AN EXAMINATION AND COMPARISON OF RUMBIA AND MINANGA: CONTROL VILLAGES FOR THE COASTAL RESOURCE MANAGEMENT PROJECT SITES AT BENTENAN AND TUMBAK

Richard B. Pollnac, Brian R. Crawford
Christovel Rotinsulu, Priciellia Kussoy, Audrie Siahainenia

TE-98/01-E

CRC/URI CRMP
NRM Secretariat
Jl. Madiun No. 3
Jakarta 10320, Indonesia

Phone : (62-21) 3926424
392 8526
Fax: (62-21) 392642
E-mail: crmp@cbn.net.id
www.indomarine.or.id/pesisir/

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Funding for the preparation and printing of this document was provided by the Coastal Resources Management Project of the USAID-BAPPENAS Natural Resources Management Program.

Further details of Proyek Pesisir publication can be found at www.indomarine.or.id
Further details of NRM Program publication can be found at www.nrm.or.id
Further details of CRM Program publication can be found at www.crc.uri.edu

Printed in: Jakarta

Citation:
Pollnac,R.B., .R.Crawford, Rotinsulu, C., P. Kussoy, A.Siahainenia, An Examination and Comparison of Rumbia and Minanga: Control Villages for the Coastal Resources Management Project Sites at Bentenan and Tumbak. 1998. Proyek Pesisir Publication TE-98/01-E, Coastal Resources Center, University of Rhode Island, Jakarta, Indonesia, 43 pp.

Credits:
Photographs:
Maps:
Line Art:
Layout: Production House/KH
Translation:
Style Editor:
ISBN:

TABLE OF CONTENTS

TABLES AND FIGURES

TABLES Page

FIGURES

ACKNOWLEDGMENTS

The authors of this document would like to thank the numerous individuals who assisted with this effort. Special thanks are provided to Alex Wowor, Vice-Chairman BAPEDDA Tk. I Sulawesi Utara, who provided the letter granting permission to conduct the control site survey work. In addition, we would like to thank Lissa Inkiriwang for coordinating all of the logistics for the field work; Daisy Malino for editing and formatting the text and tables of the final draft; and the Information Services Unit at the Pusat Kajian sumberdaya Pesisir dan Lautan (Center for Coastal and Marine Resources Studies), Institute Pertanian Bogor, led by Ibu Kun Hidayat for the work on the final layout, production and printing. We would also like to thank the Proyek Pesisir Field Extension Officers; Egmond Ulaen and Maria Dimpudus for assistance in administering the control site and mini-survey questionnaires. We are especially appreciative of all the residents of the villages of Rumbia, Minanga, Bentenan and Tumbak who gave time from their daily schedules to provide responses to the questionnaires, and to those who acted as key informants on pricing and general village information. We also appreciate comments and advice on control site design and drafts of the final report provided by Johnnes Tulungen, Field Program Manager for North Sulawesi, Lynne Hale, Associate Director of the URI Coastal Resources Center, and Ian Dutton, Chief of Party, Proyek Pesisir.

1.0 INTRODUCTION

A significant question that should be associated with any coastal zone management project concerns its relative impacts on the coastal ecosystem. This ecosystem includes both the human and non-human components. Ideally, both of these components should be positively impacted by a coastal zone management project. The only way we can determine these impacts, however, is by establishing a baseline of both socioeconomic and environmental information which can be compared with similar data collected during and after establishment of the management strategy. But it is clear that the socioeconomic and environmental status of an area is impacted by forces other than that generated by a management strategy. Changes in weather patterns, in infrastructure, in the social, political, and economic context of the involved communities can all have an impact on the socioeconomic and natural environment of the communities. In other words, outside forces, both natural an unnatural can impact an ecosystem. Therefore, in addition to baseline information, it is necessary to collect information from similar communities, which can be used as controls to determine whether the introduced coastal zone management strategy or some other forces have influenced the ecosystem.

Given the complexity of a coastal ecosystem, it is not possible to select controls which are perfectly matched with the project communities. This, however, is not a problem. The goal of the controls is not to determine the exact degree of project impact, but to determine if trends in the project communities differ from those in the controls and to try to separate out the effects of the project from non-project variables. For example, if the quality of life has increased a similar amount in both the project communities and the controls, has it been because of an overall improvement of the regional or national economy or because the resource management in the project village has improved harvesting and incomes while the increase in the control community can be attributed to improved markets as a result of a new road. Likewise, where the trends are different, both project and non-project variables must be examined in terms of their impacts on the trends. Use of controls is not simple, but without controls, it will be impossible to discern the relative impacts of project and non-project variables.

This paper describes the basic socioeconomic status of the control villages selected for the Bentenan/Tumbak component of the CRMP-North Sulawesi. It also examines community members' perceptions and beliefs concerning impacts of their activities on the coastal ecosystem. The control baseline was not conducted at the ideal time, which is simultaneous with the project site baseline; thus, a mini-survey was conducted in Bentenan/Tumbak to determine the changes that have taken place in the past year as a consequence of both the drought associated with the El Nino Southern Oscillation as well as the severe economic crisis effecting Asia and Indonesia. Survey methodology included a random sample of 51 households (2 people for each household, resulting in a total sample of 102 individuals) in the control villages of Rumbia and Minanga and a random sample of 45 households for the follow-up, mini-survey in Bentenan/Tumbak. Due to the changes that have taken place in the past year, a preliminary comparison of the control and project villages is carried out along with an examination of the interrelationships between selected variables included in the study.

2.0 THE VILLAGES OF RUMBIA AND MINANGA: AN OVERVIEW

2.1 The Shoreline

The sea reaches 50 m in depth approximately 1 km from the coast of each of the control villages, about the same as Tumbak, but less than Bentenan which has a broader expanse of relatively shallow water. Perceptions of openness to the sea vary widely between the control sites, however. With the hills of Bentenan and Bentenan Island to the southwest, the fringing coral reef, and Pakalor Island with its lighthouse approximately 11 kilometers offshore, Rumbia's seaward view is quite diverse and of limited expanse. This perception is enhanced by the gently inward curving white sand beach of Rumbia, with it's concave volcanic tuft cliff face to the northeast and further on in the same direction, the hills of the next small bay visible in the distance. Hence, Rumbia's beach is somewhat protected from the prevailing southeast currents, as well as the northeast winds and surface currents that occur between January and April. Nevertheless, although Rumbia's shoreline is somewhat protected, the eroded cliff faces and washed-out road that once paralleled the beach just southwest of the village give evidence to the power of the sea.

In contrast, Minanga's black sand[1] shoreline curves slightly outward providing an unbroken, expansive view of the open sea to the south. The small islands offshore Tumbak appear as mere specks on the horizon. The vast expanse of sea to the south is broken only by the small specks representing the marker flags on approximately 30 fish aggregating devices anchored several kilometers offshore. Adding to this sense of openness, Minanga lacks a fringing reef, having only small patch reefs about 100 m from the beach. This openness leaves Minanga exposed to the prevailing currents which come from the southeast in the Maluku Sea.

2.2 Rumbia

Rumbia is a small farming and fishing village located on a light colored sand beach just north of Bentenan. Households stretch inland along an improved stretch of road that climbs the coconut palm and maize planted hills that back the village as one moves away from the beach, to the west. Nipa swamp, some converted to paddy rice, is found on the western margins of the populated area, and several branches of the Rumbia river curve around and through this swamp and the village. The main branch of the river finally flows through a nipa swamp, abutting a concave, eroded volcanic tuft cliff face, exiting to the Maluku Sea just beyond the eastern most households (see Figure 1). The Bentenan Beach Resort has purchased coastal land up to the southern part of the village, but little has been done with the land other than clear some nipa swamp, install a fence marking the boundary, and nail some BBR signs to tree trunks.

The 1998 population was reported as 226 persons (125 males and 101 females) distributed among 71 households, 6 of which are composed of widowed females. This population reportedly grew from 145 in 1994 through the process of in migration and natural increase.[2] Houses are concentrated in a strip along the beach and up the road which heads northwest from the coast. Houses along the beach for the most part have nipa roofs and bamboo walls. Those along the road going inland are more substantial with wooden or cement walls and tin roofs.

The village has one primary school, one Mosque, and two Christian Churches. The village is 60 percent Christian and 40 percent Islamic. In terms of ethnicity, 60 percent are Sanghir, 25 percent Bolaangmongondo, and 15 percent Minahasan. According to the Kepala Desa, 85 percent of the village's inhabitants have a primary school education, five percent have graduated from junior high school, and the rest have less than a primary education.

The nearest market is in Langowan some 24 km from Rumbia which is served by public transportation only 3 days a week. If fish need marketing the fisher can either walk to Atep (12 km) and catch a ride the remaining 12 km or sell the fish at the TPI (fish landing center) in Bentenan. Five *warung* (very small convenience stores) supply everyday needs like soap, cooking oil, sandals, batteries, etc. There are no gas stations, restaurants, hotels, or telephone service. The road through the village is improved (hardtop), but it deteriorates rapidly to broken stone and mud as one leaves the village heading to Atep.

Water is supplied through standpipes in the village, and 19 of the 71 households have legal connections with the national electric company. Another 23 are connected by lines to a legally connected neighbor, resulting in 59 percent of households with electric supply. Only 10 percent of the households have septic tanks.

Figure 1 Rumbia Village

2.3 Minanga

Minanga (which is in the process of splitting into two villages—Minanga 1 and Minanga) is a much larger farming and fishing village. It is the nearest coastal village to the west of Tumbak. A dirt road, running through coconut plantings and paddy rice fields, connects Minanga's coastal dusun with the more heavily populated inland dusuns which have hard top roads connecting Minanga to Tatengesan, a farming village about 2 kilometers to the northeast, and Belang, the seat of the district government, about 14 km and one-half hour to the west. The coastal dusun (see Figure 2; the coastal dusun of Minanga will become Dusun 3 of the new village of Minanga 1) is bounded on the west by the Hais River, a favorite location for milkfish weirs (*dayang*). On the east it is bounded by the Montoi River, one source of water for Tumbak residents. Paddy rice fields extend almost to the coast on the eastern boundary and mangrove swamp is found to the west.

Minanga is a relatively large village, with a current population of 2294 distributed among 550 households—a population approximately ten times that of Rumbia and almost as large as the combined populations of Tumbak and Bentenan. This population grew from 2136 in 1992 (BPS, 1993) through the process of natural growth and in migration. The greatest proportion of the population is concentrated inland, with only 257 individuals distributed among 54 households in the coastal dusun. In terms of ethnicity the Kepala Desa reports that 90 percent are Minahasan,
five percent Bolaangmongondo, and five percent others. The village is predominantly Christian, with less than one percent Islamic.

The village has one kindergarten, two primary schools and a junior high school. According to desa statistics (BPS, 1993) 9 percent of the inhabitants have not finished primary school, 62 percent have a primary school education, 17 percent graduated from junior high school, 1 percent has a junior high school equivalency, 10 percent graduated from high school, and 1 percent from university.

There is no market in Minanga, the most convenient being in Ratahan (45 minutes by road) and Langowan (1 hour by road) to the north-northwest and north, respectively. Numerous minibuses connect the village to these markets and other nearby villages daily, except when heavy rains make the roads impassable. Numerous *warung* (very small convenience stores) supply everyday needs like soap, cooking oil, sandals, batteries, etc. There are nine of these *warung* in the coastal dusun alone. Two kiosks distribute fuel in the village, one in the coastal dusun and one in the inland population center. There are no restaurants, hotels, or telephone service.

Water is currently supplied from wells, but water pipes are in the process of being installed. The Kepala Desa reports that 228 households, or about one-half the households have electric service. A total of 176 households, (32 percent) have settling tanks, and 21 (about four percent) have septic systems.

Figure 2: The Village of Minanga1, Dusun 3

3.0 OCCUPATION IN THE CONTROL VILLAGES

Occupational structure is an important aspect of community social organization. Based on information from Kepala Desas, Rumbia's population can be classified as 20 percent fishers, two carpenters, and the rest farmers. Classifying the entire village of Minanga, the Kepala Desa reports that 80 percent are farmers, 14 percent fisher and 6 percent traders.For the coastal dusun of Minanga, he reports 85 percent fishers and fish traders and 15 percent farmers. Since figures reported by the village chiefs represent only principal occupations, and occupational multiplicity is common in rural coastal villages, the survey examined all productive activities. The results of the survey for Rumbia and the coastal dusun of Minanga are in Table 1.

Table 1. Percent distribution of ranking of productive activities in Rumbia and the coastal dusun of Minanga

Rumbia

Activity total	1	2	3	4	5	5	7	total
Fishing	15	27	27	8	12	0	4	92
Farming	42	35	8	8	0	0	0	92
Fry collection	8	15	27	8	4	0	0	62
Processing	15	4	19	12	8	4	0	62
Trading fish	4	4	0	12	8	0	0	27
Other trading	0	4	8	4	4	4	0	23
Gleaning	0	0	4	15	4	4	0	0
Trading fry	0	0	0	0	0	0	0	0
Other	15	8	0	16	4	4	4	50
TOTAL	100	97	93	83	44	16	8	

N=26

Minanga

Activity total	1	2	3	4	5	5	7	total
Fishing	40	12	12	4	4	0	0	72
Farming	12	8	8	12	16	0	0	56
Fry collection	0	8	32	28	8	4	0	80
Processing	16	12	24	12	4	4	0	72
Trading fish	16	36	12	4	0	0	0	68
Other trading	12	12	0	0	0	0	0	24
Gleaning	0	0	0	0	4	0	4	8
Trading fry	4	0	0	0	0	0	0	4
Other	0	12	4	4	0	4	0	24
TOTAL	100	100	92	64	36	12	4	

N=25

The first important observation is that there is a great deal of occupational multiplicity in the two control villages. More than 60 percent of the respondents in the two villages (83 percent The first important obsercation is that there is a great deal of occupational multiplicity in the two control villages. More than 60 percent of the respondent in the two villages (83 percent in Rumbia) practice at least 4 productive activities. The project sites had a bit less diversity, with 54 percent in coastal Bentenan and only 28 percent in Tumbak practicing four activities (see Tables 2 and 3). The most important activities in the control sites are fishing, farming, milkfish fry collection, trading and processing. Buying and selling fish is the most important type of trading, followed by running a small store (*warung*) and trading in agricultural commodities. Processing of fish and agricultural commodities are the most important types of processing.

It is also clear that the control sample has a larger emphasis on farming. Fully 92 percent of the respondents from Rumbia and 56 percent from the coastal dusun of Minanga report farming as one of their productive activities. Although the inland dusun was sampled in Rumbia, this seems to have had little effect on the findings concerning farming as a productive activity. Eighty-eight percent of the inland sample and 84 percent of the coastal sample report farming as third or greater in importance. There is a difference in emphasis, however. Fully three-fourths of the inland sample from Rumbia report farming as first in importance in contrast to only 28 percent of the coastal respondents. Half of the coastal respondents, however, report farming as second in importance. Hence, farming seems to be more important in Rumbia.

Table 2. Percent distribution of ranking of productive activities in coastal dusuns of Bentenan

ACTIVITY	1	2	3	4	5	6	TOTAL
Fry collection							
Fishing							
Fish trading							
Farming							
Seaweed farming							
Processing							
Other trading							
Fry trading							
Boat builder							
Seaweed trading							
Carpenter							
Ornamental fish							
TOTAL							

***capture of ornamental fish N=31**

Table 3. Percent distribution of ranking of productive activities in Tumbak

4.0 COASTAL ACTIVITIES IN THE CONTROL VILLAGES

4.1 Fishing

4.1.1 Rumbia

Coastal activities are clearly important in both the control sites. As noted in the section on occupations, a number of those classified as farmers in Rumbia do some fishing as evidenced by the 27 *pelang*, 11 *londe,* and 2 motorized *pelang* which were counted along the beach. Fishing techniques include hand lines (with single or multiple hooks), gill nets (drift, fixed, and drift with the use of the *paka-paka* technique) and milk fish fry nets. Distribution of gear types used among respondents to the survey can be found in Table 4. Hook and line, especially that targeting reef fish is clearly the predominant gear. Milkfish fry nets are also important during the season which lasts from October to May.

Target fish are reef fish and pelagics. Distribution of most important target fish according to respondents to the survey can be found in Table 5. As can be seen in Table 5, the most important fish, on a year round basis are those associated with the coral reefs. At the time of the survey, however, some fishers in Rumbia were targeting pelagics such as blue marlin (*ikan layar*), skipjack tuna (*cakalang*), and yellow fin tuna (*madidihang*) which were in season. Live bait, kept in small baskets or pieces of bamboo with slits (*kurungkurung*), is used for the pelagic fish. During a good season (August through October) when *pelagics* begin to concentrate offshore, community members may deploy up to 10 fish aggregating devices (FADs) offshore which are fished by *pajeko* from as far away as Bitung and Belang. There are no *pajeko* in Rumbia. FAD owners receive one-third of the catch as their share. They say they must watch to be sure they are not cheated. Local fishers also use hook and line around the FADs. One FAD owner reported that he receives a 20 percent share of the catch of 12 local hook and line fishers who fish around his FAD.

Table 4. Percent distribution of types of fishing gear used by fisher respondents.

Table 5. Percent distribution of important fish species captured as identified by fisher respondents.

SPECIES	RUMBIA	MINANGA
Nener(milkfish fry)	62	80
Malalugis	38	65
Tude	25	54
Deho	33	52
Kembung	13	30
Cakalang	12	30
Goropa	50	24
Biji nangka	33	18
Ikan batu	21	18
Ikan putih	0	18
Bobara	17	12
Uhi/Baronang	4	12
Sardin	0	12
Roa	0	12
Tandipang	0	6
Ikan kapure	0	6
Gorara	25	6
Kakatua	4	6
Babida	0	6
Singaro	4	0
Sikuda	4	0
Mameong	4	0
Ikan layar	4	0
Ekor kuning	4	0
Wantre	4	0
Werang	4	0
Lolosi	4	0
Bohang	4	0

NOTE: columns can sum to more than 100 since each fisher indicated more than one important species

4.1.2 Minanga

The coastal dusun of Minanga is a hub of fishery activity. A vessel count along the beach yielded 49 small *pelang* (most without motor), 10 large *pelang* (with motor),[4] 7 *londe*, and one vessel that appeared to be a cross between a *londe* and a *pelang*. Several racks for drying fish were observed on the beach side of the dwellings, and no fewer than six fish smoking facilities were sandwiched among the houses. In early June 1997,[5] the beach was lined with milkfish fry nets (*seser*), even extending along the beach across the river which marks the boundary of the dusun. Many had small shelters associated with them to shield the fishers, many of whom are farmers who come to the coast to capture the fry during the peak times (full and new moon, October to May). Also observed in 1997 were about twenty weirs that were used to collect milkfish fry at the western border of the dusun in a relatively flat area behind the beach which is broached by the Hais River. The high tide fills back into this area and the milkfish fry are captured in the weirs when the tide recedes. These milkfish fry weirs are referred to as *dayang*. This flat area blends into the mangrove area to the west. In July 1998 (the off season) only about ten *dayang* were observed.

Distribution of other gear types used by survey respondents can be found in Table 4. Table 4 clearly indicates the importance of milkfish fry fishing. Other important gears include various types of hook and line (mostly focusing on pelagics or large demersals in contrast to the focus on reef fish in Rumbia), small purse seines (*giop*), beach seines (*dampar*), and gill nets. It was reported that 19 people in the community deploy 30 FADs in the offshore waters. The FADs are used by both hook and line fishers from Minanga and *pajeko* from other communities up and down the coast (there are no *pajeko* in Minanga). In contrast to Rumbia and Bentenan where the FADs are deployed August to October, those in Minanga are used almost year round (February to April and June to November). *Pajeko* fishers are required to give one-third the catch to the FAD owner. No share was reported for hook and line fishers.

4.2 Farming

Farming is an important activity in both inland and coastal dusuns in both villages (see Table 1). This activity can be considered as a coastal activity since crops are grown on the hillsides and flatlands within meters of the sea. In both Minanga and Rumbia, paddy rice is grown just behind the beach or in wetlands very close to the sea. Plantings of maize climb slopes of 40 degrees or more in Rumbia. This contributes to both the income of the coastal dwellers and potential pollution for the sea—pesticides from all crops as well as particulate runoff from erosion on steeply planted hills. Distribution of different types of crops grown by survey respondents can be found in Table 6.

Table 6. Percent distribution of crop types among farmer respondents.

CROP TYPE	MINANGA	RUMBIA
Jagung (corn)	73	84
Kelapa (coconut)		
Pisang (banana)		
Ubi (cassava)		
Cabe/rica (chili)		
Tomat (tomato)		
Sawah (paddy rice)		
Palawija (assorted crops planted as a second crop during the dry season)		
Pepaya (papaya)		
Kacang hijau (mung bean)		
Bawang (onion)		

5.0 MATERIAL STYLE OF LIFE

Material style of life, as indicated by house structure and furnishings, provides an indicator of relative wealth or social status in a community. As part of the baseline survey conducted in Bentenan and Tumbak and the control sites (Rumbia and Minanga), the presence or absence of 27 aspects of house construction and furnishings considered by the research team to be indicative of differential social status were recorded for each household included in the survey. The items and their percent distribution in the two villages can be found in Table 7.

Table 7. Percent distribution of material items

While the raw distribution of these material items are somewhat useful for detailed comparative purposes, it is perhaps more expedient to determine if there are patterned interrelationships within the data that can be used to construct multi-item scales which may provide a clearer picture of the distribution of material wealth within and between the two villages. To accomplish this goal, the 27 material style of life variables listed in Table 7 were factor analyzed using the principal component analysis technique and varimax rotation for all four communities. The scree test was used to determine optimum number of factors to be rotated (Cattell, 1966). An examination of the first principal component analysis of this data indicated that seven items (tile floor, wooden wall, wooden windows, tile roof, wooden roof, bench, and water piped into the house) manifested rotated loadings less than 0.40 (all except wooden wall had loadings less than 0.20). These items also have very low percent occurrence in the sample households; therefore, they were eliminated from the analysis, and another analysis was conducted on the remaining 21 variables. The result of this analysis can be found in Table 8.

Table 8. Principal component analysis of material style of life items

VARIABLE	BASIC	ADVANCE

The majority of the items loading highest on each of the two components in Table 8 provide some indication of patterns of interrelationships of the items in the sample households. In turn, these patterns can be interpreted as "dimensions" of material style of life. For example, the items loading most highly on component one (either negative or positive) refer to structural features and basic furniture of the dwelling (e.g., windows, floors, walls, roof type, chairs, living room set, etc.). Items loading highest on component two are relatively expensive accessories or appliances which elaborate the structure. Together, the two components account for 45 percent of the variance in the data set, a modest but respectable amount. We will refer to the first component as Basic and the second as Advanced.

Component scores were created to represent the position of individual households on each of the two components. 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 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., cupboard 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 we will refer to these scores as material style of life component scores (MSL component scores). They are standardized scores with a mean of zero and a standard deviation of one.

A comparison of mean component scores across the project and control sites indicates that the sites differ minimally on the Basic Component (means; standard deviations = 0.058; 0.972 and -0.092; 1.047 respectively; $T = 0.839$, $df = 130$, $p > 0.05$). The sites differ significantly with respect to the Advanced Component scores, however. Mean score on the Advanced Component for the project sites is -0.175 (sd = 0.838) and for the control sites, 0.278 (sd = 1.170). This difference is statistically significant ($T = 2.402$, $df = 130$, $p = 0.02$).[6]

A correlation analysis of the MSL component scores relationships with fisher and farmer status, education, and age was conducted. A person was identified as a farmer or a fisher if either occupation was ranked first, second, or third in terms of contribution to the household. Hence a person could be identified as both a fisher and a farmer. Education was positively correlated with the advanced MSL scale ($r = 0.28$, $p < 0.005$) indicating that the more educated had more advanced household appliances. Interestingly, fisher was negatively correlated with both the basic and advanced MSL scales ($r = -0.27$ and -0.31 respectively, $p < 0.005$). At this point we cannot explain this relationship. Farmer status and age were not significantly correlated with MSL component scores.

6.0 PERCEPTIONS OF CHANGES IN WELL BEING, FUTURE PROSPECTS, AND PROBLEMS

As a means of determining how individuals in the two villages evaluate their present quality of life, they were asked to compare their household well-being today with that of five years ago (better off, worse off, or the same) and provide reasons for the perceived change or no change. The control sites differ significantly from Bentenan and Tumbak in terms of their perceptions of changes in household well being over the past five years.

As can be seen in Table 9, a much larger percentage of respondents in the Rumbia and Minanga report that they are worse off. An analysis of the distribution of the responses (minus the two respondents who said they did not know) indicates that the differences are statistically significant (χ^2

= 40.77, df = 6, C = 0.394, $p < 0.001$).

These differences are doubtless due to both the prolonged drought that accompanied the El Nino of 1997-1998 and the recent economic crisis. The Bentenan-Tumbak baseline survey was conducted in June 1997, immediately before this El Nino event and the economic crisis, while the Rumbia-Minanga control site surveys were conducted in July 1998, immediately after the El Nino event ended and while the economic crisis continued.

Table 9. Percent distribution of perceptions of changes in household well being over the past five years.

These same phenomena apparently had an impact on perceptions of future changes. Table 10 includes the percent distribution of responses to a question concerning whether respondents feel they will be better off, worse off or the same five years in the future. As can be seen in Table 10, most respondents (approximately three fourths) in the control sites fail to hazard a guess about the future. The differences in this distribution are also statistically significant. With the "worse" and "same" categories eliminated because of low response frequencies, the Chi Square of the distribution is 68.05 (df = 3, C = 0.49, $p < 0.001$).

As a means of determining if these differences are due to the effects of the economic crisis, a mini-survey was conducted in Bentenan and Tumbak just after the Rumbia and Minanga sites were surveyed. Respondents were asked to compare their household well-being today with that of one year ago (better off, worse off, or the same). They were also asked whether they feel they will be better off, worse off or the same five years in the future. The distribution of responses to the mini-survey conducted in July, 1998 (Bentenan-Tumbak, Time-2) are compared to the results of the baseline conducted in June, 1997 (Bentenan-Tumbak, Time-1) in Tables 11 and 12.

Table 11. Percent distribution of responses to changes in household well being in Bentenan and Tumbak at time-1 and time-2

Tables 11 and 12 clearly show that there have been changes in perceptions of changes in household well being and future status in the project sites. The time-2 data from the project sites indicates an increase in the number of people who feel worse off and a decrease in the number who feel better off than in the past. The differences in Table 11 are statistically significant ($c^2 = 27.88$, df = 2, C = 0.38, $p < 0.001$).

Table 12. Percent distribution of perceptions of canges in future status in Bentenan and Tumbak at time-1 and time-2

Some of the cell frequencies in Table 12 are too low for a valid statistical test of the differences observed, but if we collapse the "worse off" and "same" categories we obtain Table 13. Table 13 clearly indicates that in time-2 there is an increase in the "worse" and "same" categories and a decrease in the "don't" know responses. These differences are statistically significant ($c^2 = 32.97$, df = 2, C = 0.41, $p < 0.001$). It therefore seems appropriate to focus the analysis on differences between the control sites and data collected in Bentenan and Tumbak at time-2.

Table 13. Percent distribution of changes in future status in Bentenan and Tumbak at time-1 and time-2 with collapsed categories.

Table 14. Percent distribution of perceptions of changes in household well being in project (time-2 only) and control villages.

Table 15. Percent distribution of perceptions of future status in project (time-2 only) and control villages.

Tables 14 and 15 compare responses for the project (time-2) and control sites on questions comparing household well-being today with that in the past (better off, worse off, or the same), as well as perceptions as to whether they feel they will be better off, worse off or the same five years in the future. Interestingly, despite the drought and the economic crisis and its attendant inflation, more than half the respondents feel that their situation is the same or better. This is doubtless due to the fact, as many key informants reported, that prices paid for fish and agricultural products have kept up with or exceeded the costs of inputs (See Appendix III for a comparison of prices of various commodities and services in 1997 and 1998 as reported by key informants and in the mini-survey.).

Differences between project and control sites in Table 14 are not statistically significant. Table 15 has too many cells with low frequencies to perform reliable statistical tests on the entire Table. The big difference in Table 15, however, is the percent difference in "don't know" responses. This difference, comparing "don't know" with all other responses is statistically significant ($\chi^2 = 54.21$, df = 1, Phi = 0.61, $p < 0.001$).

With respect to changes in changes in household well being today as compared to the past, respondents were also asked why. Responses provided by over 10 percent of respondents in either group are: 1) drought, 2) increasing income, 3) inflation, 4) decreases in the number of fish caught, and 5) no change. A comparison of the percent distribution in these responses is presented in Table 16. The analysis presented in Table 16 indicates that respondents from the project sites are more likely to attribute changes over the past five years to drought, inflation, and less fish being caught. These differences are statistically significant.

Table 16. Percent distribution of reason for change.

Respondents were also asked to report problems they are having. Responses provided by over 10 percent in either group are: 1) no problems, 2) decreasing catch, 3) providing for child's education, 4) amount of income, 5) inflation, 6) obtaining basic household needs, and 7) obtaining water. A comparison of the percent distribution in these responses is presented in Table 17.

The analysis presented in Table 17 indicates that the project sites are more likely to perceive decreasing catch, providing for their children's education, obtaining basic needs, and obtaining water as problems. Within project group analysis of this data indicates that problems with obtaining water and decreasing catch are more likely to be mentioned by residents of Tumbak than Bentenan

(c^2-Yates corrected and c^2 = 7.90 and 13.28, df = 1, Phi = 0.26 and 0.30, $p < 0.010$ and 0.001 respectively). Additionally, residents of Bentenan are more likely than those of Tumbak to mention problems associated with providing for their children's education (c^2-Yates corrected = 6.76, df = 1, phi = 0.44, $p < 0.010$).

Table 17. Percent distribution of respondent's problems.

7.0 BELIEFS CONCERNING IMPACTS OF HUMAN ACTIVITIES ON COASTAL RESOURCES

It is essential to understand individual perceptions of factors influencing the status of coastal resources prior to attempts to involve people in community based management efforts. This understanding can be used to identify the distribution of faulty, as well as accurate perceptions. Knowledge of these distributions can then be used to structure interventions directed at involving the community in the management of their resources.

As one means of obtaining some information concerning community member's perceptions of the coastal resources and potential human impacts on these resources, the sample of household members from the project sites (Bentenan and Tumbak) and control sites (Rumbia and Minanga) were requested to provide a statement concerning the degree of their agreement or disagreement with ten statements (statement 10, below, was only used in Bentenan and Tumbak and statement 11 in the control villages only). Each of the eleven 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.
10. There is a limit to the amount of seaweed farming that can be done in this area.
11. There is a limit to the amount of marine area that can be used by this village.

The statements were arranged 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. Percent distribution of responses to the statements for the four villages are in Tables 18 through 27.

Table 18. Distribution of responses to: We have to take care of the land and the sea or it will not provide for us in the future

Table 19. Distribution of responses to: Fishing would be better if we cleared the coral where the fish hide from us.

Table 20.

Table 21.

Table 22.

Table 23.

Table 24.

Table 25.

Table 26.

Table 27.

The distribution of responses in Tables 18 through 27 clearly illustrate the range of opinions both within and between the four communities. While the detail in these Tables is important for understanding the range of variability, perhaps it would be illustrative to compare the project and control sites on the percentage of "non-conservation oriented" responses provided. To do this, the full range of responses (the seven scale values) were dichotomized at 4, with "don't know" and the non-conservation oriented responses in one category, and the conservation oriented responses in the other. The analysis of percent distribution of "non-conservation oriented" responses can be found in Table 28.

Table 28. Percent distribution of non-conservation responses in project and control sites.

Table 28 clearly shows that individuals in the control sites tend to give fewer non-conservation oriented responses than those in the project sites. As a preliminary step in determining factors contributing to these differences in response patterns, we will examine the patterning of interrelationships between the nine statements to see if they can be reduced to fewer dimensions of underlying meaning to facilitate further analysis. Principal component analysis is used to delineate the patterned interrelationships within the data that can be used to the construct multi-item scales, which represent the dimensions of underlying meaning. An analysis of these multi-item scales may provide a clearer picture of the distribution of beliefs concerning relationships between the coastal resources and human activities.

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. The scree test was used to determine optimum number of factors to be rotated (Cattell, 1966). The result of this analysis can be found in Table 29.

Table 29. Principal component analysis of conservation attitude variables

As can be seen in Table 29, the statement concerning the fishery impact of farming the hills behind the village is not included in the final analysis. It was eliminated because its lack of relationship with the two components derived in the analysis. The analysis was conducted with the eight remaining variables. 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 "Control."

Component scores representing the position of each individual on each component were created for each individual. The component scores are the sum of the component coefficients times the sample standardized variables. These coefficients are proportional to the component loadings. Hence, statements with high positive loadings contribute more strongly to a positive component score than low or negative loadings. Nevertheless, all statements contribute (or subtract) from the score; hence, statements with moderately high loadings on more than one component (e.g., attitudes about clearing coral 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 Resource Beliefs component scores. They are standardized scores with a mean of zero and a standard deviation of one.

Table 30. Inter-village comparison of resource beliefs component scores.

Table 30 indicates that the project sites seem to have lower Resource Beliefs component scores than the control sites. This indicates that their beliefs are less accurate, hence less conservation oriented. The analysis of the difference in mean Resource Beliefs component scores for the project and control sites in Table 31 indicates that these differences are statistically significant.

Table 31. Comparison of resource beliefs component scores across project and control sites.

A this point it would be interesting to determine the interrelationships of the Resource Beliefs component scores (ecological knowledge) and other variables such as relative dependence on fishing and farming, education, age, relative wealth (as measured by the MSL component scores), and sex of respondent. A person was identified as a farmer or a fisher if either occupation was ranked first, second or third in terms of contribution to the household. Hence, a person could be identified as both a fisher and a farmer. Correlations of these variables can be found in Table 32.

Table 32. Correlations of resource beliefs component scores with selected independent variables.

As expected, there is a positive and statistically significant correlation between education and both resource beliefs component scores—the higher the level of education the more likely the respondent's beliefs concerning aspects of the resource are correct. The negative correlation between age and resource beliefs can probably be accounted for, at least in part, by the negative correlation between age and education ($r = -0.32$, $p < 0.001$) which is common in developing countries. The relatively low, but statistically significant relationship between farmer and the vastness component score is difficult to explain. Perhaps those who farm their somewhat limited pieces of land realize the potential for attempting to get too much out of it and tend to perceive the ocean as less of a limitless resource. They are accustomed to limits on their resource. This finding suggests the need for more research.

Finally, we examine perceptions of the impacts and reasons why fishers practice bomb fishing. Turning to impacts, a large majority of respondents agree with the statement that bomb fishing hurts the resource (88 percent in Bentenan, 96 percent in Tumbak, and 94 percent in each of the control villages). Only one respondent said it did not hurt the resource; the others responded that they did not know. The largest percentage who responded that they did not know are from Bentenan (12 percent).

Turning to reasons why fishers use the technique, the most frequent response category is that it is a quick and/or easy way to obtain lots of fish and/or money (39 percent of respondents used this response). The second most frequent response category is that it is the fisher's way of making a living (12 percent). Other moderately high response categories included "the government is not enforcing the law (7 percent), "they know how to do it" (5 percent), and "habit" (4.4 percent). Among the low frequency categories that are interesting we find "it is fun" and "they like to hear the bomb" (less than one percent each). Another interesting response category related to the bravery and lack of fear of being caught (one percent). Finally, about two percent of the respondents related the use of bombs to lack of thought for the future.

Distribution of the two high frequency response categories across the four villages can be found in Tables 33 and 34. There is no statistically significant difference between the four villages with respect to perceptions that bomb fishers use the technique because it is a quick/easy way to obtain fish/money ($\chi^2 = 0.87$, $df = 3$, $p > 0.05$). The differences in percent distribution across the villages in Table 34, however is statistically significant ($\chi^2 = 17.97$, $df = 3$, $C = 0.27$, $p < 0.001$). The control villages manifest higher percentages of the response, "it is their way of making a living" with Minanga having the highest.

Table 33. Percent distribution of the perception that bomb fisher fish that way because it is a quick/easy way to obtain fish/money

Table 34. Percent Distribution of the perception that bomb fishers fish that way because it is their way of making a living.

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ENDNOTES

This contrasts with the black "pebbles" (approximately 3 - 5 mm in size) that cover Tumbak's beach.

[2] The Kepala Desa asserts that the 1994 population was 145, but he notes that the last Kepala Desa is in another faction and hasn't been sharing past records with him. The Desa Profil was not completed; hence information provided by the Kepala Desa was based on his memory.

[3] See Pollnac *et al.* 1997b for a discussion of this activity in Bentenan.

[4] Some small *pelang* were powered by small (5hp) Honda utility engines mounted on a hinge on a cross member in the boat. When in the water and power is needed, the hinge allows the motor to be shifted to the side and the driveshaft with the propeller is parallel to the exterior of the hull and angled down into the water. Only one vessel of this kind (a *londe*) was seen on the Maluku coast of Minahasa during our survey in early 1997 (Pollnac, et al. 1997a), but they appear to be increasing in number. The motor, driveshaft, and propeller are referred to as a *katinting*. At the time of the vessel count in Minanga, the survey team had not yet learned to recognize the mounting for the *katinting*, hence, were not able to classify the vessels according to the use of this type of motor since the motors are removed and taken to the fisher's house after completing a trip. The motor, driveshaft, and propeller are referred to as a *katinting*.

[5] Two members of the survey team walked the beach of Minanga in early June 1997, evaluating it as a control site.

[6] Although the difference seems small, the component scores are standardized with a mean on 0.0 and a standard deviation of 1.0; hence, the difference between the two groups is almost one-half a standard deviation of the scores for the entire sample.

[7] The statements concerning area of sea available (in general) and with regard to seaweed culture were not part of this analysis because they were not asked in all four villages.

APPENDIX I: CONTROL SITE SURVEY QUESTIONNAIRE

FORMULIR WAWANCARA DATA AWAL
Desa Kontrol …….. , Juli 1998
Nomor responden :……..……

***: lingkari jawaban yang tepat.**

1. Desa : …… Dusun: …… Tanggal: …… Pewancara : ……..….

2. Nama responden: .…….. . Umur:….. tahun (Lelaki /Perempuan)*

Komposisi penghuni rumah		Jumlah (orang)	Status(isteri, suami, kakak kakek, dll.)	Umur (tahun)
Laki-laki	Dewasa			
	Anak-anak			
Perempuan	Dewasa			
	Anak-anak			

BAGIAN PERTAMA

3 KEGIATAN PENANGKAPAN IKAN (Ya/Tidak)*
Urutkan 3 jenis ikan yang biasa tertangkap oleh anda:
(1)…… (2)…….. (3)……

4 KEGIATAN PENANGKAPAN NENER BANDENG (Ya-Tidak)*

5 KEGIATAN BUDIDAYA RUMPUT LAUT (Ya-Tidak)*

6 KEGIATAN MENGUMPUL HASIL LAUT DENGAN TANGAN/ALAT SEDERHANA (Ya - Tidak)*

7 KEGIATAN BELI-JUAL KOMODITI (Ya-Tidak)*
Kalau ya, sebutkan:
(1)..... (2) .....
(3) ..... (4) .....
(5) ..... (6) .....

8 KEGIATAN PENGOLAHAN (Ya-Tidak)*
Kalau ya, sebutkan:
(1)…… (2)……..
(3)…… (4)……..
(5)…… (6)……..

9 KEGIATAN PERTANIAN (Ya-Tidak)*
Kalau ya, sebutkan:
(1)…… (2)……..
(3)…… (4)……..
(5)…… (6)……..

10 KEGIATAN PRODUKTIF LAIN (Ya-Tidak)*

misalnya: menangkap ikan hias, ambil karang, turisme, tukang kayu, bikin kapal, guru, pegawai kantor, juga menerima kiriman barang/uang dari keluarganya di luar desa DAN LAIN-LAIN - sebutkan)

Kalau ya, sebutkan:

(1) …… (2)…….

(3) …… (4)…….

(5) …… (6)…….

Urutan penting kegiatan di atas (yang tercantum di nomor 10 saja):

(1)……(2)…….……

(3) ..... (4) .....

(5) ..... (6) .....… dst

11 TINGKATAN KEGIATAN PRODUKTIF yang terdaftar di pertanyaan nomor 3 hingga 10 di atas terhadap makanan dan pendapatan penghuni rumah:

Ke-1: ……. Ke-2: ……..…

Ke-3: ……. Ke-4: ……..…… ….

Ke-5: ……. Ke-6: …….

Ke-7: ……. Ke-8:……..…….

Ke-9: …….

BAGIAN KEDUA

13 INDIKATOR KEMAKMURAN RUMAH TANGGA

13.1 Keadaan bangunan rumah (Lingkari kondisi yang ada atau terlihat)

Bagian Rumah	Bahan				
Dinding	Bambu	Kayu	Beton		
Lantai	Tanah	Beton	Kayu	Tegel	Bambu
Atap	Nipa	Seng	Kayu	Genteng	
Jendela	Terbuka	Papan	Kaca		

13.2 Fasilitas dan Perabot yang ada (Lingkari huruf yang sesuai; * garis bawah yang ada)

a. Listrik	h. Bangku kayu
b. Kipas Angin	i. Lemari Pajangan
c. Kulkas	j. Lemari
d. WC di dalam rumah	k. Radio Kaset
e. Air leding pribadi	l. Televisi (berwarna / hitam putih)*
f. Satu set kursi Tamu	m. Antena Parabola
g. Kursi (kayu / plastik)*	n. Memasak: (Kompor: Minyak-Gas-Listrik)/Kayu *

14 Tanah yang anda "miliki" digunakan untuk : (pilih dari peruntukan yang ada, jika jawabannya Ya, tanyakan pula status tanah tersebut)

a. Perumahan (Ya / Tidak), Status tanah……
b. Pertanian (Ya / Tidak)), Status tanah……..
c. Peternakan (Ya / Tidak)), Status tanah……
d. Tempat usaha Warung, Toko (Ya / Tidak), Status tanah……..
dan lain-lain…….....(Tulis kalau ada)

Nomor responden: ……..(L - P)

BAGIAN KETIGA

PENJAJAKAN SIKAP INDIVIDUAL

Nama responden: ……

Bagian ini harus ditanyakan secara terpisah pada suami dan istri dari satu rumah tangga responden.

15.1 Dibandingkan dengan 5 tahun yang lalu, apakah ekonomi rumah tangga sekarang merasa lebih baik atau lebih buruk?
Jawab: (Lebih baik / Lebih buruk / Sama-saja / Tidak-tahu)*
Mengapa? Alasan (1) ……..……...……
(2) ……..……
(3) …….....……dst

15.2 Dalam 5 tahun ke depan, apakah ada kemungkinan keadaan hidup menjadi lebih baik atau tetap seperti sekarang?
Jawab: (Lebih baik / Tetap / Tidak-tahu)*

15.3 Saat ini masih ada sejumlah orang memakai bom untuk menangkap ikan. Menurut anda, mengapa mereka menggunakan bom?
(1) ….....……
(2) …… dst. (sebutkan) ……..……

15.4 Menurut anda apakah bom itu merusak lingkungan laut?
Jawab: (Ya / Tidak / Tidak tahu)*.

15.5 Masalah-masalah utama apa yang dirasakan paling sulit dihadapi oleh anda dan keluarga pada saat ini? (1) …… (2) .....
(3) …..…… ..... (4) …….....……
(5) …….. (6) dst. ……

Pertanyaan berikut ini untuk mengetahui apakah responden setuju atau tidak setuju. Apabila responden menjawab salah satu, tanyakan lagi tingkatan rasa setuju atau tidak setuju tersebut. Lingkari satu huruf yang tepat untuk setiap satu pernyataan.

Pernyataan:

1. Kegiatan manusia di laut tidak mempengaruhi keadaan jumlah ikan di dalam laut:
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

2. Apabila hutan bakau tidak di lindungi maka kita tidak dapat lagi menangkap ikan kecil-kecil.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

Nomor responden: …….(L - P)

PENJAJAKAN SIKAP INDIVIDUAL

Nama responden:.....……

3. Kita harus perduli dan menjaga tanah dan laut, bila tidak maka tanah dan laut tidak akan menyediakan makanan bagi kita di kemudian hari.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

4. Membuang sampah ke pantai, akan di bawah arus ke laut dan tidak akan menimbulkan kerusakan lingkungan laut.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

5. Kita tidak perlu kuatir mengenai lingkungan udara dan laut, karena Tuhan akan merawat dan menjaganya
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

6. Apabila ada kerjasama dari masyarakat maka sumberdaya alam di sekitar desa dapat dijaga dan dilindungi.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

7. Menangkap ikan akan menjadi lebih mudah bila karang tempat hidup ikan diangkat dan diambil habis.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

8. Perkebunan di perbukitan di belakang desa dapat mempengaruhi kehidupan ikan.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

9. Karena begitu banyak ikan di laut, maka berapa pun yang ditangkap, ikan akan tetap tersedia cukup bagi kebutuhan kita.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

10. Kawasan laut yang dapat dimanfaatkan oleh desa ini terbatas.
    a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

Pendidikan terakhir: ……
Umur: ……. tahun
Kelamin: (Lelaki/Perempuan)*
Suku ……..
Agama : …….

Nomor responden: ……..(L - P)

BAGIAN KETIGA

PENJAJAKAN SIKAP INDIVIDUAL

Nama responden:.……

Bagian ini harus ditanyakan secara terpisah pada suami dan istri dari satu rumah tangga responden.

15.1.Dibandingkan dengan 5 tahun yang lalu, apakah ekonomi rumah tangga sekarang merasa lebih baik atau lebih buruk?
Jawab: (Lebih baik / Lebih buruk / Sama-saja / Tidak-tahu)*
Mengapa? Alasan (1) ……..……
(2) ……..…….….
(3) ……..dst. ……

Dalam 5 tahun ke depan, apakah ada kemungkinan keadaan hidup menjadi lebih baik atau tetap seperti sekarang?
Jawab: (Lebih baik / Tetap / Tidak-tahu)*

15.3 Saat ini masih ada sejumlah orang memakai bom untuk menangkap ikan. Menurut anda, mengapa mereka menggunakan bom? (1) ……. (2) ……. dst. (sebutkan) ……..……

Menurut anda apakah bom itu merusak lingkungan laut?
Jawab: (Ya / Tidak / Tidak tahu)*.

15.5 Masalah-masalah utama apa yang dirasakan paling sulit dihadapi oleh anda dan keluarga pada saat ini? (1) ……
……. (3) ….……
(4) …… (5) …….
(6) dst. ……

Pertanyaan berikut ini untuk mengetahui apakah responden setuju atau tidak setuju. Apabila responden menjawab salah satu, tanyakan lagi tingkatan rasa setuju atau tidak setuju tersebut. Lingkari satu huruf yang tepat untuk setiap satu pernyataan.

Pernyataan:
1. Kegiatan manusia di laut tidak mempengaruhi keadaan jumlah ikan di dalam laut:
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

2. Apabila hutan bakau tidak di lindungi maka kita tidak dapat lagi menangkap ikan kecil-kecil.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju. g) setuju sekali.

Nomor responden: ……(L - P)

PENJAJAKAN SIKAP INDIVIDUAL Nama responden:..……

3. Kita harus perduli dan menjaga tanah dan laut, bila tidak maka tanah dan laut tidak akan menyediakan makanan bagi kita di kemudian hari.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

4. Membuang sampah ke pantai, akan dibawah arus ke laut dan tidak akan menimbulkan kerusakan lingkungan laut.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

5. Kita tidak perlu kuatir mengenai lingkungan udara dan laut, karena Tuhan akan merawat dan menjaganya
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

6. Apabila ada kerjasama dari masyarakat maka sumberdaya alam di sekitar desa dapat di jaga dan di lindungi.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

7. Menangkap ikan akan menjadi lebih mudah bila karang tempat hidup ikan di angkat dan di ambil habis.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

8. Perkebunan di perbukitan di belakang desa dapat mempengaruhi kehidupan ikan.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

9. Karena begitu banyak ikan di laut, maka berapa pun yang ditangkap, ikan akan tetap tersedia cukup bagi kebutuhan kita.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

10. Kawasan laut yang dapat dimafaatkan oleh desa ini terbatas.
   a) Sangat tidak setuju. b) tidak setuju. c) agak tidak setuju. d) tidak tahu. e) agak setuju. f) setuju.
   g) setuju sekali.

Pendidikan terakhir: …… Suku ……..
Umur: ……. tahun Agama : …….
Kelamin: (Lelaki/Perempuan)*

Terima Kasih atas kesediaan anda memberikan jawaban atas pertanyaan-pertanyaan diatas.

……. Juli 1998

APPENDIX II: MINI-SURVEY QUESTIONNAIRE

FORMULIR WAWACARA SURVEI MINI
MONITORING DESA PROYEK PESISIR

Hari/tanggal : …… Nomor responden : ……

* Lingkari jawaban yang tepat !

Desa : …… Dusun : ……. Pewancara : ……

Nama responden : ……. Umur : …….thn (Lelaki/Perempuan)*

***Petunjuk** : Tanyakan keempat pertanyaan pertama sebelum melanjutkan ke no.5 dan 6. Jika jawaban dari setiap pertanyaan pada keempat pertanyaan pertama mengemukakan kekeringan pada tahun 1997-1998 (El Nino) sebagai satu alasan, tanyakan pertanyaan no.5. Jika setiap jawaban pada pertanyaan-pertanyaan pertama mengemukakan krisis ekonomi sebagai satu alasan, tanyakan pertanyaan no. 6 !*

1. Sumber pendapatan utama : ……

2. Dalam hal kesejahteraan rumah tangga, apakah keadaanya :
   *a). lebih baik b). lebih buruk c). sama seperti setahun yang lalu ?
   Mengapa ? ……

…….

…….

…….

3. Dalam 5 tahun ke depan apakah ada kemungkinan keadaan hidup menjadi :
   * a). lebih baik b). lebih buruk c). sama saja ?
   Mengapa ?

……..

……..

……..

……..

4. Masalah-masalah utama apa saja yang dihadapi oleh anda dan keluarga anda pada saat ini ?
   ……. (4) ……
   ……. (5) ……
   ……. (6) ……

5. Jika jawaban dari pertanyaan di atas ada yang mengemukakan kekeringan pada tahun 1997-1998 (El Nino) memberikan pengaruh yang spesifik. Misalnya, jika mereka mengatakan bahwa keadaan lebih buruk karena kekeringan , tanyakan mengapa ? (Jika mereka mengatakan bahwa hasil ladang mereka tidak tumbuh , tanyakan hasil tanaman apa ?
   ……
   ……
   ……

Jika jawaban dari pertanyaan di atas ada yang mengemukakan krisis ekonomi akhir-akhir ini memberikan pengaruh yang spesifik. Misalnya, jika mereka mengatakan bahwa harga telah naik, tanyakan harga untuk barang apa ? Jika mereka mengatakan bahwa biaya bertambah dalam melakukan kegiatan produktif (mis. Menangkap ikan, berkebun, dsb) tanyakan biaya apa yang meningkat? ……
……
……

……
……

INFORMASI YANG AKAN DIPEROLEH DARI INFORMAN

Bagaimana para petani (termasuk nelayan yang bertani) menjawab pertanyaan terhadap pengaruh dari kekeringan — bagaimana mereka mendapatkan kembali pendapatan yang hilang ?

Dapatkan informasi biaya untuk peralatan penangkapan (mis, tali pancing, jaring, perbaikan suku cadang, bahan bakar, dsb) pada waktu Bulan Juli tahun lalu dan saat ini.

Dapatkan informasi biaya untuk perlengkapan budidaya rumput laut pada Bulan Juli tahun lalu dan saat ini.

Dapatkan informasi biaya kebutuhan rumah tangga (beras [kualitas dan standar varietas], minyak goreng , bahan bakar untuk memasak [kayu, minyak tanah], air, listrik, ikan, daging, dll (yang dikemukakan dalam survei] pada Bulan Juli tahun lalu dan saat ini.

Dapatkan informasi tentang kisaran harga pembayaran dari penghasil ikan (jenis yang paling penting, lihat di bawah untuk nama-nama dan jenis-jenis dari informan kunci), rumput laut, nener bandeng, produksi perkebunan (kopra, cengkih, vanilli, jagung, beras, dsb) pada bulan Juli tahun lalu dan saat ini.

Tipe informan kunci :

Kapten *pajeko*	*Pemilik giop/*kapten	Nelayan jaring insang	Nelayan pancing
deho	*roa*	*tude*	*goropa*
malalugis	*deho*	*lolosi*	*tariasang*
cakalang	*cakalang*	*kembong*	*bobara*

APPENDIX III: A COMPARISION OF 1997 AND 1998 PRICES FOR VARIOUS COMMODITIES AND SERVICES IN BENTENAN AND TUMBAK VILLAGE

The data contained in Table A1 were collected from several key informants and 28 out of a total of 40 respondents to a survey questionnaire conducted in June 1998 in Bentenan and Tumbak Villages. Individuals were asked current prices of items as well as prices one year ago. Some 1997 prices listed here are subject to errors in memory involved in recalling prices from the previous year. Additionally, there have been frequent price hikes between June 1997 and July 1998 as the Rupiah

continued to devalue from an approximate exchange rate of RP2,500/1US$ in June 1997 to RP15,000/ 1US$ in July 1998. Large price hikes continue to take place, hence, recall of 1997 prices is subject to distortion as a result of the many extreme changes that have taken place. These price changes should therefore be viewed only as representative and qualitative differences from a year ago. In cases where different estimates of prices were provided by different respondents, the range in the prices reported for that item is listed. In addition, the Indonesian government controls the prices of some services and commodities including those referred to as "*Sembako"* (*Sembilan Bahan Pokok* - nine essential commodities). Controlled prices include: rice, sugar, cooking oil, flour, kerosene, gasoline and diesel fuel, salt, and bus fares. Prices paid for commodities in rural communities however, may sometimes exceed the regulated price due to price increases caused by additional layers in the marketing chain and additional costs of transportation out to rural areas. Prices of controlled commodities, although regulated, have also increased.

Prices of commodities typically purchased (fuel, fishing and farm inputs and daily food needs) have increased from a general range of 50 percent to over 400 percent. Prices of commodities typically sold (fish and farm produce) have also increased in the general range of 50 percent to over 400 percent. Prices for services (sometimes a cost to businesses and for others a contributor to household income) have increased in the general range of 50 to 200 percent. While prices have increased for commodities purchased due to inflation, prices for commodities produced and sold by residents have also increased. For many farmers producing export crops such as seaweed, copra and cloves, price increases have generally had a net benefit. Important fisheries in Bentenan and Tumbak where fish price increases have been in the higher range, and therefore more likely to be beneficial to fishers, include pelagics such as mackerel, garfish and scad (*ikan deho, roa* and *malalugis* respectively). In addition, since capital inputs such as gear, engines and boat hulls are not necessarily purchased on an annual basis, the full effects of some price increases may not have yet had an impact on residents. These factors help explain why more than half of the respondents to the 1998 surveys in Bentenan, Tumbak, Rumbia and Minanga feel that they are better off or the same as compared to a year ago.

One anomaly with these price changes is the price of ornamental fish. While the price of angelfish and "*Capungan*" fish (a species of cardinal fish)-which are caught in Banggai Island and transshipped through Tumbak-have increased, the price for other ornamental fish has not increased, even though aquarium fish is an export commodity. Since there is only one buyer of ornamental fish in Tumbak, the lack of competition among buyers may explain why price increases (in Rupiah) for ornamental fish sold abroad are not being shared or passed along to ornamental fish collectors in the Bentenan-Tumbak field site.

The above pricing information suggests that rural communities depending on the primary sectors of fishing and farming (particularly those producing export commodities), may be less affected and even benefit from the economic crisis in comparison to other sectors such as the manufacturing, government and banking sectors, where layoffs and/or minimal wage increases have been common.

Table A1: A comparison of 1997 and 1998 prices for various commodities and services in Bentenan and Tumbak villages.

Item	**1997 Price (Rupiah)**	**1998 Price (Rupiah)**	**Percent Change ***
Commodities Purchased			
A. Fuel/Gas:			
Gasoline	800/litre	1,500/litre	88%
Kerosene	65,000/drum	100,000/drum	54%

Kerosene	400/litre -500/litre	700/litre- 1,000/litre	75% - 100%
Oil	800/litre - 3,500/litre	1,500 - 6,500/litre	86% -88%
B. Fishing Gear:			
Ballast	350/pcs - 2,500/kg	750/pcs - 5,000/kg	100% - 114%
Engine 25 HP, Yamaha	3,600,000/pcs	11,000,000/psc	206%
Engine 40 HP, Yamaha	5,000,000/pcs	18,600,000/pcs	272%
Giop net	3,700,000/set -5,000,000/set		12,800,000/set - 11,000,000/set
	120% - 246%		
Hook no.10	25/pcs - 50/pcs	125/pcs -250/pcs	400%
Hook no.8/6	100/pcs	500/pcs	400%
Net	850/m -1,200/m	1,500/m - 2,500/m	109% - 77%
Net 1 inch	100,000/roll	600,000/roll	500%
Net	400,000/roll	1,500,000/roll	275%
Pukat net	25,000/set	67,000/net	168%
Rope for anchor	6,000/roll	22,500/roll	275%
String no.5	420,000/roll	1,200,000/roll	186%
String no. 6	75,000/roll	230,000/roll	207%
String no.20	2,000/roll - 5,000/roll	16,000/roll	220% - 700%
String no. 43	5,000/roll	30,000/roll	500%
String no. 100	300/roll -350/roll	1,000/roll	186% - 233%
Tarpaulin	8,000/roll	22,500/roll	181%
Ice	400/block	600/block	50%

* Percent Change = (New Price - Old Price)/Old Price x 100

Table A1 (continued)

Item	**1997 Price (Rupiah)**	**1998 Price (Rupiah)**	**Percent Change***
C. Seaweed Farm Equipment:			
Plastic rope	3,000/kg	7,500/kg	150%
Plastic rope	4,000/roll	8,000/roll	100%
Plastic bottle for buoy	3,000/sack	6,000/sack	100%
Rope	6,000/roll	17,500 - 25,000/roll	317%
Rope	2,500/kg	10,00/kg	300%
Seaweed seed	250/kg - 300/kg	750/kg - 1,000/kg	200- 233%
D. Farm Equipment:			
Coconut seed	Free	1,000/tree	-
Corn seed	250/litre - 300/litre	800/litre - 1,000/litre	220-233%
KCL fertilizer	1,500/kg	4,000/kg	167%
Insecticide	4,000/box	10,000/box	150%
Shovel	12,500/psc	25,000/pcs	100%
TSP fertilizer	400/kg	2,000/kg	400%
E. Daily Needs (food, etc):			
Cooking oil	1,000 - 2,500/bottle	5,000/bottle	100%
Flour	18,000 - 22,500/sack	66,000 -70,000/sack	211% - 267%
Flour	1,200/kg	5,000/kg	316%
Rice	750/kg - 1,200/kg	1,750/kg - 2,000/kg	67% - 133%
	800/litre - 850litre	1,900 - 2,000/litre	135% - 138%
Soap	600/pcs	1,000/pcs	67%
Sugar	1,000/litre - 1,250/litre	2,500/litre -3,200/litre	150% - 156%
Sugar	1,500/kg	2,500/kg	67%
Yeast	600/sachet	2,000/sachet	233%

* Percent Change = (New Price - Old Price)/Old Price x 100

Table A1 (continued)

Item	1997 Price (Rupiah)	1998 Price (Rupiah)	Percent Change*
Commodities Sold			
A. Fish:			
Angelfish (ikan hias)	5,000/fish	15,000/fish	200%
Blue-striped snapper	250/fish	350/fish	40%
Capungan fish (ikan hias)	500/fish	1,000/fish	100%
Dried Anchovy(ikan putih kering)	1,500/kg	3,000/kg	100%
Dried Garfish (ikan Roa kering)	10,000 - 12,000/pack	45,000 - 50,000/pack	317% - 350%
Dried Garfish (ikan Roa kering)	50/fish	200/fish	300%
Dried Sea cucumber	80,000/kg	150,000/kg	87%
Fussilier fish (ikan Lolosi)	100/fish	500/fish	400%
Garfish (ikan Roa basah)	50/fish	200/fish	300%
Lobster (big)	40,000/kg	70,000/kg	75%
Lobster (small)	15,000/kg	30,000/kg	100%
Mackerel (Deho)	15,000 - 100,000/box	50,000 - 250,000/box	100% - 471%
Mackerel (Deho)	500/fish	1,500/fish	200%
Milkfish fry	15/fish - 19/fish	30/fish - 37/fish	95-100%
Mouth mackerel (ikan Kembung)	50/fish - 75/fish	500/fish - 600/fish	700-900%
Ornamental fish	5,000/kg	5,000/kg	0%
Reef fish (ikan batu/karang)	25,000/basket	50,000/basket	100%
Salt fish	3,000/kg	8,000/kg	167%
Scad (ikan Malalugis)	100/fish	500/fish	400%
Skipjack fish (ikan Cakalang)	2,800/kg - 5,000/kg	5,000 - 10,000/kg	66% -114%
Grouper (small)	500/fish	1,000/fish	100%
Grouper (big)	6,000/fish	15,000/fish	150%
Trevallie	5,000/fish	10,000/fish	100%
B. Crops:			
Banana	350/hand	1,500/hand	329%
Chili	1,000/litre	6,000/litre	500%
Clove	2,000/kg	10,000/kg	400%
Coconut	200/pcs - 250/pcs	1,000/pcs	300% -400%
Copra	400/kg - 750/kg	2,000/kg - 3,000/kg	300%-400%
Corn	300/kg	700/kg	133%
Vanilla	4,000/kg wet 12,500/kg dry	-	-
Seaweed (rumput laut)	700 - 1,500/kg.dry	2,750 - 3,000/kg.dry	100- 293%

* Percent Change = (New Price - Old Price)/Old Price x 100

Table A1 (continued)

Item	1997 Price (Rupiah)	1998 Price (Rupiah)	Percent Change*
Services			
Farmhand	4,000-6,500/person/day	5,000-10,000/per./day	25% - 100%
Fishing boat crew	2,500/person/day	5,000/person/day	100%
Rent ox cart for coconut	5/pcs	100/pcs	1,900%
Rent ox cart for copra	1,000/sack	2,500/sack	150%
Seaweed labor	500 - 1,500/line	1,000 - 3,000/line	100%
Other			
Operational cost to catch fish	50,000/day/trip	100,000/day./trip	100%
Operational cost to catch fish	15,000/person/trip	30,000/person./trip	100%
Op. cost for ornamental fish boat	500,000/trip	1,000,000/trip	100%

Transportation cost for fish	1,000/box -3,000/box	3,000/box - 5,000/box	67% - 200%
Worker for repair net	2,000 - 3,000/per./day	7,500 - 6,000/per./day	275% - 100%

* Percent Change = (New Price - Old Price)/Old Price x 100