bentenan. In addition the community's management plan is being used to leverage funds from Public Works and the sub-district development program to implement large scale infrastructure projects that cannot be financed and developed by the community alone.

Promote community-based tourism in Bentenan. Tourism for both local and foreign visitors has been well established in Bentenan but the local community, especially Jaga V, reap few benefits. Assistance should be provided to promote and design potential small business opportunities targeting both local and foreign tourists. The strength of the *arisan* program for fund raising, the KPL-DPL management committee and the sea use plan provides a strong foundation to build on.

Encourage PU to repair and asphalt the road between Minanga and Bentenan. Road infrastructure to Bentenan is quite good except for a several kilometer section between Minanga and Bentenan. Improvements in this road will benefit both the expanding fishing industry as well as tourism. Failure to improve the road will limit economic opportunities that are starting to emerge.

Continue to improve water supply and sanitation. Some progress in these areas has been made but more effort and community capacity building for management and maintenance of water systems, solid waste and more MCKs are needed. This is especially important if tourism is to be further developed.

Do not encourage the reformation of the BPPD. The village has already decided to disband the coastal resources management board established as part of implementation of the approved the management plan. Village governance for resources management has evolved and adapted to the bad start with the BPPD. The KPL-DPL Management Group and other village groups seem to be adequately implementing various aspects of the management plan. This is also a useful lesson in how management groups need not remain static but can adapt to changing circumstances and particular dynamics of the village.

Encourage the use of *arisan* as a means to promote supplemental livelihood and coastal resources management activities. The KPL-DPL *arisan* has been very successful to date. Another *arisan* in the village has been in existence for more than 18 years. These self-financing mechanisms seem to be very well accepted, benefit large numbers of individuals and have high levels of success. Rather than developing separate financing mechanisms for CRM activities, it is recommended that Bentenan and other communities be encouraged to use these systems as a forum for discussion of coastal management issues and management of finances for small scale livelihood and resource management projects. The KPL-DPL is an excellent model and should be highlighted in cross visits with other communities and on study tours for other CRM projects.

5.4 Tumbak

Encourage more systematic monitoring of the Tumbak coral reef MPA. While the community is conducting visual inspections of the reef periodically, additional training in simple community monitoring methods of fish abundance, and coral cover and documenting changes over time would provide better evidence of changes within the MPA.

Improve use of the information center. The information center does not seem to be getting much use. While the management committee has been discussing plans for environmental education activities, better and more frequent use of the center and its materials should be encouraged.

Promote the new model for a village management committee as a potential alternative model to the standard village management board. The KSM or peoples organization formed by Tumbak seems to promote greater ownership by the community concerning decision making and management of coastal resources. This group should be closely tracked and compared to models used in the other villages to understand better over time, what the differences are among the management group models. Tumbak should be used as an example that there are variations and alternative ways that communities can choose to organize their decision making and management activities.

Encourage the designation of additional MPA areas. While additional MPA sites should be encouraged, they should not be too far from the village or out of sight. In addition, this process should be tracked and monitored to ensure high levels of participation. If too many reef areas are designated as off limits to fishers, this may create a backlash of opposition to CB-MPAs, hence additional areas designated should be developed cautiously and only with strong community support.

Provide assistance in developing greater capacity for water supply maintenance and management. Tumbak has been very successful in acquiring funds for construction of a new water supply system for the village. However, problems concerning its management have already arisen. Management and maintenance of the new water supply need to be improved and capacity building in the form of training should be organized.

Promote more environmental sanitation activities. Very few implementation activities concerning sanitation have taken place since the management plan was approved. Visual observations of the community show a large amount of trash scattered about the community. The management committee should promote more educational activities on environmental sanitation and ongoing strategies for cleaning up the beaches and streets.

Increase enforcement and social campaigns concerning bomb fishing. Bomb fishing may have decreased somewhat in Tumbak, but it may also have become displaced to areas away from the village. The community and police need to increase enforcement efforts. The management committee should implement campaigns in the community that leads to increasing peer and social pressure on continuing bomb fishers.

Encourage the development of a marine zoning plan for Tumbak. Space utilization conflicts started to arise at the height of seaweed farming activities in 2001. While seaweed farming has stopped, it will undoubtedly pick up again in the repeating boom-bust cycle. In addition to zoning seaweed farming areas (such as was done in the excellent model in Bentenan) via a village ordinance, the ordinance should lay out procedures for how individual plot locations are determined as well as size limits on plots as already planned.

5.5 Conclusions and General Recommendations

There has been a considerable amount of implementation activities and progress on addressing coastal resources management problems as outlined in the village management plans and documented in this report. We can conclude that at all sites, greater engagement and action by the communities in identifying problems and taking actions has occurred relative to adjacent control sites and relative to pre-project activities. However, there is also a great deal of variation among the communities in the amount of effort and success levels of individual activities. For instance, while an agreement was reached in Talise concerning fishing near pearl farming areas, there is still much confusion and resentment among fishers concerning the rules and enforcement by the pearl farm. This demonstrates that while there has been progress, issues and problems are still present. We should not expect an end to all problems, and they change and evolve over time. We should also not expect that all issues and activities would always be successful. Some degree of failure should be expected. Therefore, what is important is that communities are actively working to address the issues, learning from their experience and adapting actions and strategies to improve performance over time.

In all the villages, some form of action has occurred for almost every issue highlighted in the management plans. This is a very positive sign. For instance, the management committee in Bentenan seems very active and has evolved a unique financial management system grafted from the *arisan* system. They have developed a detailed marine and coastal spatial use scheme to address conflicts arising from the expansion of seaweed farming. Tumbak has developed a more autonomous management committee that provides an additional example for other villages to consider. Tumbak and Bentenan have been successful at obtaining outside local government resources to finance implementation activities, especially for drinking water supply issues. All the communities have maintained marker buoys and signs for the marine sanctuaries and while some violations have occurred from time to time, the communities have been addressing the violations and discovering ways that enforcement can best be handled. Bomb fishing and coral mining seems to be on the decline. Hence, there has been very good progress and we can consider these efforts at this stage to be successful with regards to MPA management and plan implementation. However, it remains to be seen how sustainable these actions will be after project support has been withdrawn. For example, in Talise the absence

of additional block grants or outside funding for implementation activities over the last year has slowed the pace of progress.

Continuing support needs to be provided to these communities by local institutions to enhance the probably of sustained coastal resources management efforts. While a provincial and district coastal law have been enacted that legitimize and encourage community-based management, local institutions have not yet developed program strategies and budgets to provide continuing support to these villages as well as other coastal communities. This has been demonstrated to be a critical success factor for sustainability of community-based efforts in the Philippines (Pollnac et al. 2001). As the project has now phased out of these project sites, working to develop local community support systems and linkages with NGOs, local universities and government agencies such as *Dinas Perikanan dan Kelautan* should be priorities.

These sites have been extensively documented over the life of the USAID project. As such they represent a wealth of information and experience concerning community-based management in Indonesia. Post project monitoring to gauge the sustainability of these examples should take place. In addition, these villages should be promoted as field schools and training sites where other communities can learn from their experience and view first hand the richness and diversity of experience that they represent. While current project support has been fully withdrawn, these sites should also be considered as locations for other projects, for further development and refinement of community-based coastal management practices. In particular, these sites can serve as living laboratories for further pilot testing and development of community-based management practices. This could include community-based tourism development, development of supplemental livelihoods, incorporation of population and demographic issues into the long term community vision and management of coastal resources, and for enhanced integration of gender considerations with ongoing management and decision making processes.

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APPENDICES

Page

I. Approved Village Ordinances in Project Anchor Sites (as of Oct. 2002)

Village	Date Approved	Ordinance Number	Content
Bentenan	9-Nov-99	Surat Keputusan Bersama Pemerintah Desa Bentenan dan Desa Tumbak 01/SKB/BTN-TBK-XI/99	Pelaksanaan Rencana Pengelolaan dan Pembangunan Sumberdaya Wilayah Pesisir Desa Bentenan dan Desa Tumbak
	9-Nov-99	Surat Keputusan Bersama Pemerintah Desa Bentenan dan Desa Tumbak No : 02/KD/B/XI/99	Pelaksanaan Rencana Pengelolaan Sumberdaya Wilayah Pesisir Desa Bentenan dan Desa Tumbak
	6-Sep-00	Surat Keputusan Hukum Tua 02/SKHT-Bnt/IX/00	Pengangkatan Kelompok Pengelola Kawasan Pelestarian Laut Desa Bentenan
Tumbak	9-Nov-99	Surat Keputusan Bersama Pemerintah Desa Bentenan dan Desa Tumbak 01/SKB/BTN-TBK-XI/99	Pelaksanaan Rencana Pengelolaan dan Pembangunan Sumberdaya Wilayah Pesisir Desa Bentenan dan Desa Tumbak
	9-Nov-99	Surat Keputusan Bersama Pemerintah Desa Bentenan dan Desa Tumbak No : 002/SK/TBK-XI/99	Pelaksanaan Rencana Pengelolaan dan Pembangunan Sumberdaya Wilayah Pesisir Desa Bentenan dan Desa Tumbak
	1 Juli 2000	Surat Keputusan Hukum Tua 02/SKHT-Tbk/X/00	Pembentukan Badan Pengelola Sumberdaya Wilayah Pesisir Desa Tumbak
	15-Nov-00	Peraturan Desa Tumbak 01/2009/PD/TBK-XI/2000	Daerah Perlindungan Laut
	7-Nov-00	Surat Keputusan Hukum Tua 01/SKHT-Tbk/XI/2000	Pengangkatan Kelompok Pengelola Daerah Perlindungan Laut Desa Tumbak

Source: CRMP SULUT

I. Approved Village Ordinances in Project Anchor Sites (as of Oct. 2002) (continued)

Talise			
	6-Nov-99	Keputusan Nomor 3 Tahun 1999	Pelaksanaan Rencana Pembangunan Dan Pengelolaan Sumberdaya Wilayah Pesisir Desa Talise
	4 Mei 2000	Kesepakatan Bersama Pemerintah dan Masyarakat Desa Talise Dengan PT. HORIGUCHI SINAR INSANI 02/2028/SK-HT/IX/2000	Pemanfaatan dan Perlindungan Bersama Wilayah Pesisir Pantai Talise
	25 Agustus 2000	Peraturan Desa Talise 01/2028/PD-DT/VIII/2000	Daerah Perlindungan Laut
	25 Agustus 2000	Keputusan Hukum Tua 03/2028/SK-DT/VIII/2000	Pembentukan Kelompok Pengelola Daerah Perlindungan Laut Dusun I (Kampung)
Blongko			
	26 Agustus 1998	Keputusan Desa 03/2004A/KD-DB/VIII/98	Keputusan Masyarakat Desa Blongko Kecamatan Tenga Daerah Tingkat II Minahasa Tentang Daerah Perlindungan Laut
	7-Nov-99	Keputusan Pemerintah Desa Blongko 04/2004A/KD-DB/XI/99	Pelaksanaan Rencana Pengelolaan Daerah Perlindungan Laut Dan Pembangunan Sumberdaya Wilayah Pesisir Desa Blongko
	14 Juli 2000	Keputusan Hukum Tua Desa Blongko 02/2004A/KD-DB/VII/2000	Pembentukan Badan Pengelola Pengembangan Sumberdaya Wilayah Pesisir Desa Blongko
		Total Ordinances Approved All Sites	**15**

Source: CRMP SULUT

II. Draft Ordinances Not Yet Approved in Project Anchor Sites (as of Oct. 2002)

Village	Content	Total
Bentenan	1.Pengelolaan Air Bersih Desa Bentenan 2. Keamanan dan Ketertiban Masyarakat 3. Pungutan Iuran Keluarga 4. Tata Tertib Pemerintahan Desa 5. Pengelolaan Kawasan Pesisir dan Laut Desa Bentenan	
	Total Bentenan	**5**
Blongko	None	
	Total Blongko	**0**
Tumbak	1. Daerah Perlindungan Bakau	
	Total Tumbak	**1**
Talise	1. Perlindungan Satwa Di Darat dan Laut 2. Kemasyarakatan dan Kependudukan Desa Talise	
	Total Talise	**2**
	TOTAL ALL SITES	**8**

Source : Data Proyek Pesisir SULUT

III. Grants for Early Implementation Actions by Village (June, 2000 - September, 2002)

Name of Proposal	Description	Date of Proposal	Date Approved	Amount (RP) Approved by CRMP	Date Report Submitted
Blongko Village					
Dike Construction		2-Jul-00	31-Aug-00	21,734,500	March-01
Dike Construction		2-Jul-00	31-Aug-00	5,265,500	March-01
Information Center	Permanent Location	2-Jul-00	31-Aug-00	5,000,000	March-01
English Training		2-Jul-00	31-Aug-00	1,000,000	March-01
Snorkeling Training		2-Jul-00	31-Aug-00	500,000	March-01
Handicraft Training		2-Jul-00	31-Aug-00	500,000	March-01
Printing Training		2-Jul-00	31-Aug-00	1,000,000	March-01
TOTAL GRANTS AT BLONGKO				**35,000,000**	
Tumbak Village					
CoTs Clean up		2-Jul-00	31-Aug-00	2,000,000	December-00
Dike Construction (II)		2-Jul-00	31-Aug-00	7,000,000	December-00
Public Education	Public education and law education	2-Jul-00	31-Aug-00	2,000,000	December-00
Marine Sanctuary		2-Jul-00	31-Aug-00	2,000,000	December-00
Information Center	Information Center Rehabilitation	2-Jul-00	31-Aug-00	15,000,000	December-00
Mangrove Sanctuary	Rehabilitation of mangrove fence	2-Jul-00	31-Aug-00	5,000,000	December-00
Crab Fattening		2-Jul-00	31-Aug-00	1,000,000	December-00
Coastal Management	Establish Coastal Management zone	2-Jul-00	31-Aug-00	1,000,000	December-00
TOTAL GRANTS AT TUMBAK				**35,000,000**	

Source: Compiled by Proyek Pesisir Reports, Community Proposals and Financial Accounts by Daisy Malino, Office Manager, Proyek Pesisir, North Sulawesi

III. Grants for Early Implementation Actions by Village (June, 2000 - September, 2002) (continued)

Name of Proposal	Description	Date of Proposal	Date Approved	Amount (RP) Approved by CRMP	Date Report Submitted
Bentenan Village					
Marine Sanctuary		6-Sep-00	21-Sep-00	11,750,000	March-01
Water Supply	Rehabilitation of water supply and the forest	2-Jul-00	31-Aug-00	8,000,000	March-01
Public Health		2-Jul-00	31-Aug-00	8,050,000	March-01
Agroforestry	Demonstration plot for agroforestry	2-Jul-00	31-Aug-00	7,200,000	March-01
TOTAL GRANTS AT BENTENAN				**35,000,000**	
Talise Village					
Village Ordinance	Sand mining, coral and mangrove cutting	16-Jun-00	31-Aug-00	4,000,000	August-01
Rehabilitation	Replanting trees near water spring	16-Jun-00	31-Aug-00	2,000,000	August-01
Training	Agroforestry system training	16-Jun-00	31-Aug-00	2,000,000	August-01
Training		16-Jun-00	31-Aug-00	5,000,000	August-01
Village Ordinance	Bomb fishing	16-Jun-00	31-Aug-00	3,000,000	August-01
Village Ordinance	Coral mining and wood cutting	16-Jun-00	31-Aug-00	3,000,000	-
Village Ordinance		16-Jun-00	31-Aug-00	1,000,000	-
Village Ordinance		16-Jun-00	31-Aug-00	1,000,000	-
Village Ordinance		16-Jun-00	31-Aug-00	1,000,000	August-01
Public Education		16-Jun-00	31-Aug-00	2,000,000	August-01
Information Center		16-Jun-00	31-Aug-00	3,000,000	-
Cross Visit		16-Jun-00	31-Aug-00	4,000,000	-
Operational	Routine activities	16-Jun-00	31-Aug-00	4,000,000	August-01
TOTAL GRANTS AT TALISE				**35,000,000**	
GRAND TOTAL ALL SITES			**Rp**	**140,000,000**	

Source: Compiled by Proyek Pesisir Reports, Community Proposals and Financial Accounts by Daisy Malino, Office Manager, Proyek Pesisir, North Sulawesi

III. Grants for Early implementation actions by Village (November 1997 –May 2000) (continued)

Name of Proposal		Date of Proposal	Date Approved	Amount (RP) Approved by CRMP	Amount (RP) Approved by BAPPEDA	Date Report Submitted
Blongko Village						
Public Toilet (I)	1 unit public toilet + 1 well	22-Jan-98	29-Apr-98	1,239,500		1-Jul-98
Public Toilet (II)	Additional budget with Public revised prices	1-Jul-98	13-Jul-98	2,529,000		28-Aug-98
Information Center (I)	Moveable building with size 600 x 400 m	20-Aug-98	1-Sep-98	2,330,000		15-Oct-98
Public Toilet (III)	5 units public toilet	28-Aug-98	1-Sep-98	11,145,000		24-Mar-99
Water Supply	4% community contribution for World Bank project	9-Oct-98	22-Oct-98	2,400,000		-
Information Center (II)	Additional budget for finishing building	12-Nov-98	18-Nov-98	231,000		Mar-99
Marine Sanctuary (I)	Marine sanctuary marker buoys	22-Sep-98	13-Nov-98	5,220,000		4-Dec-98
Marine Sanctuary (II)	Additional budget for buoy connector, chain, pipe	4-Dec-98	7-Dec-98	5,845,000		15-Feb-99
Public Toilet (IV)	4 units public toilet	24-Mar-99	25-Mar-99	8,916,000		Sep-99
Marine Sanctuary (III)	Additional budget for finishing	16-Feb-99	16-Feb-99	704,300		Mar-99
Boat Engines	Revolving fund starting w/ 6 boat engines (5 HP)	23-Sep-99	Mar-00		9,582,000	28-Mar-00
Dike Construction	80 M length (to prevent beach erosion)	10-Oct-99	30-Mar-00	9,850,000		-
Dike Construction	Additional budget for finishing	1-Mar-00	31-Mar-00		5,000,000	-
TOTAL EARLY IMPLEMENTATION ACTIONS AT BLONGKO				**50,409,800**	**14,582,000**	
Tumbak Village						
Mangrove Planting (I)	Bamboo fence to protect replanted mangrove area	25-Nov-97	25-Mar-98	2,856,250		27-Apr-98
Mangrove Planting (II)	Additional budget for finishing	28-May-98	23-Jul-98	300,000		Sep-98
Water Supply	Additional funds for govt. project to buy boulders	15-May-98	23-Jul-98	1,000,000		16-Aug-99
Dike Construction	600 M length (to prevent road flooding from high tide)	Not available	Mar-99		6,225,000	3-Feb-00
Marine Sanctuary (I)	Marine sanctuary marker buoys 700 M x 300 M	27-Jan-00	15-Feb-00	9,215,000		-
Marine Sanctuary (II)	Additional budget to purchase buoy connector	3-Mar-00	9-Mar-00	3,150,000		-
Boat Engines	Revolving fund for 5 units boat engine (5 HP)	20-Feb-00	23-Mar-00	11,000,000		-
Boat Engine	Revolving fund additional 1 unit	1-Mar-00	31-Mar-00		5,000,000	-
TOTAL IMPLEMNETATION ACTIONS AT TUMBAK				**27,521,250**	**11,225,000**	

Source: Compiled from Proyek Pesisir Reports, Community Proposals and Financial Accounts by Lissa Inkiriwang, Office Manager, Proyek Pesisir, North Sulawesi

III. Grants for Early implementation actions by Village (November 1997 –May 2000) (continued)

Name of Proposal	Description	Date of Proposal	Date Approved	Amount (RP) Approved by CRMP	Amount (RP) Approved by BAPPEDA	Date Report Submitted
Bentenan Village						
Water Supply	4 units public toilet & water supply pipe-length 375 M	18-Jan-99	19-Feb-99	1,410,000		Mar-99
Information Center (I)	Permanent building with size 12 x 6 x 72 .meters	12-Nov-98	20-Feb-99		10,000,000	1-Aug-99
Information Center (II)	Additional funds for building	17-May-99	18-May-99	4,234,000		1-Aug-99
Information Center (III)	Additional budget for finishing	15-Sep-99	1-Nov-99	3,625,000		19-Feb-00
Mangrove Planting	Planting 7,500 seedling	21-Mar-00	30-Mar-00	597,500		-
Seaweed Farming	Revolving funds for small seaweed farms (10 persons)	21-Mar-00	31-Mar-00		5,000,000	-
TOTAL EARLY IMPLEMENTATION ACTIONS AT BENTENAN				**9,866,500**	**15,000,000**	
Talise Village						
Information Center (I)	Permanent building with size 16 x 8 x 3 meters	22-Jan-98	24-Apr-98	4,433,000		22-Jan-98
Information Center (II)	Additional budget for 30% increasing cost of materials	22-Jan-99	29-Jan-99	7,535,500		27-Mar-00
Dike Construction	250 M length (to prevent flood erosion)	Not available	10-Apr-99		4,693,000	21-Feb-00
Boat Engines	5 Units Boat Engine (5 Horse Power)	10-Aug-99	29-Feb-00	12,250,000		-
Mangrove Planting	Cultivation of 650 seedlings for replanting 2-3 ha	1-Feb-00	29-Feb-00	565,000		-
Information Center (III)	Additional budget for finishing	27-Mar-00	30-Mar-00	530,000		19-Apr-00
Information Center (IV)	Installation of electricity	27-Mar-00	30-Mar-00	1,985,000		19-Apr-00
Marine Sanctuary	Marine sanctuary marker buoys	1-Mar-00	31-Mar-00		5,000,000	-
TOTAL EARLY IMPLEMENTATION AC				**27,298,500**	**9,693,000**	

		CRMP	BAPPEDA
GRAND TOTAL FOR ALL SITES	**RP**	**115,096,050**	**50,500,000**

Source: Compiled from Proyek Pesisir Reports, Community Proposals and Financial Accounts by Lissa Inkiriwang, Office Manager, Proyek Pesisir, North Sulawesi

IV. List of Reports Produced on the Project Anchor Sites (Blongko, Talise, Bentenan-Tumbak)

No	Title	Author	Year
Technical Reports			
A.	**Profil / Rencana (Profiles/Plans)**		
1	Rencana Pengelolaan Daerah Perlindungan Laut dan Pembangunan Sumberdaya Wilayah Pesisir Desa Blongko Kecamatan Tenga, Minahasa Sulawesi Utara	Tim Penyusun	1999
2	Rencana Pembangunan dan Pengelolaan Sumber Daya Wilayah Pesisir Desa Talise	Tim Penyusun	1999
3	Profil Sumberdaya Wilayah Pesisir Desa Blongko Kecamatan Tenga Minahasa Sulawesi Utara,1999	Tim Penyusun	1999
4	Profil Sumberdaya Wilayah Pesisir Desa Talise	Tim Penyusun	1999
5	Profil Serta Rencana Pembangunan dan Pengelolaan Sumberdaya Wilayah pesisir Desa Bentenan dan Desa Tumbak Kecamatan Belang Kabupaten Minahasa Sulawesi Utara	Tim Penyusun	1999
B.	**Laporan Data Dasar (Environmental Baseline Reports)**		
1	Laporan Data Dasar Sumberdaya Wilayah Pesisir di Bentenan - Tumbak	Janny Kusen, B. Crawford, A. Siahainenia dan C. Rotinsulu	1997
2	Laporan Data Dasar Sumberdaya Wilayah Pesisir Desa Talise Kabupaten Minahasa Propinsi Sulawesi Utara	Janny Kusen, B. Crawford, A. Siahainenia dan C. Rotinsulu	1999
3	Laporan Data Dasar Sumberdaya Wilayah Pesisir Desa Blongko Kabupaten Minahasa Propinsi Sulawesi Utara	Janny Kusen, C. Rotinsulu, A. J. Siahainenia dan A.Sukmara	1999
4	Survey Kondisi Terumbu Karang, Mangrove, Rumput Laut di Daerah Pesisir Pantai Airbanua, Kahuku, Rumbia, Minanga, Sapa dan Boyonge Pante, Kab. Minahasa, Sulawesi Utara	Fakultas Perikanan dan Ilmu Kelautan, UNSRAT	1999
C.	**Aspek Sosial Ekonomi (Socio-Economic Baseline Reports)**		
1	Socioeconomic Aspects of Coastal Resources Use in Bentenan and Tumbak	Richard B. Pollnac, F. Sonita, B. Crawford, E. Mantjoro, C. Rotinsulu and A. Siahainenia	1997
2	Socioeconomic Aspects of Coastal Resource Use in Talise	Brian Crawford, P. Kussoy, A. Siahainenia and R.B. Pollnac	1999
3	An Examination and Comparison of Rumbia and Minanga : Control Village for The Coastal Resources Management Project Sites at Bentenan and Tumbak	Richard B. Pollnac, B. Crawford, C. Rotinsulu, P. Kussoy, and A. Siahainenia	1998
4	Aspek Sosial Ekonomi untuk Pemanfaatan Sumberdaya Pesisir di Desa Blongko Sulawesi Utara	Priciellia Kussoy, B. Crawford M. Kasmidi dan A. Siahainenia	1999

IV. List of Reports Produced on the Village Anchor Sites (Blongko, Talise, Bentenan-Tumbak) (continued)

D.	**Penilaian Sementara (Interim Assessment Reports)**		
1	Community-Based Coastal Resources Management : An Interim Assessment of the Proyek Pesisir Field Site in Blongko , North Sulawesi, Indonesia	Brian R Crawford, R.B. Pollnac and Asep Sukmara	1999
2	Community-Based Coastal Resources Management : An Interim Assessment of Early Implementation Actions in Proyek Pesisir Field Sites in North Sulawesi	Brian R. Crawford, R.B. Pollnac, A Sukmara and J. J. Tulungen	2000
3	Community-Based Coastal Resources Management : An Interim Assessment of the Proyek Pesisir Field Site in Bentenan-Tumbak, North Sulawesi, Indonesia	Richard B. Pollnac, B.R. Crawford and A. Sukmara	2000
4	Pengelolaan Sumberdaya Pesisir Berbasis Masyarakat Penilaian Sementara Terhadap Desa Proyek Pesisir Di Desa Talise, Minahasa Sulawesi Utara	Asep Sukmara, B. R. Crawford and R. B. Pollnac	2001
E.	**Laporan Konsultan (Consultant Reports)**		
1	Sejarah Penduduk dan Lingkungan Hidup Desa Talise	Eddy Mantjoro	1997
2	An Ecological History of Bentenan and Tumbak Villages	Eddy Mantjoro	1997
3	Sejarah Penduduk dan Lingkungan Hidup Desa Blongko Kecamatan Tenga	Meidiarti Kasmidi	1998
4	Pelaksanaan Pengukuran Profil Pantai di Desa Bentenan	Piere Gosal	1998
5	Pelaksanaan Program Agroforestry, Terrasering dan Penghijauan di Desa Blongko, Talise Dusun II dan Bentenan	Tim Konsultan Program Agroforestry Fak. Pertanian UNSRAT	-
6	Pelaksanaan Program Agroforestry di Desa Blongko, Desa Talise Dusun I dan Dusun II	Fakultas Pertanian UNSRAT	2000
7	Assessment of Wildlife Populations, Forests and Resource Use on Talise Island, North Sulawesi, Indonesia	Robert Lee and P. Kussoy	2000
8	Budidaya Laut dan Pengembangan Mata Pencaharian Tambahan	Konsultan Fakultas Perikanan dan Ilmu Kelautan, UNSRAT	2001
	Sub Total Technical Reports	***25 reports***	

IV. List of Reports Produced on the Project Anchor Sites (Blongko, Talise, Bentenan-Tumbak) (continued)

Laporan Kegiatan Magang (Internship Reports)

1	Kegiatan Magang Nasional Proyek Pesisir di Sulawesi Utara	Godlief Joseph William Kawer	2001
2	Pembangunan Sumberdaya Pertanian Pedesaan padaWilayah Pesisir (Suatu Studi tentang PengelolaanSumberdaya Pertanian di Desa Talise Kecamatan Likupang Kabupaten Minahasa Sulawesi Utara)	Noviar F Wenno	2001
3	Peningkatan Kesejahteraan Masyarakat Pesisir Pantai di Desa Blongko Kabupaten Minahasa Sulawesi Utara	Imelda Judith Siahainenia	2001
4	Dinamika Kelompok Pengelola Daerah Perlindungan Laut Talise	Noviar F Wenno	2002
	Sub Total Internship Reports	***4 reports***	

Training Reports

1	Pelatihan Pengelolaan Sumberdaya Wilayah Pesisir Terpadu bagi Tim Kerja Kabupaten (KTF) Minahasa	Sesilia Dajoh, Sherly Tulung, D. Malino	1999
2	Lokakarya Penyusunan Rencana Pengelolaan Sumber Daya Wilayah Pesisir Tingkat Desa Proyek Pesisir Sulut	Sesilia Dajoh, N. Tangkilisan, D. Malino	1999
3	Lokakarya Kelompok Pengelola Daerah Perlindungan Laut Desa Blongko-Desa Tumbak	Proyek Pesisir Sulawesi Utara	2000
4	Pelatihan bagi Asisten Lapangan dan Pendamping Masyarakat	Sesilia Dajoh dan Maria Dimpudus	2001
5	Lokakarya Evaluasi Block Grant 2000	Proyek Pesisir Sulawesi Utara	
6	Workshop Pengembangan Agroforestry di Desa Pesisir	Sesilia Dajoh, Maxi Wowiling	2001
	Sub Total Training Reports	***6 reports***	
	Grand Total Reports for all Village Sites	**35 reports**	

V. List of Research Assistants, National & Local Interns Working in the Project Anchor Sites

Location	Name	Start Date	End Date	Total Estimated Days in the Field Site
Research Assistants				
Tumbak	Jefta Talunoe	1-Feb-01	30-Apr-01	55
Bentenan	Gitrix Sondakh	1-Feb-01	30-Apr-01	62
Blongko	Meilyn Maino	1-Feb-01	30-Apr-01	63
Talise	Marline Punusingon	1-Feb-01	30-Apr-01	52
	Raymond Bororing	1-Feb-01	30-Apr-01	56
	Ismail Tampi	18-Sep-01	18-Des-01	59
		Sub Total Research Assistant Person Days		***347***
National and Local Interns				
Tumbak	Ferdinand Mayulu	1-Aug-00	31-Oct-00	30
	G. Joseph W. K	7-Sep-01	31-Mar-02	93
Bentenan	Muh. Ikbal	8-Jul-00	30-Sep-00	45
	M. Abdi	4-Sep-01	Dec 01	56
	Yuler Saulauda	1-Feb-02	Apr-02	45
Blongko	Maya Andes	3-Aug-00	31-Oct-00	21
	Richard Pangkey	Mar 01	1-May-01	37
	Yessi Momongan	Mar 01	May-01	33
	Imelda J. Siahainenia	Sep-01	Nov 01	47
	Xaverius Runtuwene	1-Feb-02	31-Jul-02	38
Talise	Adnan Watasen	12-Jul-00	30-Sep-00	40
	Noviar F. Weno	4-Sep-01	Mar-02	79
		Sub Total National and Local Intern Person Days		***564***
		GRAND TOTAL PERSON DAYS		***911***
			Sub Total Tumbak Person Days	***178***
			Sub Total Blongko Person Days	***239***
			Sub Total Bentenan Person Days	***208***
			Sub Total Talise Person Days	***286***

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002)

Date	Event	Number of Participants		
		Total	Female	Male
Blongko				
Pertemuan (Meetings)				
11-Apr-00	Pertemuan masyarakat tentang Erosi di Dsn I	17	5	12
12-Apr-00	Studi Banding Bapedal Wilayah II Bali	20	5	15
25-May-00	Kunjungan Menteri Departemen Eksplorasi Laut dan Perikanan	69	15	54
13-Jun-00	Pemilihan Skala Prioritas	24	12	12
6-8 Juli 00	Kunjungan Silang Kelompok DPL Desa Talise ke Blongko	7	1	6
6-Jul-00	Pertemuan Kelompok DPL Talise dengan Masyarakat Blongko	17	4	13
16-Jul-00	Rapat Badan Pengelola tentang Pemantapan dan Sosialisasi RPTD 2000/2001	16	1	15
22-Aug-00	Pertemuan Kelompok Pengelola DPL dan Pemerintah desa ttg pembuatan bronjong	22	4	18
31 Okt 00	Diskusi Kegiatan Proyek	24	5	19
4-Nov-00	Diskusi Kegiatan Proyek	10	2	8
9-Feb-01	Pertemuan untuk Kesepakatan Bersama ttg pembangunan yang sudah terealisasi dan yang sudah berjalan	20	5	15
16-Feb-01	Studi Banding Desa Sawang Siau Timur dan Bunaken	39	6	33
25-Feb-01	Pemantapan Evaluasi Block Grant 2000	15	4	11
15-Mar-01	Kunjungan Tim NRM Assessment	70	25	45
24-Mar-01	Diskusi ttg Pemboman Ikan dan Penyuntingan Gambar DPL oleh TVRI	7	2	5
25-26 Mar 01	Penanaman Tanaman Agroforestry	25	12	13
3 July 01	Persiapan dalam rangka kunjungan Presiden dan Menteri Kelautan	26	5	21
21-Aug-01	Studi banding tentang Proses DPL dari Masyarakat P. Sebesi-Lampung	8	2	6
7-Sep-01	Pertemuan tentang kelanjutan perbaikan air bersih dan bahaya rusak mental	30	10	20
11 Okt 01	Pertemuan kelompok sablon	12	7	5
16 Okt 01	Temu bicara dengan Tim Studi dari Irian Jaya	36	6	30
5-Feb-02	Evaluasi Kinerja BP	16	4	12
7-Feb-02	Koordinasi KP-DPL	11	1	10
25-Feb-02	Kunjungan Pak Sarwono	81	24	57
12-Apr	Diskusi hasil pemeriksaan Laboratorium hasil sumur	8	0	8
6-Jun-02	Self assessment dalam rangka graduation	15	5	10
10-Jun-02	Self assessment dalam rangka graduation jaga IV	12	7	5
11-Juni-02	Self assessment dalam rangka graduation jaga V	28	5	23
12 Juni 02	Self assessment dalam rangka graduation Jaga III	11	1	10
18 Juni 02	Self assessment dalam rangka graduation Jaga I	28	6	22
18 Juni 02	Pertemuan kunjungan Pansus Ranperda	56	14	8
26 Juli 02	Diskusi antara masyarakat dengan Dirjen P3K	23	8	15
23-Aug-02	Kunjungan Lapangan Tim KTF	35	12	23
		838	***225***	***579***

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	**Female**	**Male**
Blongko (continued)				
Pendidikan Lingkungan Hidup (Environmental Education)				
24 Mei 01	PLH : Pencanagan Hari Pemuda Cinta Lingkungan	156	106	50
27 July 01	Penyuluhan Sanitasi Lingkungan dan Air Bersih	54	21	33
		210	***127***	***83***
Pelatihan (Training)				
15-Aug-00	Pelatihan Administrasi Block Grant untuk BP-DPL dan pembangunan Sumberdaya Wilayah Pesisir	46	14	32
29-Sep-00	Pelatihan Administrasi Block Grant	11	5	6
17 Okt 00	Dissemination of Lesson Learned (establish CB-CRM)	19	4	15
13-14 Mar 01	Pelatihan Sablon	25	10	15
11 Okt 01	Pelatihan Pengelolaan Pusat Informasi	15	6	9
19 - 20 Okt 01	Pelatihan Pengelolaan Pusat Informasi	11	3	8
8-Feb-02	Pelatihan Pengelolaan Program Pengunjung	22	6	16
		149	***48***	***101***
Presentasi (Presentations)				
14-Aug-00	Lokakarya BP-DPL dan Pembangunan Sumberdaya Wilayah Pesisir	62	14	48
26-Feb-01	Lokakarya Evaluasi Block Grant	40	11	29
7 Okt 01	Sosialisasi RPTD 2001/2002, Pembahasan Sarana Air Bersih	18	1	17
5-Feb-02	Evaluasi Kinerja BP Desa Blongko	16	4	12
		136	***30***	***106***
	BLONGKO Grand Total	**2245**	**752**	**1425**

Source : PMP Reports - Proyek Pesisir SULUT

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	Female	Male
Talise				
Pertemuan (Meetings)				
13-Apr-00	Studi Banding Bapedal Wilayah II Bali	29	6	23
19-Apr-00	Peresmian Pusat Informasi	102	49	53
4-May-00	Pertemuan Masyarakat dengan PT.Horiguchi	54	13	41
25-May-00	Musyawarah tentang DPL Dusun II	27	5	22
16-Jun-00	Penyusunan Rencana Kegiatan Tahunan	11	1	10
4-Aug-00	Kunjungan KTF	15	6	9
23-Aug-00	Pertemuan Persiapan Peresmian DPL	14	6	8
25-Aug-00	Peresmian DPL Dusun I Desa Talise	112	38	74
29-Aug-00	Kunjungan Lapang USAID Jakarta	10	2	8
14-Sep-00	Cross Visit CRMP Lampung	23	5	18
27 Okt 00	Packard Foundation Visit	40	12	28
2-Nov-00	Diskusi Kegiatan Proyek Pesisir	13	5	8
3-Nov-00	Diskusi Kegiatan Proyek Pesisir	14	5	9
11-Nov-00	Rapat Evaluasi Block Grant di Kantor Desa	16	12	4
11-Nov-00	Rapat Evaluasi Block Grant di Pusat Informasi	31	5	26
14 Des 00	Pertemuan untuk informasi sertifikasi tanah, klarifikasi masalah & penyerahan peta buatan masyarakat	45	16	29
11-Feb-01	Penyusunan Rencana Kegiatan Tahunan (2001-2002) masyarakat Jaga III dan Jaga IV	14	2	12
20-Feb-01	Rapat BPPD untuk evaluasi kegiatan Tahun 2000 dan Penyelesaian RPTD 2001	14	3	11
24-Feb-01	Pertemuan Kelompok Ekowisata	6	0	6
28-Feb-01	Pertemuan masyarakat Kinabuhutan dengan BPN	42	8	34
12-Mar-01	Pertemuan Kelompok Katinting	8	0	8
21-Mar-01	Pertemuan Kelompok DPL	6	1	5
24-Mar-01	Pertemuan Kelompok Agroforestry	8	0	8
31-Mar-01	Pertemuan Kelompok Ekowisata	17	4	13
2-Apr-01	Pertemuan Kelompok DPL	9	2	7
7-Apr-01	Penelitian Laporan Semua Kegiatan Kelompok Pengelola	30	10	20
19-Apr-01	Pembahasan Laporan Kelompok Pengelola	21	3	18
8-Aug-01	Pertemuan membahas aturan-aturan desa	9	4	5
11 Aug 01	Pembahasan RPTD 2001	20	2	18
22 Aug 01	Studi banding tentang Proses DPL dari Masyarakat P. Sebesi-Lampung	11	0	11
28 Aug 01	Revisi RPTD 2001	3	0	3
11-Sep-01	Rapat Umum Dusun III & IV Kinabuhutan tentang DPL	47	10	37
26 Okt 01	Rapat Kelompok DPL Kinabuhutan	10	2	8
14-Feb-02	Evaluasi BP Desa Talise	32	7	25
22-Feb-02	Kunjungan Pak Sarwono	105	?	?
26-Apr	Pertemuan dm rangka kunjungan USAID, BAPPENAS, DKP	19	3	16
6 Juli 02	Self assessment dalam rangka graduation Jaga I	30	17	13
8 Juli 02	Self assessment dalam rangka graduation	18	2	16
27 Juli 02	Kunjungan Dirjen Pesisir dan Pulau-pulau Kecil	23	5	18
27 Agust 02	Kunjungan Lapangan Tim KTF	33	10	23
		1091	***281***	***705***

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	**Female**	**Male**
Talise (continued)				
Pendidikan Lingkungan Hidup (Environmental Education)				
08-Mei-01	Lomba PLH bagi Anak-anak SD	39	15	24
		39	***15***	***24***
Pelatihan (Training)				
10-Aug-00	Pelatihan BP untuk Administrasi Keuangan Peran/ Tugas dan Penyusunan Perencanaan Kegiatan	23	3	20
18 Okt 01	Pelatihan Pengelolaan Pusat Informasi	14	4	10
22 Okt 01	Pelatihan pemanfaatan pekarangan dan lahan sempit serta pembudidayaan tanaman buah dalam pot di Jaga II	19	14	5
29-Oct-01	Pelatihan pemanfaatan pekarangan dan lahan sempit serta pembudidayaan tanaman buah dalam pot	17	15	2
		73	***36***	***37***
Presentasi (Presentations)				
24-Apr-00	Sosialisasi DPL	34	12	22
25-Apr-00	Sosialisasi DPL	32	11	21
28-Feb-01	Lokakarya Evaluasi Block Grant Tahun 2000			
19 July 01	Sosialisasi aturan DPL dan pelestarian pesisir P. Kinabuhutan	59	15	44
26-Nov-01	Sosialisasi aturan DPL Kinabuhutan	27	1	26
8-10 Mei 02	Sosialisasi Produk Kampanye CB-CRM di Likupang			
10 Mei 02	Sosialisasi Formal penutupan PP dan Program Graduation	25	10	15
		177	***49***	***128***
	TALISE Grand Total	**2583**	**713**	**1660**

Source : PMP Reports-Proyek Pesisir SULUT

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	Female	Male
Bentenan				
Pertemuan (Meetings)				
14-Apr-00	Studi Banding Bapedal	34	5	29
26-May-00	Pertemuan untuk Sosialisasi Aturan KPL dan PLH	54	32	22
10-Aug-00	Pertemuan Kelompok PengePLH Mengenai Dana Bergulir	26	4	22
22-Aug-00	Pertemuan Kelompok PLHuntuk Membahas/ Merumuskan aturan-aturan dalam zona kawasan Pelestarian Laut Bentenan	19	6	13
3-Sep-00	Pembentukkan BPPD	31	6	25
23-Sep-00	Kunjungan KTF untuk monitoring Dana Block Grant			
14 Okt 00	Pertemuan KP-KPL untuk Sosialisasi aturan KPL	18	4	14
1-Nov-00	Diskusi Kegiatan Proyek Pesisir	25	14	11
12-Nov-00	Evaluasi sementara pelaksanaan dana Block Grant dan Unit Pelaksanan Saluran Air Bersih	29	6	23
15 Des 00	Pertemuan untuk membahas Dana Block Grant	25	4	21
14-Jan-01	Pembahasan Dana Proyek Pengembangan Kecamatan dan dana Bappeda	27	2	25
15-Jan-01	Pertemuan Kelompok PLH, pengembalian dana bergulir dan Pembahasan KPL	31	10	21
4-Mar-01	Rapat Interen BPPD	9	3	6
10-Mar-01	Kegiatan Penghijauan	40	11	29
1 May 2001	Pengembalian Modal Bergulir Rumput Laut	32	10	21
6 May 2001	Evaluasi Kegiatan Kelompok KPL dan Pergantian Pengurus	23	8	15
9 July 01	Musbangdes Penyusunan RPTD 2001-2002	21	5	16
14 July 01	Rapat desa mengenai pengaktifan Badan Perwakilan Desa dan pembahasan program Kawasan Pelestarian Laut	15	2	13
15 July 01	Pertemuan Kel. Peng. KPL untuk pengembalian dana bergulir	25	12	13
1 Aug 01	Pertemuan mengenai pengembalian dana bergulir	30	20	10
3 Aug 01	Pertemuan mengenai program Badan Perwakilan Desa dan perencanaan pembahasan Peraturan Desa	8	2	6
6 Aug 01	Rapat desa tentang BPD dan audit Block Grant 2000	47	7	40
6-Aug-01	Replikasi Daerah Perlindungan Laut	6	1	5
14-Sep-01	Rapat BPPD untuk implementasi hasil audit Block Grant	9	4	5
1 Okt 01	Pengembalian Dana Bergulir	42	26	16
7-Feb-02	Pertemuan Kelompok Pengembalian Dana Bergulir	45	27	18
13-Feb-02	Pertemuan Kelompok PLH	35	15	20
20-Feb-02	Pertemuan kelompok	45	20	25
26-Feb-02	Kunjungan Pak Sarwono	133	54	79
27-Feb-02	Pertemuan Kelompok PLH	49	23	26
6-Mar-02	Pertemuan Kelompok PLH	48	22	26
13-Mar-02	Pertemuan Kelompok PLH	55	25	30
17-Mar-02	Evaluasi Kegiatan Kelompok Agroforestri	6	0	6
17-Mar-02	Evaluasi kegiatan Kelompok PLH	30	9	21
20-Mar-02	Pertemuan Kelompok PLH	55	30	25
27-Mar-02	Pertemuan Kelompok PLH	60	25	35
31-Mar-02	Pertemuan untuk membahas Peraturan Desa tentang KPL/ DPL	43	9	34
29-Apr-02	Pembahasan Peraturan Desa tentang KPL	23	2	21
7-Jun-02	Pembuatan Peraturan Desa tentang Sarana Air Bersih	15	1	14
		1268	***466***	***801***

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	Female	Male
Bentenan (continued)				
Pendidikan Lingkungan Hidup (Environmental Education)				
28-Sep-01	Pendidikan Lingkungan Hidup	29	26	3
30-Sep-01	Pendidikan Lingkungan Hidup	25	14	11
19 Okt 01	Pendidikan Lingkungan Hidup	26	24	2
22 Okt 01	Pendidikan Lingkungan Hidup	29	21	8
15-Feb-02	Pendidikan Lingkungan Laut mengenai sampah dan kehidupan di laut	47	22	25
		156	***107***	***49***
Pelatihan (Training)				
2-Apr-02	Pelatihan Pembuatan Proposal/pelaporan kegiatan dan pengelolaan Pusat Informasi	17	6	11
9-Apr-02	Pelatihan Pengelolaan Keuangan dan Pelaporan Kegiatan	10	4	6
		27	***10***	***17***
Presentasi (Presentations)				
19-Sep-00	Workshop Implementasi Block Grant	44	10	34
16 Okt 00	Sosialisasi dana bantuan Proyek Pesisir	27	10	17
8-Feb-01	Sosialisasi draf aturan KPL di KolomIV	32	17	15
9-Feb-01	Sosialisasi Drat aturan KPL di Jaga V	56	56	0
13-Feb-02	Sosialisasi Drat aturan KPL di Kolom III	18	18	0
20-Feb-01	Sosialisasi Drat aturan KPL di Kolom III	17	17	0
22-Feb-01	Sosialisasi Drat aturan KPL di Kolom VI	40	24	16
22-Feb-01	Sosialisasi Drat aturan KPL di Kolom III	46	31	15
24-Feb-01	Lokakarya Evaluasi Block Grant	48	12	36
10-Mar-01	Sosialisasi Drat aturan KPL untuk remaja mesjid	34	21	13
18-Mar-01	Sosialiasi draf aturan KPL di Pemuda	28	12	16
21-Mar-01	Lokakarya Penguatan BPD	35	5	30
6-Sep-01	Sosialisasi Perda Peng. Sumberdaya Wilayah Pesisir Minahasa	37	4	33
13 Mei 02	Sosialisasi Formal penutupan PP dan Program Graduation	20	4	16
		482	***241***	***241***
	BENTENAN Grand Total	**3384**	**1407**	**1975**

Source: PMP Reports- Proyek Pesisir SULUT

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	Female	Male
Tumbak				
Pertemuan (Meetings)				
13-Sep-00	Cross Visit CRMP Lampung	28	1	27
29-Jun-00	Penyusunan Rencana Pembangunan Tahunan Desa	15	2	13
15-Nov-00	Peresmian DPL	91	30	61
25-Feb-01	Persiapan Evaluasi Dana Block Grant	12	0	12
19-Mar-01	Rapat Persiapan Kunjungan Studi Banding Masyarakat Rap-rap binaan JICA	5	0	5
20-Mar-01	Rapat KP-DPL	9	0	9
2-Apr-01	Pertemuan Kelompok Isu dan Revisi RPTD	22	0	22
4-Apr-01	Pertemuan Kelompok DPL dan Evaluasi Katinting	15	0	15
27-Apr-01	Pertemuan Kelompok Bakau	10	2	8
25-Sep-01	Diskusi Kelompok Isu tentang pelaksanaan kegiatan program Proyek Pesisir	23	7	16
19-Jan-02	Penyusunan anggaran kegiatan RPTD 2001/2002 khusus konservasi	16	7	9
11-Feb-02	Pertemuan untuk membahas tatabatas Desa Tumbak	20	0	20
12-Feb-02	Evaluasi BP Tumbak	8	2	6
26-Feb-02	Kunjungan Pak Sarwono	161	51	110
13 Mei 02	Sosialisasi dan pembahasan mengenai Daerah Perlindungan bakau Desa Bakau	76	21	55
14 Mei 02	Sosialisasi dan pembahasan mengenai Daerah Perlindungan bakau Desa Bakau	50	5	45
15 Mei 02	Sosialisasi dan pembahasan mengenai Daerah Perlindungan bakau Desa Bakau	33	8	25
16 Mei 02	Sosialisasi dan pembahasan mengenai Daerah Perlindungan bakau Desa Bakau	33	10	23
		627	***146***	***481***
Pendidikan Lingkungan Hidup (Environmental Education)				
25-Sep-01	Pendidikan Lingkungan Hidup tentang pentingnya melestarikan terumbu karang, hutan, mangrove dan pesisir	23	7	16
		23	***7***	***16***
Pelatihan (Training)				
21 Okt 01	Training on penyusunan proposal kegiatan dan teknik pelaporan	14	4	10
21-Nov-01	Training on Penyusunan Proposal Kegiatan dan teknik pelaporan	28	10	18
17-18 Apr 02	Pelatihan Program Pengunjung	19	4	15
29-30 Juli 02	Pelatihan Monitoring			
		61	***18***	***43***

VI. Activities Conducted in the Project Anchor Sites (April 2000-August 2002) (continued)

Date		Number of Participants		
		Total	**Female**	**Male**
Tumbak (continued)				
Presentasi (Presentations)				
27-Feb-01	Lokakarya Evaluasi Block Grant	50	1	49
2 Okt 01	Penyampaian Hasil Audit Keuangan Block Grant Desa	6	0	6
21-Nov-01	Sosialisasi dan Revisi RPTD 2001/2002	28	10	18
23-Apr-02	Sosialisasi Informal penutupan Proyek dan program Graduation	30	8	22
6 Mei 02	Sosialisasi Formal penutupan PP dan Program Graduation	21	5	16
		135	***24***	***111***
	TUMBAK Grand Total	**1557**	**366**	**1191**

Source: PMP Reports- Proyek Pesisir SULUT

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Bentenan				
Meeting				
21 Oct 98	Studi Lapangan peserta ICM	8	29	37
25 Nov 97	Sharing pengalaman peranan masyarakat dalam pengelolaan sumberdaya pesisir di Pulau Apo Philippina	8	18	26
19 Jan 98	Focus Group gender	10	4	14
4 Apr 98	Pertemuan Kelompok Nelayan: Perkenalan dan penyampaian harapan bersama	5	22	27
24 Apr 98	Pertemuan Kelompok Nelayan: Pembahasan Rencana Program	4	10	14
6 Jun 98	Pelaksanaan Awal: Pusat Informasi dan Pembentukan Panitia Pengelola	11	13	24
12 Jun 98	Pertemuan awal untuk paket PLH	0	2	2
23 Jul 98	Pertemuan dengan rombongan Dirjen Bangda	8	21	29
21 Agust 98	Pertemuan pelaksanaan awal Pusat Informasi dan rencana rehabilitasi daerah rawa	2	5	7
21 Oct 98	Pertemuan masyarakat dengan peserta training ICM Outreach	8	28	36
24 Oct 98	Pembersihan pantai	12	18	30
26 Nov 98	Kegiatan pelaksanaan awal	4	7	11
6 Dec 98	Kegiatan pelaksanaan awal	6	9	15
14 Jan 99	Pembentukan Tim Pengelola Pelaksanaan Awal	1	8	9
24 May 99	COREMAP Visit	12	32	44
4 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Bentenan-Tumbak	2	8	10
10 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Bentenan-Tumbak	5	15	20
18 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Bentenan-Tumbak	23	30	53
22 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Bentenan-Tumbak	18	25	43
25-26 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Bentenan-Tumbak	30	30	60
29 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Bentenan-Tumbak	42	43	85
7 Nov 99	Persetujuan Rencana Pengelolaan Desa Bentenan	4	26	30
16 Des 99	Pertemuan masyarakat Dusun III untuk pembangunan talud sungai	1	9	10
14 Feb 00	Pertemuan tentang rehabilitasi rawa dan sungai	6	25	31
18 March 00	Pertemuan Kelompok Pengelola Lingkungan Hidup	4	27	31
Presentation				
11 April 98	Penjelasan Tentang Proyek Pesisir	7	32	39
14 April 98	Penjelasan Tentang Proyek Pesisir	8	6	14
6 June 98	Penjelasan Tentang Proyek Pesisir	11	13	24
1 July 98	Hasil Survey Rawa dan Profil Pantai	5	18	23
7 Agust 98	Penjelasan Tentang Proyek Pesisir	35	5	40

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Bentenan				
Presentation				
23 Sept 98	Materi Hasil Pelatihan ICM dan Pelaksanaan Awal	11	2	13
25 Sept 98	Materi Hasil Pelatihan ICM dan Pelaksanaan Awal	32	1	33
15 Oct 98	Sosialisasi ICM Training	5	7	12
17 Oct 98	Sosialisasi ICM Training	18	17	35
18 Oct 98	Sosialisasi ICM Training	14	23	37
24 August 99	Analisa Data Profil dan Survey	6	6	12
Training				
25-26 Mar 98	Pengukuran Profil Pantai dan Tinggi Muka Air Rawa Pasang Surut	5	5	10
25-27 Apr 98	Pengukuran Profil Pantai dan Tinggi Muka Air Rawa Pasang Surut	7	4	11
23-25 May 98	Pengukuran Profil Pantai dan Tinggi Muka Air Rawa Pasang Surut	7	4	11
23-24 June 98	Pengorganisasian Kelompok	8	8	16
22 Agust 98	Pengukuran Profil Pantai dan Tinggi Muka Air Rawa Pasang Surut	5	3	8
15-16 Feb 00	Pelatihan Kelompok Lingkungan Hidup	9	29	38
15-17 Feb 00	Coral Reef Monitoring Participatory	6	14	20
Environmental Education				
12 Feb 98	Coastal Processes and Erosion	7	37	44
15-16 Feb 00	Pemutaran Film Ekosistem Terumbu Karang	20	30	50
	Bentenan Total	**460**	**728**	**1188**

Source : Workplan Implementation Reports. Proyek Pesisir. Jakarta.

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Tumbak				
Meeting				
14-16 July 97	The CRMP and Field Activities, CRM Issues of concern by villagers	179	273	452
25 Nov 97	Sharing pengalaman peranan masyarakat dalam pengelolaan sumberdaya pesisir di Pulau Apo Philippina	12	72	84
20 Jan 98	Focus Group Gender	7	5	12
26 Feb 98	COTs Clean Up in Bentenan-Tumbak	17	145	162
1 Mar 98	Pelaksanaan awal penanaman bakau	0	9	9
3 Apr 98	Persamaan persepsi masyarakat, kepala desa, dan Proyek Pesisir	152	243	395
4 April	Pertemuan lanjutan Penaman Bakau	0	17	17
13 Apr 98	Pertemuan monitoring penanaman bakau dan permohonan bantuan material untuk sarana air minum	1	16	17
22 Apr 98	Persiapan Post COT clean up	11	18	29
23 May 98	Pertemuan Kegiatan Penanaman Bakau	33	15	48
28 May 98	Penanaman Bakau	92	83	175
18 Jun 98	Pertemuan formal penjajakan kelompok binaan	10	11	21
23 Jun 98	Pertemuan dengan rombongan Dirjen Bangda dan penyerahan dana pelaksanaan awal	5	22	27
24 Jun 98	Persiapan Daerah Perlindungan Laut	17	23	40
13 Agust 98	Pertemuan aspek lingkungan hidup dan persiapan DPL	7	71	78
21 Sept 98	Musyawarah Umum : Daerah Perlindungan	113	116	229
13 Oct 98	Koordinasi kegiatan pelaksanaan awal, daerah perlindungan dan pembersihan COT	5	13	18
21 Oct 98	Pertemuan masyarakat dengan peserta training ICM Outreach	14	47	61
11 Nov 98	Pertemuan masyarakat dengan Bappeda	6	39	45
17 Nov 98	Pertemuan masyarakat dengan Bappeda	6	29	35
24 Nov 98	Rapat koordinasi pembersihan COT	3	6	9
28 Nov 98	Rapat koordinasi pembersihan COT untuk persiapan terakhir	3	9	12
29 Nov 98	Pembersihan COT	57	99	156
7 Apr 99	Penyerahan bantuan pembangunan dari Bappeda	1	36	37
25 May 99	COREMAP Visit	9	28	37
30 Jul 99	Rapat perangkat desa dengan Kelompok Inti	1	11	12
6 Agust 99	Pertemuan tokoh masyarakat	0	12	12
22 Sept 99	Sosialisasi DPL dan Rencana Pengelolaan	0	9	9
1 Nov 99	Penjelasan Rencana Pengelolaan	6	16	22
1 Nov 99	Pembentukan kelompok DPL	7	16	23
25 Jan 00	Pertemuan Kelompok Pengelola DPL	1	19	20
7 March 00	Pertemuan masyarakat untuk aturan DPL	8	72	80

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Tumbak				
Meeting				
17 March 00	Pertemuan Kelompok Katinting	1	16	17
21 March 00	Pertemuan kelompok katinting untuk penentuan penerima katinting tahap pertama	4	13	17
24 March 00	Penyerahan bantuan katinting kepada kelompok nelayan Tumbak	2	9	11
Presentation				
27-29 Agust 98	Sharing Pengalaman Proses Pembentukan DPL dan Pelatihan Manta Tow di Desa Blongko	5	7	12
Training				
25-26 Mar 98	Administarsi dan Keuangan	3	9	12
1-6 June 98	Coral Reef Monitoring Participatory I	5	7	12
22 July 98	Administrasi dan Keuangan	3	10	13
24-29 Agust 98	Coral Reef Monitoring Participatory II	5	7	12
10-15 Nov 98	Coral Reef Monitoring Participatory III	3	5	8
13 March 00	Pengelolaan Kepiting Bakau	0	4	4
Environmental Education				
28 April 98	Terumbu Karang	37	17	54
7 March 00	Pemutaran Film tentang Ekosistem Terumbu Karang	54	88	142
27 Apr 98	Pertemuan PLH	16	21	37
	Tumbak Total	**921**	**1813**	**2734**

Source : Workplan Implementation Reports. Proyek Pesisir. Jakarta.

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Blongko				
Meeting				
20-21 July 97	The CRMP and Field Activities, CRM Issues of concern by villagers	4	20	24
28-29 August 97	The CRMP and Field Activities, CRM Issues of concern by villagers	78	134	212
26-27 Nov 97	*Sharing* pengalaman peranan masyarakat dalam pengelolaan pesisir di Pulau Apo Philippina	45	23	68
15 Dec 97	Pelaksanaan Awal : Pembuatan MCK Desa	4	12	16
12 Feb 98	Pelaksanaan Awal: Pembuatan MCK desa dan penjelasan strategi rencana kerja desa tahun kedua	6	4	10
18-24 Feb 98	Pelaksanaan Awal: Persetujuan untuk pembuatan MCK dan *sharing* hasil pelatihan usaha rakyat	37	90	127
13 Mar 98	Pelaksanaan Awal: Lokasi Pembuatan MCK desa dan Daerah Perlindungan	91	123	214
7 Apr 98	Musyawarah Daerah Perlindungan Laut bersama kelompok pemanfaat	20	14	34
19 Apr 98	Musyawarah tentang Draft Peraturan DPL	4	9	13
29 Apr 98	Penjelasan tentang pendanaan, administrasi, keuangan, dan penyerahan dana pelaksanaan awal I	2	8	10
10 Jun 98	Persiapan Evaluasi Dana dan Administrasi Pelaksanaan Awal	2	1	3
13 Jul 98	Penyerahan dana pelaksanaan awal: MCK tahap kedua	3	8	11
23 Jul 98	Sosialisasi peta lokasi DPL	18	15	33
10 Agust 98	Pembentukan Kelompok Pengelola DPL, Proyek Air Bersih, dan evaluasi pembangunan MCK	3	10	13
12 Agust 98	Pertemuan pembentukan MCK untuk 8 keluarga	4	4	8
13 Agust 98	Pertemuan tanda batas DPL dan kepastian persetujuan lokasi Pusat Informasi Masyarakat	6	31	37
20 Agust 98	Pertemuan Pembangunan Pusat Informasi	5	15	20
26 Agust 98	Pertemuan persetujuan keputusan desa untuk UU DPL	14	38	52
2 Sep 98	Pertemuan Penyerahan dana tahap III pembangunan MCK dan Pusat Informasi	8	6	14
18 Sept 98	Diskusi strategi Pendidikan Lingkungan Hidup	7	3	10
14 Oct 98	Laporan kegiatan Pusat Informasi	5	13	18
14-15 Oct 98	Proses Daerah Perlindungan	4	4	8
16-18 Oct 98	Persiapan kunjungan peserta pelatihan ICM Outreach	5	12	17
22 Oct 98	Pertemuan masyarakat dengan peserta training ICM Outreach	9	13	22
13 Jan 99	Laporan kegiatan Kelompok Pengelola Daerah Perlindungan Laut	6	20	26
7 Apr 99	Penyerahan batuan pembangunan dari Bappeda	7	31	38
16 Apr 99	Peresmian Daerah Perlindungan Laut	57	87	144
20 Jun 99	Rapat Kelompok Pengelola DPL dengan Kelompok Katinting	3	12	15
1 Jul 99	Pertemuan petani dengan Tim Agroforestry	1	33	34
6 Jul 99	Sosialisasi Rencana Pengelolaan	8	15	23

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Blongko				
18 Jul 99	Sosialisasi Rencana Pengelolaan	5	21	26
19 Jul 99	Sosialisasi Rencana Pengelolaan	14	40	54
23 Sept 99	Evaluasi kelompok pengelola DPL	3	12	15
24 Sept 99	Monitoring Manta Tow	2	8	10
28 Sept 99	Kunjungan INCUNE	10	17	27
10 Oct 99	Musyawarah erosi pantai dan sungai	-	-	-
28 Oct 99	Evaluasi umum program Proyek Pesisir di Desa Blongko	11	10	21
9 Feb 00	Sosialisasi penenaman pohon sengon di sepanjang sempadan Sungai Laimpangi	2	13	15
9 Feb 00	Pembentukan Badan Pengelola	2	13	15
26 Feb 00	Regional Cross Visit Takabonerate-Blongko COREMAP	7	34	41
Presentasi				
18 Nov 97	Proyek Pesisir Socialization	27	14	41
19 Nov 97	Proyek Pesisir Socialization	9	10	19
13 Mar 98	Aspek Hukum Lingkungan	33	53	86
14 Mar 98	Aspek Hukum Lingkungan	24	39	63
18 Mar 98	Aspek Hukum Lingkungan	18	39	57
19 Mar 98	Aspek Hukum Lingkungan	77	103	180
30 Sept 99	Hasil Pengamatan Erosi Pantai	7	18	25
Training				
10-14 Nov 97	Coral Reef Monitoring Participatory I	3	9	12
4-10 Mar 98	Coral Reef Monitoring Participatory I	8	5	13
10-11 Mar 98	Administrasi dan Keuangan	3	2	5
11-13 Mar 98	Coral Reef Monitoring Participatory II	3	10	13
20-21 April 98	Coral Reef Monitoring Participatory II	3	9	12
25 Agust 98	Administrasi dan Keuangan	5	9	14
18-19 August 99	Pelatihan Agroforestry	6	24	30
Workshop				
18-21 Jan 00	Kelompok Pengelola Daerah Perlindungan Laut	5	28	33
	Blongko Total	**753**	**1348**	**2101**

Source : Workplan Implementation Reports. Proyek Pesisir. Jakarta.

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Talise				
Meeting				
24-26 July 97	The CRMP and Field Activities, CRM Issues of concern by villagers	256	254	510
Nov 97	Sharing pengalaman peranan masyarakat dalam pengelolaan sumberdaya pesisir di Pulau Apo Philippina	205	214	419
10 Feb 98	Pelaksanaan awal pembangunan Pusat Informasi dan penjelasan strategi rencana kerja tahun kedua Desa Talise	2	5	7
12 Feb 98	Pelaksanaan Awal: Pembangunan Pusat Informasi	15	45	60
Mar 98	Pelaksanaan Awal: Pembangunan Pusat Informasi dan masalah penambangan pasir serta pemotongan mangrove	2	12	14
24 Apr 98	Sosialisasi Daerah Perlindungan	17	23	40
28-29 Apr 98	Musyawarah Focus Group: Daerah Perlindungan untuk Objek Wisata	17	39	56
11 Agust 98	Persiapan DPL dan penjelasan status hutan Talise	4	22	26
16 Agust 98	Sosialisasi pembentukan kelompok ibu-ibu	13	2	15
27 Oct 98	Pembersihan pantai	46	23	69
27 May 99	COREMAP Visit	7	22	29
8-10 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Desa Talise	47	39	86
11 Jul 99	Pertemuan para orang tua murid	41	19	60
13 Jul 99	Pertemuan masyarakat dengan Tim Agroforestry	18	24	42
18 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Desa Talise	28	9	37
19 Jul 99	Sosialisasi Draft I Rencana Pengelolaan Desa Talise	55	15	70
21 Agust 99	Pertemuan dengan Tim Agroforestry	1	17	18
15 Sept 99	Pertemuan untuk pengadaan sertifikat	12	45	57
15 Dec 99	Kunjungan menteri kelautan dan penyerahan sertifikat tanah	17	33	50
15 March 00	Sosialisasi hasil pelatihan Manta Tow Dusun I dan DPL	14	22	36
16 March 00	Merancang aturan DPL Dusun I	2	4	6
20 March 00	Pengukuran zona inti dan zona penyangga DPL Dusun I	0	4	4
22 March 00	Sosialisasi aturan DPL Dusun I, Pembentukan kelompok pengelola, Sosialisasi lokasi DPL	16	20	36
Presentation				
Oct 97	Proyek Pesisir Socialization	39	45	84
19 Oct 97	Proyek Pesisir Socialization	6	22	28
23 Oct 97	Proyek Pesisir Socializtion	33	7	40
24 Feb 98	Aspek Hukum Lingkungan	4	16	20
25 Feb 98	Aspek Hukum Lingkungan	54	42	96
24 Nov 98	Hasil Survey Hutan dan Satwa P.Talise	27	29	56
26 Nov 98	Hasil Survey Hutan dan Satwa P.Talise	11	18	29
14 Jun 99	Hasil pemantauan profil pantai Dusun III Kinabuhutan	27	45	72

VI. Activities Conducted in the Project Anchor Sites (October 1997 – March 2000) (continued)

Category and Date	Activity	Partcipants		
		Female	Male	Total
Talise				
Presentation				
Oct 97	Proyek Pesisir Socialization	17	57	74
16 Jan 99	Sosialisasi Profil Desa	2	13	15
2 Feb 99	Sosialisasi Profil Desa	19	6	25
Training				
20 Dec 97	Pembuatan Transek desa, Peta desa dan Kalender musim	1	3	4
21 Dec 97	Pembuatan Transek desa, Peta desa dan Kalender musim	2	4	6
14 April 98	Administrasi dan Keuangan	5	21	26
15-16 May 98	Pengukuran Profil Pantai	6	6	12
5-6 Sept 99	Pelatihan Agroforestry	3	25	28
20-21 Oct 99	Coral Reef Monitoring Participatory	1	8	9
14 March 00	Pelatihan Administrasi Keuangan Kelompok Katinting dan Kelompok Penanaman Bakau	0	6	6
15 March 00	Coral Reef Monitoring Participatory	1	3	4
Environmental Education				
15 Jan 98	Manfaat dan Akibat Kerusakan Terumbu Karang	16	11	27
18 Feb 98	Coastal Processes and Erosion	45	44	89
20 Feb 98	Coastal Processes and Erosion	23	24	47
15-16 May 98	Hutan dan Satwa	6	6	12
22 May 98	Hutan dan Satwa	10	15	25
23 Sept 98	Hutan dan Satwa	10	10	20
	Talise Total	**1203**	**1398**	**2601**

Source : Workplan Implementation Reports. Proyek Pesisir. Jakarta.

VII. Traditional Use Rights in Fisheries in Minahasa, North Sulawesi, Indonesia

By R.B. Pollnac, B. Crawford, C. Rotinsulu, R. Titahelu and D. Kawur

Under past Indonesian law, the government has not recognized traditional use rights in fisheries. The 1945 constitution declares all waters as state property. The decentralization laws of 1999 (law No. 22 of 1999) which devolved authority for marine resources management to local governments (provinces to 12 nm and districts to 4 nm) is silent with respect to traditional marine resource use rights. However, in 2000, the Minahasa District passed an ordinance (Law No. 2 of 2002, Chapter X, Sections 23 - 25) on community-based coastal resources management that allows for formal acknowledgement of traditional marine use right claims (fisheries and other uses). Under the current local law, such claims must be documented and reviewed by the district Coastal Resources Management Board. Then, the District Head (*Bupati*) can approve the traditional use rights after a community consultation process has been undertaken. Legitimate marine resource use rights under this law must meet several criteria. It must be a non-destructive resource use practice as well as demonstrate a history of long and continuous use.

There are many traditional use rights in fisheries that are practiced in villages located in the Minahasa District of North Sulawesi Province. These are not codified in any official written district, provincial or national law but are respected by local communities and fisher groups. As such they could qualify under this new law for official designation as legitimate and officially sanctioned traditional use rights. *Labuang*, *Bonor*, *Sero* and *Rumpun* are four cases that are documented below from project villages that may have the potential to be formally declared legitimate traditional use right fisheries.

Labuang: A Traditional Use Right Fishery in Kinahobutan, North Sulawesi, Indonesia

Failure to introduce a community based marine protected area into the waters of Kinabohutan was attributed by one village extension agent to the existence of a family owned fishing area in the selected area. Follow-up questions concerning reasons for rejection did not produce this rationale; nevertheless the allegation that family ownership of fishing rights existed in the village required investigation. Traditional use rights in the fishery (TURF) had not been encountered in this area before, so the investigators were skeptical of its existence. Hence, attempts were made to disconfirm its existence.

The ex-sub-village chief was identified as a key informant. We first described the system of land tenure and asked him if such tenure systems existed for areas of the sea. To our surprise he responded that about 20 years ago a conflict erupted when a fisher attempted to fish in someone else's territory. The type of territory he described is a channel that concentrates the flow of fish at certain times; hence, it is an ideal place to set a net. The name for the territory is *labuang*. *Labuang* in Indonesian means anchorage. However, its' usage in Kinabohutan is related to a deep-water area on the fringing reefs associated with abundance and passage of fish during the March-April-May fishing season.

The ex-sub-village chief then went on to note that there were six *labuang* in the waters of Kinabohutan, one that is no longer used is in the area proposed for the marine sanctuary. Its name was *Labuang Sore*. The family that owned this area moved their operation to an area in

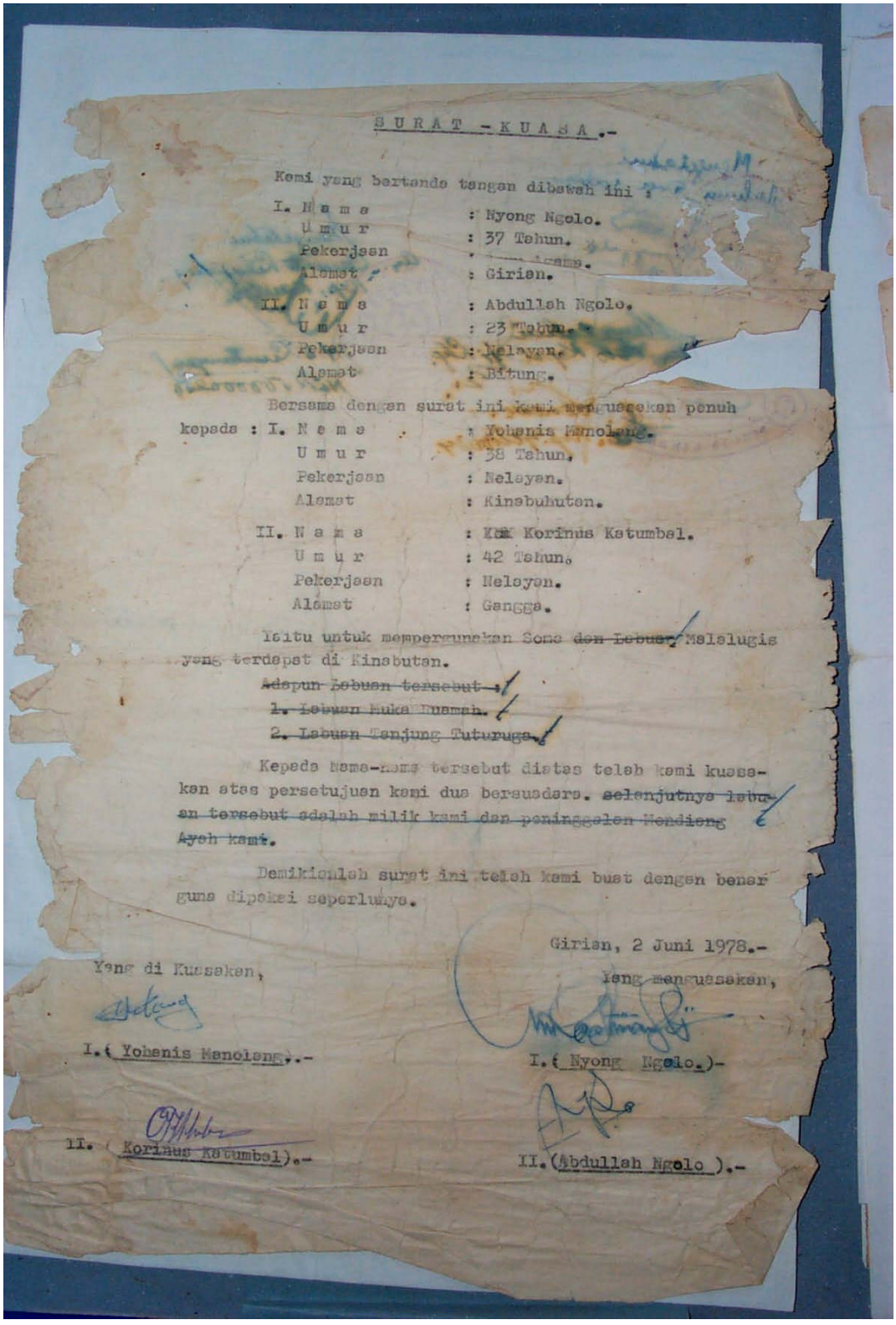
front of their house, which is referred to as *Labuang Muka Rumah*. Other areas are *Labuang Karang Tinggi*, *Labuang Kobong Satu*, *Labuang Lalade*, and *Labuang Tanjung Turruga*. Two families reportedly rotate the use of *Labuang Karang Tinggi*, and one of these families also owns *Labuang Lalade*. It was also reported that the family that owns *Labuang Muka Rumah* also has rights to *Labuang Tanjung Turugga*. It was claimed that the *labuang* system is also practiced in other parts of the Sanghir Islands located to the north of Kinabohutan Island. However, the *labuang* TURF system has only been practiced in Kinabohutan for the past 20- 30 years and came about as a result of increasing fishing pressure and declining fish stocks.

The gear deployed in the *labuang* is a seine net (*soma labuang*) with one guiding barrier wing with the bag at the end of the wing. The wing is 8 *depa* (arm spans, or approximately 40 feet) deep. Fishing in a *labuang* is conducted during the afternoon. One end of the net is staked in the *labuang* and once fish pass into the area, the net is drawn around and closed behind them. Crew size can vary from one to up to 30 persons but averages approximately 15 persons. A motorized *bolotu* (large mono-hull dugout boat) is used to deploy the gear. The share system divides catch into two parts - 50 percent for the gear, boat and *labuang* owner, and 50 percent for the crew. Target fish were principally *malalugis*, but other species such as bait fish and tuna were also caught on occasion in the past. It is reported that harvests have decreased since the 1970s, and one fisher attributed the drop to the pearl farm rafts, which he asserts act as fish-aggregating devices and have changed the patterns of movement of the fish away from the channels where the *labuang* are located.

The *labuang* TURF applies only to the use of the specialized *labuang* fishing gear (*soma labuang*). Other gear types can be used in the area and other fishers can fish these areas as well. The claimant of *Labuang Sore*, *Muka Rumah* and *Tanjung Turruga* stated that even *soma labuang* can be used in his areas. However, whenever he wants to fish the area using *soma labuang*, he claims first fishing rights and others must move out of the area at his request. Other family claimants of *labuang* are reportedly stricter about other fishers using *soma labuang* in their areas.

The fishers that practice the *labuang* system are from Sanghir and Bajo ethnic groups. If the claimant of a *labuang* dies, the use rights are reportedly passed on within the family. The use rights for several *labuang* in Kinabohutan have been monetarily traded in the past. The original claimant moved away from the island and ceded the *labuang* rights and gear to a fish trader to whom he was in debt. Then, the current claimant purchased the rights and gear from the fish trader through an intermediary by paying the debt of the original claimant. The current claimant produced a letter dated and signed in 1978 that stipulated an agreement between him, the fish trader, the former owner and several witnesses that turned over the gear and *labuang* areas to him. Upon return to the island, the original claimant tried to reclaim the *labuang* use rights after a long period of absence. The conflict that ensued was brought to the attention of local authorities. The original letter of transfer of ownership was brought to the Sub-District Head. He manually crossed through all references to marine areas (the local names of the *labuang* locations), and retained only the gear transfer provisions of the agreement. This demonstrates a denial of official acknowledgement of the TURF at that time. However, the current claimant has exercised use rights for more than 20 years and this seems to be accepted as valid by residents of Kinabohutan Island.

Signed and Notarized Letter of Agreement Detailing the Transfer of Labuang Gear and Use Rights, with References to Labuang Use Rights Crossed Out by the Local Government Official



S U R A T - K U A S A .-

Kami yang bertanda tangan dibawah ini :

I. N a m a : Nyong Ngolo.
U m u r : 37 Tahun.
Pekerjaan : [illegible].
Alamat : Girian.

II. N a m a : Abdullah Ngolo.
U m u r : 23 Tahun.
Pekerjaan : Nelayan.
Alamat : Bitung.

Bersama dengan surat ini kami menguasakan penuh kepada :

I. N a m a : Yohanis Manoleng.
U m u r : 38 Tahun.
Pekerjaan : Nelayan.
Alamat : Kinabuhutan.

II. N a m a : Korinus Katumbel.
U m u r : 42 Tahun.
Pekerjaan : Nelayan.
Alamat : Gangga.

Ialtu untuk mempergunakan Sone ~~dan Lebuan~~ Malalugis yang terdapat di Kinabutan.

~~Adapun Lebuan tersebut :~~
~~1. Lebuan Muka Kuamah.~~
~~2. Lebuan Tanjung Tuturuga.~~

Kepada Nama-nama tersebut diatas telah kami kuasakan atas persetujuan kami dua bersaudara. ~~selanjutnya lebuan tersebut adalah milik kami dan peninggalan Mendiang Ayah kami.~~

Demikianlah surat ini telah kami buat dengan benar guna dipakai seperlunya.

Girian, 2 Juni 1978.-

Yang di Kuasakan,

I.(Yohanis Manoleng).-

II. (Korinus Katumbel).-

Yang menguasakan,

I.(Nyong Ngolo.)-

II.(Abdullah Ngolo).-

Bonor: A Traditional Use Right Fishery in Blongko, North Sulawesi, Indonesia

Another example of traditional use rights in a marine fishery in North Sulawesi is found in Blongko. It is referred to as *bonor*. The existence of this use right first came to our knowledge during the development of the community-based marine protected area (MPA) in Blongko in 1997. The reef area immediately in front of the village settlement was one of the potential locations proposed for the MPA. In community meetings, it was pointed out that this potential site contained a *bonor* on the reef flat, an area that would overlap with the proposed boundaries of the marine protected area. Due to the existence of the *bonor* and potential conflicts that could arise if the MPA was designated in this area, the community selected an alternate location for the MPA.

The owner claims that he never saw one elsewhere. Several other fishers stated that they never saw a *bonor* in other reef areas along the coast of Minahasa, but a similar system called *sero batu* does exist in the Malukus. *Sero batu* (rock weir) in the Malukus are operated by members of the village that are required to pay a annual fee to the head of village for the rights to operate the *sero batu*. Hence they do not own the gear or location but are provided use rights formally acknowledged by local government. There are numerous cases of traditional "*sasi*" in the Malukus where use rights are auctioned by local government (Novaczek et al. 2001). No such system of local government use rents is practiced in Blongko.

The owner of the *bonor* could not explain why he named it *bonor*. An elderly informant in Sapa reported that his father referred to a high point in the reef as *bonor*, which may give some indication as to the source of the term. The *bonor* actually looks like a somewhat regular, fringing reef.

In 1974, the *bonor,* measuring some 200 by 300 meters, was constructed just south of the small embayment where the river exits Blongko. The *bonor* is completely submerged at high tide. The 300m length is parallel to the shore, and the 200m width extends from within the mangroves well out onto the flats in the sea. According to a family member, it was constructed over a period of seven days by the owner's family of seven. The Hukum Tua, however noted that several months were spent refining the structure. The majority of the wall is constructed with large stones, almost exclusively coral. Rubble is used as fill between the large stones. It is about 60cm high at its highest point and almost a meter wide at the base. Storm damage has always been repaired (reportedly 5 times since construction) particularly following the southeast monsoons (*Musim Barat*), and family members were observed putting fallen rocks back on the wall in October 2002.

At high tide fish swim over the wall and as the tide recedes, fish are trapped behind the walls, and the fishers simply scoop them from the water or remaining puddles. Reportedly, a good catch is about 20kg, and sometimes there is almost nothing. Sometimes even tuna get stranded in the *bonor*.

It is reported that no one has complained about the building of the *bonor*. The owner said that others are free to use the *bonor* when he is not using it. When there are good catches, he said that he might ask for a share. "What can I do if someone takes them," he asks. Other fishers

in the community gave mixed responses when questioned about fishing in the *bonor*. One stated that it was not allowed, that the owner would, "get mad." Another said that only the owner could, but then noted that if the fisher asked the owner, then maybe the owner would allow him to collect fish in the area. Another said that others can fish because the catch is so small. The *Hukum Tua* said that people should respect the work that went into building and maintaining the *bonor* and ask the owner's permission, but that if conflict developed, he would close it.

External Coral Rock Walls of the Bonor Exposed at Low Tide on the Blongko Reef Flat

Rumpun/Rakit: Territorial Use Right Practices in the Pelagic Fisheries of Southern Minahasa, North Sulawesi, Indonesia

Rumpun, also know as *rakit*, are traditional names used for fish aggregating devices in Minahasa, North Sulawesi Indonesia. Fish aggregating devices (FADs) are a widely used fishing technique throughout the Indo-Pacific region and extensively used in the Philippines as well as Indonesia. FADs are used to aggregate schools of pelagic fishes such as tuna as well as other species, which are then harvested by encircling nets; typically purse seines and ring nets. These FADs are placed from within a half a kilometer of the shore to as far as a several hours boat ride out into the sea. Placement of FADS can occur at variable depths from scores of meters to over 1000 meters. Deepwater FADs are usually made of metal pontoons consisting of a circular piece of welded metal that is hollow on the inside. Inshore FADS such as in Bentenan are rafts made from bamboo with palm fronds tied upright on the raft so they can be seen from a distance. Both types suspend a rope with palm fronds attached into the water column to attract fish. Costs and scale of operations will vary with the location and depth at which they are placed. FADs are a stationary supplemental fishing gear and do not catch fish by themselves. Hence they are used in combination with typical pelagic fishing methods such as purse seine nets as well as trolling and hand lining.

There are currently no regulations or licensing schemes for FADs in Indonesia or in North Sulawesi. However, most commercial fishing vessels that use FADs are licensed *pajeko*. Small scale fishers also use FADs, especially fishers using hand lines, targeting fish that aggregate at the FAD. FADs increase the efficiency of fishing operations as they reduce the need to search for schools of fishes migrating within the ocean. Typically, FADs are permanently placed at sea and may require up to a month or more after placement before there are enough fish aggregating around them to set a net. Therefore, a number of FADs are usually used for any one fishing vessel.

The system of use of FADs on the Maluku Sea coast of Minahasa in Bentenan was described by Pollnac et. al. (1998). This system uses bamboo and palm FADs (sometimes intermixed with styrofoam floatation) that are fished a kilometer or more from shore. The fishers that own the FADs do not necessarily own the gears or boats that fish them. Pollnac et al. (1998) describes share systems and traditional practices followed by the fishers in the Bentenan area concerning use rights and shares of catch between the FAD, gear, and boat owners.

FADs used offshore of the Southwestern coast of Minahasa are considerably different than those used in Bentenan. It the area of Blongko and Amurang Bay, FADs are placed far offshore, up to three to four hours boat ride from Blongko. These FADs are typically made of steel pontoons and are anchored in deep water. Some local fishermen complain that the FADs placed offshore have deflected the migration patterns of pelagic species that previously came in closer to shore (Pollnac et. al. 1997). These FADs have been constructed and placed at sea by two commercial fishing groups operating out of Amurang Bay. One is a cooperative operating ten FADs and the other is a privately owned company operating approximately ten mini purse seiners (*pajeko*). Local fishers report that these FADs are also fished on occasion by Filipino fishing boats coming down from ports in Mindanao. It is unclear how many of these Filipino fishers are legally operating in the area, but a large amount of illegal fishing by Filipino fishers reportedly occurs in

the area. A member of the Philippine Consulate in Manado estimated that in 1998 almost 1000 Filipino fishers were caught illegally in North Sulawesi and repatriated to the Philippines.

FADs in Southern Minahasa are fished by their owners using their own boats, but other boats can also fish these FADs. However, key informants reported that commercial boats must ask permission before they are allowed to fish on someone else's FAD. Hand liners, such as those operating out of small vessels from Blongko that occasionally fish offshore at the FADs do not have to ask permission to fish the FADs and do not pay a share to the FAD owner. Two share systems were reported for commercial fishing vessels. One informant reported that 10 percent of the catch had to be given to the FAD owner, but another informant stated that the FAD obtains one share and the boat gets two shares. Informants also reported that *Funai* boats (pole and line) are not permitted to fish near the FADs. The rationale given was that they attract the fish away from the FADs through the use of the water sprays and trolling fishing methods, thereby reducing catch of the *pajekos* that use the FADs. The FAD owner has first rights to fish the FAD. There does not seem to be any spatial conflicts at this time regarding placement of FADs in the ocean, such as distance required between FADs or spatial use rights of one FAD operator to place multiple FADs in a given area.

At present, rules governing FAD share systems and use rights are informally implemented among the fishing community. There do not seem to be major conflicts arising at this time with regard to their use rights in Minahasa. Hence the informal traditional management practices seem to be operating effectively. Therefore no formal rules system or local laws need to be created at this time. However, if conflicts do erupt in the future, creating formal rule systems could be an option. Since many of these FADs are placed far from shore, while some may be within district (Kabupaten) jurisdiction (out to 4 nautical miles), many are anchored in provincial waters (four to twelve nautical miles) and some may even be beyond provincial waters and therefore fall under the jurisdiction of national government (beyond 12 nautical miles). Formalization of rules would therefore require a complex regulatory and jurisdictional patchwork. Variations in the use rights and share systems from location to location would also complicate creation of formal regulations or local ordinances. Hence, until use conflicts arise, allowing the traditional system to operate on its own would seem to be the most appropriate policy. However, in other areas of North Sulawesi, particularly in the districts of Sanghir and Talaud, local fishers have complained about illegal pelagic fishing by foreign fleets. This fishing is often associated with FADs and therefore regulating use of FADs by foreign fishing interests should be considered.

Sero: A Traditional Use Right Fishery in Bentenan and Minanga, North Sulawesi, Indonesia

Sero is a stationary fishing gear made of netting and/or poles shaped like an arrow. It is located on reef flats and in river mouths. The *sero* will trap fish due to daily movements of fish associated with tidal changes. Fish hit the stem end of the gear and follow the barrier into the arrow shaped end where a small entrance leads to a holding pen. The shape of the entrance to the holding pen is like most fish traps, so that once the fish swim in, their swimming pattern inside the pen prevents them from easily finding their way back out. Typically, such nets may be checked and harvested daily. Bentenan and Tumbak used to have *sero* located on the reef flats but they are no longer deployed reportedly due to declining catches. *Sero* still exist in the river

mouth in the southern end of the village of Minanga I. These *sero* are unidirectional with the pointed end facing up river. They trap fish on the outgoing tide. The Kepala Jaga of the coastal sub-village said that these *sero* have existed at the southern river mouth further south for approximately 20 years, and are maintained and periodically repaired by their owners. He reported that there are five *sero* in the river mouth. Two belong to villagers in Jaga V and three belong to villagers from inland sub-villages. The Kepala Jaga said that the *sero* can be sold to other users if it is not being used or if the *sero* owner has another livelihood activity. However, the Kepala Jaga said the gear can be sold but not the space where it is located. However, for nets that are purchased and are still located in-situ in the river mouth, the new owner has rights to utilize his gear in that same location. If the gear is removed from the river mouth and sold, the new owner of the gear must find a location not occupied by existing gears. The Kepala Jaga mentioned that ownership or transfer of ownership of *sero* does not require a letter from the village government. He reported that there was no record or letter of recognition from the Hukum Tua of Minanga concerning *sero*. He also mentioned that he has never been aware of any conflict between owners concerning placement and location of *sero* in the river mouth.

A *sero* fisherman in Minanga reported that he is not aware of sero gears ever being sold or rented. They are only used for daily subsistence, with excess fish being sold in the community. He acknowledged there is no letter of recognition for the utilization of the area where the *sero* is deployed. He reported that the number fish caught with the *sero* is declining. Presently, they cannot rely very much on *sero* to catch fish. The *sero* fisher and *Kepala Jaga* both stated that other *sero* users cannot put their gear in close proximity to an existing *sero* gear, either directly in front of or behind an existing gear.

In Bentenan, *sero* gears were in abundance in the 1960's, but none have been deployed since 1979. During the period of *sero* operation, the Hukum Tua did issue letters to *sero* operators. These letters (see example below) acknowledged ownership rights of an individual ("*mempunyai*") to use *sero* in a certain location on the reef flat. This policy was probably in contravention to past law as enshrined in the constitution that declared all Indonesian waters as state property. Traditional use rights and ownership over marine territory generally have not been recognized by state authorities (see letter on transfer of ownership of *Labuang* where references to rights to fish certain reef areas were crossed out). The Hukum Tua in Bentenan however is a representative of the state. Therefore, at least in this case in Bentenan, ownership of specific use rights for a given marine territory were acknowledged by the local village government. This example is quite different from *Bonor* and *Labuang*. *Bonor* and *Labuang* had no formal recognition by government but are generally accepted as valid use rights by the community. The case of *sero* in Bentenan goes much further. In Bentenan, the local government formally recognized ownership of marine territorial use rights (*sero*) even though higher levels of government would likely not acknowledge it until the passage of the new law in 2002.

It should also be pointed out that *sero* are no longer used in Bentenan. This gear was discontinued due to declines in catch (overfishing). *Labuan* in Talise came into existence as a result of increasing fishing effort. These practices, along with *bonor* and FADs, are examples of traditional use rights and fishery management systems. However, they have not served a sustainable fishery or conservation goal. They are important since they demonstrate that local

fishing communities understand, at least in some limited circumstances, the concept of limited entry and access. Hence the notion of the oceans as a commons with open access for all is not a view held by all Indonesians and is not considered by all as applicable to all Indonesian waters.

Letter Dated July 28, 1964 from the Hukum Tua of Bentenan Acknowledging Sero Ownership Rights for a Certain Location on the Reef Flat

VIII. PROJECT FINAL EVALUATION SURVEY FORM: (Project Sites)

HOUSEHOLD INFORMATION

QUESTIONNAIRE NUMBER	(NUMBER)
INTERVIEWER	(INTERVIE)
DESA	(VILLAGE)
DUSUN	(LOCATION)
DATE	(TIME)
AGE yrs (Head of Houshold)	(AGE1)
SEX M/F	(SEX1)
HOUSEHOLD SIZE *(number of people in household, including person interviewed)*	(HOUSETOT)

PRODUCTIVE ACTIVITIES

IF FISHING IS PRACTICED

GEAR TYPES: List gear types.	(GEARTYPE)
SPECIES CAUGHT: classified as reef, non-reef or both	(FISHTYPE)

IF MILKFISH FRY COLLECTION IS PRACTICED

IF SEAWEED FARMING IS PRACTICED

Size of planting (record unit of measurement)	(SWARREA)
Number and length of lines	(SWLINES, LINLEN)
Identify roles of household members in seaweed farming	(SWUSERS)

IF GLEANING IS PRACTICED

IF BUYING AND SELLING OF FISH PRACTICED
IF BUYING AND SELLING OF MILKFISH FRY PRACTICED
IF BUYING AND SELLING OF SEAWEED PRACTICED
IF BUYING AND SELLING OF OTHER PRODUCTS PRACTICED

IF FISH PROCESSING IS PRACTICED
IF OTHER PROCESSING IS PRACTICED

IF FARMING IS PRACTICED

IF OTHER PRODUCTIVE ACTIVITIES PRACTICED
List type and rank of importance

LIST ALL ACTIVITIES:

FISHING ( )	(FISHING)
MILKFISH FRY COLLECTION ( )	(MILKFRY)
SEAWEED FARMING ( )	(SWFARM)
GLEANING ( )	(GLEANING)
BUY AND SELL:	
FISH ( )	(TRADFISH)
MILKFISH FRY ( )	(TRADFRY)
SEAWEED ( )	(TRADSW)
OTHER ( )	(TRADOTH)
FISH PROCESSING ( )	(PROFISH)
OTHER PROCESSING ( )	(PROCESS)
FARMING ( )	(FARMING)
OTHER_____ _____	(OTHEROC1,2,3..OCCICODE…)

RANK ORDER ALL PRODUCTIVE ACTIVITIES PRACTICED IN TERMS OF CONTRIBUTION TO HOUSEHOLD INCOME AND FOOD:

1^{ST} 2^{ND} 3^{RD} 4^{TH} 5^{TH} 6^{TH}

MATERIAL STYLE OF LIFE (HOUSEHOLD WEALTH INDICATOR)

HOUSE CONSTRUCTION:

HOUSE WALLS: bamboo/ wood/ concrete block/ other (WALLBAMB, WALLWOOOD, WALLCONC)
FLOOR: dirt/concrete/wood/tile/other (FLDIRT, FLCONC, FLWOOD, FLTILE, FLBAMBOO)
ROOF: nipa/tin/wood/tile/other (RFNIPA, RFTIN, RFWOOD, RFTILE)
WINDOWS: open/wood shutters/glass/other (WINOPEN, WINWOOD, WINGLASS)

FACILITIES AND APPLIANCES:

ELECTRICITY	(ELECTRIC)
ELECTRIC FAN	(FAN)
REFRIGERATOR	(REFRIG)
INDOOR TOILET	(TOILETIN)
PIPED WATER	(WATERIN)
MATCHED LIVINGROOM SET (chairs, sofa, coffee table)	(LIVSET)
WOOD OR PLASTIC CHAIRS	(CHAIRS)
WOODEN BENCHES	(BENCH)
DISPLAY CABINET	(CABINET)
CUPBOARD	(CUPBOARD)
RADIO/CASSETT PLAYER	(RADIOCAS)
VCD PLAYER	(VCD)
VIDEO GAME	(VIDGAME)
TELEVISION	(TV)
SATTELITE DISH	(SATELIT)
COOKSTOVE MODERN (other than wood or charcoal)	(MODSTOVE)

MIGRATION ISSUES (Head of Household Only)

Primary Household Occupation	(HEADWRK1)
Secondary Household Occupation	(HEADWRK2)
Were you born in the village? Y/N	(BORN)
If no, how long have you lived in this village? _____ years	(VILLTIME)
If you were not born in this village, where did you move from?	(FRMWHERE)
If you moved to this village in the last three years, Why?	(MOVEWHY)

ALTERNATIVE LIVELIHOOD
(Tumbak, Bentenan, Rumbia, Minanga, only)

Have you ever farmed seaweed in the past? Y/N	(SWBEFORE)
If yes, what year did you stop?	(YRSTOP)
Why did you stop?	(WHYSTOP)
After stopping, did you replace seaweed farming with any other productive activities?	(NEWWORK)
If yes, What?	(WHTWORK)

ALTERNATIVE LIVELIHOOD MINI SURVEY
(SEPARATE SUB SAMPLE OF PEARL FARMER AND GANGGA ISLAND RESORT WORKERS)
Talise, Aerbanua, Kahuku, Gangga only

If working in a pearl farm/resort, how many years?	(PEARLYRS)
Before working in the pearl Farm/resort what did you do?	(BEFWHT1, 2, 3…)
If you were fishing before working in a pearl farm/resort, do you still fish?	(STILFISH)
Education	(EDUC)
Sex	(SEX2)
Age	(AGE2)
Ethnicity	(EHTNIC)
Religion	(RELIGION)

INDIVIDAL QUESTIONNAIRE
(HEAD OF HOUSEHOLD AND SPOUSE OR OTHER HOUSEHOLD FEMALE)
(*To be asked of both husband and wife separately*)

FUTURE OUTLOOK
In terms of household well-being are you better off or worse off or the same as you were 5 years ago? (WELLBE)
If worse off, Why? (WELLWHY1, 2, 3...)
Do you expect your standard of living to be better in 5 years? (better, worse, don't know) (BET5YRS)

PROJECT QUESTIONS

CRM Activity Knowledge
What activities are ongoing in your village concerning coastal resources and environmental management? (CRMACT1,2..)

Project Knowledge
Have you heard of Proyek Pesisir? Y/N (PROKN)

Community Participation

Have you participated in Project Pesisir activities? Y/N (PROJPART)
Participated in Management Plan development activities? Y/N (PLANPART)
Participated in MPA establishment Y/N (MPAPART)

Ever participated in the following type of plan implementation activities (frequently, sometimes, rarely, never:

TALISE:

Land tenure	(PARTFR1)
Sea use conflicts	(PARTFR2)
Forest management	(PARTFR3)
Protection of wildlife	(PARTFR4)
Controlling erosion	(PARTFR5)
Drinking water supply	(PARTFR6)
Improved sanitation	(PARTFR7)
Human resources development	(PARTFR8)
Improved farming practices	(PARTFR9)
Management of coral reefs and mangroves	(PARTFR10)
Tourism development	(PARTFR11)
Improving community awareness on coastal resources management	(PARTFR12)

BLONGKO:

Management of the marine sanctuary	(PARTFR1)
Protection and rehabilitation of coral reef, mangroves, seagrasses	(PARTFR2)
Increasing community incomes	(PARTFR3)
Raising awareness of community concerning environmental protection	(PARTFR4)
Community health and sanitation	(PARTFR5)
Preventing coastal erosion and stream flooding	(PARTFR6)
Improving community livelihood/production	(PARTFR7)
Reducing erosion/sedimentation from land and farm areas	(PARTFR8)

BENTENAN:

Managing coral reefs	(PARTFR1)
Managing water supply and facility maintenance	(PARTFR2)
Managing flooding/erosion in swamp/estuarine areas	(PARTFR3)
Improving environmental sanitation and health	(PARTFR4)
Development of public tourism	(PARTFR5)
Improving community awareness and education	(PARTFR6)
Improving fisheries and farming production	(PARTFR7)
Managing seaweed farming and sea space areas	(PARTFR8)

TUMBAK:

Managing coral reefs	(PARTFR1)
Managing water supply and facility maintenance	(PARTFR2)
Improving road infrastructure	(PARTFR3)
Managing flood prone areas	(PARTFR4)
Improve community health and sanitation	(PARTFR5)
Development of public tourism	(PARTFR6)
Improving community awareness and education	(PARTFR7)
Managing mangroves	(PARTFR8)
Improving fisheries and farming production	(PARTFR9)

Have you ever had informal discussions with the Extension Officers, or field assistants concerning project activities? Y/N (INFOPART)

Do you belong to an organization associated with project activities, the MPA or management plan? Y/N (ORGPART)

If yes,

Management committee
MPA management group
Mangrove replanting group
Other (specify)_____ (TYPEORG1, 2, 3, 4 , 5…)

Knowledge of the Marine Sanctuary

Do you know that an ordinance was approved in your village establishing a community-based marine sanctuary? Y/N (MPAKNOW)

What is the purpose of the marine sanctuary? (PURPMPA1, 2, 3...)
What are the rules (prohibited, allowed, sanctions) for the marine sanctuary? (RULEMPA1, 2, 3…)

Legitimacy of Marine Sanctuary Rules

Are there any rules you do not agree with? (NOTAGREE)
Which ones? (NOTAGRL1, 2, 3 ..)
Why? (WHYNOTAG)
The marine sanctuary is in a good location: Agree/Don't Know/Disagree? (LOCMPA)
Is the marine sanctuary: Too Large/About Right/ Too Small/Don't Know? (SIZEMPA)

Impacts/Benefits of the Marine Sanctuary

Is the marine sanctuary beneficial or not beneficial for the community:
Beneficial/Don't know/Not Beneficial? (BENMPA)

Why? (WHYBEN)

The catch of reef fish adjacent to the marine sanctuary compared to 3 years ago:
Increased/Decreased/Same/Don't know (CATCHMPA)

Reef Health

Fish abundance inside the sanctuary has decreased compared to 3 years ago:
Increased/Decreased/Same/Don't know (FISHMPA)

The condition of the coral reefs adjacent to the village have improved since 3 years ago:
Agree/Don't know/Disagree (CORALMPA)

Enforcement of the Marine Sanctuary

How well has the marine sanctuary committee enforced the rules of the marine sanctuary?
Excellent/Good/Fair/Poor/Extremely Poor/Don't know (MGTMPA)

Compliance

What rules of the marine sanctuary are violated? (WHTVIO1, 2, 3…)

Which rules are most often violated? (MOSTVIOL)

How often do villagers violate the sanctuary? (Daily/Weekly/Monthly/Less than monthly/Never) (VILLVIO)

How often do outsiders violate the sanctuary? (Daily/Weekly/Monthly/Less than monthly/Never) (OUTVIO)

Why do people violate the sanctuary? (WHYVIO1, 2, 3..)

During the last 3 years, bomb fishing in the waters near the community
Increased/Decreased/About the same (BOMBFREQ)

During the last 3 years, coral mining on the reefs near the community
Increased /Decreased/About the same (MINEFREQ)

If a resident of your community was violating the rules of the marine sanctuary, which of the following would you do?

- Nothing
- Talk to him and explain why he should not do it
- Report the incident to the sanctuary management committee
- Report the incident to the head of village
- Apprehend the violator and bring them to head of village (VIOACT1)

If a resident of a neighboring community was violating the rules of the marine sanctuary, which of the following would you do?

- Nothing
- Talk to him and explain why he should not do it
- Report the incident to the sanctuary management committee
- Report the incident to the head of village
- Apprehend the violator and bring them to head of village (VIOACT2)

If a resident of your community was bomb fishing, which of the following would you do?

- Nothing
- Talk to him and explain why he should not do it
- Report the incident to the head of village
- Report the incident to the police
- Apprehend the violator and bring them to head of village or to the police (VIOACT3)

If a resident in a neighboring community was bomb fishing in your village, which of the following would you do?

- Nothing
- Talk to him and explain why he should not do it
- Report the incident to the head of village
- Report the incident to the police
- Apprehend the violator and bring them to head of village or to the police (VIOACT4)

Support from Village Leadership

Do village government officials support the marine sanctuary? (scale of 1-7: do not support – support) (VILLSUPP)

Do informal community leaders support the marine sanctuary? (scale of 1-7: do not support – support) (INLEADSP)

ATTITUDES/PERCEPTIONS

For each of the following questions ask the respondent if he/she agrees or disagrees. For either response ask if he/she strongly agrees(disagrees), agrees (disagrees), or just slightly agrees(disagrees).

Human activities do not influence the number of fish in the ocean. (INUMFISH)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

Unless mangroves are protected we will not have any small fish to catch (IMANGFIS)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

We have to take care of the land and the sea or it will not provide for us in the future. (ICARESEA)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

If we throw our garbage on the beach, the ocean takes it away and it causes no harm. (IGARBAGE)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

We do not have to worry about the air and the sea, God will take care of it for us. (IGODCARE)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

If our community works together we will be able to protect our resources. (ICOMWORK)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

Fishing would be better if we cleared the coral where the fish hide from us. (ICLRCORAL)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

Farming in the hills behind the village can have an effect on the fish. (IFARMHIL)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

There are so many fish in the ocean that no matter how many we catch, there will always be enough for our needs.
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__ (IMANYFIS)

There is a limit to the amount of seaweed farming that can be done in Bentenan. (ILIMITSW)
Strong disagree__ disagree__ slight disagree__ neither__ slight agree__ agree__ strong agree__

(for control sites, change the above statement to;
"There is a limit to the area of the sea that can be used by the village") (ILIMITSE)

Community Empowerment

Is the community prepared to continue the planning, management, development and enforcement of coastal resources? (scale of 1-7: prepared – not prepared) (COMMPREP)

If not prepared, Why? (WHYNOT)

Support from Local Government

What type of support should local government (district or sub-district) provide to the community in the future to assist your efforts at coastal resources management? (GOVNEED1, 2, ..)

LADDER QUESTIONS

The following questions involve showing the respondent a ladder-like diagram with 15 steps. The respondent is told that the first step represents the worst possible situation and the highest step is best situation. The subject would then be asked where on this ladder (ruler, scale, whatever is appropriate for the subjects involved) the local area is today (the self-anchoring aspect of the scale). The subject would then be asked to indicate where it was pre-plan implementation (3 years ago) and where he/she believes it will be 3 years in the future. The step numbers are entered on the form for each time period.

Overall well-being of individual family.

The first step indicates a very poor family, without enough food to eat, very little or no furniture in the house, and a very poor house that is too small and doesn't protect one from the weather. The highest step indicates a wealthy family with more than enough food, and a beautifully furnished well built house.

TODAY___ 3 YEARS AGO___ 3 YEARS IN THE FUTURE___(FAMILTDY, FAMILPST, FAMILFTR)

Empowerment : Control over resources.

The first step indicates a community where the people have no control over access to the community's coastal resources--anyone from anywhere is free to come and fish, gather shellfish, cultivate seaweed, etc. The highest step indicates a community where the people in the community have the right to control (e.g., develop rules) the use of the coastal resources of their community.

TODAY___ 3 YEARS AGO___ 3 YEARS IN THE FUTURE___(CNTRLTDY,CNTRLPST,CNRLFTR)

Empowerment : Ability to influence community affairs.

The first step indicates a community where the people have no influence on community affairs. Things are changed even if community members disagree with the changes, and they have no influence on anything that happens. The highest step indicates a community where all community members can attend meetings, voice their wants and concerns, and influence what happens in the community through popular vote.

TODAY___ 3 YEARS AGO___ 3 YEARS IN THE FUTURE___(INFLUTDY, INFLUPST, INFLUFTR)

Benefit: Amount of traditionally harvested fish resource in the water.

The first step indicates waters with none of the traditionally harvested fish. All the fish are gone. The highest step indicates waters where community members can easily catch all the fish they want.

TODAY___ 3 YEARS AGO___ 3 YEARS IN THE FUTURE___(AMTRSTDY, AMRSPST,AMRSFTR)

Benefit : Resource health

First step is coastal resources destroyed,
Highest step is coastal resources healthy

___today ___3 years ago ___3 years in the future (ENVTDY, ENVPST, ENVFTR)

Compliance

First step is illegal fishing rampant
Highest step is illegal fishing never occurs

___today ___3 years ago ___3 years in the future (ENFTDY, ENFPST, ENFFTR

Enforcement

First step is No enforcement of fishing laws, no one ever arrested
Highest step is Laws strictly enforced and people always arrested

___today ___3 years ago ___3 years in the future (CPLTDY,CPLPST, CPLFTR)

Prosecution

First step is Sanctuary violators are never caught or fined,
Highest step step is Sanctuary violators are caught and fined/sanctioned,

___today ___3 years ago ___3 years in the future (LAWTDY, LAWPST, LAWFTR)

Support from Local Government Leadership

First step is government leadership above the village is apathetic with respect to the marine sanctuary.
Highest step is government leadership above village is supportive and active with respect to the marine sanctuary.

___today ___3 years ago ___3 years in the future (VSPTDY,VSPPST, VSPFTR)

Personal Information

Years of Education	(EDUC)
Sex	(SEX2)
Age	(AGE2)
Ethnicity	(ETHNIC)
Religion	(RELIGION)

PROJECT FINAL EVALUATION SURVEY FORM (Control Sites)

HOUSEHOLDINFORMATION

QUESTIONNAIRE NUMBER	(NUMBER)
INTERVIEWER	(INTERVIE)
DESA	(VILLAGE)
DUSUN	(LOCATION)
DATE	(TIME)
AGE yrs (Head of Household)	(AGE1)
SEX M/F	(SEX1)
HOUSEHOLD SIZE *(number of people in household, including person interviewed)*	(HOUSETOT)

PRODUCTIVE ACTIVITIES

IF FISHING IS PRACTICED	
GEAR TYPES: List gear types.	(GEARTYPE)
SPECIES CAUGHT: classified as reef, non-reef or both	(FISHTYPE)

IF MILKFISH FRY COLLECTION IS PRACTICED

IF SEAWEED FARMING IS PRACTICED	
Size of planting (record unit of measurement)	(SWARREA)
Number and length of lines	(SWLINES, LINLEN)
Identify roles of household members in seaweed farming	(SWUSERS)

IF GLEANING IS PRACTICED

IF BUYING AND SELLING OF FISH PRACTICED
IF BUYING AND SELLING OF MILKFISH FRY PRACTICED
IF BUYING AND SELLING OF SEAWEED PRACTICED
IF BUYING AND SELLING OF OTHER PRODUCTS PRACTICED

IF FISH PROCESSING IS PRACTICED
IF OTHER PROCESSING IS PRACTICED

IF FARMING IS PRACTICED

IF OTHER PRODUCTIVE ACTIVITIES PRACTICED (List type and rank of importance)

LIST ALL ACTIVITIES:

FISHING ( )	(FISHING)
MILKFISH FRY COLLECTION ( )	(MILKFRY)
SEAWEED FARMING ( )	(SWFARM)
GLEANING ( )	(GLEANING)
BUY AND SELL:	
FISH ( )	(TRADFISH)
MILKFISH FRY ( )	(TRADFRY)
SEAWEED ( )	(TRADSW)
OTHER ( )	(TRADOTH)
FISH PROCESSING ( )	(PROFISH)
OTHER PROCESSING ( )	(PROCESS)
FARMING ( )	(FARMING)
OTHER_____ _____	(OTHEROC1,2,3..OCCICODE…)

RANK ORDER ALL PRODUCTIVE ACTIVITIES PRACTICED IN TERMS OF CONTRIBUTION TO HOUSEHOLD INCOME AND FOOD:

1^{ST} 2^{ND} 3^{RD} 4^{TH} 5^{TH} 6^{TH}

MATERIAL STYLE OF LIFE (HOUSEHOLD WEALTH INDICATOR)

HOUSE CONSTRUCTION:

HOUSE WALLS: bamboo/ wood/ concrete block/ other (WALLBAMB, WALLWOOOD, WALLCONC)

FLOOR: dirt/concrete/wood/tile/other (FLDIRT, FLCONC, FLWOOD, FLTILE, FLBAMBOO)

ROOF: nipa/tin/wood/tile/other (RFNIPA, RFTIN, RFWOOD, RFTILE)

WINDOWS: open/wood shutters/glass/other (WINOPEN, WINWOOD, WINGLASS)

FACILITIES AND APPLIANCES:

ELECTRICITY	(ELECTRIC)
ELECTRIC FAN	(FAN)
REFRIGERATOR	(REFRIG)
INDOOR TOILET	(TOILETIN)
PIPED WATER	(WATERIN)
MATCHED LIVINGROOM SET (chairs, sofa, coffee table)	(LIVSET)
WOOD OR PLASTIC CHAIRS	(CHAIRS)
WOODEN BENCHES	(BENCH)
DISPLAY CABINET	(CABINET)
CUPBOARD	(CUPBOARD)
RADIO/CASSETT PLAYER	(RADIOCAS)
VCD PLAYER	(VCD)
VIDEO GAME	(VIDGAME)
TELEVISION	(TV)
SATTELITE DISH	(SATELIT)
COOKSTOVE MODERN (other than wood or charcoal)	(MODSTOVE)

MIGRATION ISSUES (Head of Household Only)

Primary Household Occupation	(HEADWRK1)
Secondary Household Occupation	(HEADWRK2)
Were you born in the village? Y/N	(BORN)
If no, how long have you lived in this village? _____ years	(VILLTIME)
If you were not born in this village, where did you move from?	(FRMWHERE)
If you moved to this village in the last three years, Why?	(MOVEWHY)

ALTERNATIVE LIVELIHOOD

(Tumbak, Bentenan, Rumbia, Minanga, only)

Have you ever farmed seaweed in the past? Y/N	(SWBEFORE)
If yes, what year did you stop?	(YRSTOP)
Why did you stop?	(WHYSTOP)
After stopping, did you replace seaweed farming with any other productive activities?	(NEWWORK)
If yes, What?	(WHTWORK)

ALTERNATIVE LIVELIHOOD MINI SURVEY

(Separate Sub-Sample of Pearl Farmer and Gangga Island Resort Workers)

(Talise, Airbanua, Kahuku, Gangga only)

If working in a pearl farm/resort, how many years?	(PEARLYRS)
Before working in the pearl Farm/resort what did you do?	(BEFWHT1, 2, 3…)
If you were fishing before working in a pearl farm/resort, do you still fish?	(STILFISH)
Education	(EDUC)
Sex	(SEX2)
Age	(AGE2)
Ethnicity	(EHTNIC)
Religion	(RELIGION)

INDIVIDAL QUESTIONNAIRE
(HEAD OF HOUSEHOLD AND SPOUSE OR OTHER HOUSEHOLD FEMALE)
(*To be asked of both husband and wife separately*)

FUTURE OUTLOOK
In terms of household well-being are you better off or worse off or the same as you were 5 years ago? (WELLBE)
If worse off, Why? (WELLWHY1, 2, 3...)
Do you expect your standard of living to be better in 5 years? (better, worse, don't know) (BET5YRS)

PROJECT QUESTIONS

CRM Activity Knowledge
What activities are ongoing in your village concerning coastal resources and environmental management? (CRMACT1,2..)

Project Knowledge

Have you heard of Proyek Pesisir? Y/N (PROKN)

Knowledge of the Marine Sanctuary
Do you know that an ordinance was approved in your neighboring village establishing a community-based marine sanctuary? Y/N (MPAKNOW)

Communication Network
If yes, from whom did you hear about the marine sanctuary? (can choose more than one) (DPLHEAR1, 2, 3...)

(Airbanua-Kahuku only)
(1) Relative in the village
(2) Friend in the village
(3) Local government official
(4) Friend from outside the village
(5) Relative from outside the village
(6) Project Pesisir Staff
(7) TV
(8) Radio
(9) Newspaper
(10) Other source:_____

(Sapa-Boyo, Minanga-Rumbia only)
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(10) Church/Mosque
(11) Environmetal NGO
(12) university
(13) Other source:_____

Benefit of a Marine Sanctuary (perception)
Do you think an MPA would be good for your community? Y/N (MPAGOOD)

Knowledge of the Marine Sanctuary (cont.)
What is the purpose of the marine sanctuary? (PURPMPA1, 2, 3...)
What are the rules (prohibited, allowed, sanctions) for the marine sanctuary? (RULEMPA1, 2, 3…)

Impacts/Benefits of the Marine Sanctuary

Is the marine sanctuary beneficial or not beneficial for the community:
Beneficial/Don't know/Not Beneficial? (BENMPA)

The catch of reef fish adjacent to the marine sanctuary compared to 3 years ago:
Increased/Decreased/Same/Don't know (CATCHMPA)

Compliance

During the last 3 years, bomb fishing in the waters near the community
Increased/Decreased/About the same (BOMBFREQ)

During the last 3 years, coral mining on the reefs near the community
Increased /Decreased/About the same (MINEFREQ)

If a resident of your community was bomb fishing, which of the following would you do?

- □ Nothing
- □ Talk to him and explain why he should not do it
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- □ Report the incident to the police
- □ Apprehend the violator and bring them to head of village or to the police (VIOACT3)

If a resident in a neighboring community was bomb fishing in your village, which of the following would you do?

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- □ Report the incident to the head of village
- □ Report the incident to the police
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First step is coastal resources destroyed,
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Enforcement

First step is No enforcement of fishing laws, no one ever arrested
Highest step is Laws strictly enforced and people always arrested

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Prosecution

First step is Sanctuary violators are never caught or fined,
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Support from Local Government Leadership

First step is government leadership above the village is apathetic with respect to the marine sanctuary.
Highest step is government leadership above village is supportive and active with respect to the marine sanctuary.

___today ___3 years ago ___3 years in the future (VSPTDY,VSPPST, VSPFTR)

Where do you usually get information on issues (problems and opportunities) regarding fisheries, natural resources, and environmental management? (can choose more than one) (ENVHEAR1, 2, ….)

(Airbanua-Kahuku only)

(1) Relative in the village
(2) Friend in the village
(3) Local government official
(4) Friend from outside the village
(5) Relative from outside the village
(6) Project Pesisir Staff
(7) TV
(8) Radio
(9) Newspaper
(10) **Other source**

(Sapa-Boyo, Minanga-Rumbia only)

(1) Relative in the village
(2) Friend in the village
(3) Local government official
(4) Friend from outside the village
(5) Relative from outside the village
(6) Project Pesisir Staff
(7) TV
(8) Radio
(9) Newspaper
(10) Church/Mosque
(11) Environmental NGO
(12) university
(13) Other source

Who do you trust most for advice on fisheries, natural resources, and environmental management issues? (only one response) (TRUSTWHO)

(Airbanua-Kahuku only)

(1) Relative in the village
(2) Friend in the village
(3) Local government official
(4) Friend from outside the village
(5) Relative from outside the village
(6) Project Pesisir Staff
(7) TV
(8) Radio
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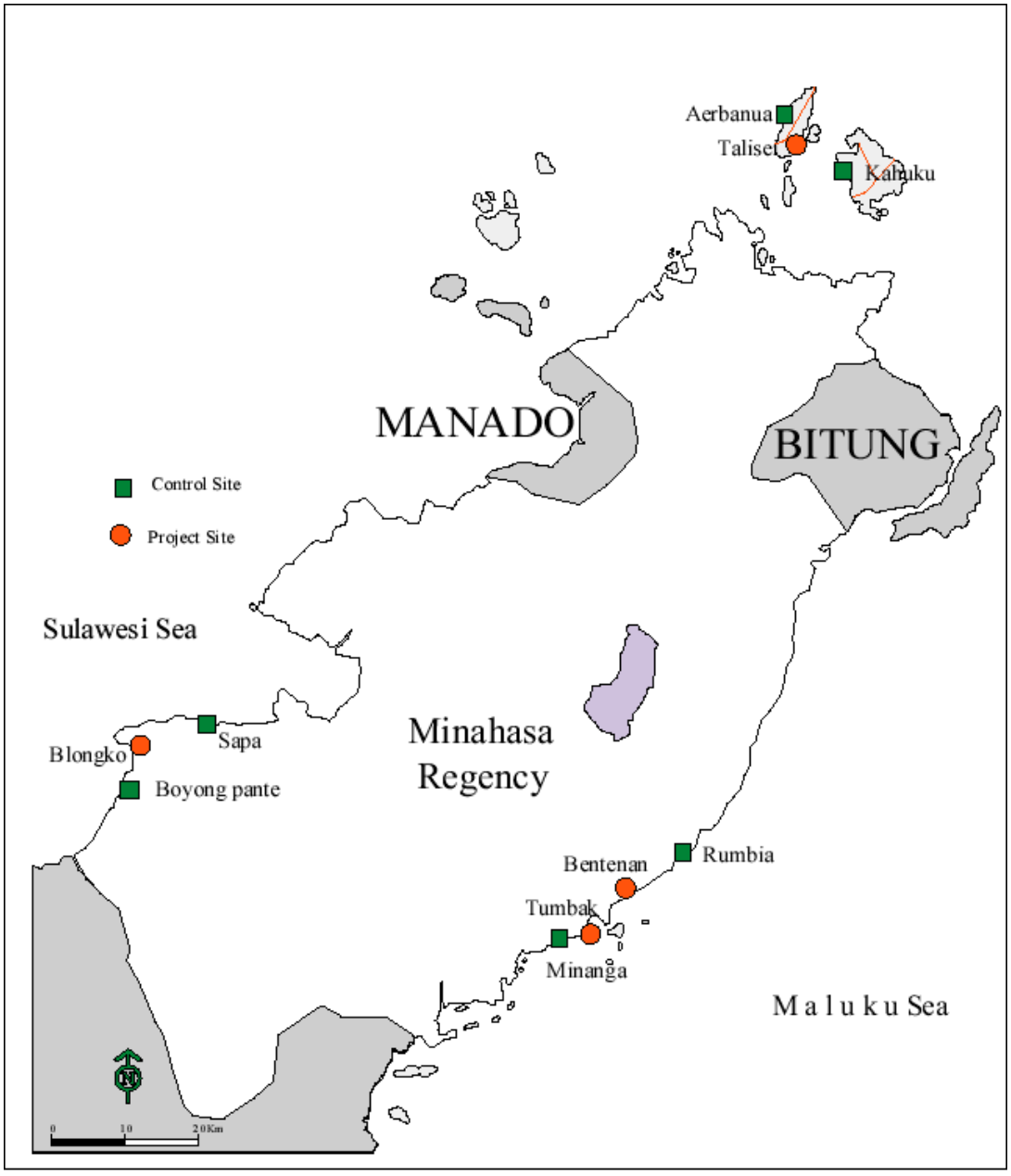
(7) TV
(8) Radio
(9) Newspaper
(10) Church/Mosque
(11) Environmental NGO
(12) university
(13) Other source

Personal Information

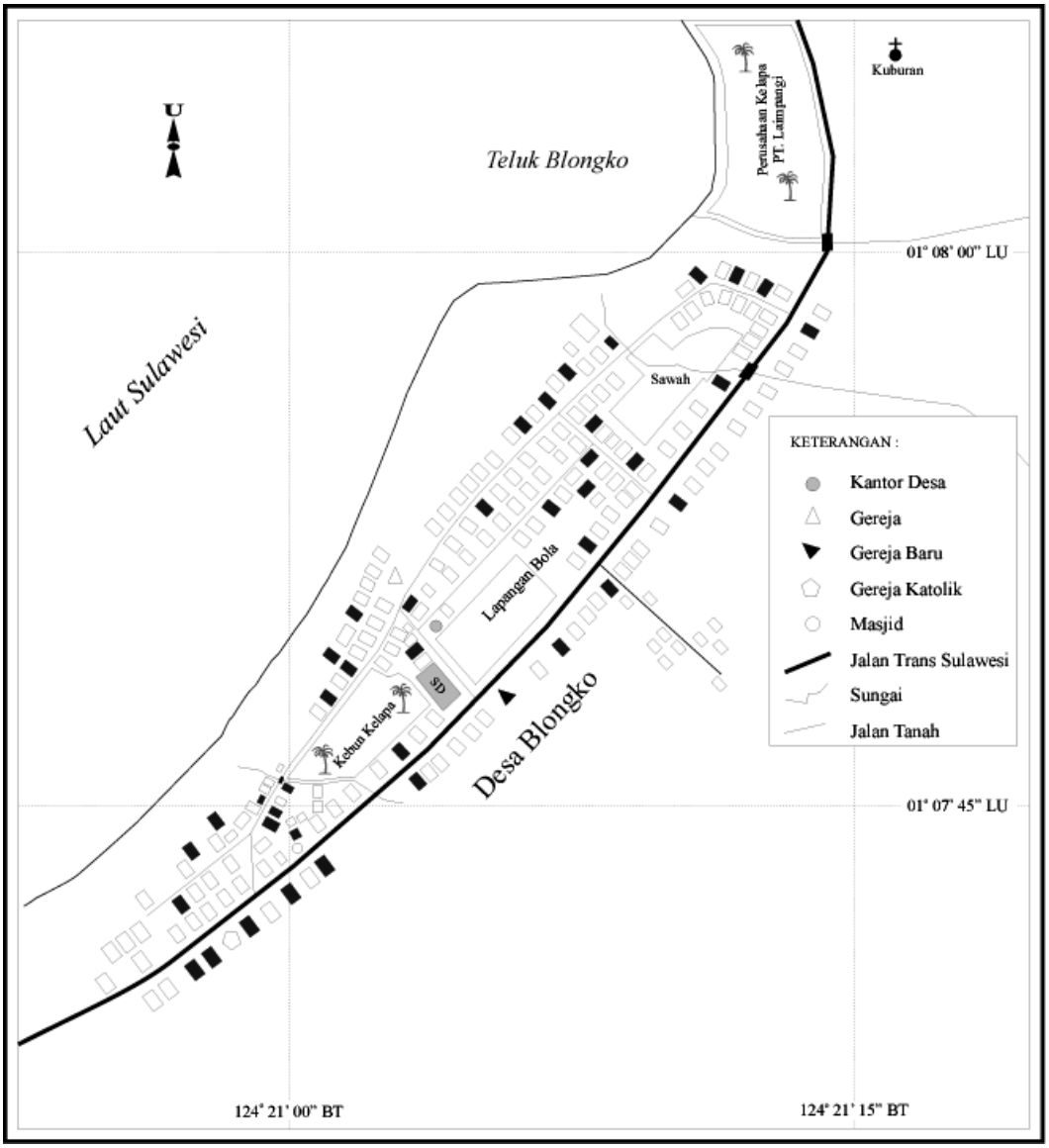
Years of Education	(EDUC)
Sex	(SEX2)
Age	(AGE2)
Ethnicity	(ETHNIC)
Religion	(RELIGION)

X. Maps of Project and Control Site Villages and MPAs,

Location of Project and Control Sites in the Minahasa District of North Sulawesi



Blongko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Teluk Blongko
Laut Sulawesi
Perusahaan Kelapa
PT. Lampangi
Kuburan
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Sawah
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Kebun Kelapa
Desa Blongko
01° 07' 45" LU
KETERANGAN :
Kantor Desa
Gereja
Gereja Baru
Gereja Katolik
Masjid
Jalan Trans Sulawesi
Sungai
Jalan Tanah
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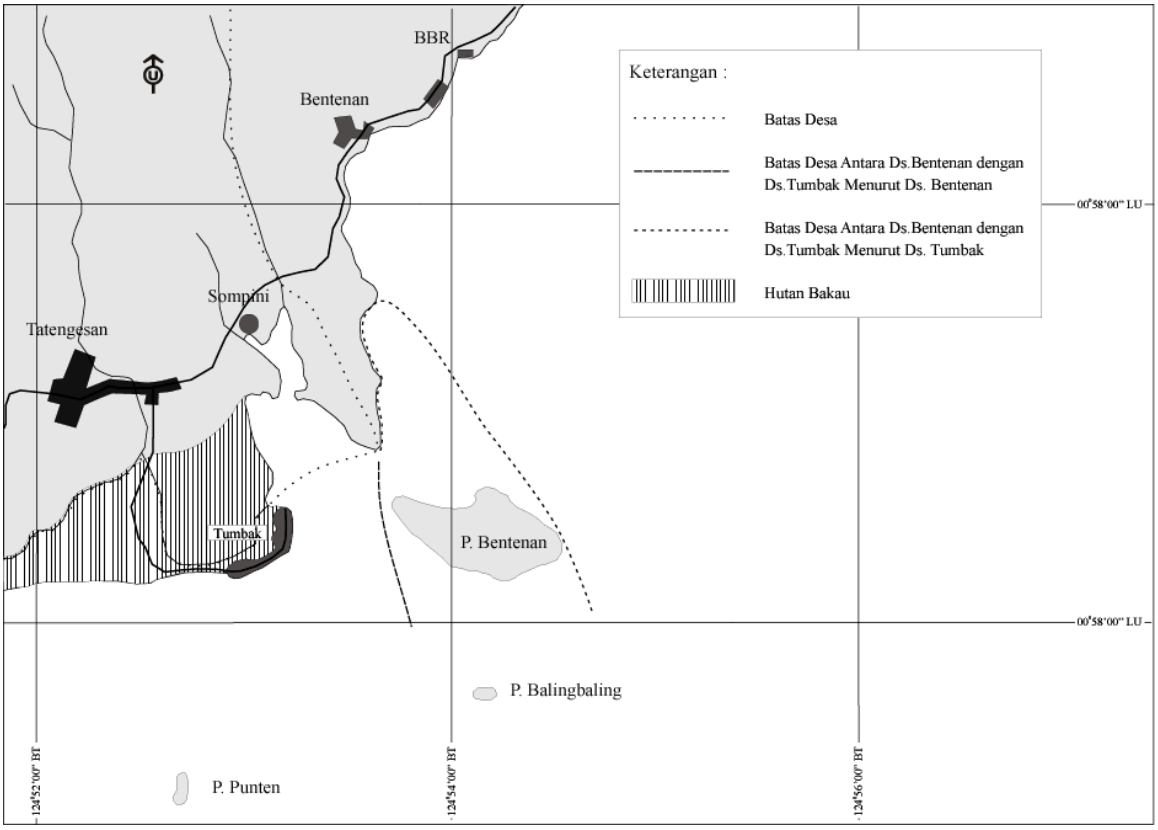
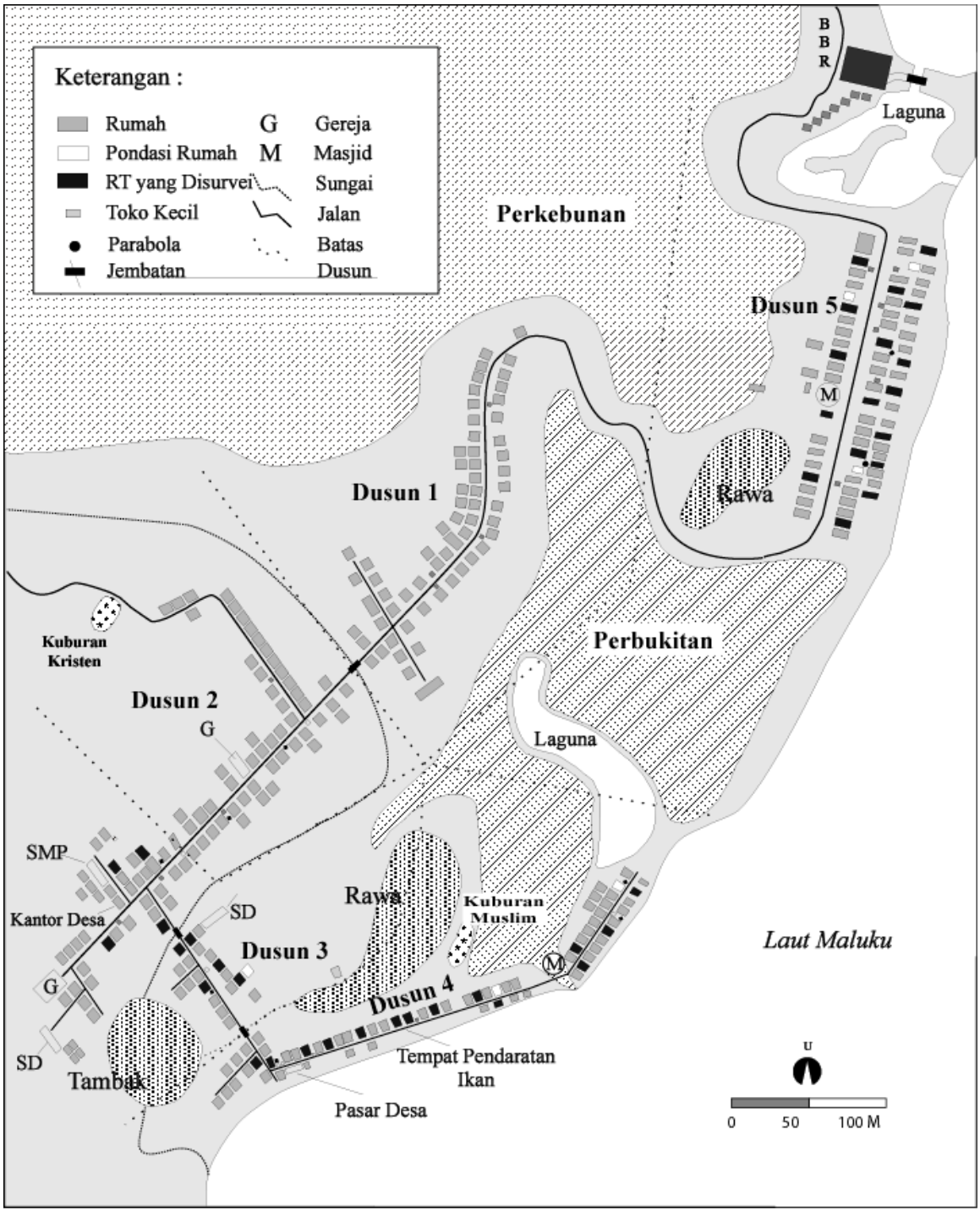
124° 21' 15" BT

Bentenan and Tumbak Villages



Bentenan


Keterangan :
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Pondasi Rumah
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G Gereja
M Masjid
Sungai
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Batas Dusun
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Laguna
Perkebunan
Dusun 5
M
Dusun 1
Rawa
Kuburan Kristen
Perbukitan
Dusun 2
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Laguna
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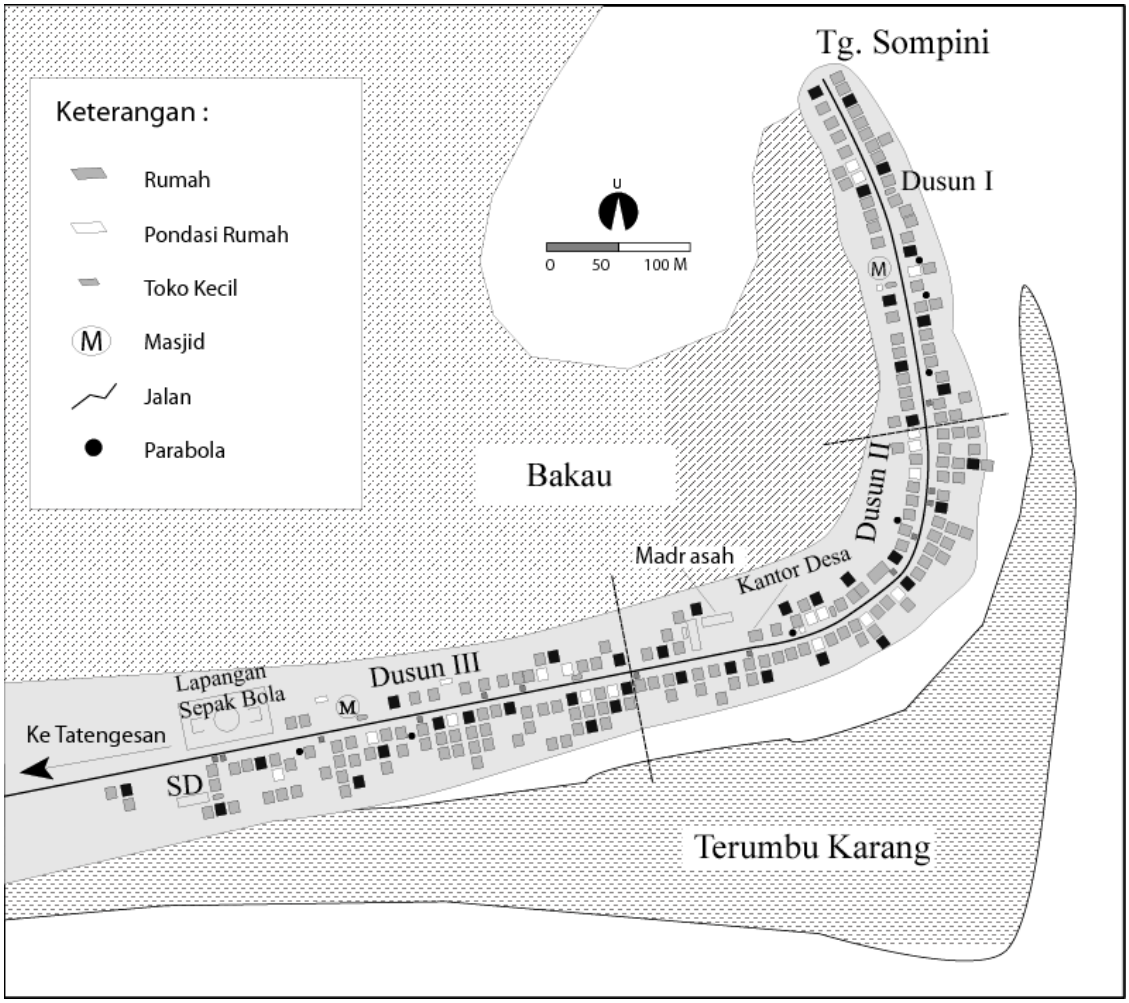
Keterangan :
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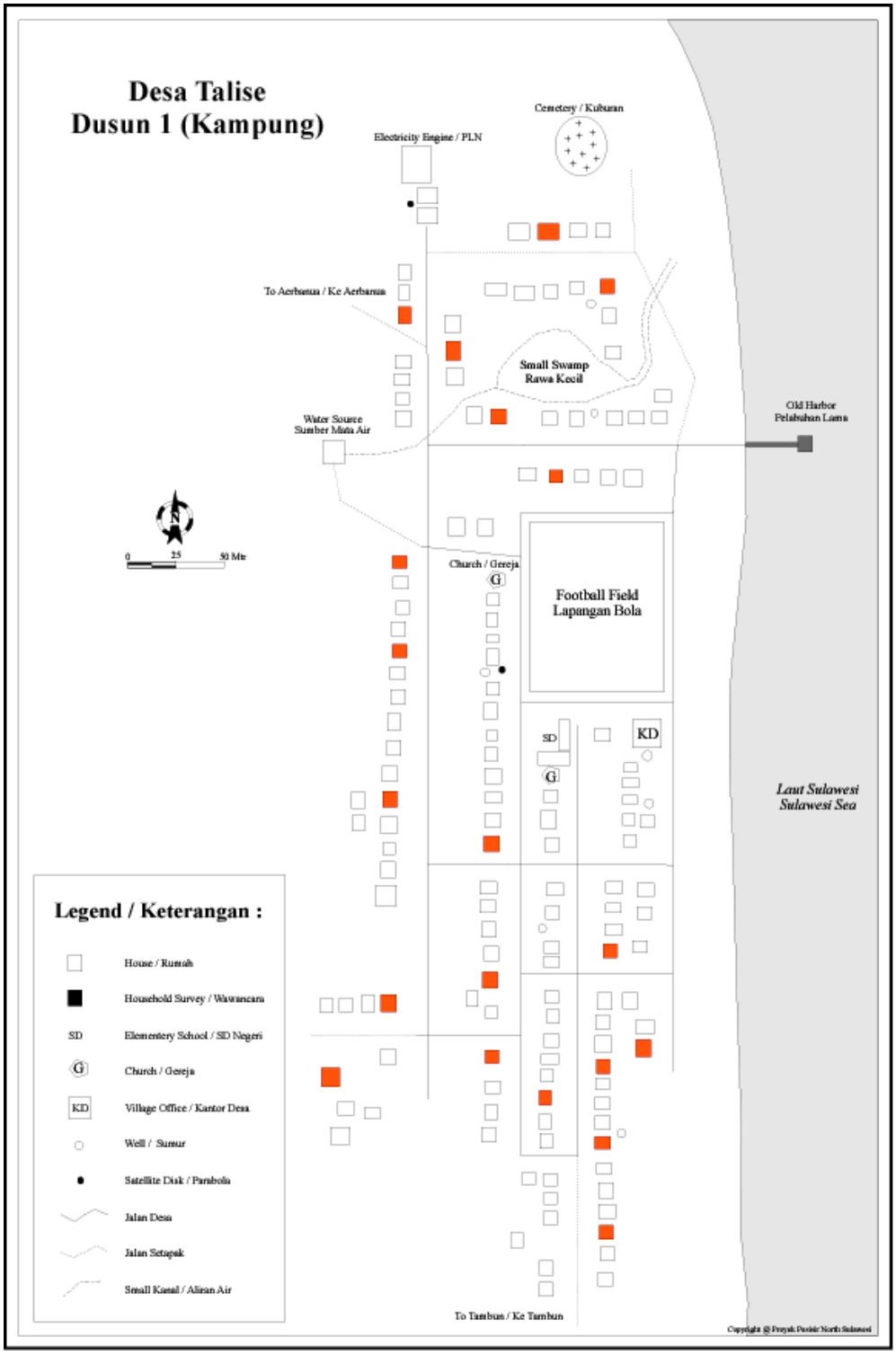
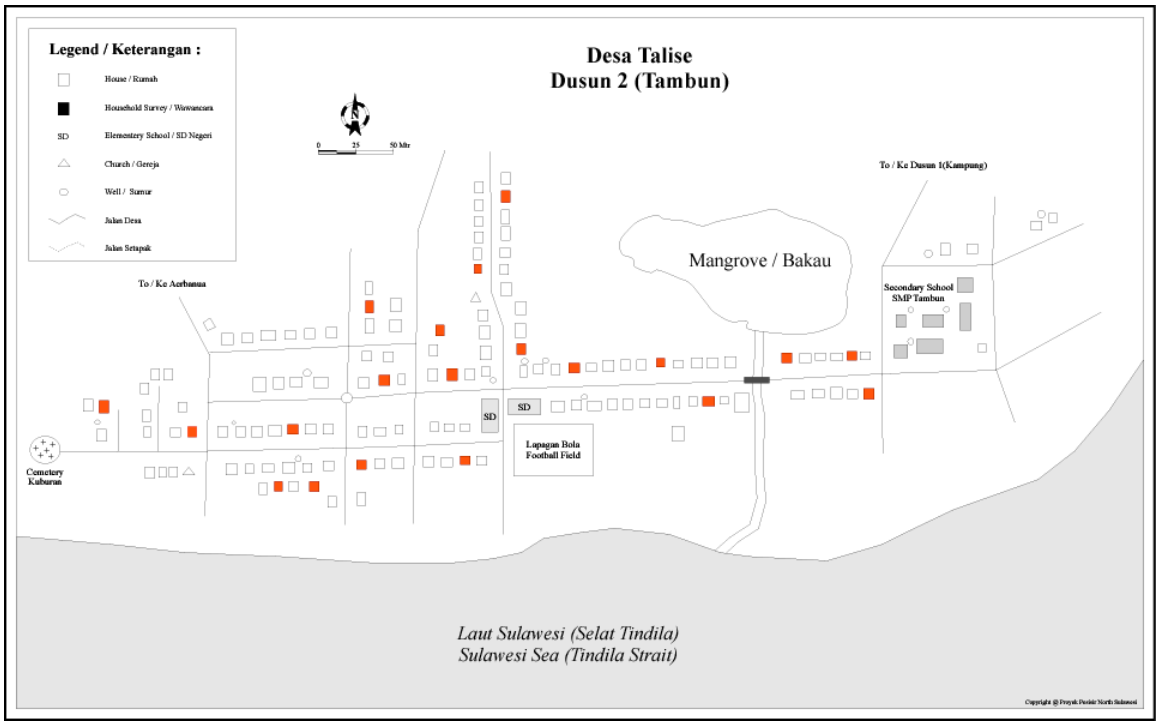
Bakau
Dusun II
Madrasah
Kantor Desa
Dusun III
Lapangan
Sepak Bola
Ke Tatengesan
SD
Terumbu Karang

Talise Village and Island
(Talise and Aerbanua Villages)

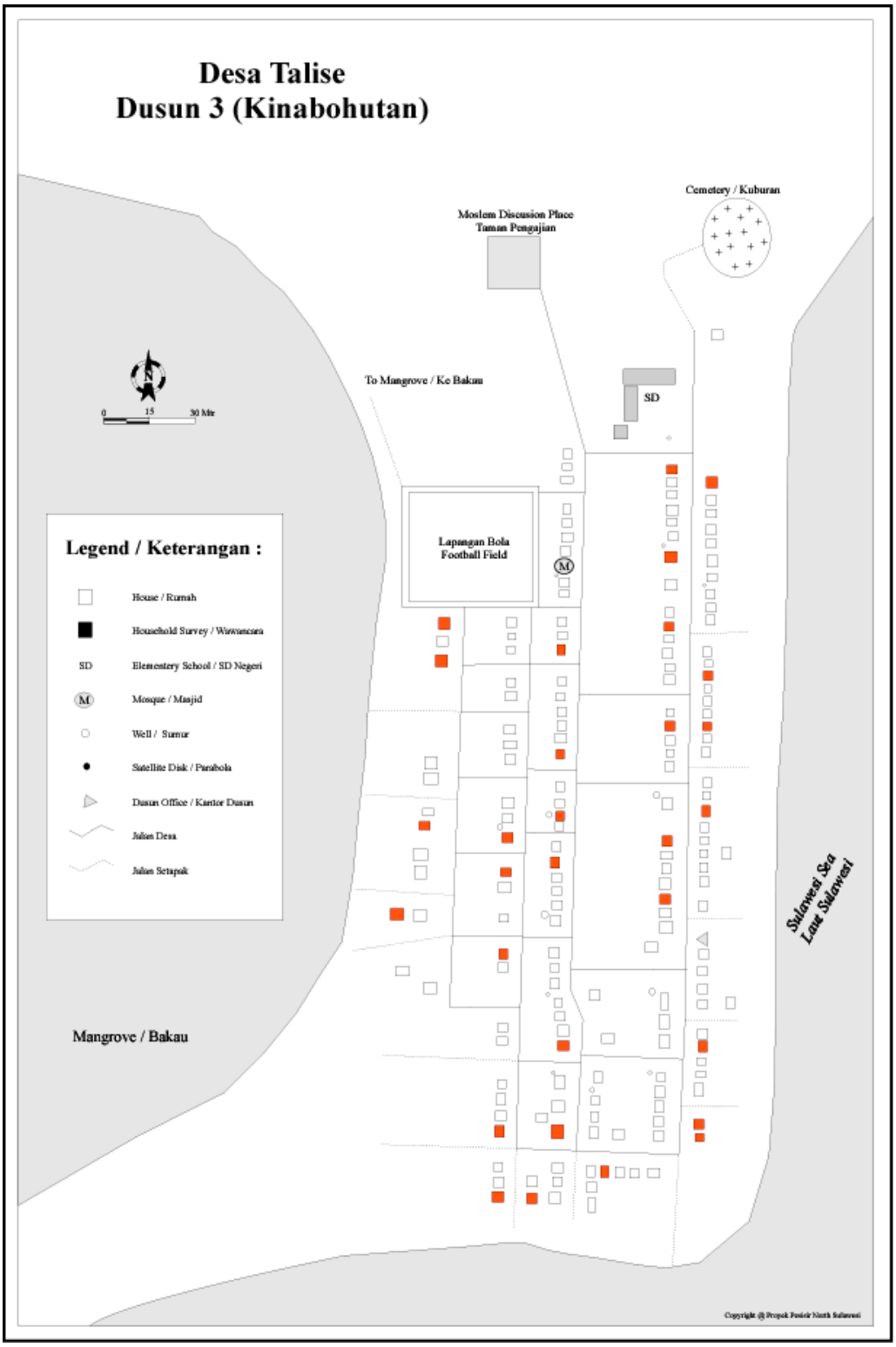
Talise (Dusun 1)



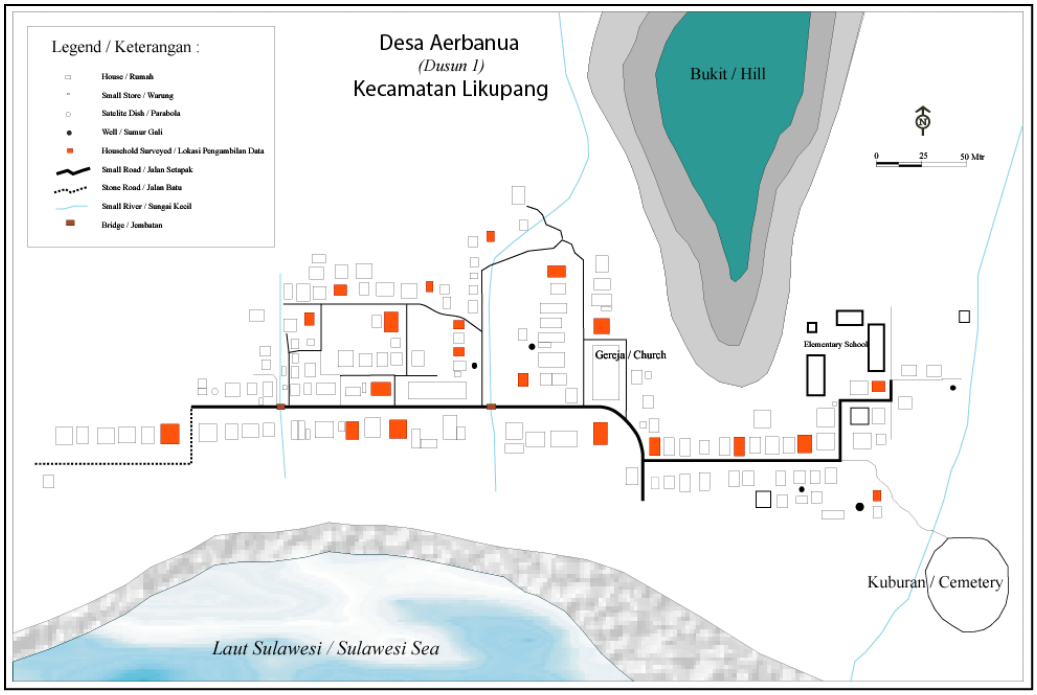
Talise (Dusun 2)



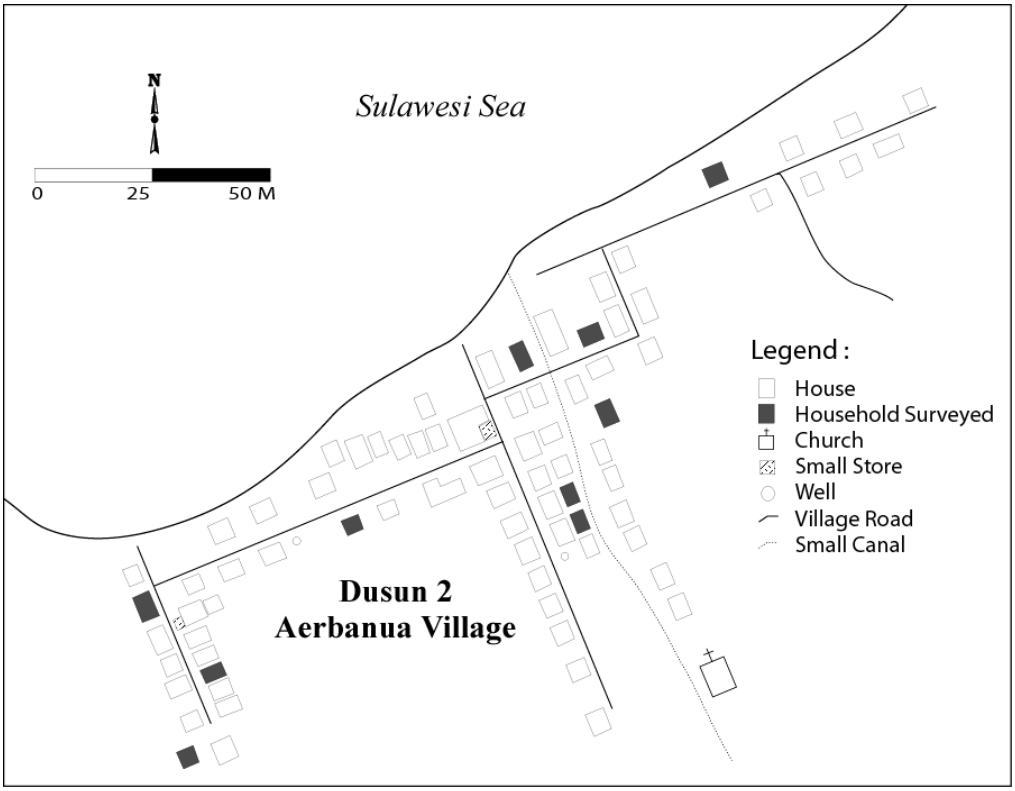
Talise Dusun 3 (currently subdivided into two dusuns - Dusun 3 and 4)



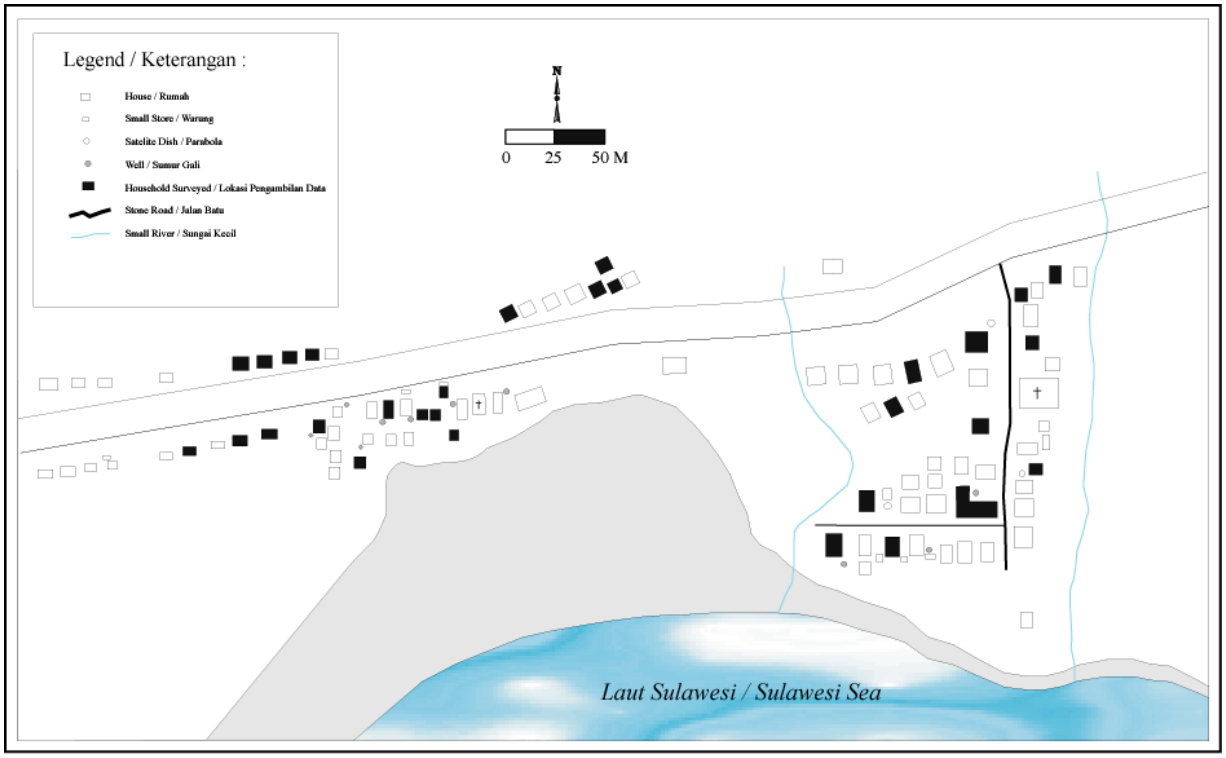
Aerbanua (Dusun 1)



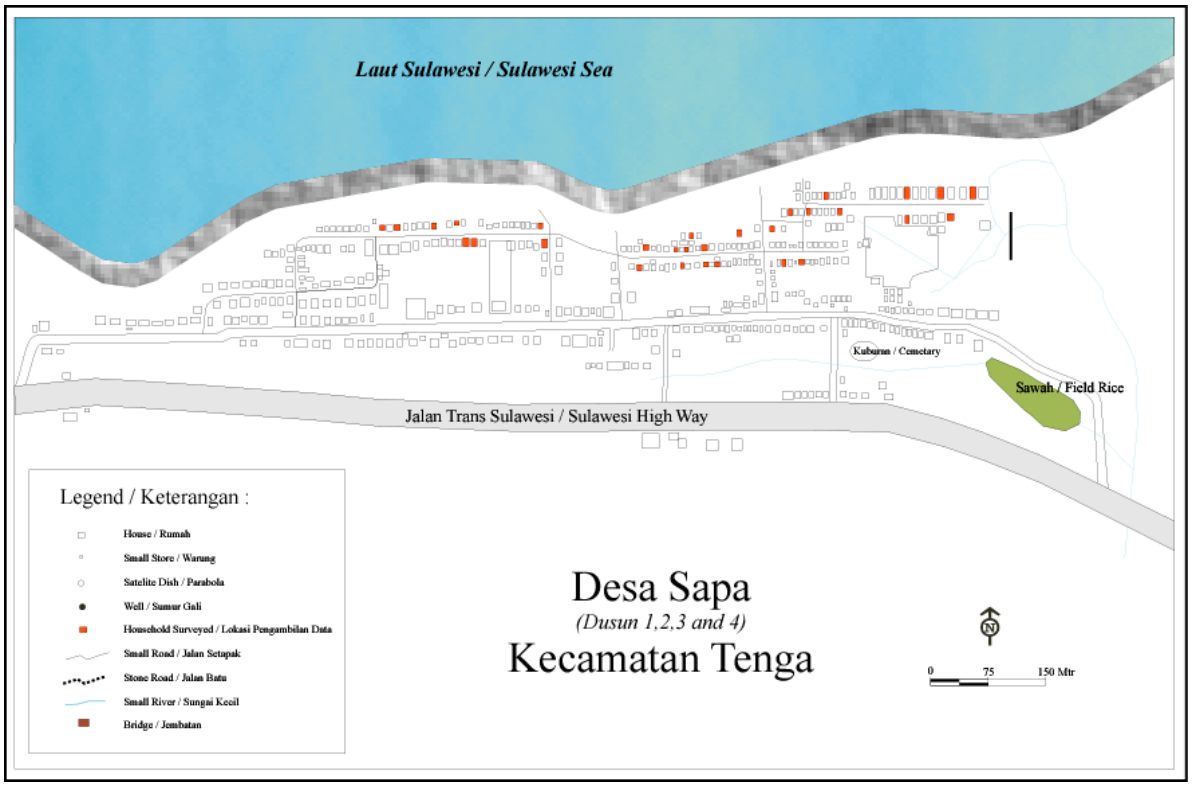
Aerbanua (Dusun 2)



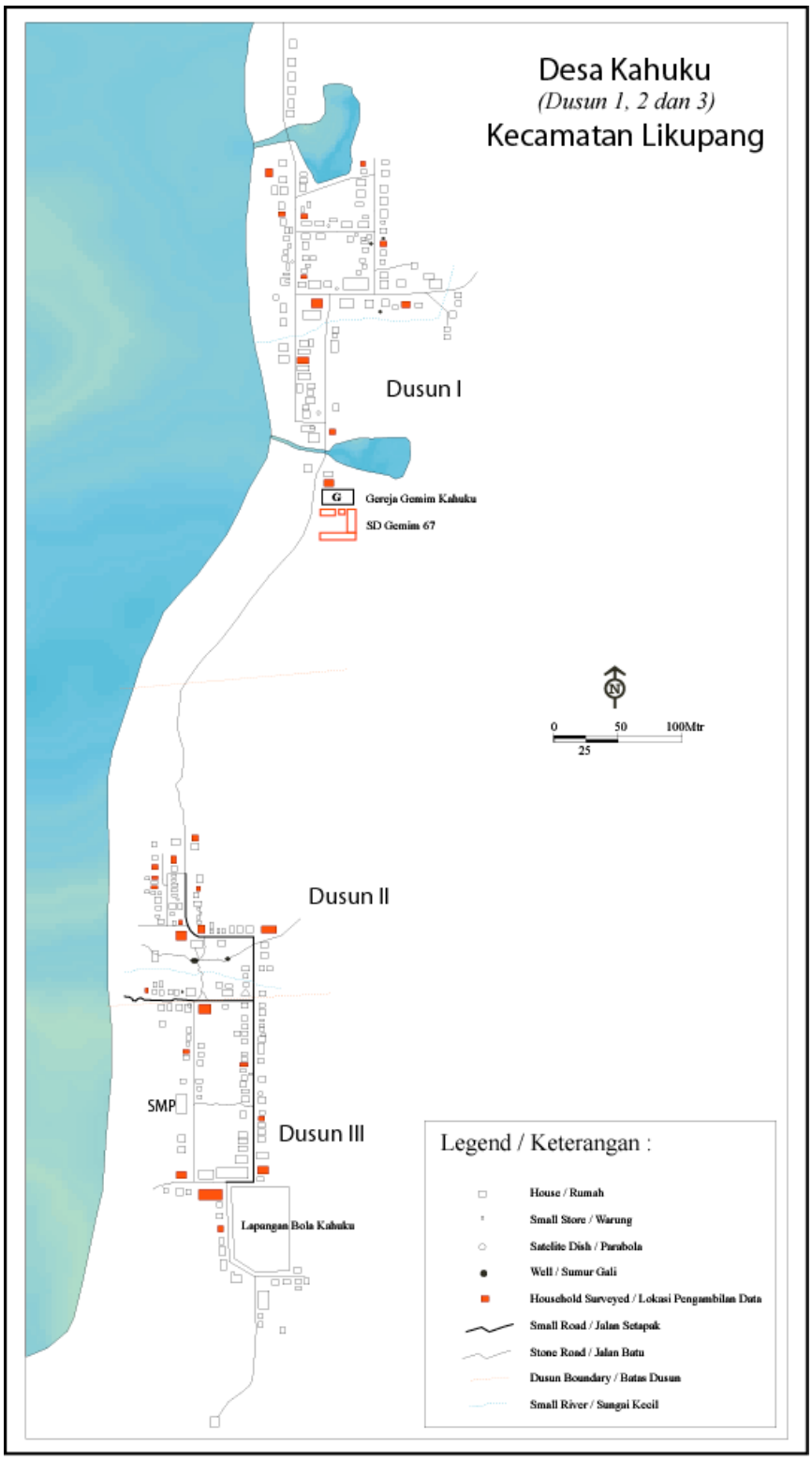
Byongpayante



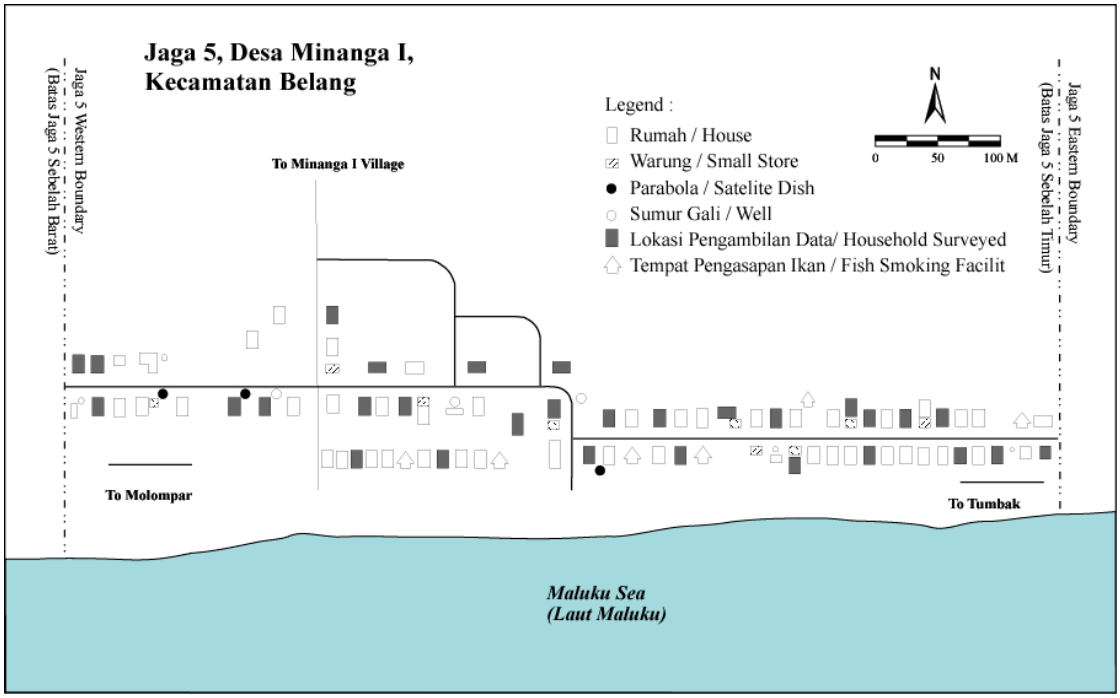
Sapa



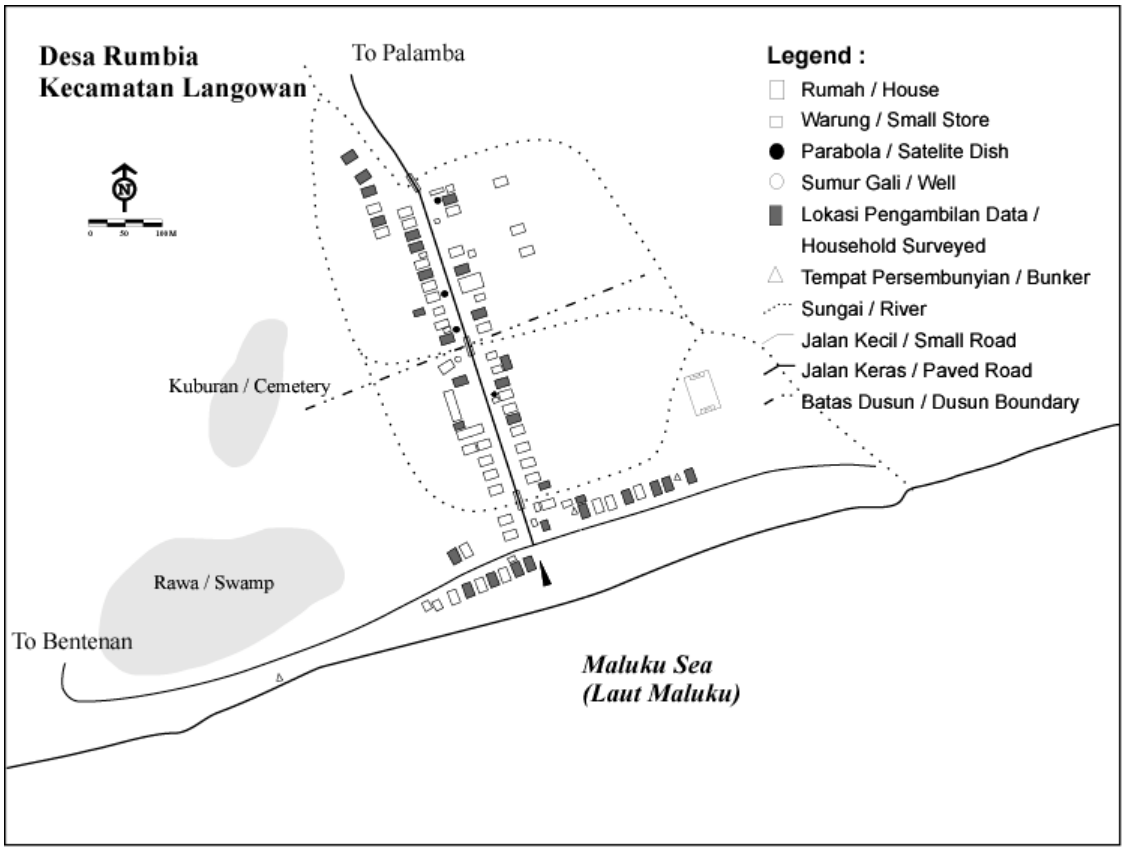
Kahuku


Desa Kahuku
(Dusun 1, 2 dan 3)
Kecamatan Likupang
Dusun I
G
Gereja Gemim Kahuku
SD Gemim 67
N
0
50
100Mtr
25
Dusun II
SMP
Dusun III
Lapangan Bola Kahuku
Legend / Keterangan :
House / Rumah
Small Store / Warung
Satelite Dish / Parabola
Well / Sumur Gali
Household Surveyed / Lokasi Pengambilan Data
Small Road / Jalan Setapak
Stone Road / Jalan Batu
Dusun Boundary / Batas Dusun
Small River / Sungai Kecil

Minanga 1

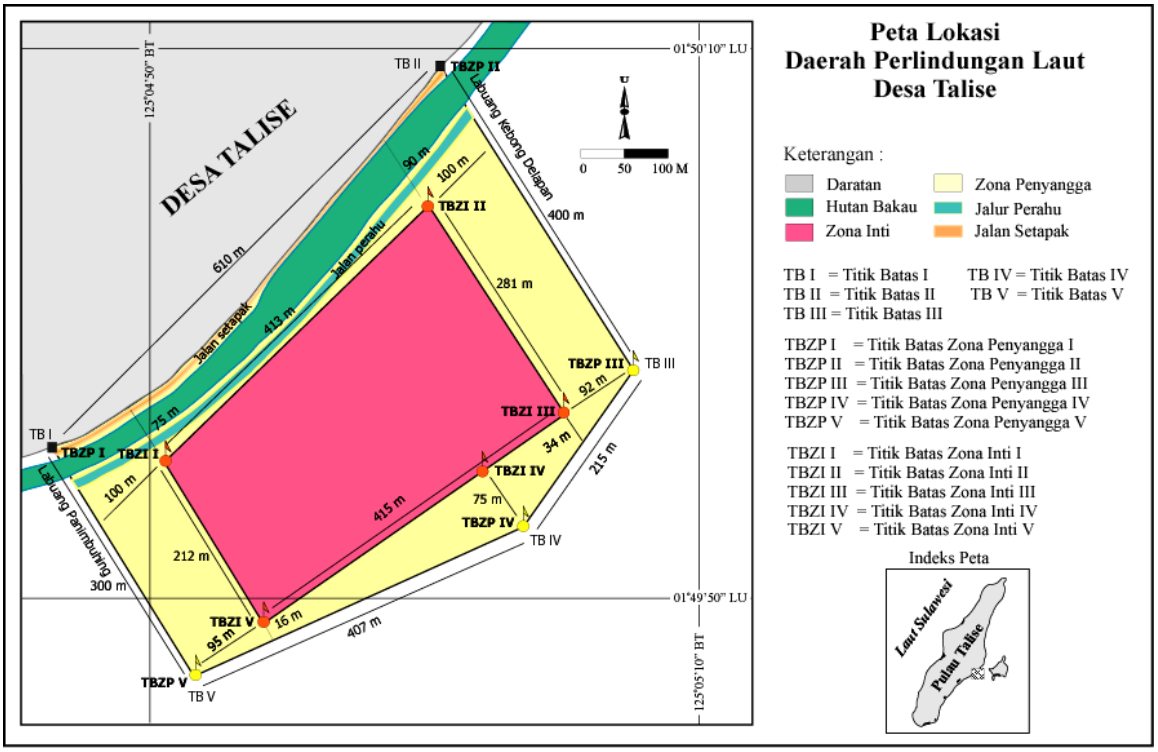


Rumbia

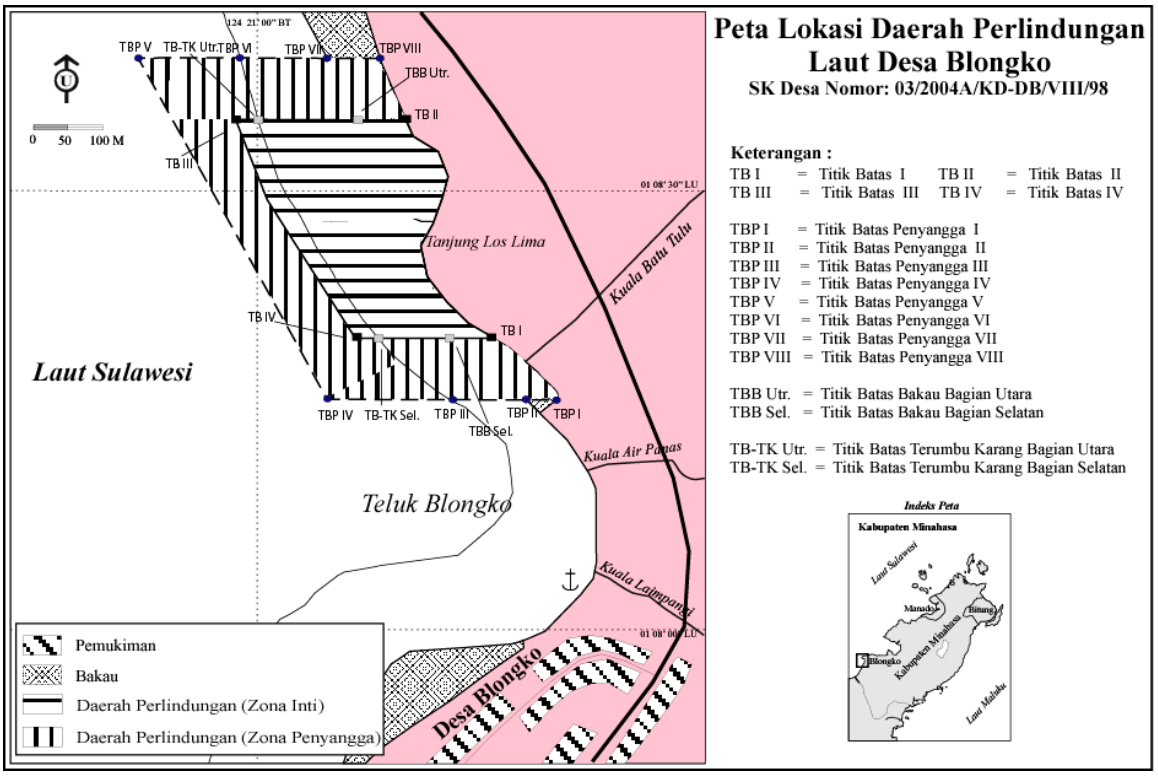


Village Marine Protected Areas (Talise, Blongko and Tumbak)

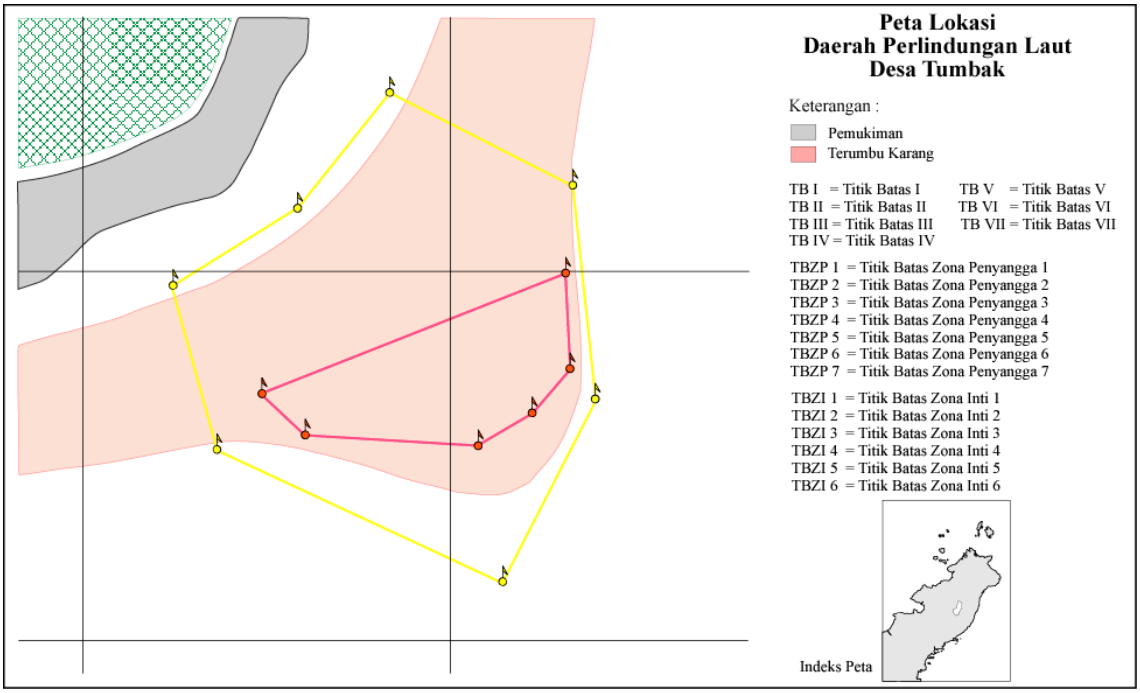
Talise MPA



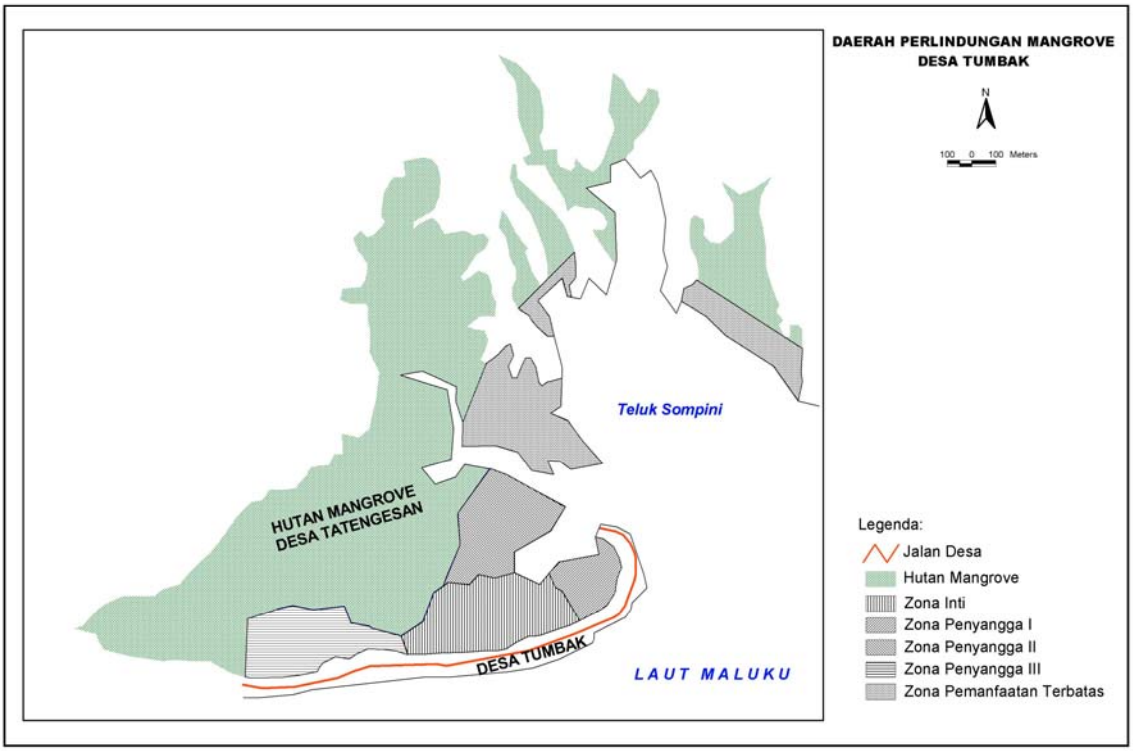
Blongko MPA



Tumbak MPA



Mangrove Sanctuary in Tumbak Village



Marine Zoning Area in Bentenan Village including the MPA