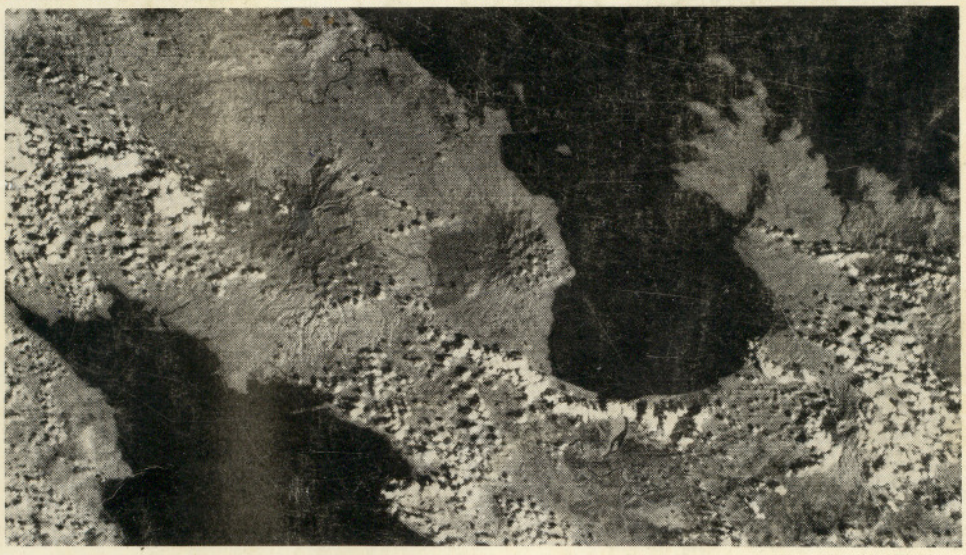
Small-scale fisheries of San Miguel Bay, Philippines: occupational and geographic mobility

Conner Bailey



INSTITUTE OF FISHERIES DEVELOPMENT AND RESEARCH, COLLEGE OF FISHERIES, UNIVERSITY OF THE PHILIPPINES IN THE VISAYAS;
INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT; THE UNITED NATIONS UNIVERSITY

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INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT
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Cover: *Upper:* Fishermen and buyers on the beach, San Miguel Bay. *Lower:* Satellite view of the Bay, to the right of center. [Photo, NASA, U.S.A.].

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Preface

The research project "Small-Scale Fisheries of San Miguel Bay: A Multidisciplinary Analysis" was conducted jointly by the Institute of Fisheries Development and Research (IFDR) of the College of Fisheries, University of the Philippines and the International Center for Living Aquatic Resources Management (ICLARM), both based in Manila, Philippines.

San Miguel Bay is one of the more important fisheries of the Philippines, being a shallow productive body of water producing large catches of fish, shrimp and other crustaceans. It is located in the Bicol Region of the Philippines towards the southern end of the island of Luzon, approximately 400 km south of Manila, the capital city and major market for fishery products, especially shrimp.

In addition to the Bay's high biological productivity, there were several other reasons why this site was chosen for this in-depth multidisciplinary study, the first of its kind in the Philippines, if not all of Southeast Asia. The Bicol Region is one of the more depressed areas of the country, with per capita incomes well below the national average. For this reason, and because of the potential for increased production from the agricultural sector, the Bicol River Basin Development Program (BRBDP), an integrated area development plan, was formulated in the early 1970s with the major purpose of building the necessary physical and social infrastructure to bring irrigation to the region's rainfed rice land. With its subsequent responsibilities expanding both geographically beyond the Bicol River basin and administratively to include activities other than rice, the BRBDP became interested in the potential for incorporating fishing communities into its development planning. The opportunity existed therefore for this IFDR/ICLARM research project to provide some of the basic biological and socioeconomic information on the fisheries that would make such planning possible.

Other reasons for selecting San Miguel Bay relate to the biology of the fishery. With a narrow mouth in the North, the Bay sustains what can be identified essentially as a unit fishery, with almost all the fishing activity of residents around the Bay confined to the Bay itself. Moreover, biological data were available from the 1950s, thus providing a basis for comparison with data collected by this research project, and allowing the researchers to address allegations that the Bay is overfished.

Finally, two major gear types typical of Philippine waters, gill-netters and trawlers, compete for the same stocks within the Bay. This research project was designed to determine the distribution of total catch and revenues among major gear types, so that informed decisions regarding possible gear regulations could be made by the Bureau of Fisheries and Aquatic Resources (BFAR) and the municipalities which have responsibility for enforcing fishery regulations in the San Miguel Bay and other fishing grounds of the country.

In addition to funding from IFDR and ICLARM the project received grants from the United Nations University (UNU), Tokyo, Japan and the Philippine Council for Agriculture and Resources Research and Development (PCARRD), Los Baños, Laguna, Philippines. IFDR and ICLARM are both grateful for this support because completion of this research project would have been impossible without it.

The project has produced four technical reports which cover the biological, economic and sociological aspects of the San Miguel Bay fisheries. A fifth report synthesizes these complementary perspectives and discusses their implications for managing the San Miguel Bay fisheries.

As part of the project's socioeconomic perspective, this technical report analyzes existing and

potential sources of alternative employment for fishermen and their families in the San Miguel Bay area, and the effect these alternatives have or might have on reducing levels of fishing effort. Stated willingness of fishermen to change their occupation and their place of residence is compared to the availability of alternative employment and to patterns of migration. The study is based on the analysis of census data, results of a household socioeconomic survey, and personal observations and in-depth interviews conducted over the 16 months from February 1980 to June 1981.

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Small-Scale Fisheries of San Miguel Bay, Philippines: Occupational and Geographic Mobility

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Abstract

The possibility of raising incomes and standards of living among small-scale fishermen in much of the developing world is constrained by the limited nature of their fishery resources. In this report existing patterns and future potentials for occupational and geographic mobility among small-scale fishermen of San Miguel Bay, Philippines were examined to determine whether such mobility has led or is likely to lead to a reduction of surplus fishing labor or improvements in the productivity and incomes of those fishermen who remain.

Existing alternatives to fishing within the local economy were examined and found to offer only limited potential for absorbing labor from the fisheries sector. A high degree of stated willingness to change both occupation and residence was found to exist among fishermen regardless of age, educational attainment, ownership of house or land, and type of fisherman (e.g., owner-operator, crewman).

Examination of census data at the community *(barangay)* level for the period 1939-80 using census-survival techniques indicated substantial net out-migration from the San Miguel Bay area. Nonetheless, in absolute terms, numbers of fishermen have increased during this period, contributing to heavy pressure on the Bay's marine resources. Equally significant in terms of fishing effort were trawlers, which began operating within the Bay during the 1970s. Owned by a small number of families, these trawlers employed 10% of the Bay's fishermen but accounted for 47% of the total catch in 1980.

The issue of competition between small-scale fishermen and trawler operators in San Miguel Bay was discussed. The appropriateness of displacing small-scale fishermen from their traditional fishing grounds was questioned, especially where alternative employment opportunities are limited, as is the case in the San Miguel Bay area. In the long term the encouragement of economic alternatives to fishing was found to be essential, but in the short term, efforts to improve conditions among small-scale fishermen might more effectively be based on better enforcement of current management regulations, which are designed to limit competition between small-scale fishermen and trawlers.

Too Many Fishermen, Too Few Fish

THE DILEMMA OF SMALL-SCALE FISHERIES DEVELOPMENT

Efforts designed to improve incomes and standards of living of the developing world's small-scale rural producers have perhaps inevitably emphasized increasing agricultural productivity. This approach to rural development, a natural consequence of growing human populations and finite

resources of arable land, has led to intensified use of labor and purchased inputs in a generally successful effort to coax higher yields from existing farmlands. Efforts to apply a similar strategy of intensification in the hope of increasing productivity of small-scale fishermen, however, have been less successful.

This is primarily due to fundamental differences between terrestrial and marine resources. The productivity of agricultural land can be increased by fertilizers, irrigation, the introduction of new plant varieties, or more careful crop management techniques. Moreover, issues of land tenure aside, there is a reasonable chance that the farmer who undertakes the expense and effort of such improvements will reap the benefits thereof. In contrast, marine capture fisheries are not nearly as amenable to this sort of managed change. There is very little that man can do to improve the natural productivity of the sea, though it certainly is true that he is capable of affecting it negatively through pollution or, more commonly, by exploiting a fishery beyond its maximum sustainable yield (see Pauly and Mines 1982). Since the sea is an open access resource available to all, it is in no single individual's interest to limit his level of exploitation. Garett Hardin's "Tragedy of the Commons" (1968) is the most elegant statement of this problem. Within the fisheries literature, the tendency towards overexploitation of marine resources has been widely noted by, among others, Gordon (1954) and Christy and Scott (1965). Throughout the developing world, ever increasing numbers of small-scale fishermen using increasingly effective boats and gear threaten coastal marine resources with overexploitation, a problem exacerbated by frequent encroachment of large-scale commercial fishermen on nearshore fishing grounds. As will be seen in the following pages, these twin pressures describe the present situation of San Miguel Bay.

This, then, is the dilemma: how do we speak of development for small-scale fisheries when the resource upon which fishermen depend for their livelihood itself already may be overexploited?

Small-scale fishermen in the developing nations are generally very poor. The reasons for this poverty vary from country to country and from locale to locale, but at the heart of the issue lies the limitation of a finite living resource. Providing small-scale fishermen improved means of exploiting this resource may lead to short-term gains but sooner or later will lead to overexploitation and a reduction in catch. In recent years there has been increased acceptance of the fact that small-scale fisheries development cannot be divorced from resource management. Rather than speak of development, which is commonly associated with improving technology to increase productivity of individual small-scale fishermen, it often is necessary to emphasize management of the resource to ensure an optimum sustainable yield not only for the producer but for protein-hungry consumers as well. Management of a fishery requires some form of control on fishing effort. This may be accomplished through regulating mesh sizes, establishing closed seasons, restricting the types of gear in use, or other similar measures.

DIVERSIFICATION AND ECONOMIC ALTERNATIVES FOR SMALL-SCALE FISHERMEN

In the case of small-scale fisheries in the developing world, however, such regulations offer limited scope for effective management. The productivity of small-scale fishermen tends already to be low and measures to further limit fishing effort by this sub-sector would exacerbate problems of poverty. Increasing attention has, therefore, been devoted to the search for alternative economic opportunities in an effort to reduce in absolute terms the number of fishermen supported by coastal small-scale fisheries (IPFC 1980; Smith 1979, 1981). It is hoped that pressure on the resource itself will be relieved and that the production (and incomes) of those fishermen who remain will increase. In the long run, the basic problem of too many fishermen chasing after too few fish depends upon the absorption of labor from small-scale fisheries into other productive pursuits.

A number of studies indicate that small-scale fishermen often are engaged in agricultural or other pursuits on a part-time basis (Collier et al. 1977; Smith et al. 1980; Bailey 1983). Such diversification frequently is necessary due to seasonal high winds and rough seas or seasonal avail-

ability of fish. Alternative economic opportunities available in most Philippine coastal fishing communities, however, tend to be limited. Land suitable for agricultural purposes often is limited in area and productivity. Frequent intrusion of sea water, acid-sulfate soils, or sandy soils low in organic content and incapable of retaining moisture or nutrients, are some of the more common constraints. High winds and rugged mountains extending down to the shoreline affect agricultural productivity in some areas, including parts of San Miguel Bay.

Even where conditions are favorable, most small-scale fishermen do not own agricultural land. Those who take part in farming do so as tenants or agricultural laborers and must compete with other landless agricultural laborers. In common with fishermen elsewhere, economic opportunities beyond the communities surrounding the Bay are limited by physical isolation from urban growth centers and the absence of skills marketable in an urban setting.

These generalizations accurately reflect conditions in San Miguel Bay and the surrounding communities. Because conditions in many other parts of the Philippines (and elsewhere in the developing world) are quite similar, it is hoped that this study, while focusing on the particular problems of one area, will serve to highlight the basic issues generally involved in reducing fishing effort through the encouragement of economic alternatives to fishing.

FIELD METHODOLOGY AND DATA SOURCES

During the 16 months of field research the main tools of my craft were in-depth interviews and personal observation with varying levels and types of participation. The Bicol language was my primary medium of verbal communication. Extensive use was made of census returns and other secondary information. I have also had the benefit of large volumes of information from the detailed socioeconomic survey conducted by the sociology team of the project. A glossary of commonly-used terms is provided following the text of this report.

The first six months (February to July 1980) were spent living in the fishing community of Barcelonita, learning the Bicol language and studying the dynamics of life in a reasonably typical fishing community. The choice of Barcelonita was made on the basis of several criteria. It was conveniently located within 10 km of the project headquarters in Cabusao. Barcelonita also offered other advantages; it is located literally at the end of a road and many coastal fishing communities along the western coast of the Bay moved their goods through Barcelonita. Residence in Barcelonita afforded a convenient vantage from which to view these activities.

At the end of July 1980 I moved from Barcelonita to Naga City, the commercial center of the Bicol Region. Naga City is located 12 km by road from the large fishing community of Sabang, Calabanga. Residence in Naga City allowed me to observe more closely the manufacturing and commercial opportunities of the Bicol Region, an important consideration for this study. Naga City also provided a more central location for studying communities along the southern and eastern flanks of San Miguel Bay, in particular Sabang, whose importance as the base for the Bay's fleet of various sized trawlers could not be ignored.

The Setting of the Study

SAN MIGUEL BAY

Located in the Bicol Region of the Philippines (Fig. 1), San Miguel Bay is the most productive coastal fishing ground of Luzon's entire eastern coast. This fishery directly supports 3,500 households. Average household size in the study area is 6.8, meaning that approximately 24,000 people depend on this fishery for their livelihoods. With an average of 1.6 active fishermen per household, 5,600 fishermen are directly employed in exploiting this resource. In addition to the income earned by these fishermen at sea, several thousand members of their families are employed on a part-time or seasonal basis in such ancillary services as fish processing and marketing. Numerous others are employed in boat building, transportation, and the supply of provisions, fuel, gear and equipment.

San Miguel Bay offers one of the few protected bodies of water along the Pacific coast where year-round fishing is possible. The other eastern shores of Luzon and the islands to the south are exposed to the high winds and strong seas of the Pacific Ocean, which limit the ability of small-scale fishermen to operate, especially during the height of the northeast monsoon (November-February). Unlike most of the Philippines' Pacific fisheries, which are deep-water fisheries, San Miguel Bay is relatively shallow. According to charts dating from 1907, 80% of the Bay is less than 7 fathoms (fm) (12.8 m) in depth and 40% is less than 4 fm (7.3 m). Table 1 gives the distribution of depth zones by area. Only at the mouth of the Bay are depths of over 10 fm (18.3 m) to be found. In fact, the Bay is now shallower than these figures indicate due to considerable siltation during the intervening years. In some parts of the Bay 1.5 m of silt has been deposited since 1907 (Mines et al. 1982).

Table 1. Depth zones and areas of San Miguel Bay.

Depth zone	Fathoms	Depth zone in meters	Area in km^2	Area in % of total	
1	0.0 - 3.9	0.0 - 7.2	333.45	39.8	
	4.0 - 4.9	7.3 - 9.0	137.94	16.5	
2	5.0 - 5.9	9.1 - 10.9	97.49	11.6	39.6
	6.0 - 6.9	11.0 - 12.7	96.18	11.5	
	7.0 - 7.9	12.8 - 14.5	44.64	5.3	
3	8.0 - 8.9	14.6 - 16.4	40.22	4.8	13.9
	9.0 - 9.9	16.5 - 18.2	32.19	3.8	
	10.0 - 10.9	18.3 - 20.0	21.19	2.5	
	11.0 - 11.9	20.1 - 21.8	15.63	1.9	
	12.0 - 12.9	21.9 - 23.7	9.66	1.2	
4	13.0 - 13.9	23.8 - 25.5	4.46	0.5	6.7
	14.0 - 14.9	25.6 - 27.3	2.39	0.3	
	15.0 - 15.9	27.4 - 29.2	1.82	0.2	
	16.0 - 16.9	29.3 - 31.0	0.57	0.1	

Source: Based on data in Mines et al. (1982).

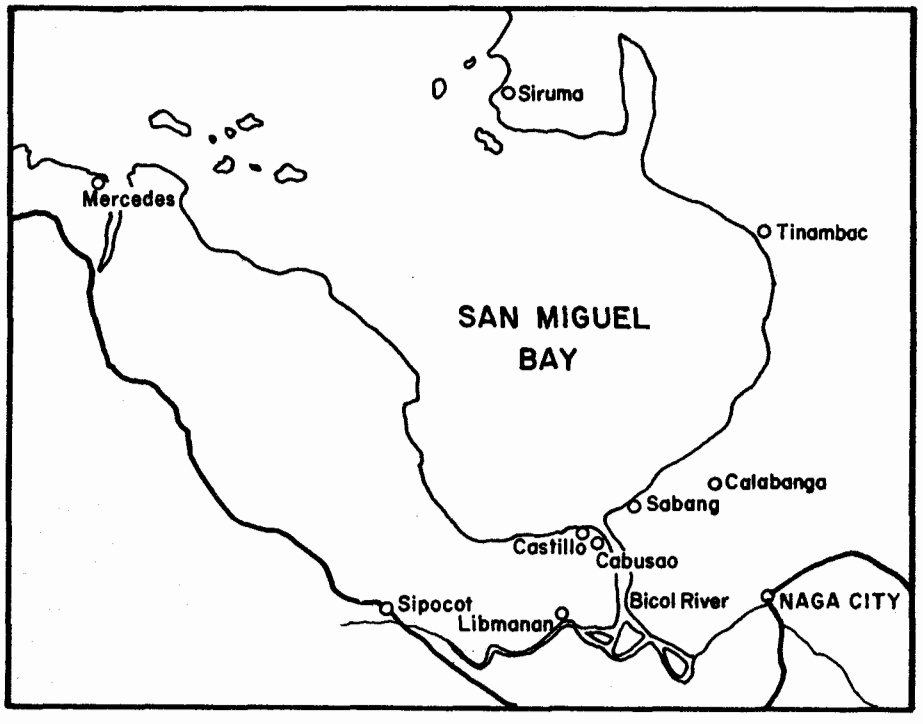

Fig. 1. San Miguel Bay, Philippines.

The Bicol River discharges copious quantities of nutrient-rich silt into the Bay. The Bay's bottom and most of its shoreline are comprised of soft mud deposited over the years. The broad alluvial plain formed by the Bicol River lies at the southern base of the Bay and rises gradually to a series of hills which run in a southeasterly direction. Rice, grown under both rainfed and irrigated conditions, is the primary product of this plain. Along the southern border of the Bay, rice lands give way to mangrove swamps, with a transition zone of marginal rice land subject to frequent inundation by saline water. The municipalities of Cabusao and Calabanga share this southern border of the Bay, with Cabusao to the west and Calabanga to the east of the Bicol River.

The eastern and western flanks of San Miguel Bay are primarily hilly to mountainous. On the western side, the rolling hills of Sipocot municipality give way further north to the mountains of the Bicol National Forest located within the municipality of Mercedes. Of the six municipalities bordering San Miguel Bay, Mercedes is the only one in Camarines Norte Province; the remaining five municipalities are in Camarines Sur Province.

The eastern side of San Miguel Bay is divided between the municipalities of Tinambac and Siruma. At the southern extreme of Tinambac, where that municipality borders with Calabanga, foothills of Mt. Isarog (elevation 1,976 m) descend to the Bay. Further north through Tinambac and Siruma, the terrain is dominated by low hills. Both here and along the western side of the Bay the most important crop is coconut. Difficult and expensive transportation due to lack of roads seriously affects the marketing of this bulky crop, and of course also affects marketing of such a perishable commodity as fish. The municipalities of Cabusao and Calabanga to the south and most of Tinambac to the east are connected to their most important markets by rough but serviceable roads. Part of Tinambac and Mercedes municipalities, and all of Sipocot and Siruma municipalities lack roads connecting their coastal communities to the outside world. Of San Miguel Bay's total coastline of approximately 115 km, more than half (75 km) is without road service. Nearly half of all fishing communities and nearly half of the total population living on the shores of San Miguel Bay are thus affected (Fig. 1 and Table 2). Residents of these isolated communities rely on boats of various sizes to move their products or for travel.

Table 2. Population of fishing communities surrounding San Miguel Bay, 1980.

Barangay	Population	Barangay	Population
1. Apuao*	272	22. Balongay*	794
2. Quinapaguian*	531	23. Punta Tarawal	314
3. Cariñgo*	600	24. Sabang*	3,053
4. Cayucyucan*	674	25. Belen	796
5. Masalongsalong	578	26. Bonot-Sta Rosa*	1,124
6. Mambungalon*	1,170	27. Sibobo*	828
7. Matoogtoog*	750	28. Cagsao	807
8. Hinipaan	941	29. Bagacay*	1,709
9. Colasi	1,154	30. Caaluan	446
10. Hamoraon	922	31. Salvacion	785
11. Lalawigan	1,043	32. Sogod*	1,016
12. Lanot*	734	33. Union	670
13. San Vicente	817	34. Buenavista*	1,867
14. Cotmo	877	35. Magtang	529
15. Calampinay	450	36. Cagliliog*	1,158
16. Manga*	858	37. Bani	806
17. Barcelonita*	2,147	38. Daligan*	851
18. Pandan*	1,138	39. Sulpa*	682
19. Castillo*	2,666	40. Cabugao	797
20. Santa Cruz	806	41. Vito*	1,333
21. Santa Lutgarda	673		

Source: 1980 Census of the Population (Camarines Norte and Camarines Sur).
Note: Communities marked with asterisks were included in the project's socioeconomic survey.

The Bicol Region and San Miguel Bay lie within the so-called typhoon belt. On an average, 20 typhoons and tropical depressions can be expected to roll in from the Pacific each year (NEDA 1980), many affecting the Bicol Region. The typhoon season begins as early as May and lasts through November, with peak activity being concentrated between July and September. Heavy winds and high seas make fishing impossible during such storms and often for several days thereafter. More serious than this periodic disruption of daily activities is the destruction of crops, property and even human life by particularly severe storms, such as Typhoon Siring, which flooded several coastal communities in 1970 and killed a number of people living there.

The hills and mountains surrounding San Miguel Bay on the south, east and west offer little effective protection from a strong storm, but they do shelter parts of the Bay for most of the year. Weather in the Philippines is determined to a large extent by the northeast and the southwest monsoons. During November through April when the northeast monsoon dominates, the coastal waters of Siruma and Tinambac are sheltered from the strong winds of that season, while waters off Cabusao, Siruma and especially Mercedes are quite rough. After a transitional period of general calm throughout the Bay, the southwest monsoon begins in May or June and lasts through September before tapering off and giving way once again to the northeast monsoon. During the southwest monsoon the waters of Cabusao, Calabanga, Sipocot and Mercedes are calmer than those off Tinambac and Siruma. Thus at all times other than severely stormy weather, fishermen are able to operate in some parts of the Bay, and there is considerable movement of fishermen from one location to another to take advantage of this fact.

FISHING IN SAN MIGUEL BAY

San Miguel Bay's natural endowments are both a blessing and a curse. High natural productivity and the ability to operate all or most of the year have contributed to extremely high levels of resource exploitation (Pauly and Mines 1982). Some 5,600 full- and part-time fishermen operate within San Miguel Bay, which has a surface area of approximately 840 km^2. The image of more than six fishermen per square kilometer of surface area is dramatic but inconclusive evidence of too many fishermen chasing too few fish. More important from the standpoint of measuring the level of fishing effort is the relative efficiency (as measured in weight, not value, of fish landed) of the various gears actually in use. Pauly and Mines (1982) provide this information for gear used in San Miguel Bay. A wide range of gear types with varying degrees of efficiency is used in exploiting San Miguel Bay's marine resources, operated from both motorized and non-motorized boats.

The most common fishing craft here as elsewhere in the Philippines is the "pumpboat", a narrow canoe with outriggers on both sides (Spoehr 1980). The keel may be either a hollowed-out log or a milled hardwood beam. The siding is marine plywood supported by ribs. Also common are boats without outriggers fashioned from hollowed-out logs of various sizes. Either style of boat may be referred to as a *banca* and may be motorized or not. The most common engine in use (Briggs and Stratton) burns regular gasoline and generates 9-16 horsepower (hp). Since the boats are of very shallow draft, when motorized they are capable of speeds in excess of 15 km/hr in calm water. Non-motorized boats are powered by paddle or a simple sail and are usually less than 5 m in length. Motorized *bancas* are more commonly 7-10 m in length. A small non-motorized boat may cost ₱300-500 (₱8.00= US$1.00) while a new motorized boat requires an investment of ₱6,000 or more (see Smith and Mines 1982). Non-motorized boats are more numerous and are usually used by hook-and-line fishermen and/or part-time fishermen.

The most significant small-scale gear types in terms of catch are gill-nets (both bottom-set and drifting) made of monofilament nylon or cotton thread. Different mesh sizes are used for the capture of fish, shrimp or crab depending on season and location. As a class known as *panke*, these gill-nets are operated from both motorized and non-motorized boats. These nets are normally used during the day.

The question of seasonality of fishing in the San Miguel Bay is discussed at length in Esporlas (1982) and seven contributions in Pauly and Mines (1982). Here it is sufficient to note that for a *panke* fisherman to be able to operate more than a few months of the year requires investment in more than one type of net. Cost per net varies depending on length and size of mesh, but a figure of ₱1,500-2,000 per net is a rough estimate of the required investment.

The most common type of gear used in San Miguel Bay is the simple hook and line. Hook-and-line fishermen are most active in the municipalities of Mercedes and Siruma at the mouth of the Bay. There, rocky outcrops and coral reefs are protected by a number of small islands. From these relatively deep and clear waters, a wide variety of high-value species are caught, notably grouper and Spanish mackerel. The investment costs for this gear are quite small. Thus, even though they live at some distance from the better fishing grounds for hook and line, some fishermen with motorized boats from other municipalities utilize this gear part of the year. A gill-net operator who owns only one type of *panke* can continue to fish past the season for which his net is appropriate with minimal investment by switching to hook and line. The viability of this option, however, decreases with distance from the hook-and-line fishing grounds. It is for this reason that this gear is used by relatively few fishermen from the more heavily populated fishing communities of Cabusao and Calabanga at the southern base of San Miguel Bay.

Fishermen from these municipalities have other options available to them besides the various gill-nets. If they do not own a boat they can still operate a scissor net *(hud-hud)* which is pushed through chest-deep water and used to capture a species of very small shrimp known as *balao* (a sergestid shrimp). The scissor net consists of two poles with a mosquito net-like screen costing less than ₱100. If the fisherman owns a suitable boat, another option is the mini trawl, variously known as *itik-itik*, *kuto-kuto*, or *mangquerna*. These mini-trawl nets, often equipped with otter boards, are pulled by a pumpboat with a 16-hp engine and are used to capture *balao*. A very fine mesh screen is used in the cod end of the net. The combination of fine mesh and low engine power results in a very slow trawling speed. Consequently, very few fish are captured by these mini trawls. There are, however, some mini trawls using somewhat larger meshed cod ends which allow for greater trawling speed and hence capture a higher proportion of small fish. Larger fish appear able to escape from such nets, however, and most of the catch from mini trawls rigged for fish is sold for fish meal. Mini trawls are concentrated in the municipalities of Sipocot, Cabusao, Calabanga and Tinambac and generally operate in waters of 4 fm or less. The gear itself is not as expensive to acquire as a gill-net, but fuel expenses for a mini trawler are considerably higher. A gill-net operator moves from shore to the fishing ground, waits to retrieve the net, possibly moves to another near-by location if the catch is unsatisfactory, and returns home. Total travel time is usually well under one hour. The engine of a mini trawler, in contrast, is running constantly for six to eight hours or more each day.

Both the gill-net and the mini trawl usually are operated by two or often three men and have similar sharing arrangements between owner and crew (Villafuerte and Bailey 1982). In addition to these two types of gear and the hook and line, there are a number of other gears in use in San Miguel Bay, including beach seines, stationary liftnets, fish corrals, tidal weirs, and stationary filter nets (see Esporlas 1982; Smith and Mines 1982). Investment costs and crew compositions vary tremendously but they share a common denominator: owners who do not fish and fishermen who do not own such gear typically live in the same community and have social and kinship ties in addition to their economic relationships. There are inequalities of income and of wealth in communities of small-scale fishermen. The social and economic stratification found within rural Philippine society is an obvious and much-remarked upon fact (Lynch 1959). Yet this system of stratification is based even to this day on traditional values of reciprocity. Fishing communities are not immune to jealousy and conflict, but these natural concomitants of inequality are to some extent at least mitigated by face-to-face contact in the community, ties of fictive and actual kinship, and bonds of support and service between patrons and their clients.

THE "BABY TRAWLERS" OF SAN MIGUEL BAY

There remains one other major type of gear operating in San Miguel Bay, a type of trawl known locally as the "baby trawl" or "Norway", that for a number of reasons deserves separate discussion. The characteristics which set this type of gear apart from others used in San Miguel Bay stem from being relatively capital-intensive. As is also done in Pauly and Mines (1982), Smith and Mines (1982) and Bailey (1982), baby trawlers are classified here according to displacement; those displacing less than three gross tons (GT) are identified as small trawlers and those in the range of three to ten GT are referred to as medium trawlers. (There also are a number of large commercial trawlers based near Naga City which usually operate outside San Miguel Bay. During some seasons these trawlers operate at the mouth of the Bay and at other times shoot their nets as they leave for or return from their normal fishing grounds. Vakily (1982) indicates that even this relatively small effort on their part is responsible for 10% of the total catch from San Miguel Bay.)

The distinction between small and medium trawlers is important on two counts. Small trawlers are permitted under existing regulations to operate in as little as 4 fm of water, while medium trawlers can operate only in waters over 7 fm in depth. The medium trawlers also typically have larger engines (e.g., 210-hp diesels) which permit the use of larger nets, operation in deeper waters, and/or faster trawling speeds than the small trawlers, which typically are powered by diesel engines generating 135 hp. Visually, both small and medium trawlers resemble over-grown pumpboats, complete with outriggers. There the similarity ends, however. Heavier and more sturdily constructed, baby trawlers are 15 m and more in length and can accommodate a crew of five or six men. Small trawlers cost ₱55,000 to build and equip, while medium trawlers cost over ₱75,000.

Few if any small-scale fishermen are able to afford this level of investment. In fact, most of the 75 small and 20 medium trawlers which operate within San Miguel Bay are owned by entrepreneurs who were born elsewhere. None of the owners actually go to sea, attending instead to marketing the catch and other details of what are distinctly commercially-oriented enterprises. Although trawler owners are willing to give material assistance to those who work on their boats, the nature of this relationship is more purely economic than is the case between owners and non-owners of other gear. Not only the size of the investment but the scale of the operations tends to make this so. Trawlers are economically quite efficient. Crewmen stand to earn more than fishermen operating simple small-scale gear, but the incomes earned by owners as a return to their sizeable investments and managerial expertise place them in a separate economic class from the fishermen who man their boats. The concentration of economic power is clearly indicated in Table 3. One family owns almost one quarter of all small and medium trawlers operating within San Miguel Bay, and five families control almost half the total trawler fleet.

Table 3. Distribution of ownership of small and medium trawlers based in San Miguel Bay (total = 95 trawlers).

No. of owners	No. of boats owned	Total no. of boats	% of units owned	Cum. % of units owned
1	24	24	25.3	25.3
2	6	12	12.6	37.9
2	4	8	8.4	46.3
4	3	12	12.6	58.9
5	2	10	10.5	69.4
11	1	11	11.6	81.0
n.a.	18	18	19.0	100.0
Total	95			

Source: Primary data collected by Project team.

Trawlers also can be differentiated from other types of gear found in San Miguel Bay on the basis of specialized crew tasks and responsibilities, which are reflected in a sharing system significantly more complex than that for other gears (Villafuerte and Bailey 1982). The most important member of a baby trawler's crew is the captain or *maestro*, who is responsible for the daily operation of the boat and decides when and where to shoot the nets. He is usually responsible for hiring and managing the crew. Since the owners do not accompany their boats to sea, they depend on their captains for safe and profitable operation. A competent captain who regularly returns with a good catch is a valuable resource for the owner. Thus, it is not surprising that trawler captains are given sizeable extra shares by the owners. Also of importance to the owner is the mechanic, who is responsible for maintaining the boat's engine and who receives a small extra payment. The remainder of the crew, three or four men, provide essentially unskilled labor for hauling the net and sorting the fish and receive a single share each. Most of these crewmen are younger than the captains, who earn their position through experience either locally or, less commonly, in other trawling grounds.

The shallow waters and soft muddy bottom of San Miguel Bay provide excellent conditions for trawlers. The general absence of hard rocky outcrops and coral reefs in most of the Bay reduces the likelihood of damage to the nets, while trawling in deeper waters would require larger, more powerful engines and greater fuel costs. The only significant physical obstacles to trawling are stationary liftnets scattered about in the south-central portion of the Bay. Trawlers occasionally snag their nets on submerged pilings of these liftnets, which remain after the liftnet is disassembled at the end of the season. Other than this problem, trawlers in San Miguel Bay are provided with optimal conditions and are both profitable and productive. It has been estimated that the 95 trawlers operating within San Miguel Bay, each with a crew of five to six men, account for 47% of the total volume of catch (excluding *balao)* from the Bay (Pauly 1982). Thus, less than 500 men operating boats owned by 25 families equal the volume of catch landed by more than 5,000 small-scale fishermen.

Many fishermen from San Miguel Bay allege, and personal observations confirm, that trawlers frequently ignore existing regulations which legally restrict them from operating in shallow waters. These waters include some of the most productive fishing grounds and where shrimp is most abundant. Shrimp constitute the most valuable part of a trawler's catch. Especially at night, when the shrimp are most active and most vulnerable to the trawl nets, trawlers operate close to shore. Not only are such night operations profitable, they have the added advantage of making more difficult the task of enforcing fishery regulations.

Local Alternatives to Fishing: Limited Options and Opportunities

THE NEED FOR ALTERNATIVES TO FISHING

Small-scale fishermen operating in San Miguel Bay are experiencing both a gradually declining catch per effort and rapidly increasing costs of operation. Three quarters of the 641 fishermen respondents of the project's socioeconomic survey were of the opinion that the Bay's resources are in decline. As noted above, this problem is common to many coastal fisheries in the Philippines and many other parts of the developing world. Researchers and administrators alike have called for the encouragement of alternative sources of income and employment for small-scale fishermen, both as a means of increasing incomes and as a means of reducing the level of effort exerted on coastal marine resources. Other means of reducing effort also may be considered (regulating mesh size, gear types, seasons of operation, etc.), but in the context of small-scale fisheries, limiting effort through these means may lead to greater hardship in the short term for this impoverished sector. Thus, in the long run, reducing levels of effort in a small-scale fishery depends to a large extent on the reduction of the absolute numbers of fishing units and fishermen, allowing higher levels of production for those who remain active in the fishery. Where heavy exploitation of coastal marine resources suggests the need to limit the numbers of fishermen, it is imperative to find viable economic alter-

natives for those who are displaced from the fishery. This section is an assessment of such alternatives in the local economy of the San Miguel Bay area.

PRESENT DEPENDENCE ON FISHING

Data from our socioeconomic survey indicated a very high level of dependence upon fishing as a source of income for respondents and their families. Fishing was a full-time occupation for most respondents, almost 70% of whom reported fishing on at least 12 of the 14 days preceding the interview. These interviews took place between the months of May and October 1980, when weather conditions were most favorable for sustained effort. From Table 4 it is clear, however, that while 39% of respondents fished 12 months of the year preceding the interview, almost half reported fishing 10 months or less. Such breaks in fishing activity are attributable to a combination of poor fishing conditions in the area nearest the respondent's home community and inadequacy or inappropriateness of his gear for a particular season.

Table 4. Number of months fishing in past twelve months (n = 620).

Months of fishing	No. of respondents	Percentage of respondents	Cumulative percentage
12	240	38.7	38.7
11	73	11.8	50.5
10	70	11.3	61.8
9	49	7.9	69.7
8	61	9.8	79.5
7	16	2.6	82.1
6	37	6.0	88.1
5	20	3.2	91.3
4	15	2.4	93.5
3	11	1.8	95.3
2	2	0.3	95.6
1	3	0.5	96.1
0	23	3.7	99.8

Source: Primary data from socioeconomic survey (Bailey 1982).

Notes: Data unavailable on 21 of our 641 respondents. The 23 respondents who reported no fishing in 12 months preceding our survey gave various reasons such as health for their inactivity. Cumulative figures do not add to 100% due to rounding.

LIMITED INVOLVEMENT IN AGRICULTURE

Seasonal lulls in fishing allow and encourage alternative economic activities. Yet only 182 of 641 (28.4%) respondent fishermen were active in other forms of employment which provide supplemental income to that derived from fishing (Table 5). The most important alternatives to fishing are in various agricultural pursuits. The level of income they derive from agriculture is quite limited, primarily because of difficulty in gaining access to land. There were 83 respondents whose involvement in agriculture was sufficiently substantive to be classified under "farming," but only seven owned rice land and four owned coconut land. Our definition of ownership included full owners with clear title, amortizing owners under the Land Reform program (there were none), as well as various part-ownership arrangements (e.g., respondent owned inherited land jointly with other siblings). The rest either were share-tenants, lessees, agricultural laborers, or had free use of small parcels of land.

Only 62 respondents (less than 10% of the sample) had regular access to agricultural land. The distribution of land among these cases, including all types of agricultural land and all categories of tenure, is presented in Table 6. We recorded only 24 cases, including all types of ownership and tenure arrangements, where one hectare or more was involved; in 38 cases respondents had access to

Table 5. Prevalence of supplemental occupations among respondent fishermen.

Type of supplemental employment	No.	Percentage
No supplemental occupations	459	71.6
Farming	83	12.9
Planting of root crops, maize, etc. for home consumption only	26	4.1
Laborer (including agricultural or other temporary laborer)	25	3.9
Petty trading (including fish and other products)	19	3.0
Carpentry	9	1.4
Animal husbandry	5	0.7
Others	15	2.3
Total	641	99.9

Source: Primary data from socioeconomic survey (Bailey 1982).
Note: Total percentage does not equal 100 due to rounding.

Table 6. Distribution of agricultural land, including all types of land and all tenure categories (n = 641).

Area (ha)	No. of cases	Percent of cases	Cumulative percentage
nil	579	90.3	90.3
0.1 - 0.9	38	5.9	96.2
1.0 - 1.9	7	1.1	97.3
2.0 - 2.9	3	0.5	97.8
3.0 - 3.9	4	0.6	98.4
4.0 - 4.9	7	1.1	99.5
5.9 - 9.9	2	0.3	99.8
> 10.0	1	0.2	100.0

Source: Primary data from socioeconomic survey (Bailey 1982).

less than one hectare. The remainder of those who reported farming as a secondary economic activity presumably worked as landless agricultural laborers. Only 23 members of respondents' households (besides respondents themselves) were reported to be engaged in any kind of agricultural pursuit.

It is quite likely that the sampling frame led to underestimating the numbers of fishermen who are part-time farmers. Because the primary interest of the project was on fishing, it concentrated on communities whose residents were primarily fishermen. Several isolated coastal communities in Mercedes had a higher concentration of part-time fishermen/farmers than elsewhere around the Bay, but were not included in the list of communities to be surveyed partly for this very reason. Another problem which limited our coverage of such communities was the presence of local bandits in the area and consequent concern regarding the physical safety of the survey team. It is also possible that part-time fishermen from communities studied were underrepresented in the sample. Even if the interaction between fishing and farming is underestimated by these survey results, it is clear that a substantial number of fishing families are not at present involved in the agricultural sector.

AGRICULTURAL OPTIONS AND OPPORTUNITIES

Limited present involvement in agriculture does not preclude increased future involvement. However, at least in the immediate hinterland of the coastal fishing communities surrounding San Miguel Bay, agricultural opportunities are distinctly limited. Neither are there unoccupied arable lands elsewhere within the Bicol Region, or, for that matter, elsewhere in the Philippines, with the possible exception of some areas on the island of Mindanao. For the most part, existing farm sizes are so small that even owners of farm land are faced with seasonal underemployment. Added to this are literally millions of landless agricultural laborers throughout the Philippines. Khan (1977) estimates that 68% of the national population is located in rural areas. On the basis of the 1980 census (NCSO 1981) the total population was 47,914,017, of which over 32,500,000 lived in rural areas. Khan states that 14% of the rural population are totally dependent upon wage and salary earnings in the agricultural sector (over 4,500,000) and 29% are to some extent dependent upon such employment (almost 9,450,000).

A significant proportion (14% in 1971) of all agricultural lands in the Philippines is in holdings of over 50 ha (NEDA 1980), devoted mostly to the production of coconuts and sugar cane. The present Land Reform program, however, is restricted to land on which the food grains of rice and corn are cultivated. Under this program an owner of more than 7 ha of rainfed rice or corn land or 3 ha of irrigated crop land must give up land in excess of those amounts to his tenants, who become amortizing owners. However, if an owner directly manages his farm and does not employ tenants, his lands are not subject to land reform (see Presidential Decree Number 27, October 21, 1972 and Pinpin 1974). Owners of tenanted land below these levels may retain their ownership, but must sign fixed tenancy agreements which insure the tenants' right to continued access to that land. Landless agricultural laborers without tenancy agreements do not qualify as beneficiaries under the Land Reform program.

A major problem with this program is that the average beneficiary typically receives such a small holding as to make survival as a full-time farmer difficult. In the Bicol Region, 36,204 tenants have gained full ownership over a total of 45,387 ha, or an average of 1.25 ha per beneficiary (NEDA 1980). A further 25,896 tenants have obtained formal leasehold rights over 24,147 ha, an average of 0.93 ha per farm family. The majority of these cases are for rice lands, and give an indication of the small holdings of many rice farmers in the Bicol Region. Data from the 1971 Census of Agriculture, collected the year before the current Land Reform program was inaugurated, show that even then this sector was dominated by numerous small rice farms (Table 7).

Table 7. Rice farms—number and size, Camarines Norte and Camarines Sur (April 1971).

Province	Total		<1 ha.		1-3 ha.		3-5 ha.		5-10 ha.		10-25 ha.		25-50 ha.		>50 ha.	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Camarines Norte	2,926	9,931	333	171	1,454	2,430	630	2,299	333	2,144	157	2,167	19	600	2	120
Camarines Sur	36,740	92,452	5,750	3,067	21,181	33,844	7,004	24,675	2,049	12,823	644	8,967	62	1,936	50	7,080

Source: NCSO (1971a and 1971b).

In the lowland rice producing areas surrounding San Miguel Bay, this pattern of small holdings is repeated. Within the coastal communities of Cabusao municipality, a total of 49 tenants have become amortizing owners of a total of 98.59 ha, an average of 2 ha per household. For the coastal communities of Calabanga municipality, 116 tenants have become amortizing owners of 46.28 ha, an average of less than 0.4 ha per household (data from the Ministry of Agrarian Reform, Magarao Office, Camarines Sur).

In Calabanga, the terrain near the coast is such that rice lands tend to be interspersed with lands devoted to other crops not covered by the land reform program. In Cabusao, however, agricultural land is devoted almost exclusively to rice and several large holdings owned by individual families have been affected by land reform.

The neighboring municipalities of Cabusao and Libmanan have been the subject of a baseline socioeconomic survey conducted during 1977 and 1978. Data from that study, presented in Table 8,

Table 8. Number of farmers by farm size and tenure status, Libmanan-Cabusao Integrated Development Project (1977-78).

Farm size	Tenure status					Total no.	Percent
	Owner operator	Amortizing owner[1]	Lessees	Share-tenants	Others[2]		
1.0 ha and below	42	104	149	101	21	417	34.37
1.1-2.0 ha	36	76	116	109	31	368	30.34
2.1-3.0 ha	26	68	81	49	27	251	20.70
3.1-4.0 ha	10	24	23	17	16	90	7.41
4.1 ha and above	22	12	19	10	24	87	7.17
Total	136	284	388	286	119	1,213	100.00

[1]Amortizing owners are those who have received Certificates of Land Transfer under the Land Reform Program.
[2]Includes those farmers who belong to two or more tenure groups.
Source: Libmanan-Cabusao Integrated Area Development Project Agro-Economic Development data (mimeo, n.d.).

show the distribution of farm size by tenure category. As may be seen, more than one third of all farms are one hectare or less in size. Unfortunately, no data are available on the number of local landless agricultural laborers, though it is doubtful that their proportion within the total agricultural labor force varies significantly from the national figures presented earlier in this section. The combination of small farm size of those fortunate enough to own or have access to land, and a large number of landless agricultural workers, is an indication that the local agricultural sector does not have the capacity to absorb surplus labor from the fishing sector.

Even if large landholdings devoted to coconut, sugar, or other crops not currently covered by land reform in the Philippines, were to be redistributed, the beneficiaries would be existing share-tenants and agricultural laborers and not fishermen. The numbers of such potential beneficiaries are sufficiently large to ensure that few openings would be available for non-agriculturalists. Indeed, we must recognize that the problem of too many fishermen and too few fish is part of a larger nation-wide phenomenon of too many rural producers and too few productive resources.

For the area around San Miguel Bay, and probably for most parts of the Philippines, all that small-scale fishermen can presently hope for from the agricultural sector is part-time employment and supplemental income. Yet the adaptations and particular mixes of economic activities found in the various communities around the Bay differ in important respects. These differences need further elucidation to determine whether location-specific opportunities exist and what strategies for enhancing the potential of agricultural production could be followed to improve the incomes and standards of living of small-scale fishermen.

LOWLAND AND UPLAND AGRICULTURE

Two distinct agricultural zones border San Miguel Bay. Along the southern edge of the Bay lies an alluvial plain dominated by rice monoculture, with a transition zone of mangrove swamp and marginal agricultural land along the shore. To the east and west of the Bay rise rolling hills where a number of crops, including corn, coconut and root crops are grown, the most important of which is coconut.

Lowland agriculture

Lowland agriculture, and specifically the culture of rice, has attracted considerable attention within the Bicol Region. The Bicol River Basin Development Program (BRBDP), a regional development and coordinating body of the national government, has concentrated the bulk of its attention and energies on providing irrigation and other infrastructure in support of rice production. Two BRBDP irrigation projects will have a major impact on coastal communities along the southern base of the Bay. The Libmanan-Cabusao Integrated Development Area Project will be in full operation during the dry season in early 1982. Some 4,000 ha, which presently depend on rainfall, are to be irrigated. Affecting coastal communities on the other side of the Bicol River, the Calabanga Integrated Development Area Project will irrigate another 4,000 ha.

The addition of a second crop and increases in productivity expected from improved water control during the main season will certainly benefit owners of farm land. Present and probably future labor requirements are provided by landless or near-landless farmers who reside in the immediate area. The common use of tractors, mechanical threshers and other labor-saving devices is likely to become more widespread due to time constraints imposed by the new double-cropping regimen. The benefits of increased production and heightened productivity are not likely to be passed along to agricultural laborers due to the relative abundance and marginal costs of such labor. Owners of rice land in other parts of the Philippines, where irrigation and improved production technologies have increased productivity, have effectively reduced the proportion of the crop earned by harvestors by stipulating that only those who weed the fields earlier in the season will be able to take part in the harvest. This right to take part in the harvest is considered payment for the weeding. There is no reason to expect that rice-land owners within the Libmanan-Cabusao or Calabanga project areas will respond differently. Indeed, this new arrangement between owners and agricultural laborers, known in Tagalog-speaking provinces as the *gama* system, already has been introduced to and is finding acceptance in the Bicol Region. The *gama* system has been analyzed by Hayami (1978), Smith and Gascon (1979) and Kikuchi et al. (1979). A similar realignment of traditional sharing systems which followed the introduction of new agricultural technologies in Indonesia has been described in Collier et al. (1973).

For fishermen, even those living on the borders of these projects, the direct effect on employment opportunities will be minimal. The indirect benefits of these agricultural development projects are likely to be more important. The most obvious of these indirect benefits is the improvement of local roads, of critical importance to fishing communities dependent upon quick and reliable transportation facilities to move their highly perishable product. Increased agricultural production, insofar as it leads to increases in local wealth, and hence demand for goods and services, may generate increased employment within the area. Viewed in isolation, these projects are insufficient to effect major changes in local employment opportunities, but they gain significance as part of a larger rural development effort aimed at improving standards of living for the rural population as a whole.

Upland agriculture

The hills and mountains on either flank of San Miguel Bay represent a greater diversity of conditions and opportunities than the more heavily exploited lowlands. The timber resources of what were within present life-times extensive areas of tropical forest no longer exist, but have been replaced by stands of coconut and *cogon* grass *(Imperata cylindrica)*. In some areas where terrain and soil conditions permit, maize is grown. Small pockets of land suitable for rainfed rice cultivation also exist. Cassava and other root crops are grown either within stands of coconut or in areas cleared of *cogon*. Citrus production is well established in Sipocot, including areas near the shores of San Miguel Bay. Limited areas also have been planted to sugar cane. Sugar cane is a relatively new crop in the Bicol Region, but is likely to attain increased importance now that a new sugar processing

mill has been established between Naga City and Iriga City. Sugar production in the Philippines tends to be large-scale and capital-intensive (see Lynch 1970 for an analysis of working conditions of agricultural laborers in the sugar industry in the Philippines). Limited seasonal employment opportunities probably will be filled by landless farmers living in proximity to the sugar fields. The potential involvement of fishermen in sugar production is limited by their limited access to land and inexperience with a crop that demands relatively high levels of capital and technical expertise. Even as laborers, their involvement is likely to be limited due to the ready availability of more experienced workers.

Soil, temperature and rainfall patterns favor a wide range of potential crops in the upland zones surrounding San Miguel Bay, yet this land is underutilized. Several factors account for this, perhaps the most important of which are problems related to the local coconut industry. Coconut stands in the area surrounding San Miguel Bay have been particularly hard hit by a viroid known as *cadang-cadang*, which kills mature coconut trees. This disease, first identified in the province of Albay before World War II, gradually has spread north through the Bicol Region. Field surveys conducted by the Philippine Coconut Authority indicate that an over-all mortality rate of 25% of all bearing trees has affected the eastern side of the Bay (Dr. Nazir Mohamed, FAO, pers. comm.), and personal observations indicate that the level of devastation is equally high on the western shore of the Bay. The effect of *cadang-cadang* has been even worse than these figures would indicate, however, since the presence of this disease discourages owners from replanting stands which are no longer productive due to advanced age or have been destroyed by typhoons. There is no known cure for this disease. There is some hope that new imported hybrid varieties will be resistant, but it can be expected that farmers will approach replanting with some caution until there is more evidence of this resistance.

In addition to *cadang-cadang*, unstable and low prices in the local and world markets and a substantial levy of ₱76 for each 100 kg of copra marketed have limited the attractiveness of coconut production in the Bicol Region. This levy underwent a number of changes during 1981 and 1982. In January 1982, the levy began to follow a sliding scale tied to the international market price of coconut oil. In October 1981, the levy had been reduced to ₱50/100 kg of copra. This reduction was not enough to still the controversy surrounding the levy (Sacerdoti 1982). The proceeds from the levy are to support research, replanting, and a number of social and economic services to benefit coconut producers. During 1980 and the first half of 1981, the farm-gate price received by copra producers in the San Miguel Bay area was between ₱55 and ₱80/100 kg.

The coconut tree, referred to in the Philippines as "the tree of life" because of the importance of its many products (food, drink, cooking oil, fiber, wood for fuel and other purposes), is admirably suited for the small farmer. Once a stand of coconuts is established, relatively little maintenance is required and the land below the trees can be used for grazing livestock or inter-planting with various crops. The labor requirement for copra production is periodic, allowing ample scope for alternative economic activities.

Not only small farmers are involved in coconut production; in 1971, 10% of all coconut lands were in holdings of 50 ha and more (NEDA 1980). Unfortunately, the 1981 Census of Agriculture was still being conducted as of this writing and I am unable to report if the gradual trend towards concentration of ownership of coconut land indicated in the comparative 1960 and 1971 figures continued into 1981. Available data do not allow for breaking down of farm size by type of farm and by municipality, but for the provinces of Camarines Sur and Camarines Norte the distribution of number and sizes of coconut farms is given in Table 9. The average coconut farm size for Camarines Sur is 6.48 ha; the average for Camarines Norte is slightly larger at 7.93 ha. In both provinces there is significant concentration of coconut land in holdings over 50 ha.

Copra is a bulky commodity with a high weight-to-price ratio. Many of the coconut-producing communities surrounding San Miguel Bay are not served by road, greatly increasing the expense of marketing and hence decreasing the net income from coconut production. From these isolated

Table 9. Coconut farms—number and size, Camarines Norte and Camarines Sur (April 1971).

Province	Total		<1 ha		1-3 ha		3-5 ha		5-10 ha		10-25 ha		25-50 ha		>50 ha	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Camarines Norte	9,948	78,854	65	32	1,684	3,111	2,686	9,857	2,860	19,403	2,379	34,993	214	6,753	60	4,706
Camarines Sur	19,999	129,508	487	241	5,632	10,143	5,902	21,497	4,579	30,598	2,983	43,876	305	10,099	111	13,056

Source: NCSO (1971a and 1971b).

coastal communities copra must be moved to market by small boat or, if there is such service, by passenger launch. This may require, in addition to the transportation fee itself, the payment of small sums to young men at either end of the trip to load and unload the copra, and perhaps an additional trip to the copra buyer by jeepney or bus and more handling and transportation expense. Even if the producer sells to a buyer in his home community, the price he receives will reflect these marketing costs.

Other crops grown in upland areas face similar difficulties due to the absence of road transportation. Rootcrops are normally for home consumption, but maize often is sold and transported to piggeries and poultry farms for use as feed. As with copra, the high weight-to-price ratio makes transportation relatively expensive. It should be noted that similar marketing constraints affect fish and shrimps, the bulk, weight and value of which are considerably increased if packed in ice. Ice actually involves double transportation costs since it must be brought to the landing and then shipped out again.

Despite these limitations of isolation and the constraints facing producers of copra and other upland products, the relatively untapped potential of these upland areas offers greater opportunity for alternative economic activities to fishing than the lowland areas at the base of San Miguel Bay. The physical isolation of these upland areas keeps them potentially rather than actually productive.

ANIMAL HUSBANDRY

Direct involvement in agricultural production as owner-operators, share-tenants, or agricultural laborers appears to offer limited scope either for absorbing surplus labor from the fisheries sector or for supplementing incomes for families of small-scale fishermen. The primary constraints are lack of access to agricultural land and abundance of labor within the agricultural sector itself. Animal husbandry, however, offers certain advantages as a secondary economic activity for small-scale fishermen and their families. Backyard operations require only a few square meters of land and labor requirements can be provided by part-time involvement of fishermen or other members of their households.

By far the most common animal raised by fishing households is the pig, an omnivorous beast capable of transforming many kinds of waste products into valuable animal protein. Over 40% of respondents in our socioeconomic survey reported raising pigs, but less than 15% were raising chickens or ducks. Ruminants, either large or small, were raised by only 5% of all households surveyed (Table 10).

The relative popularity of pigs compared to other animals in fishing villages is understandable. Ruminants require wide areas for grazing and by no means all families have access to such land. The primary food provided for chickens is unmilled rice, a commodity more abundant in farming than fishing villages. Pigs, on the other hand, will eat almost anything and thrive on the unsaleable portion of a fisherman's catch. No matter what kind of gear is used in the capture of fish, there is a certain proportion that is not commercially valuable except as fish meal. At present, much of the fish meal produced in fishing communities is sold and sent to piggeries elsewhere. The same is

Table 10. Number of families owning various types of livestock (n = 641).

Type of livestock	No. of families owning	Percentages
pig	272	42.4
chicken	85	13.3
duck	8	1.2
water buffalo	17	2.7
cattle	12	1.9
goat	5	0.8

Source: Primary data from socioeconomic survey (Bailey 1982).

true of maize and the leaves of the giant *ipil-ipil (Leucaena leucocephala)* tree, which provide valuable fodder. Considerable room for improvement in backyard pig production exists by taking better advantage of these locally available resources.

Some families raise one or two pigs for home consumption. Other families raise pigs for sale, but most combine these motivations, sometimes selling a pig or pigs for needed cash income and at other times slaughtering the animals for home consumption or for a feast during community festivals. At a market size of 80 kg in mid-1981, the farm gate, live-weight price of a pig in the study area was ₱8.00/kg.

Local, imported and mixed breeds may be found in coastal communities, though mixed breeds appear to be the most popular. This is so because they combine the best features of both lines: rapid weight gain of the imported breeds and resistance to local diseases of the local breeds. Two disadvantages limit the spread of imported breeds: the high cost of piglets (₱400 or more compared to ₱200-250 for a mixed breed and under ₱200 for a local breed) and the necessity to provide them with carefully mixed and balanced rations. Local and mixed breeds can be raised, albeit at a slower rate of weight gain, on locally-prepared fish meal, rice bran, kitchen scraps, and other waste products. Feeding in this manner greatly reduces cash costs but increases the demand for time and labor. In most cases, however, the opportunity costs for such labor are low due to the lack of competing obligations or opportunities for one or several household members.

Viewed as a commercial enterprise, with adequate management and veterinary care, the added expense of raising improved breeds of pigs is justified, particularly when the producer is able to take advantage of economies of scale and produce his own weanlings. For the special case of coastal fishing communities, a somewhat different approach is needed, one which places less reliance on heavy investment and takes advantage of local resources, which are available at little or no cost to individual families. The local market price is heavily influenced by prices in Manila, the destination for many Bicol pigs. Transportation costs, however, reduce the local price below that earned by growers in areas closer to Manila.

In one such area (Nueva Ecija), Sevilleja (1981) estimated that costs and returns of a backyard operation with six pigs provided a margin of ₱137 per animal. In this study labor was valued at zero cost and locally available feeds were used to supplement commercial rations. The return to investment, 43.2%, is attractive, but monthly income from such operations came to just over ₱100 per family raising six pigs. In the case reported by Sevilleja, farmers paid an average of ₱265 per weanling and were at least partly dependent upon commercial feeds. In the fishing communities surrounding San Miguel Bay, commercial feeds are rarely used due to their high cost (which includes transport from Manila). By relying on local resources, especially for high-protein feed such as fish meal, families of fishermen in the San Miguel Bay area have some significant comparative advantages despite their distance from major urban markets.

Other animals could be raised profitably in a more intensive manner than is done at present. Broiler chickens are good for short-term returns while laying hens require a longer time frame, but yield an easily marketable product, not to mention a source of protein for the family. Chickens

and pigs can be raised in a small space. This is important as it means that a family need not own land to engage in expanded backyard production of these animals. The pens and cages themselves may be more or less elaborate depending on the availability of money and materials, but no expenditure on additional land is necessary.

Water buffalo, cattle and goats, on the other hand, require relatively extensive areas. However, wide areas of potential grazing land exist and are fully utilized only in a very few locations. The grass below stands of coconut and even *cogon* lands provide suitable areas for ruminants if consistently grazed or if the tough mature grass periodically is burned off (PCARR 1976). The only grazing lands which currently are being exploited are located near the southern base of the Bay where saline intrusion limits agricultural production. These lands are near centers of population with access to roads and markets. Even here, however, potential for increased production is apparent. The fact that grazing lands further into the interior also are underexploited indicates the reason few ruminants are raised by fishermen has less to do with unfamiliarity with these particular animals than with the prohibitive cost of stock.

AQUACULTURE

There is a common and understandable tendency when discussing alternatives to fishing, to think of aquaculture and particularly brackishwater aquaculture. Many fishermen live near mangrove swamps or other areas deemed suitable as pond sites. Besides, the reasoning seems to go, fishermen are familiar with fish and such problems as marketing of this perishable commodity. Rather than dependence on an uncertain catch and prices which fall when the catch is abundant, aquaculture presents to capture fishermen the possibility of controlling the harvest of fish to meet seasons of peak demand.

A survey conducted in December 1973 showed that 68% of the full-time fishermen living near the mouth of the Bicol River were willing to become fishpond operators. Sixty five percent of the part-time fishermen from the same area also were willing to adopt this new occupation (Barrameda et al. 1974). Unfortunately, the opportunities in aquaculture are distinctly limited. Brackishwater aquaculture in ponds is capital-intensive, requiring investments in excess of ₱20,000/ha for the land and necessary improvements. Once the ponds are constructed most of the labor requirements are met by a single caretaker and the periodic hiring of short-term wage labor to assist in harvest or pond maintenance (Yengoyan 1974). Aspuria and Fabro (1979) showed that where milkfish *(Chanos chanos)* is raised, total labor demand, exclusive of guarding and supervising is less than 18 man-days/ha/year. Even for polyculture of milkfish and shrimp *(Penaeus monodon)*, only 45 man-days/ha/year are required. Brackishwater aquaculture in ponds has great potential in terms of food production, but its capital-intensive nature precludes the involvement of significant numbers of small-scale fishermen as owners. Limited labor demands offer little hope for absorbing surplus labor from the small-scale fisheries sector.

There exists at present one area of developed and developing brackishwater aquaculture in the municipality of Tinambac, at the southwestern corner of San Miguel Bay. Approximately 1,000 ha of ponds have been constructed in mangrove swamp. Most of the ponds are devoted to a polyculture of milkfish and shrimp. Few fish farmers use inorganic or organic fertilizers and the ponds are imperfectly cleared of debris. Some of the ponds are privately owned while others are on long-term lease from the government or other private individuals. Most of the area is controlled by a few families.

Plans have been drawn up to develop brackishwater fishponds for small-scale producers in an area of mangrove and marginal rice land near the Bicol River in the municipality of Calabanga. This is a government project, known as a "fishpond estate", with international funding designed for the benefit of people already resident in the area, some of whom are part-time fishermen; others depend on gathering and making roofing "shingles" out of *nipah (Nipa fruiticus)*, which grows in the coastal swamp. Each family will receive 4 ha of ponds and a small house site. Because of the need to build

dikes protecting this project area from floods, construction costs are very high. The investment per hectare of pond for this area of approximately 960 ha is estimated to be ₱60,000 or ₱240,000 (approx. US$30,000) per family.

The danger of flooding in this "typhoon belt" of the Philippines is very real and introduces an important element of risk to fishpond production. Maricultural alternatives similarly are limited by the dangers posed by high winds and wave action. Experimental rafts of the Bureau of Fisheries and Aquatic Resources for mussel culture off Cabusao were destroyed by a typhoon in the early 1970s. The mariculture potential of the relatively well-protected lagoon formed by the Look River on the eastern side of the Bay merits investigation for mussel, clam or oyster cultivation. Marketing problems will need to be addressed; in 1979, shelled mussels in Cabusao were being sold for only ₱1.00 per half coconut shell. Some limited gathering of seaweeds is practiced on Quinopaguian Island near the mouth of the Bay, but the limited protection offered by this and neighboring islands probably makes expansion of seaweed farming too risky.

THE LOCAL MANUFACTURING INDUSTRY

Just as many coastal fishing communities are isolated and lack inexpensive and reliable transportation to their most important markets, so is the Bicol Region isolated from important national and international markets. The limited manufacturing and cottage industries in the Bicol Region are likely to continue to be concentrated in the province of Albay, where the port of Tabaco and an industrial park equipped with facilities and infrastructure to attract manufacturers to that part of the Region are located.

Development in the Bicol Region has been hampered in the past by the lack of adequate infrastructure, including transportation facilities and electrical power. The Philippine National Railway (PNR) line runs through Camarines Sur (but not Camarines Norte) down to Albay, but the service at present is considered unreliable. The PNR is in the process of rebuilding tracks and bridges and promises improved service in the future. Travel by road from Metro Manila to the Bicol Region used to be an uncertain adventure until paving of the highway was completed in the mid-1970s. This road has greatly facilitated the movement of goods and people in and out of the Region, but there is little evidence of enthusiasm on the part of manufacturers to relocate their operations away from Metro Manila in regions such as the Bicol. Established national and international trade links are focused on Metro Manila, which is also the nation's largest market.

Such essential services as electricity have until recently been less than reliable even in places like Naga City, which prides itself as being the commercial center of the Bicol Region. Before the Tiwi geothermal plant in Albay was opened in the late 1970s, the provinces of the Bicol Region depended on the Manila area as the source of electricity. Even now Bicol users pay the same basic rate as Manila users despite their proximity to cheaper geothermal power. As a means of adjusting electricity rates to keep up with the cost of fuel oil used for power generation, consumers have been charged a Fuel Cost Adjustment (FCA). Preceding the June 1981 presidential elections, it was agreed that since electricity consumed in the Bicol area no longer depends on oil, this FCA will no longer apply in the Region.

The recent opening of an all-weather road linking the Bicol Region with the markets to the north, and the even more recent provision of reliable and relatively cheap electrical power, may lead to a growth in manufacturing industries in the future. National and international planners anticipate, however, that the direction of the Region's development will be towards agro-industries, reasoning that manufacturing will continue to be concentrated in Metro Manila and that regional development must be based on local resources (Drew et al. 1975). For example, it is thought possible to prepare commercial feeds for livestock from locally-available materials rather than send the raw materials to Manila and buy back the processed product.

Similarly, since construction of the new all-weather road, there is no reason why pigs should be sent to market in Manila live rather than as dressed, split carcasses in refrigerated trucks. Pigs lose

considerable weight during the long trip to Manila, where most of the commercially-produced pigs from the Region are marketed. Reducing this loss, plus the fact that only edible parts are carried, should offset the added expense of the refrigerated truck and retain, in the form of salaries to employees and profits to local entrepreneurs, the value added through partial processing of the animals within the Region.

Recent developments indicate that local entrepreneurs are aware of the new possibilities. One group set up a shrimp packing plant in 1979 and a fish cannery in 1980. In 1981 they opened a hatchery for shrimp *(P. monodon)*, the first such commercial hatchery in the Philippines. This same group owns or controls through majority interest most the large commercial trawlers which operate outside San Miguel Bay and a fleet of purse seiners which operate alternatively off San Miguel Bay and the Ragay Gulf, depending on season. They also own the largest ice plant in Camarines Sur.

There is scope for further development in the local manufacturing industry, which at present consists primarily of small-scale operations. The present lack of growth in such typically urban activities as manufacturing is reflected in the rate of population growth within the urban areas of the Bicol Region. Between 1975 and 1980 the population of Naga City grew at an annual rate of 1.71%, compared to the national average of 2.64%. Legaspi City in Albay Province managed to keep up with the national average, but Iriga City's (Camarines Sur) population actually decreased during this period by 2.72%. (NCSO 1981).

COTTAGE INDUSTRY

It would appear that the population of the Bicol Region will remain predominantly rural in the forseeable future, and that increases in incomes and standards of living for the majority of the population will have to come about through improving rural productivity. One commonly discussed way of achieving this goal is through cottage industries designed to utilize local materials. At present cottage industries in the Bicol Region are based in Albay Province and use abaca and other fibers to produce a variety of products for both export and local sale. Abaca is produced in Camarines Sur and Camarines Norte, but is exported to Albay for processing by several large and numerous small handicraft producers. Cottage industry in Camarines Sur is so insignificant that only one extension agent of the National Cottage Industry Development Authority (NACIDA) is assigned for the entire province. Because tax and other privileges are granted to NACIDA-registered businesses, most manufacturing concerns with less than ₱100,000 capitalization are so registered.

Within Camarines Sur, most NACIDA-registered businesses are located in Naga or Iriga Cities. According to the NACIDA Regional Office, Legaspi, there are only four NACIDA-registered businesses to be found within the communities surrounding San Miguel Bay (see also Camarines Sur Province 1977). This may not be an accurate representation of the number of cottage industries in these communities for the simple reason that the limited NACIDA field staff are unable to visit isolated communities on a regular basis. By the same token, it is unlikely that these communities will benefit from various loan schemes and other NACIDA benefits.

There is more cottage industry-type activity going on than the above figures would indicate, primarily the making of *nipah* roofing shingles. This is a full- or part-time job for many people, including fishermen, who live near mangrove swamps. It is labor-intensive, requires little investment in capital, and can be set aside if a more pressing task is at hand. The relative coolness of *nipah* roofs and their limited life span (five to seven years) ensures constant demand. But the incomes to be derived from *nipah* shingle making are low. Barrameda et al. (1974) found that those who made this roofing material as their primary occupation had lower incomes than those primarily engaged in fishing.

FISHING OUTSIDE SAN MIGUEL BAY

For the small-scale fishermen operating within San Miguel Bay, increasing productivity is at best a short-term option given that the Bay's resources already are heavily exploited. Increasing the

productivity of small-scale fishermen through gear and vessel improvements is likely to put further pressure on the resource with possible long-term negative consequences for producers and consumers alike.

The fishery on the continental shelf outside San Miguel Bay should be examined to determine whether it is sufficient to support some increased effort. Simpson (1979) provides some information on this as do several papers in Pauly and Mines (1982). Some 30 large commercial trawlers (27 to 117 t), a seasonally variable number of purse seiners (up to 100 t), and a large number of liftnetters (*basnig*, displacing 10 to 15 t) operate outside the Bay. *Basnig* operation is restricted to the period of relatively calm seas during the southwest monsoon. During the northeast monsoon most of these boats operate out of fishing ports along the protected western shore of Luzon. Lucena City and Cavite are home ports for most of the *basnigs* that operate from Mercedes. In recent years the number of *basnigs* operating out of Mercedes has declined from over 120 boats in the late 1970s to less than 80 in 1980. The main reason for this decline, according to local BFAR officials, is not a decline in catch but rather the increased cost of fuel and hence the expense of moving the boats from one coast to the other. *Basnig* operators from Cavite reported fuel costs to Mercedes and back to be ₱5,760 (12 drums, each containing 44 gallons and costing ₱480).

The ability of small-scale fishermen from San Miguel Bay to fill this gap and exploit this open-sea resource is problematic. Certainly their small bancas and current mix of gear are inappropriate for the rough seas of the Pacific Ocean.

A credit scheme known as *Biyayang Dagat* ("Bounty of the Sea") has been instituted to assist small-scale fishermen to purchase productive assets. A limit of ₱15,000 per fisherman is placed on these loans which have no collateral requirement. As of April 1981, ₱1.8 million had been released through various rural banks to 119 fishermen in the Bay. Almost all of these loans are for the construction of the baby trawlers designed to operate within the Bay. The loans are issued in the names of groups of five fishermen so that adequate funds are received to construct one baby trawler. During in-depth interviews with some such *Biyayang Dagat* loan recipients it was found that certain "guarantors" of otherwise unsecured loans will actually control the new baby trawlers. Without these guarantors rural banks are reluctant to loan money to small-scale fishermen. The fishermen themselves are willing to put their names to the loans even though they will not be the owners, on the understanding that their guarantors will hire them as crew. Not one *Biyayang Dagat* loan had been issued or considered as of April 1981 for fishing units capable of operating in the open sea.

It would not be easy for small-scale fishermen used to operating within San Miguel Bay to switch gears and learn new open-sea fishing grounds, even assuming they were able to afford purchase and operating expenses of larger and more complex boats and gear. Questions of resource availability need to be answered before a major expansion in this direction is considered. Nonetheless, based on interviews with commercial fishermen operating outside the Bay for both pelagic and demersal species, these fishing grounds offer more scope for expanded production and increased productivity per fisherman than waters within the Bay. Increasing the level of fishing effort expended on the continental shelf outside San Miguel Bay could lead to a reduction of effort within the Bay, but may have the opposite effect if, during the heavy seas of the northeast monsoon, boats intended for open-sea operations shift to fishing in the relatively protected waters within the Bay. In any event, it is unlikely that more than several hundred of the fishermen currently operating within San Miguel Bay would find employment in this open-sea fishing, and at that probably only during the relatively calm months of the southwest monsoon.

CONCLUSIONS

Most of the alternatives to fishing discussed in this section are in agriculture or related industries and are themselves by nature just as seasonal as fishing. Other local opportunities are distinctly limited at present, though future growth is predicted in the direction of agro-industrial development.

Whether this will provide enough jobs to absorb surplus labor from both the agricultural and fisheries sectors is doubtful.

Would increased involvement in such activities as farming and animal husbandry have the effect of substantially reducing the level of effort exerted on the marine resources of San Miguel Bay? During peak seasons when the catch is good, fishermen may find it economically advantageous to resume fishing and only return to their other activities during lean seasons at sea. Even if they divert their productive investments away from fishing boats and gear, they may still join other fishermen during peak seasons. Redirecting investment away from boats and gear towards other productive assets will depend on the profitability of alternative pursuits. If such redirection results in a substantial reduction in the number and efficiency of fishing units, then a reduction of fishing effort will follow. This also would have the effect of limiting the number of crewmen who could be accommodated and affect the ability of part-time fishermen to take part in the fishery during peak seasons. If no reduction in the number and efficiency of fishing units takes place, however, the fishing sector will continue to absorb during peak seasons these fishermen who have diversified into other activities.

Thus the reduction of fishing effort through encouraging local alternative economic activities is problematic. Yet identifying and encouraging the development of alternative opportunities also can be justified as a means of diversifying the resources available to communities of small-scale fishermen and improving levels of income and standards of living for the individual households which make up such communities. In the short term, it is this latter goal that is more likely to be served by encouraging alternatives to fishing. Reduction of fishing effort through economic diversification is an important but longer-term goal which will be met only if the identified alternatives are sufficiently attractive to the individuals and families involved. Thus, developments in the small-scale fisheries sector are intimately related to larger questions of rural and national economic development.

Economic underdevelopment has led to considerable out-migration from the Bicol Region over the past several decades, and this is predicted to continue into the forseeable future (Drew et al. 1975). In the following section, migration, a human response to differential opportunities, is analyzed as it affects the Bicol Region in general and more specifically the communities of small-scale fishermen around San Miguel Bay.

Occupational and Geographic Mobility: a Willingness to Change

THE MOBILITY OF FISHERMEN

Current levels of exploitation of the San Miguel Bay fishery are near if not beyond that which would produce the maximum sustainable yield (Pauly 1982) and some reduction in the level of fishing effort will be necessary to correct this imbalance between fish and fishermen. We also have seen that local alternatives to fishing in the San Miguel Bay area are distinctly limited. If local options are limited, we must consider whether or not small-scale fishermen are willing to change not only their occupation but their place of residence as well. The population of the Philippines as a whole is highly mobile, as will be seen in the next section. Are Filipino fishermen any less so? A number of studies conducted elsewhere in the world indicates substantial socio-cultural differences between fishermen and non-fishermen and suggest that those bound by "the call of the sea" might be reluctant to join the ranks of "landlubbers" (Firth 1966; Johnson 1977). Gordon (1954) says that fishermen are "one of the least mobile of occupational groups."

It is interesting to note that no such observation has been made in the Philippines regarding Filipino fishermen. Evidence from our survey presented below indicates a strong willingness to adopt alternatives to fishing.

In the socioeconomic survey of the present project (Yater 1982b), respondents, who were both small-scale fishermen and household heads [99% were males (see Bailey 1982)], were asked whether they would be willing to change their occupation if such a change led to an improvement in their

income and standard of living, even if this required moving to a different municipality within the same province. The question was repeated but stipulating a move to a different province. As shown in Table 11, 44% of respondents were willing to undertake the more limited inter-municipal move while 39% were willing to accept the more serious dislocation (and expense) entailed in moving to a different province (Table 12). More than one quarter of the respondents indicated some degree of uncertainty and said their decision would depend on circumstances. Thus, the high proportion of respondents willing to change their occupation, even if this entailed physically moving from their home community, probably is an understatement.

Table 11. Number and percentage of respondents willing to change occupation even if it requires move to different municipality, by age (grouped).

Age	Total	Yes		No		Depends/uncertain	
	#	#	%	#	%	#	%
<20	22	10	45.4	7	31.8	5	22.7
21-25	84	37	44.0	27	32.1	20	23.8
26-30	122	58	47.5	30	24.6	34	27.9
31-35	85	40	47.1	21	24.7	24	28.2
36-40	94	49	52.1	22	23.4	23	24.5
41-45	69	28	40.6	23	33.3	18	26.0
46-50	65	29	44.6	22	33.8	14	21.5
51-55	44	6	13.6	23	52.3	15	34.1
56-60	28	15	53.6	8	28.6	5	17.9
61-65	13	5	38.5	4	30.8	4	30.8
66-70	12	2	16.7	8	66.7	2	16.7
>70	3	1	33.3	2	66.7	0	0.0
Totals	641	280	43.7	197	30.7	164	25.6

Source: Primary data from socioeconomic survey (Bailey 1982).

Table 12. Number and percentage of respondents willing to change occupation even if it requires move to different province, by age (grouped).

Age	Total	Yes		No		Depends/uncertain	
	#	#	%	#	%	#	%
<20	22	8	36.4	38	36.4	6	27.3
21-25	84	32	38.1	31	37.0	21	25.0
26-30	122	52	42.6	33	27.0	37	30.3
31-35	85	39	46.0	24	28.2	22	26.0
36-40	94	43	45.7	28	29.8	23	24.5
41-45	67	24	34.8	27	39.1	18	26.1
46-50	65	24	37.0	28	43.1	13	20.0
51-55	44	5	11.4	25	56.8	14	31.8
56-60	28	15	53.6	9	32.1	4	14.3
61-65	13	4	30.8	5	38.5	4	30.8
66-70	12	2	16.7	9	75.0	1	8.3
>70	3	1	33.3	2	66.7	0	0.0
Totals	641	249	38.8	229	35.7	163	25.4

Source: Primary data from socioeconomic survey (Bailey 1982).

Also interesting is the apparent willingness of respondents, themselves fishermen, to encourage their children to seek opportunity elsewhere. The overwhelming majority of respondents said they would encourage their children to leave the home community if an occupation elsewhere provided a higher income and standard of living (Table 13). Whether such a move would have to be made to a different municipality or a different province made very little difference. The exceptionally high percentage of respondents indicating a willingness for their children to seek their fortunes elsewhere should be treated with some caution, however. Some respondents may have found it difficult to answer in the negative during an interview, yet would respond differently if a son or daughter actually considered leaving the home community.

Table 13. Willingness of respondents to encourage children to seek opportunity elsewhere.

Willing?	If in different municipality		If in different province	
	Number	%	Number	%
Yes	537	83.8	534	83.3
No	21	3.3	23	3.6
Depends	19	3.0	29	4.5
Don't know	26	4.0	17	2.6
Not applicable[1]	38	6.0	38	6.0
Totals	641	100.0	641	100.0

[1]Refers to respondents with no children.
Source: Primary data from socioeconomic survey (Bailey 1982).

FACTORS INFLUENCING STATED ACCEPTANCE OF CHANGE IN BOTH OCCUPATION AND RESIDENCE

This apparent willingness to change occupation, even if such a change entails a move away from the home community, is significant, for it indicates one possible means of reducing the level of fishing effort in San Miguel Bay. Below some contributing factors are discussed.

Age

Age is one variable factor that can be expected to affect willingness to change either residence or occupation. It is clear that those respondents in their twenties, thirties and forties were most willing to consider a change of occupation and residence (Tables 11 and 12). Persons 51 years and older tended to be more conservative in the face of such changes. A partial exception to this was a number of individuals between the ages of 56 to 60.

Ownership of land

Another factor which might tie a person or a household to the home community is ownership or control over residential or agricultural land. In the case of our sample population, however, it is clear that this influence is limited. Of 632 respondents for whom information is available, only 64 owned the land upon which their house stood and only 39 owned agricultural land (Table 14). More than half were squatting on land for which they paid no rent. In many cases such squatting represents a more or less permanent arrangement with the owner and may be part of broader relationships between owner and user. In the fishing communities surrounding San Miguel Bay, most houses are simply and lightly constructed. Even though they may represent significant investments to their owners, they also may be sold to others (e.g., a newly married couple seeking to establish their own

Fishing and Agricultural Activities around San Miguel Bay

Photos by the author

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1. The Bicol river enters the southern end of San Miguel Bay. Extensive fields of rice, the main crop of the surrounding plain, can be seen.
2. Coconuts are the major crop along parts of the eastern and western shore of the Bay.
3. Serviceable roads connect most of the communities in the inner parts of the Bay, but more than half the shoreline is without road service.
4. Rice monoculture dominates the alluvial plain south of San Miguel Bay. Irrigation projects underway are expected to allow a second crop each season.
5. Hills on the eastern and western sides of the Bay exhibit a diversity of conditions and opportunities. *Cogon* grass now covers much of the slopes, once tropical forest.

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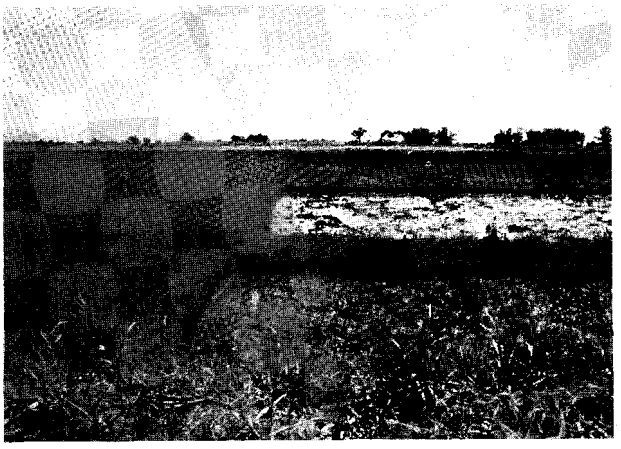

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6. Root crops are grown in areas cleared of *cogon* grass.
7. Sugar cane is a relatively new crop in the Bicol region, becoming more important with the recent establishment of a sugar mill in the area.
8. Although admirably suited for small farmers, the coconut industry is suffering from the effects of a viroid which has killed about 25% of trees on both sides of the Bay, discouraging growers to replant.
9. By far the most common animal raised by fishing households is the pig, consuming kitchen waste and unsaleable fish and requiring little space.
10. Other livestock need more extensive grazing land. Prohibitive cost of stock is a deterrent for small-scale fishermen to enter the industry.

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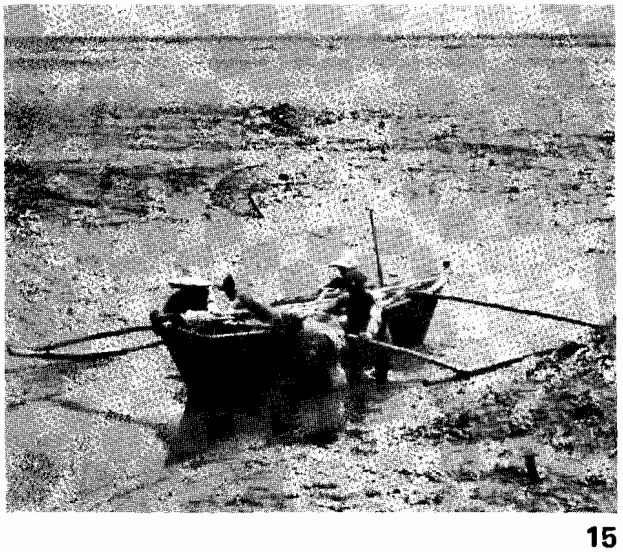
11. About 1,000 ha of swamp in Tinambac have been converted to fishponds, mostly for the polyculture of milkfish and shrimp. There are plans for a "fishpond estate" in Calabanga, consisting of 4-ha family units.
12. In terms of catch, gill-netters are the most important non-trawl gear type. They include motorized, outriggered *bancas* shown here.
13. Other gill-netters are non-motorized and some vessels are simple, hollowed-out logs.
14. A "baby trawler" docked beside drying fish in Cabusao. Some communities have sheltered landing areas.
15. At Barcelonita, broad mud flats make landing of the catch difficult; growth of this community is much slower than that of Castillo, in the same municipality.

13



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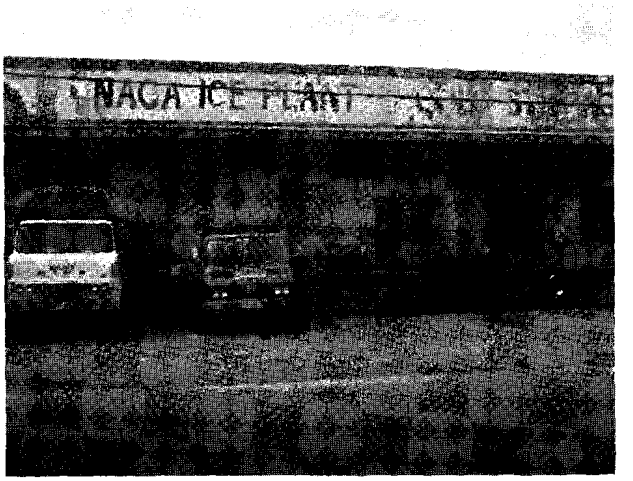

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16. Ice increases the value of the fish catch, but adds to transportation costs, since it is shipped to the landing and then out again with the catch.

17. Jeepneys are used extensively to move fish between communities where serviceable roads exist.

18. An important part of the small-scale fishermen's catch is the small shrimp known as *balao,* mostly used to prepare a condiment, *bagoong.* A significant ancillary industry in the fishery sector.

19. *Bagoong* is transported to the major market, Manila, by jeepneys and trucks.

20. A Cabusao fishing community attending Easter celebrations. There has been a steady stream of migration from such communities, around San Miguel Bay, although the numbers of fishermen are still increasing.

19

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household). Neither the ownership of a house nor of residential land are major factors which limit the willingness of our respondents to be geographically mobile (Table 15). In fact, of the three tenure groups, owners expressed the greatest willingness to change their occupation and location.

Table 14. Age (grouped) by access to residential and agricultural land, various tenure categories.

		Residential land						Agricultural land				
Age	Totals[1]	Owned	Free use	Rented	Tenant	Other[2]	Total with access to ag. land	Owned	Free use	Rented	Tenant	Other[2]
<20	21	1	13	7	0	0	2	1	1	0	0	0
21-25	82	7	40	33	0	2	6	4	1	0	1	0
26-30	124	13	78	32	0	1	12	1	3	0	7	1
31-35	84	8	50	25	0	1	7	2	3	0	1	1
36-40	92	10	55	24	0	3	16	6	5	0	5	0
41-45	71	8	41	21	0	1	16	9	3	0	3	1
46-50	62	5	35	17	0	5	11	3	4	0	3	1
51-55	43	2	30	11	0	0	6	4	2	0	0	0
56-60	25	2	15	7	0	1	8	5	0	0	3	0
61-65	13	3	6	3	0	1	3	1	1	0	1	0
66-70	13	4	6	1	0	2	4	3	1	0	0	0
>70	2	1	1	0	0	0	0	0	0	0	0	0
Totals	632	64	370	181	0	17	91	39	24	0	24	4

[1]Complete response obtained from only 632 of 641 respondents.
[2]Includes mortgages and leases.
Source: Primary data from socioeconomic survey (Bailey 1982).

Table 15. Percentage of respondents willing to change occupation if it requires move to different municipality or province, by tenure status (residential land).

	Different municipality			Different province		
Tenure status	Yes	No	Depends	Yes	No	Depends
Owned	53.8	38.5	7.7	46.2	46.2	7.7
Free use	52.6	21.1	26.3	45.6	26.3	28.1
Rented	39.3	29.5	31.1	32.8	39.3	27.9
Other*	100.0	–	–	100.0	–	–

*Includes leases and mortgages.
Source: Primary data from socioeconomic survey (Bailey 1982).

Ownership of fishing boats and gear

Ownership of residential or agricultural land does not appear to be strongly affected by age (Table 14). This is not true of age and ownership of fishing assets, as shown in Table 16. Of the sample, 61% of the fishermen interviewed owned the means of their production; another 13% owned either fishing boats or gear, and rented, shared, or otherwise obtained the additional equipment necessary to operate. Only 26% of respondents were crewmen who had no investment in the boat and/or gear they operated. The proportion of fishermen who work as non-owning crew members was relatively high for those below 25 years of age and decreased dramatically for older groups. The proportion of fishermen who were full owners increased with age, while remaining reasonably constant for part-owners.

Table 16. Ownership status of respondent fishermen, by age (grouped).

Age	Total #	Full owner #	Full owner %	Part owner #	Part owner %	Crewman #	Crewman %
<20	22	10	45.4	3	13.6	9	41.0
21-25	84	30	35.7	6	7.1	48	57.1
26-30	122	61	50.0	23	19.0	38	31.1
31-35	85	49	57.6	12	14.1	24	28.2
36-40	94	55	58.5	17	18.1	22	23.4
41-45	69	52	75.4	7	10.1	10	14.5
46-50	65	48	74.0	11	17.0	6	9.2
51-55	44	36	81.8	2	4.5	6	13.6
56-60	28	22	78.6	3	10.7	3	10.7
61-65	13	11	84.6	1	7.7	1	7.7
66-70	12	11	91.7	0	0.0	1	8.3
>70	3	3	100.0	0	0.0	0	0.0
Totals	641	388	60.5	85	13.3	168	26.2

Source: Primary data from socioeconomic survey (Bailey 1982).

Full owners of fishing assets were less willing to accept occupational and geographic changes than were part-owners or non-owning crewmen (Tables 17 and 18). What is striking, however, is that such a high percentage of those who were classified as full owners would be willing to change their occupation even if it required a move to a different municipality (38%) or a different province altogether (33%).

Table 17. Number and percentage of respondents willing to change occupation even if it requires move to different municipality, by category of fisherman.

Category	Total #	Yes #	Yes %	No #	No %	Depends/uncertain #	Depends/uncertain %
Full owner	388	148	38.1	125	32.2	115	29.6
Part owner	85	55	64.7	14	16.5	16	19.0
Crew	168	76	45.2	46	27.4	46	27.4
Totals	641	279	43.5	185	28.9	177	27.6

Source: Primary data from socioeconomic survey (Bailey 1982).

Table 18. Number and percentage of respondents willing to change occupation even if it requires move to different province, by category of fisherman.

Category	Total #	Yes #	Yes %	No #	No %	Depends/uncertain #	Depends/uncertain %
Full owner	388	126	32.5	144	37.1	118	30.4
Part owner	85	47	55.3	23	27.0	15	17.6
Crew	168	74	44.0	49	29.2	45	26.8
Totals	641	247	38.5	216	33.7	178	27.8

Source: Primary data from socioeconomic survey (Bailey 1982).

Level of education

Very few respondents continued their education beyond Grade 6, the modal level of academic achievement. As level of education rises there was a clear pattern towards increased willingness to accept both change in occupation and place of residence (Table 19). This is understandable due to greater occupational opportunities available to high school graduates or those with a college education, particularly in the urban sector. What is remarkable about the figures of Table 19 is that even those respondents who did not complete elementary school expressed a high level of willingness to leave their home communities and begin a new career. It might also be pointed out that, as in Tables 11-13, 15, 17 and 18, there was slightly greater willingness to favorably consider a more limited intra-provincial move as compared to moving to a different province.

Table 19. Number and percentage of respondents willing to change occupation if it requires move to different municipality or province, by level of educational attainment.

			Move to different municipality						Move to different province					
	Total		Yes		No		Depends		Yes		No		Depends	
Education	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Grade 1	5	0.8	0	0.0	4	80.0	1	20.0	0	0.0	4	80.0	1	20.0
Grade 2	13	2.1	4	30.8	6	46.2	3	23.1	4	30.0	7	53.8	2	15.4
Grade 3	25	4.0	7	28.0	8	32.0	10	40.0	5	20.0	10	40.0	10	40.0
Grade 4	94	15.2	37	39.4	30	31.9	27	28.8	35	37.2	34	36.2	25	26.6
Grade 5	72	11.7	28	38.9	29	40.3	15	20.9	25	34.7	32	44.4	15	20.9
Grade 6	305	49.4	138	45.2	87	28.5	80	26.2	119	39.0	102	33.4	84	27.5
Grade 7	4	0.6	3	75.0	1	25.0	0	0.0	3	75.0	1	25.0	0	0.0
1st yr. high school	27	4.4	14	51.9	6	22.2	7	25.9	12	44.4	7	25.9	8	29.6
2nd yr. high school	31	5.0	20	64.5	2	6.5	9	29.0	21	67.7	3	9.7	7	22.6
3rd yr. high school	16	2.6	8	50.0	5	31.3	3	18.8	8	50.0	5	31.3	3	18.8
4th yr. high school	18	2.9	9	50.0	2	11.1	7	38.9	8	44.4	3	16.7	7	38.9
1st yr. college	2	0.3	1	50.0	0	0.0	1	50.0	1	50.0	0	0.0	1	50.0
2nd yr. college	5	0.3	3	60.0	2	40.0	0	0.0	3	60.0	2	40.0	0	0.0
3rd yr. college	1	0.2	1	100.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0
4th yr. college	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Vocational school	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Graduate school	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Totals	618	100.0	273	44.2	182	29.5	163	26.4	245	39.6	210	34.0	163	26.6

Note: Total number of respondents different from other tables in this section due to incomplete information on levels of education.
Source: Primary data from socioeconomic survey (Bailey 1982).

LATENT AND ACTUAL MOBILITY

A high degree of willingness to accept change in occupation and residence cuts across all categories of fishermen, all age groups, all levels of educational attainment, and is little affected by ownership of agricultural or residential land. Below, patterns of observed mobility are analyzed.

Patterns of Migration

NATIONAL MIGRATION PATTERNS

The population of the Philippines is remarkably mobile, a feature of national life which has attracted considerable attention. The basic literature on human migration in the Philippines is reviewed in Castillo (1979). The Philippine islands are divided into 11 regions. In 1960, 11% of the population enumerated in the national census of that year were living in a region other than that of their birth; by 1970 this figure had risen to 12% (Plameras 1977). In 1970 some five million Filipinos

were living in municipalities different from those in which they had lived in 1960. More than half of these migrants, over 7% of the national population, had moved across regional boundaries during the period 1960 to 1970 (Table 20).

Table 20. Human migration in the Philippines by sex and type of migration: 1960-1970.

Migration status	Both sexes		Male		Female	
	#	%	#	%	#	%
Total population	36,642,666	100.00	18,230,616	100.00	18,412,050	100.00
Non-migrants	31,597,216	86.23	15,818,052	86.77	15,779,164	85.70
Migrants	5,045,450	13.77	2,412,564	13.23	2,632,886	14.30
Intra-provincial	1,736,293	4.73	827,259	4.54	909,034	4.94
Intra-regional	727,395	1.99	352,648	1.93	374,747	2.03
Inter-regional	2,581,762	7.05	1,232,657	6.76	1,349,105	7.33

Source: Flieger et al. (1976).

A number of distinct migration streams has been documented (Pascual 1965; Flieger et al. 1976). These include rural-urban streams, especially towards Metro Manila, and rural-rural streams, especially towards areas where population density per unit of agricultural land is relatively low, such as Palawan and Mindanao. Once particular patterns become established they tend to be self-reinforcing as successful migrants send or bring back information and are able to assist new migrants as they arrive.

Over half of the total number of migrants between 1960 and 1970 were rural-urban migrants (Zachariah and Pernia 1975). Migrants in general, and rural-urban migrants in particular tend to be better educated than the national average and urban areas attract younger and more highly educated migrants than rural areas (Juan and Kim 1977). This selective attractiveness strips the rural populace not only of their best educated but their most energetic and ambitious sons and daughters as well.

Internal migration in the Philippines reflects the "push and pull" effects of varying economic and social opportunities (Plameras 1977; Lee 1966). It is easy to understand that the prospect of steady employment attracts people from the countryside, where underemployment is all too common. Castillo (1979), however, persuasively argues that rural-urban migrants are attracted by more than immediate material rewards. The superior quality of education, health care, and other important social services found in urban areas also motivate migration. Non-economic criteria appear to be most important in attracting migrants to Metro Manila, which has a population of almost six million (NCSO 1981). In addition to the concentration of schools, universities, hospitals and other services in Manila, a disproportionate share of the nation's manufacturing sector is located there. Manila is the nation's financial center as well as the center of government, and is a classic example of a primate city which dominates the nation's social, political and economic life. Flieger et al. (1976) noted:

> . . . the tremendous drawing power which the industrial-commercial complex of the country, centered around Rizal and Manila, exercised during the 1960's. . . . Of the 35 Luzon provinces, 26 sent the majorities of their migrants to Rizal; the nine which did not were predominantly isolated island or mountain provinces.

There is every indication from the 1980 Census returns that Rizal Province, which is part of the greater Metro Manila area, has continued to attract migrants from other provinces; while the national rate of population growth between 1975 and 1980 was 2.64%, Rizal posted the nation's highest growth rate of 5.92% (NCSO 1981). Since the effect of international migration on the population of the Philippines is statistically insignificant, disparities in provincial growth rates must be attributed to internal migration.

OUT-MIGRATION FROM CAMARINES SUR AND CAMARINES NORTE

Camarines Sur and Camarines Norte are the two provinces under whose jurisdiction are the six municipalities and the forty-four coastal communities which surround San Miguel Bay. Both provinces are predominantly rural and agricultural and have experienced high rates of out-migration in recent years. The population of Camarines Sur is concentrated in the fertile alluvial plain formed by the Bicol River and is significantly more dense (209 persons/km^2) than the population of Camarines Norte (146/km^2), whose geography is dominated by mountains. Population density in terms of total farm area within these two provinces, however, is nearly equal, with 375/km^2 in Camarines Sur and 337/km^2 in Camarines Norte. Even the most optimistic observers realize that present levels of out-migration from the Bicol Region are likely to continue or even increase during the forseeable future (Drew et al. 1975). This also is likely to be true for the two provinces of Camarines Sur and Camarines Norte.

Although the 1970 Census of Population was the first to explicitly deal with the issue of human migration, a number of researchers have attempted to estimate directions and levels of migration within the Philippines as far back as 1939. These studies show that Camarines Sur attracted more migrants than it lost during the period 1939 to 1948 (Nava 1959, quoted in Juan 1978), but has consistently lost migrants since 1948. During the intercensal period 1948 to 1960, Camarines Sur's net loss through migration was estimated at 14,600 (Pascual 1965). Between 1960 and 1970 out-migration increased dramatically, with net out-migration from Camarines Sur totalling 164,363 (Kim 1972). During this period, Camarines Sur had the third largest total of out-migrants in the Philippines. Camarines Norte, while losing migrants during the intercensal period 1939 to 1948 (Nava 1959, quoted in Juan 1978), gained impressively in proportion to overall population with an increase of 25,600 (Pascual 1965) during the period 1948 to 1960. Between 1960 and 1970, however, Camarines Norte lost through migration a comparatively insignificant 4,392 persons (Kim 1972). Results of the 1980 Census of the Population were just being released at the time this report was written and studies of provincial migration patterns were not yet available for the period 1970 to 1980.

Population increase of Camarines Sur and Camarines Norte during 1970-1975 and 1975-1980 was slower than the Philippines as a whole (Table 21). Differences in the rate of natural population increase (births minus deaths) for the Bicol Region (Table 22) and presumably for these two provinces (though provincial level data were not available) did not account for these differences in actual population increase. Only for 1970 and 1971 was the rate of natural population increase in the Bicol Region substantially lower than the nation as a whole, and in 1975 and 1976 (the last year for which data were available) the rate of natural population increase in the Bicol Region was higher.

Such comparisons between rates of natural population increase and actual population increase as measured by census returns are the basis of the "census survival method", a demographic technique commonly used in the Philippines and the only possible approach for measuring migration below the regional level for census data prior to 1970 (Flieger et al. 1976). The principle is that, if the rate of natural population increase within a sub-population is the same as that of the national population, significant differences in the rate of actual population increase can only be explained by net in-migration or out-migration.

The difference between rate of natural population increase for the nation and for the Bicol Region was not enough to explain the significantly lower rate of actual population increase of Camarines Sur and Camarines Norte compared to that of the Philippines in recent years. The figures indicate substantial out-migration from these two provinces during the 1970s.

The Bicol Region's agrarian economy offers few opportunities for the young, the ambitious, and the relatively well-educated. Unemployment and underemployment are serious problems which Illo and Lynch (1974a and b) found to affect a disproportionately large number of those with high school educations. Roco (1980) found that high school and college graduates from rural back-

Table 21. Philippines, Camarines Norte, Camarines Sur and selected municipalities: population enumerated in various censuses, 1939-1980.

		1939	1948	1960	1970	1975	1980	1939-1980
Philippines	No.	16,000,303	19,234,182	27,087,674	36,642,666	42,070,660	47,914,017	
	Rate	–	2.07	2.89	3.07	2.80	2.64	2.71
Camarines Norte	No.	98,324	103,702	188,091	262,207	288,406	307,995	
	Rate	–	0.59	5.09	0.96	1.92	1.32	2.82
Mercedes	No.	n.a.	7,247	13,983	19,674	25,161	27,644	
	Rate	–	–	5.63	3.47	5.04	1.90	4.27*
Camarines Sur	No.	385,695	553,691	819,565	948,436	1,023,819	1,100,044	
	Rate	–	4.10	3.32	1.47	1.54	1.45	2.59
Cabusao	No.	4,743	5,130	8,020	9,078	10,110	10,903	
	Rate	–	0.88	3.79	1.25	2.18	1.52	2.05
Calabanga	No.	15,087	21,791	28,467	34,718	40,274	43,030	
	Rate	–	4.17	2.25	2.00	3.01	1.33	2.59
Sipocot	No.	7,936	18,089	32,650	38,153	39,457	43,505	
	Rate	–	9.59	5.04	1.57	0.67	1.97	4.24
Siruma	No.	5,851	5,245	9,307	9,373	10,435	11,613	
	Rate	–	(0.99)	4.90	0.07	2.17	2.16	1.69
Tinambac	No.	10,921	14,103	28,897	36,357	34,415	39,621	
	Rate	–	2.18	6.16	2.32	(1.09)	2.86	3.91

*Annual rate of increase for Mercedes based on 1948-1980.
Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

grounds have little opportunity to utilize their knowledge and skills in their home communities. Opportunities in local urban centers are not much more promising. Roco also found that only 63% of high school and college graduates who were living in urban areas were fully employed; 25% were employed part-time and 12% were unemployed. Both studies called for revisions in the educational system to make education more relevant to local needs. Cariño (1979) noted:

> While the Bicol economy is characterized by the predominance of the agricultural sector, a large number of educational institutions concentrate their efforts in non-agricultural fields, which only provide an impetus for qualified entrants into the non-agricultural labor force to migrate. Not surprisingly, therefore, out-migrants have been mostly the young and persons of higher skills and qualifications.

Between 1960 and 1970, 78% of all out-migrants from Camarines Norte were inter-regional migrants; the figure for Camarines Sur was only slightly smaller at 72% (Flieger et al. 1976). More than 60% of all out-migrants from both Camarines Norte and Camarines Sur went to Metro Manila and the rapidly growing provinces surrounding the capital. Countering this flow of migrants is a much smaller counter-stream of migrants from Metro Manila and its surrounding provinces. These migrants to the Bicol tend to be older and have a lower level of educational attainment than migrants of the dominant stream (Cariño 1979). This drain of youth and brains is compounded by the fact that the educational qualifications of out-migrants from the Bicol Region are higher than those of non-migrants.

MIGRATION PATTERNS AFFECTING MUNICIPALITIES AND BARANGAYS SURROUNDING SAN MIGUEL BAY

Most studies of migration in the Philippines have been based on demographic data obtained from various censuses and analyzed on the level of region or province. I am aware of no previous attempt in the Philippines to use these data as they are used here, to trace patterns of both in- and out-migration at the community level over time. Previous micro-level studies have been limited to areas

Table 22. Recorded birth and death rates, rate of natural population increase for the Philippines and Bicol Region, 1950-1976 (rates per 1,000 population).

	Philippines				Bicol Region		
Year	Births	Deaths	Increase	Difference, (Bicol) rate higher (lower)	Increase	Births	Deaths
1950	31.7	11.1	20.6	3.3	23.9	35.2	11.3
1951	30.5	11.4	19.1	4.2	23.3	34.0	10.7
1952	30.1	11.2	18.9	2.4	20.3	31.6	11.3
1953	29.8	10.8	19.0	1.6	20.6	30.6	11.0
1954	30.7	9.5	21.2	(0.8)	20.4	30.7	10.3
1955	31.2	9.0	22.2	(0.6)	21.6	30.7	9.1
1956	31.2	9.0	22.2	0.5	22.7	32.1	9.4
1957	30.0	9.6	20.4	(1.0)	19.4	29.6	10.2
1958	29.7	8.5	21.2	0.7	21.9	30.3	8.4
1959	30.4	7.4	23.0	(0.6)	22.4	30.7	8.3
1960	23.7	7.2	16.5	(2.8)	13.7	21.4	7.7
1961	23.0	7.4	15.6	(1.5)	14.1	21.5	7.4
1962	26.7	5.8	20.9	5.4	26.3	32.3	6.0
1963	26.3	7.2	19.1	(3.1)	16.0	23.8	7.8
1964	26.0	7.4	18.6	(0.3)	18.3	25.9	7.6
1965	25.0	7.4	17.6	(1.7)	15.9	23.8	7.9
1966	25.2	7.2	18.0	(1.0)	17.0	24.4	7.4
1967	24.9	7.1	17.8	(1.1)	16.7	24.2	7.5
1968	25.9	7.5	18.4	(3.0)	15.4	23.3	7.9
1969	26.5	6.8	19.7	(1.3)	18.4	25.2	6.8
1970	26.2	6.4	19.8	(1.5)	18.3	24.8	6.5
1971	25.5	6.6	18.9	(2.5)	16.4	23.8	7.4
1972	24.9	7.3	17.6	(0.4)	17.2	25.0	7.8
1973	26.3	7.1	19.2	(0.3)	18.9	27.9	9.0
1974	26.3	6.9	19.4	0.8	20.2	28.0	7.8
1975	29.1	6.4	22.7	2.5	25.2	32.5	7.3
1976	30.2	6.9	23.3	1.9	25.2	33.1	7.9

Source: NEDA (1980).

of heavy in-migration such as Mindanao (Hackenberg and Hackenberg 1971) or Metro Manila (Hollensteiner 1972). Emphasis has been less on demographic issues than intent on explaining the process and socioeconomic impact of human migration.

Available studies on human migration in the Philippines have not examined population movement below the provincial level. For our purposes, however, since we are interested in studying the movement of small-scale fishermen and their families, even municipal level data represent too high a level of aggregation. In most cases the number of fishing villages or communities *(barangays)* represents a small portion of the total number of *barangays* in a given municipality. Thus, migration in or out of these municipalities affords little insight as to the number of people living in specific communities around San Miguel Bay. Even at the village level we must realize that only a certain proportion of residents are likely to be fishermen. We may know that proportion at a given point in time, but we will have to make an educated guess for other times.

There are some problems with using *barangay*-level data which require caution in treatment and interpretation. The most serious of these is that from census to census the number of *barangays* within a given area changes, as do the boundaries. This may reflect the establishment of new communities or the realization of past mistakes on the part of census takers. As of the 1980 Census of Population, nearly but not quite all *barangay* boundaries had been fixed. Fortunately, those in the San Miguel Bay area are clearly defined, though there have been various changes over the past four decades that will be noted below. This will facilitate matters in the future, but solves no problems

of the past. Thus, the researcher attempting to use *barangay*-level data needs to know the particular area and watch for inconsistencies, boundary changes or other problems that may introduce error.

These caveats and limitations aside, the use of *barangay*-level data is critical to a study that differentiates human populations on the basis of their primary economic activity. Municipal level data are inappropriate for this task as typically they include communities with a wide range of characteristics which, when aggregated, lose much of their utility. The existence of diversity within most municipalities is of greater interest to researchers or development administrators concerned with a particular type of economic activity than statistical averages which mix fish with fowl and gear with grain. Since fishing communities in the Philippines rarely dominate any municipality, it is *barangay*-level data we must use to document change in their human populations.

To determine whether particular communities have gained, lost, or maintained an equilibrium of population through migration it is necessary to adopt the census survival approach. Tables 23 to 30 present data on the population and annual rates of population increase (or decrease) for the six municipalities surrounding San Miguel Bay, for individual fishing communities, and for all fishing communities within these municipalities.

Cabusao

Cabusao is the only one of the six municipalities surrounding San Miguel Bay where residents of fishing communities make up a majority of the total population (Table 23). Between 1948 and 1960 this municipality experienced an appreciable increase in population largely due to the opening of a rough highway between Manila and the Bicol Region which ran through Cabusao. Subsequent to 1960 the growth of this municipality slowed to below national levels, suggesting net out-migration. On average between 1939 and 1980 the fishing communities of Cabusao grew at a rate even lower than that of the municipality as a whole.

Table 23. Cabusao: population and annual rate of population increase (decrease) of municipality and fishing communities, 1939-1980.

		1980	1975	1970	1960	1948	1939	1939-1980
Total, Cabusao	No.	10,903	10,110	9,078	8,020	5,130	4,743	
	Rate	1.52	2.18	1.25	3.79	0.88		2.05
Total, all fishing communities	No.	7,430	6,931	6,301	5,700	4,291	3,529	
	Rate	1.40	1.92	1.01	2.39	2.20	–	1.83
Barcelonita	No.	2,147	2,113	1,751	1,590	1,665	1,223	
	Rate	0.32	3.83	0.97	(0.38)	3.49	–	1.38
Castillo	No.	2,666	2,344	2,056	1,669	968	940	
	Rate	2.61	2.66	2.11	4.64	0.33	–	2.58
Pandan	No.	1,138	898	896	1,025	422	393	
	Rate	4.85	0.04	(1.34)	7.68	0.79	–	2.63
Santa Cruz	No.	806	834	902	755	621	489	
	Rate	(0.68)	(1.56)	1.79	1.64	2.69	–	1.23
Santa Lutgarda	No.	673	742	696	661	615	484	
	Rate	(1.93)	1.29	0.52	0.60	2.70	–	0.81

Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

The new north-south highway which opened in the mid-1970s now bypasses Cabusao and the old highway has been allowed to deteriorate. This may be one factor accounting for the low growth rate of Barcelonita, the second largest fishing community in Cabusao. The largest such community, Castillo, continued to grow steadily since 1948 and is today the second largest fishing community

on San Miguel Bay. Compared with Barcelonita, Castillo has several advantages which account for its continued growth. Castillo is located at the mouth of the Bicol River, which provides a sheltered landing where fishermen can bring their boats right to the beach even at low tide. In contrast, the broad mud flats at Barcelonita make it necessary for fishermen to unload their catch at considerable distance from the shore unless they land at high tide. Perhaps more importantly, the road connecting Castillo to Libmanan and thence to the new main highway has been maintained in serviceable condition, facilitating rapid marketing of the catch and encouraging a larger number of buyers who compete for the catch. As a result, prices at Castillo tend to be higher than at Barcelonita.

The only fishing community which grew more rapidly than Castillo during 1975 and 1980 was Pandan. However, only a minority of Pandan's residents are full-time fishermen, with rice production being the main economic activity in this community. Fishing is a secondary economic activity for the majority, though there are full-time fishermen as well.

The decline in population of Santa Cruz and Santa Lutgarda in recent years indicates out-migration. In many cases, however, such moves have been made to the neighboring community of Castillo where marketing facilities are better developed.

Calabanga

Less than 20% of Calabanga's population in 1980 was to be found in coastal fishing communities, of which Sabang is by far the largest (Table 24). Between 1975 and 1980 Calabanga's growth rate was only half the national average, indicating net out-migration. The average for all fishing communities within this municipality during that period was just over the national average, with the small community of Cagsao showing the highest rate of gain (over 6%). Sabang also grew at a rate above the national average for 1975-1980 due largely to the growth of the small- and medium-

Table 24. Calabanga: population and annual rate of population increase (decrease) of municipality and fishing communities, 1939-1980.

		1980	1975	1970	1960	1948	1939	1939-1980
Total, Calabanga	No.	43,030	40,274	34,718	28,467	21,791	15,087	
	Rate	1.33	3.01	2.00	2.25	4.17	–	2.59
Total, all fishing communities	No.	7,716	6,737	6,095	6,454	3,856	2,452	
	Rate	2.75	2.02	(0.57)	4.39	5.16	–	2.84
Balongay	No.	794	701	612	618	832	581	
	Rate	2.52	2.75	(0.10)	(2.45)	4.07	–	0.76
Belen	No.	796	741	445	413	225	530	
	Rate	1.44	10.74	0.75	5.19	(9.08)	–	1.00
Bonot-Sta. Rosa	No.	1,124	1,011	748	482	528	324	
	Rate	2.14	6.21	4.49	(0.76)	5.58	–	3.08
Cagsao	No.	807	596	497	540	558	184	
	Rate	6.25	3.70	(0.83)	(0.27)	13.12	–	3.67
Punta Tarawal	No.	314	313	446	401	n.a.	n.a.	
	Rate	0.06	(6.84)	1.07	–	–	–	(1.22)
Sabang	No.	3,053	2,546	2,510	2,624	1,159	307	
	Rate	3.70	0.29	(0.44)	7.05	15.91	–	5.76
Sibobo	No.	828	829	837	822	554	526	
	Rate	(0.02)	(0.19)	0.18	3.34	0.58	–	1.11

Note: The rate of decline for Punta Tarawal is based on data from the period 1960-1980 only. It is likely that this *barangay* was created by subdividing the neighboring *barangay* of Balongay, since this latter community experienced a drop in population during the period 1948-1960.

Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

trawler fleet in this community, which began in the early 1970s and accelerated during the mid- and late-1970s. It might be noted that between 1960 and 1975 the population of Sabang actually declined after having grown rapidly between 1939 and 1960. This probably was due to the presence of large trawlers based at Sabang during this earlier period. These trawlers later shifted their base of operations to Camaligan, in the Bicol River near Naga City, due to progressive siltation at Sabang which prevented large trawlers from landing their catch close to shore.

The pattern of population growth or decline for the remaining fishing communities of Calabanga is mixed. The average growth rate between 1939 and 1980 for all coastal communities was 2.84% (Table 24), slightly higher than the national average of 2.71% over the same period (Table 21). But only three out of seven fishing communities in Calabanga exceeded this national rate. As was true for Cabusao, some migrants from fishing communities with particularly low growth rates may have moved to neighboring communities within the same municipality.

Mercedes

Mercedes is the only municipality covered by the San Miguel Bay Project which is located in Camarines Norte Province. Eleven coastal communities whose fishermen operate primarily within San Miguel Bay were identified, including the three small island communities of Apuao, Cariñgao and Quinapaguian. Only two of the communities on the coast of Luzon itself are served by roads (Masalongsalong and Mambungalon).

The municipality of Mercedes grew at an average annual rate of over 4% between 1948 and 1980 though the rate of growth declined to 1.9% between 1975 and 1980 (Table 25), suggesting substantial in-migration prior to 1975 and net out-migration after that point. The average annual rate of growth for all fishing communities between 1939 and 1980 was marginally lower than the national average for this period, with a substantial decline between 1939 and 1948 followed by rapid growth between 1948 and 1975, indicating net in-migration. Between 1975 and 1980, however, population growth in these communities slowed to just over 1%, suggesting renewed out-migration. Four fishing communities actually lost population during this period. The rest gained, but only three grew at a rate above the national average for 1975-1980.

If these population figures reflect numbers of fishermen active within San Miguel Bay, it would appear that a considerable increase occurred between 1948 and 1975, followed by a much slower increase after 1975. For the generally isolated coastal communities of Mercedes, however, the connection between total population and numbers of fishermen may be less close than for other municipalities as many local residents are engaged in a mix of subsistence farming and part-time fishing. This economic mix is inadequately represented in the Project's survey data as few of these communities were covered due to the difficulty in reaching them; there were also problems regarding the safety of the study team in some areas where banditry was at that time on the rise. The same problems affected our coverage of the several isolated coastal communities of Sipocot Municipality, which borders on Mercedes.

Sipocot

The pattern of rapid population growth within Sipocot Municipality and somewhat lower but still substantial growth in the population of its coastal fishing communities between 1939 and 1980 closely follows that of Mercedes. For Sipocot, however, the most rapid period of growth, both for the municipality as a whole (9.6%) and for all fishing communities (9.5%) was between 1939 and 1948 (Table 26). Between 1948 and 1960 the municipality continued to grow at over 5% per year, indicating substantial in-migration. However, four out of five coastal communities during this period experienced a net decline in population. In each of the census periods following 1960 the average annual rate of population increase in Sipocot Municipality and its fishing communities was well below the national average, indicating net out-migration. Between 1975 and 1980 two out of five fishing communities lost population. A large number of persons moved to the village of Mangga,

Table 25. Mercedes: population and annual rate of population increase (decrease) of municipality and fishing communities, 1939-1980.

		1980	1975	1970	1960	1948	1939	1939-1980
Total, Mercedes	No.	27,644	25,161	19,674	13,983	7,247	n.a.*	
	Rate	1.90	5.04	3.47	5.63	–		4.27*
Total, all fishing communities	No.	8,619	8,144	6,333	4,998	2,864	3,102	
	Rate	1.14	5.16	2.40	4.75	(2.18)	–	2.52
Cayucyucan	No.	674	675	561	465	399	334	
	Rate	(0.03)	3.77	1.89	1.28	2.00	–	1.73
Colasi	No.	1,154	1,025	843	478	260	439	
	Rate	2.40	3.99	5.48	5.21	(5.65)	–	2.39
Hamoraon	No.	922	846	600	626	279	340	
	Rate	1.74	7.11	(0.42)	6.97	(2.18)	–	2.46
Hinipaan	No.	941	1,054	732	613	242	295	
	Rate	(2.24)	7.56	1.79	8.05	(2.18)	–	2.87
Lalawigan	No.	1,043	1,075	937	690	604	748	
	Rate	(0.60)	2.79	3.11	1.12	(2.35)	–	0.81
Lanot	No.	734	719	442	489	234	166	
	Rate	0.41	10.22	(1.01)	6.33	3.89	–	3.69
Mambungalon	No.	1,170	1,025	827	595	360	439	
	Rate	2.68	4.39	3.35	4.28	(2.18)	–	2.42
Masalongsalong	No.	578	473	397	180	42	51	
	Rate	4.09	3.57	8.23	12.89	(2.18)	–	6.10
Quinapaguian	No.	531	455	381	289	169	206	
	Rate	3.40	3.61	2.80	4.57	(2.18)	–	2.34
Apuao	No.	272	274	219	159	69	84	
	Rate	(0.15)	4.58	3.25	7.20	(2.18)	–	2.91
Cariñgao	No.	600	523	394	414	206	389	
	Rate	2.79	5.83	(0.49)	5.99	(6.82)	–	1.06

*Mercedes was part of Daet Municipality in 1939. Annual rate of population increased from 1948-1980. Data from 1939 not readily available due to changes in boundaries and in names of communities.

Note: 1939 population figures not available for Apuao, Hamoraon, Hinipaan, Mambungalon, Masalongsalong and Quinapaguian. Estimates were made based on rate of population change for those communities for which data are available, which showed a rate of decrease of 2.18% per year, 1939-1948. This figure was then used to extrapolate missing values for 1939.

Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

which grew appreciably during this period. Two factors account for Mangga's rapid growth: the availability of land transportation in the neighboring community of Barcelonita (Cabusao), from which Mangga is separated by a small river; and the unsettled conditions in other areas of Sipocot caused by the presence of local bandits. During 1981 and 1982 the New People's Army was active in this area.

Siruma

Siruma is a sparsely populated municipality with only three fishing communities within the San Miguel Bay area (Table 27). At present Siruma is not connected by road to the outside world, though a road is planned. Siruma's population declined between 1939 and 1948 but grew rapidly between 1948 and 1960. Since 1960 the municipality's average annual rate of growth has been below the national average, and for the period 1939-1980 Siruma's growth rate (1.7%) has been well below the national average.

Table 26. Sipocot: population and annual rate of population increase (decrease) of municipality and fishing communities, 1939-1980.

		1980	1975	1970	1960	1948	1939	1939-1980
Total, Sipocot	No.	43,505	39,457	38,153	32,650	18,089	7,936	
	Rate	1.97	0.67	1.57	5.04	9.59	–	4.24
Total, all fishing communities	No.	4,060	3,727	3,397	2,685	3,102	1,375	
	Rate	1.73	1.87	2.38	(1.20)	9.47	–	2.68
Anib	No.	1,058	1,121	934	794	622	269	
	Rate	(1.15)	3.72	1.64	2.06	9.76	–	3.40
Calampinay	No.	450	455	474	411	645	269	
	Rate	(0.22)	(0.81)	1.44	(3.69)	10.20	–	1.26
Cotmo	No.	877	737	801	612	832	392	
	Rate	3.54	(1.65)	2.73	(2.53)	8.72	–	1.98
Mangga	No.	858	656	539	355	410	182	
	Rate	5.52	4.01	4.26	(1.20)	9.47	–	3.85
San Vicente	No.	817	758	649	513	593	263	
	Rate	1.51	3.15	2.38	(1.20)	9.47	–	2.80

Note: Population data for San Vicente prior to 1970 are confusing due to possible errors in location of this community on census map. Population data for Mangga unavailable due to possible name change, but again census map does not allow for confidence in deciding which name was later changed to Mangga. For both communities estimates were made by means discussed in the Note of Table 25.

Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

Table 27. Siruma: population and annual rate of population increase (decrease) of municipality and fishing communities, 1939-1980.

		1980	1975	1970	1960	1948	1939	1939-1980
Total, Siruma	No.	11,613	10,435	9,373	9,307	5,245	5,851	
	Rate	2.16	2.17	0.07	4.90	(0.99)	–	1.69
Total, all fishing communities	No.	2,812	2,389	1,925	1,671	1,523	1,752	
	Rate	3.31	4.41	1.43	0.77	(1.54)	–	1.16
Cabugao	No.	797	516	339	326	297	342	
	Rate	9.08	8.77	0.39	0.77	(1.54)	–	2.08
Sulpa	No.	682	661	531	508	447	550	
	Rate	0.63	4.48	0.44	1.07	(2.28)	–	0.53
Vito	No.	1,333	1,212	1,055	837	779	860	
	Rate	1.92	2.81	2.34	0.60	(1.09)	–	1.07

Note: Population data for Cabugao are not available for 1939 and 1948. Estimates were made using procedures outlined in the Note of Table 25.

Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

The average annual growth rate between 1939 and 1980 within the three coastal communities was even lower than the municipality as a whole at 1.2%, indicating substantial out-migration. Since 1970, however, these communities have grown at a rate substantially above the national average, suggesting marked recent in-migration.

Tinambac

Tinambac is a large municipality which between 1939 and 1980 grew at an average annual rate (3.9%) (Table 28), well above the Philippines as a whole. The population of the nine coastal communities within Tinambac accounted for only 22% of the municipal total in 1980 compared to 46% in 1939, indicating that fishing has become relatively less important than other economic activities, particularly agriculture.

Table 28. Tinambac: population and annual rate of population increase (decrease) of municipality and fishing communities, 1939-1980.

		1980	1975	1970	1960	1948	1939	1939-1980
Total, Tinambac	No.	39,621	34,415	36,357	28,897	14,103	10,921	
	Rate	2.86	(1.09)	2.32	6.16	2.88	–	3.91
Total, all fishing communities	No.	8,879	7,736	8,297	7,273	7,049	5,057	
	Rate	2.79	(1.39)	2.04	0.26	4.50	–	1.38
Bagacay	No.	1,709	1,750	1,876	1,300	1,250	697	
	Rate	(0.47)	(1.38)	3.74	0.83	6.71	–	2.21
Bani	No.	806	727	924	722	635	538	
	Rate	2.08	(4.68)	2.50	1.08	1.86	–	0.99
Buenavista	No.	1,867	1,359	1,396	1,255	892	702	
	Rate	6.56	(0.54)	1.07	2.89	2.70	–	2.41
Caaluan (new and old)	No.	446	370	397	514	465	313	
	Rate	3.81	(1.40)	(2.55)	0.84	4.50	–	0.87
Daligan	No.	851	874	857	992	900	735	
	Rate	(0.53)	0.39	(1.45)	0.81	2.28	–	0.36
Magtang	No.	529	389	491	460	445	299	
	Rate	6.34	(4.55)	0.65	0.26	4.50	–	1.40
Salvacion (Poblacion)	No.	985	864	927	750	727	489	
	Rate	2.66	(1.39)	2.14	0.26	4.50	–	1.72
Sogod	No.	1,016	680	695	562	545	367	
	Rate	8.36	(0.44)	2.14	0.26	4.50	–	2.51
Union	No.	670	723	734	718	1,190	917	
	Rate	(1.51)	(0.30)	0.22	(4.12)	2.94	–	(0.76)

Note: It was necessary to estimate the population of Caaluan (1939, 1948), Magtang (1939, 1948), Salvacion (1939, 1948, 1960, 1970), and Sogod (1939, 1948, 1960). Prior to 1975 Salvacion, which is part of the *población* of Tinambac, was included in that town's census. It is likely that the absence of census information prior to 1970 for Sogod, which borders the *población,* can similarly be explained. See Note, Table 25, for explanation of estimation procedure.

Source: Bureau of Census and Statistics (1939, 1948, 1960); NCSO (1970a, 1970b, 1975a, 1975b, 1981).

This relative decline is reflected in the slow growth of the nine coastal communities during the period 1939-1980, which at 1.4% is just over half the national average and approximately one third that of the municipality as a whole. Between 1970 and 1975 the population of all but one fishing community actually declined. Between 1975 and 1980 the average growth of all fishing communities was slightly above that of the Philippines as a whole. However, three communities actually experienced a decline in population. Several others gained strongly, including two out of the three largest fishing communities. Bagacay, the third largest community, has experienced a decline in population since 1970. It is interesting to note that the economic base of Bagacay has shifted away from capture fisheries towards aquaculture, with a large area of nearby mangrove swamp having been converted to brackishwater ponds during the 1970s. Part of the population decline might be due to a dispersal

of Bagacay's population over the broad area of the ponds themselves to facilitate supervision and guarding. Some of this area is included in the small neighboring community of Caaluan, which grew by 3.8% during the period 1975-1980.

COMBINED GROWTH OF ALL FISHING COMMUNITIES, 1939-1980

Compared to the 2.7% average annual rate of population growth for the Philippines between 1939 and 1980, the average for all fishing communities surrounding San Miguel Bay is somewhat lower at 2% (Table 29), while that for the six municipalities as a whole is somewhat higher at 2.9% (Table 30). An examination of Tables 29 and 30 clearly shows that the rates of population growth for these municipalities were highest up to 1960, after which they declined to levels below the national average, indicating out-migration after an earlier period of in-migration. The highest average annual growth rate of the 40 fishing communities listed in Tables 23 through 28 was between 1939 and 1948 when they grew at an average rate of 3% per year compared to 2% for the Philippines as a whole. Subsequent to 1948, however, these communities grew more slowly than the national population. Here again, an initial period of in-migration was reversed but even more strongly than the pattern for the six municipalities as a whole.

Table 29. Population of fishing communities surrounding San Miguel Bay, by municipality, 1939-1980.

	Year						
Municipality	1939	1948	1960	1970	1975	1980	Average annual rate of increase 1939-1980
Cabusao	3,529	4,291	5,700	6,301	6,931	7,430	1.83
Calabanga	2,452	3,856	6,454	6,095	6,737	7,716	2.84
Mercedes	3,102	2,864	4,998	6,333	8,144	8,619	2.52
Sipocot	1,375	3,102	2,685	3,397	3,727	4,060	2.68
Siruma	1,752	1,523	1,671	1,925	2,389	2,812	1.16
Tinambac	5,057	7,049	7,273	8,297	7,736	8,879	1.38
Total	17,267	22,685	28,781	32,348	35,664	39,516	
Annual rate of increase	–	3.08	2.00	1.18	1.97	2.07	2.04

Source: Tables 23-28.

Table 30. Population and rate of increase of municipalities surrounding San Miguel Bay, 1939-1980.

	Year						
Municipality	1939	1948	1960	1970	1975	1980	Average annual rate of increase 1939-1980
Cabusao	4,743	5,130	8,020	9,078	10,110	10,903	2.05
Calabanga	15,087	21,791	28,467	34,718	40,274	43,030	2.59
Mercedes	n.a.	7,247	13,983	19,674	25,161	27,644	4.27*
Sipocot	7,936	18,089	32,650	38,153	39,457	43,505	4.24
Siruma	5,851	5,245	9,307	9,373	10,435	11,613	1.69
Tinambac	10,921	14,103	28,897	36,357	34,415	39,621	3.91
Total	n.a.	71,605	121,324	147,353	159,852	176,316	2.86*
Annual rate of increase	–	–	4.49	1.96	1.64	1.98	2.86

*Annual rate of increase for Mercedes based on period 1948-1980.
Source: Tables 23-28.

Despite net out-migration from the coastal fishing communities surrounding San Miguel Bay between 1939 and 1980, and especially during the period 1948 to 1980, the coastal population has more than doubled since 1939, increasing by 74% between 1948 and 1980.

It is not known whether the percentage of active fishermen has remained constant. In 1980 the estimated 5,600 fishermen operating within San Miguel Bay constituted 14.2% of the coastal population. If the same percentage is applied to the 1939 population there would have been less than 2,500 fishermen in that year. Given the limited nature of alternative economic opportunities to fishing in this area, it is likely that the proportion of fishermen to total population in 1980 represents conditions in previous years with reasonable accuracy. If this is so, the numbers of fishermen exploiting San Miguel Bay have more than doubled since 1939. Even if the proportion is lower, it is beyond doubt that the numbers of fishermen operating in the Bay have increased substantially over the past four decades despite a strong pattern of out-migration.

The overall population of coastal fishing communities and presumably fishermen, has increased over time but the rates and indeed the directions of change have varied considerably from community to community (Table 31).

Table 31. Summary net migration in and out of San Miguel Bay fishing communities surveyed, 1959-1979.

Barangay	Total in-migrants	Total out-migrants	Net in (out) migration
1. Barcelonita	56	42	14
2. Castillo	47	12	35
3. Pandan	12	6	6
4. Balongay	15	8	7
5. Bonot-Sta. Rosa	27	17	10
6. Sabang	133	22	111
7. Sibobo	16	29	(13)
8. Apuao	17	10	7
9. Cariñgo	43	57	(14)
10. Cayucyucan	6	11	(5)
11. Lanot	24	20	4
12. Mambungalon	34	31	3
13. Matoogtoog	16	36	(20)
14. Quinapaguian	17	11	6
15. Mangga	41	15	26
16. Sulpa	47	16	31
17. Vito	97	28	69
18. Bagacay	13	17	(4)
19. Buenavista	33	14	19
20. Cagliliog	19	9	10
21. Daligan	22	39	(17)
22. Sogod	18	28	(10)
Total	753	478	275

Source: Primary data from socioeconomic survey (Bailey 1982).

As a comparative statistic, the rates of change have considerable utility. It must be recognized, however, that absolute values also are important and that a high rate of change in a small community may be less significant than a smaller rate of change in a larger community. There does seem to be a tendency in recent years for larger communities to grow in size, often at the expense of smaller nearby communities. In the case of Castillo, Cabusao, growth apparently has been at the expense of Santa Cruz and Santa Lutgarda, though migrants from other areas also have moved there.

Sabang, Calabanga, is another major community which has experienced considerable growth in recent years. The primary attraction in this case involves the presence of small and medium trawlers which, in addition to employing several hundred men on the boats themselves, also have contributed to the expansion of such shore-based opportunities as fish processing, net manufacturing and repair, and a wide range of other ancillary services directly and indirectly related to fishing.

Most of the other communities around San Miguel Bay which have exhibited higher rates of population growth than would be expected through natural processes alone have attracted new residents for reasons that may have less to do with fishing than agriculture. The case of Colasi in Mercedes is an example of this situation. Colasi is an isolated community located near the Bicol National Forest. The absence of road transportation or regular service by passenger launches increases the costs and risks of fish marketing to prohibitive levels except for relatively small volumes of dried fish. For the most part, fishing there and in several other communities along the western shore of San Miguel Bay is limited to local subsistence needs rather than for sale elsewhere. It is the availability of land for agricultural production and not the fish in the sea which has attracted migrants to this and other similarly situated communities in the municipality of Mercedes.

Not all communities along the western shore have attracted migrants, however. In Sipocot Municipality, Mangga has in recent years attracted considerable in-migration due to the presence of land transportation. Neighboring coastal communities in Sipocot have lost population directly to Mangga, whose population is relatively more concentrated than that of the others. A major factor behind this shift in population is "hooliganism" affecting isolated farmsteads and attributable to two gangs of young men in the area. Losses of livestock and agricultural produce have forced people to move to areas of higher population concentration such as Mangga for protection.

The movement of population from smaller to larger communities seems to be taking place elsewhere as well, though for different reasons. Small fishing communities will continue to exist due to such factors as the availability of land or other local resources and despite physical isolation and attendant difficulty in moving fish or other products to market. Both in terms of absolute numbers of people living around San Miguel Bay and numbers of fishermen exploiting that body of water, however, larger communities are increasingly important. This is a natural concomitant of the gradual commercialization of even small-scale fishermen whose growing dependence on fossil fuels, synthetic netting and spare parts for their engines binds them to a cash economy. It thus becomes increasingly important for fishermen to have access to markets of sufficient size and efficiency to obtain a return on their investment and operating expenses. As rising fuel costs increase the expense of transportation in and out of the more isolated coastal fishing communities, this trend of population concentration in larger settlements is likely to continue.

SURVEY DATA ON MIGRATION

Migrants into an area are relatively easy to identify during a survey by simply asking respondents where they were born and where they lived during the last census period. Identifying out-migrants who are no longer resident in the area of interest, however, is much more difficult. During our socioeconomic survey in the San Miguel Bay area we were able to obtain information on out-migrants only for those individuals whose families remained behind to be interviewed. Where entire families left the study area we were left with no source of information but instead a major source of bias.

The preceding analysis of census data indicated net out-migration from the San Miguel Bay area during the period 1939-1980. Data from our socioeconomic survey, however, indicated net in-migration between 1959 and 1979 (Table 31). This is certainly erroneous for the reasons indicated above. However, the information gathered through our survey provides some useful insights into patterns of migration. It can be noted, for example, that the largest number of in-migrants and the strongest net gain through migration occurred in Sabang, the base of trawler operations. Of the seven communities where our data indicated net out-migration, only one (Daligan) actually declined in population after 1960 (Table 28). (Due to various problems with the census data for

Matoogtoog and Cagliliog these communities were not included in Tables 25 and 28.) It is possible that our focus on fishing households rather than with community population as a whole accounted for this discrepancy. This suggests that for some communities net out-migration of fishing households may be even more pronounced than that indicated in the above analysis of census returns.

In Table 32, information is provided on place of birth of our survey respondents and all household members if born in a community different from their present residence—i.e., if they were in-migrants. Over 20% of all in-migrants moved to their present community from a different fishing community on San Miguel Bay. A further 27% were born within the same municipality but not in a community bordering San Miguel Bay. Some 58% of all in-migrants moved to this area from different municipalities within the same province, with 22% of all in-migrants moving from a contiguous municipality. There was also considerable movement into the San Miguel Bay from different provinces (36.4%), though relatively few in-migrants originated from areas outside of the Bicol Region (7.8%).

Table 32. Place of birth of respondents and their family members if born in *barangay* other than that of present residence, 1959-1979.

Barangay	Total in-migrants	In-migrants from other fishing barangay, San Miguel Bay	In-migrants from same municipality different barangay	In-migrants from different but contiguous municipalities	In-migrants from same province different municipality	In-migrants from same region different province	In-migrants from different region
1. Barcelonita	56	11	0	37	43	6	7
2. Castillo	47	13	9	10	25	10	2
3. Pandan	12	0	0	3	5	7	0
4. Balongay	15	1	4	3	4	6	1
5. Bonot-Sta. Rosa	27	4	11	1	9	4	3
6. Sabang	133	22	73	15	28	22	10
7. Sibobo	16	2	7	1	5	3	1
8. Apuao	17	6	9	0	1	5	2
9. Cariñgo	43	13	17	12	15	11	1
10. Cayucyucan	6	2	1	2	2	3	0
11. Lanot	24	4	0	4	0	24*	0
12. Mambungalon	34	2	12	10	12	8	2
13. Matoogtoog	16	5	4	3	3	5	4
14. Quinapaguian	17	5	3	4	5	6	3
15. Mangga	41	4	12	6	12	17	0
16. Sulpa	47	19	10	12	22	12	3
17. Vito	97	27	2	27	46	31	18
18. Bacagay	13	1	1	3	8	3	1
19. Buenavista	33	8	16	6	9	8	0
20. Cagliliog	19	3	3	2	2	14	0
21. Daligan	22	0	4	3	12	6	0
22. Sogod	18	1	5	0	8	4	1
Total	753	153	203	164	276	215	59

*Eighteen of these in-migrants came from Camarines Sur.
Source: Primary data from socioeconomic survey (Bailey 1982).

Unfortunately, we did not gather data on the occupational backgrounds of these in-migrants at their point of origin. Personal observations in the field by this author suggest that many of these migrants come from agricultural backgrounds, and this is almost certainly the case for the majority of those making intra-municipal and intra-provincial moves.

CHARACTERISTICS OF OUT-MIGRANTS

Virtually all out-migrants on whom we have data are the offspring of our respondents. Over 70% of those out-migrants moved out during or since 1970; 94% of recorded moves, which include all destinations even if within the same *barangay*, were accomplished since 1960. Thus, while the survey data provide useful information for recent years, understanding longer-term trends still requires recourse to census data.

It is obvious from the data presented in Table 33 that the level and direction of out-migration uncovered during our survey is of considerable importance. Almost half of those family members no longer living with a respondent (96.7% of whom are either sons or daughters) moved to a different province while nearly one third continued to live in the same community.

Table 33. Current place of residence of family members no longer living with respondent (n = 686).

Respondents residence	Living in same barangay as respondent	Total out-migrants from respondent's barangay	Out-migrants to different barangay same municipality	Out-migrants to different municipality same province	Out-migrants to different province	Out-migrants to Manila area*
1. Barcelonita	17	42	0	5	37	3
2. Castillo	18	12	0	2	10	2
3. Pandan	8	6	0	2	4	0
4. Balongay	12	8	0	1	7	0
5. Bonot-Sta. Rosa	24	17	2	14	1	1
6. Sabang	14	22	8	4	10	4
7. Sibobo	5	29	1	7	21	6
8. Apuao	2	10	0	7	3	0
9. Cariñgo	14	57	15	12	30	5
10. Cayucyucan	2	11	2	2	7	2
11. Lamot	8	20	5	0	15	0
12. Mambungalon	10	31	2	9	20	6
13. Matogtoog	9	36	3	8	25	0
14. Quinapaguian	20	11	2	5	4	0
15. Mangga	5	15	0	2	13	3
16. Sulpa	2	16	3	3	10	5
17. Vito	6	28	3	4	21	10
18. Bagacay	8	17	0	2	15	0
19. Buenavista	2	14	0	7	7	1
20. Cagliliog	12	9	2	0	7	1
21. Daligan	7	39	4	10	25	2
22. Sogod	3	28	7	4	17	0
Sub-totals	208	478	59	110	309	51
Percent of total (686)	30.3	69.7	8.6	16.0	45.0	7.4

*Figures in this column already included in column labeled "Out-migrants to different province."
Source: Primary data from socioeconomic survey (Bailey 1982).

Of at least equal importance to indications of the magnitude of out-migration obtained through this survey is the information on the characteristics of the out-migrants themselves and the families they left behind.

Sex

There is a marked tendency for sons to remain in their parents' homes longer than daughters. The distribution of all sons and daughters (1,383 and 1,381, respectively) was quite even, but while 82.6% of all sons were still living at home only 72.2% of all daughters did so. Two factors explained

this difference. Females married at a younger age than males (Table 34). Also important were the different prospects for employment for young males and females. Some adolescent females found local employment as live-in housekeepers or part-time helpers with other families.

Table 34. Civil status by sex and age.

		Male					Female			
		Single		Married			Single		Married	
Age	Total	#	%	#	%	Total	#	%	#	%
⩽ 10	712	712	100.0	0	0.0	733	733	100.0	0	0.0
11 – 15	272	272	100.0	0	0.0	252	249	98.8	3	1.2
16 – 20	255	236	92.3	19	7.5	225	157	69.8	68	30.2
21 – 25	231	113	48.9	118	51.1	250	55	22.0	195	78.0
26 – 30	205	32	15.6	173	84.4	215	11	5.1	204	94.9
> 30	516	22	4.3	494	95.7	450	9	2.0	441	98.0

Source: Primary data from socioeconomic survey (Bailey 1982).

In some communities, seasonal work opportunities are available for drying and salting fish. For young unmarried women, other employment prospects in their home community are distinctly limited. Adolescent males, on the other hand, are able to go to sea in their early teens and earn a full fisherman's share, which then is turned over to the family. Sons are financially important to many fishing families and in most cases more so than daughters. Daughters looking for regular employment often have to leave the home community, finding employment elsewhere as factory workers, sales clerks, housekeepers, or bar hostesses. By way of contrast, it is much more likely that sons will be encouraged to remain at home until they marry, usually in their mid-twenties. Between the ages of sixteen and twenty, 60% of all adolescent males in the survey population went to sea (Table 35). During this same period 55% of adolescent females became primarily engaged in housekeeping activities (Table 36), sometimes in the home of others for pay, but more often in the family home. There is no question as to the value of such domestic duties, which are described and analyzed elsewhere (Yater 1982b). Yet the significant difference between the income-earning potential of adolescent males and adolescent females in their home communities is too important to be overlooked.

Table 35. Occupation of adolescent and pre-adolescent males residing in San Miguel Bay area, 1981 (n = 652).

Age	Total	Student	Fishing	Petty trading	Others
< 10	208 (100.0%)	207 (99.5%)	0 (0.0%)	0 (0.0%)	1 (0.5%)
11 – 15	236 (100.0%)	184 (80.0%)	38 (16.1%)	5 (2.1%)	9 (3.8%)
16 – 20	208 (100.0%)	51 (24.5%)	124 (59.6%)	23 (11.1%)	10 (4.8%)

Note: Figures for those ten and under do not include infants, toddlers or others for whom no identifiable occupation or activity was stated.

Source: Primary data from socioeconomic survey (Bailey 1982).

Table 39. Reason for moving and present residence of family members no longer living with respondent.

Present residence	Totals	Reason for moving			
		Job	Marriage	Study	Relative
Same barangay	180	10 (5.6%)	168 (93.3%)	0 (0.0%)	2 (1.1%)
Different barangay same municipality	49	4 (8.2%)	34 (69.4%)	11 (22.4%)	0 (0.0%)
Different municipality same province	86	31 (36.0%)	40 (46.5%)	8 (9.3%)	7 (8.1%)
Different province	297	156 (52.5%)	111 (36.4%)	18 (6.0%)	12 (4.0%)
Abroad	3	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)
Totals	615	203 (33.0%)	354 (57.6%)	37 (6.0%)	21 (3.4%)

Note: Includes only those for whom reasons for moving were given.
Source: Primary data from socioeconomic survey (Bailey 1982).

Discussion and Conclusions

THE ISSUE RESTATED

In many parts of the developing world, coastal fisheries are said to have reached or exceeded maximum biologically sustainable levels of production. Growing demand by protein-hungry human populations is likely to push to their limits those few coastal fisheries where expanded production is possible. The Philippines is no exception to this pattern, a situation which presents two serious and related problems. The first is management of a biologically renewable resource. The second problem concerns fishermen and their families: how is it possible to increase incomes and improve standards of living of small-scale fishermen when the resource upon which they depend already is maximally exploited or even overexploited, and when new entrants continue to swell the ranks of active fishermen?

In searching for solutions to these twin problems much discussion has been devoted to the identification of alternative economic activities which will attract surplus labor away from heavily exploited fisheries and into other more productive and economically rewarding pursuits. The study reported upon in this report is an attempt to examine the issues involved in encouraging such economic alternatives.

Net out-migration has kept the rate of population growth in the fishing communities surrounding San Miguel Bay below national levels for several decades, but in absolute terms the numbers of fishermen exploiting the fishery gradually have increased. In 1980, there were 5,600 fishermen operating in the Bay, compared to approximately 3,200 in 1948. Over the past twenty years the small-scale fishermen of San Miguel Bay have adopted engines, which enable them to extend the range of their fishing operations, and to use more efficient gear. Increasing numbers of small-scale fishermen using more effective boats and gear have contributed significantly to the high level of pressure exerted on the San Miguel Bay fishery.

In the early 1970s only a few trawlers operated within the Bay, but by 1981 there were 95 small and medium trawlers in operation and several more under construction (Pauly and Mines 1982). In 1980-81, trawlers landed 47% by weight of the total catch of fish, shrimps, crabs and squid. This rapid expansion of the trawler fleet has resulted in a major increase in the level of exploitation. Some part of their catch has come at the expense of the small-scale fishermen with whom they are in competition. The essence of this competition is indicated in Table 40, which gives the catch composition of trawlers and small-scale fishermen. Competition is most clearly defined for penaeid shrimps, the single most valuable species in the fishery. Yet the competition for other species, such as anchovies, also is strong. Here the more passive type of gear used by small-scale fishermen, the stationary liftnet, is at a serious disadvantage compared to the more active trawl net which has proven itself highly effective in capturing anchovies through the simple expedient of fitting a fine-meshed screen into the cod end of a trawl.

Table 40. Distribution of catch between small-scale and trawler fisheries in San Miguel Bay, ranked by total annual catch (1980-81).

Common name	Total annual catch (in tonnes)	Percent caught by	
		Trawl fishery	Small-scale fishery
Miscellaneous species	4,406	68.5	31.5
Croakers	3,472	20.8	79.2
Anchovy	2,100	65.2	34.8
Mullets	1,190	27.7	72.3
Penaeid shrimps	1,044	44.2	55.8
Sardinella	795	25.3	74.7
Crabs	500	24.0	76.0
Hairtails	324	78.5	21.5
Trevally, scads	269	21.3	78.7
Squids	250	93.9	6.1
Slipmouths	112	33.8	66.2
Spanish mackerel	75	37.9	62.1
Sharks and rays	45	79.9	20.1
Sea catfish	44	13.0	87.0
Grunts	34	61.5	38.5
Total catch*	14,660	47.1	52.9

Note: Figures exclude *balao* (Sergestid shrimp) which, following Pauly and Mines (1982) differ from the rest of the fishery in terms of trophic levels and percentage of water content. *Balao* landings totalled 4,473 t, caught exclusively by the small-scale sector. If we add *balao,* the distribution of catch between the trawl and small-scale fisheries is 36% and 64%, respectively.
Source: Adapted from Table 4 in Pauly (1982).

By the early 1970s competition among increasing numbers of small-scale fishermen operating within San Miguel Bay already had led to a decline in catch per effort. As competition from trawlers began to increase, the perceived impact on the stock became an issue of growing concern among the thousands of small-scale fishermen affected. At the same time, the first of the world-wide energy crises struck, leading to major increases in the cost of operation. The close of the decade saw the small-scale fishermen of San Miguel Bay caught between declining catches and increasing costs.

The rationale behind encouraging some fishermen to leave this fishery which is heavily exploited is to allow the remaining fishermen to catch more and hence improve their incomes. The best available evidence indicates that San Miguel Bay has reached its maximum level of production and that for there to be an improvement in individual catches for significant numbers of fishermen there will have to be an overall reduction in the level of fishing effort.

Fishery regulations can be classified either as (1) those affecting the size of fish caught or (2) those affecting the total amount of fishing effort (Anderson 1977; Huat 1980). The first category includes those measures that set minimum mesh sizes or minimum allowable sizes of fish landed and the establishment of closed areas or seasons. All these measures potentially influence the age

at which fish enter the fishery. The second category, which is more relevant to this discussion, includes measures which alter the various effort parameters; i.e., the number of fishing units used, their individual harvesting power, their spatial distribution and the total time spent fishing. The types of regulation that might be considered to control effort include (1) area or seasonal closures, (2) individual or fleet quotas, (3) gear restrictions, (4) limits on number of boats or their harvesting power, (5) taxes on effort or catch and (6) licensing programs.

In the context of the Philippines generally, and the San Miguel Bay specifically, the feasibility of most of the above measures is distinctly limited due to the weakness of existing enforcement mechanisms. Introducing closed seasons, establishing quotas or collecting taxes or license fees might be feasible for trawlers, most of which land their catch at one location, but attempting to apply such measures within the more dispersed small-scale fisheries of the Bay would not be administratively feasible and would be questionable as an appropriate strategy. Limits on areas open to fishing have been enacted to control trawler operations but these have not been enforced. Reducing the already low efficiency of small-scale fishing gear is not an appropriate strategy for limiting fishing effort as this would weaken their competitiveness *vis-a-vis* trawlers and worsen incomes of an already impoverished group. These various management options are explored in considerably more detail from an interdisciplinary perspective in the final technical report of this project.

In theory, reducing the absolute numbers of fishermen offers the best hope for reducing the level of effort contributed by the small-scale sector. However, the alternatives to fishing in the San Miguel Bay area at present are limited. The local agricultural sector is unable to absorb surplus labor from other sectors due to existing high levels of underemployment in rural farming communities. Local manufacturing and cottage industries offer little potential absorptive capacity and local urban "growth centers" such as Naga City are economically stagnant. Developing the Bicol Region's agro-industrial potential is a long-term process which will encourage economic diversification throughout the Region. Coastal fishing communities could take part in this development to some extent through types of animal husbandry which utilize such available local resources as fish meal and undergrazed land. Diversification in this direction, however, will provide at best supplementary sources of income and is unlikely to result in a substantial reduction of fishing effort.

In the absence of local employment alternatives, it is possible that the numbers (or at least the growth in numbers) of fishermen could be reduced through encouraging out-migration from the communities surrounding San Miguel Bay. Existing migration patterns show a steady stream of out-migration, mostly to distant provinces where economic opportunities are perceived to be greater. A significant proportion of these migrants choose as their destination such urban growth centers as Manila, joining the stream of rural-urban migrants from other areas and sectors. The resultant rapid urban growth has produced its own problems, and active official support to spur increased rural-urban migration is highly unlikely. Neither are there official programs supporting rural-rural migration, such as the long-established transmigration programs of Indonesia or the Federal Land Development Authority resettlement schemes of Malaysia. Rural-rural migration to "frontier" areas in the Philippines has been spontaneous and private. The most important destination has been Mindanao, far from the Bicol Region, and there are indications that the flow of migrants there is decreasing as available land becomes increasingly scarce. In any event, few rural-rural migrants to Mindanao have come from the Bicol Region.

In sum, reducing the level of fishing effort in San Miguel Bay through reducing numbers of small-scale fishermen is not likely to be a viable strategy. Local alternatives to fishing are distinctly limited and out-migration is not likely to be adequate to reduce pressure on the resource.

DIVIDING THE PIE DIFFERENTLY

Given that San Miguel Bay is fully exploited and that it is not feasible to reduce the absolute numbers of small-scale fishermen, one remaining option for increasing their catch and incomes is

to reduce levels of effort by limiting the types of gear used to exploit the fishery. This approach in effect would mean a reallocation of the resources among fishermen using competing types of gear.

At present, production from San Miguel Bay is divided almost equally between small-scale and trawler fishermen. These two groups compete for many of the same species and it can be assumed that removing one group from the fishery will result in increased catches for the other (Pauly, pers. comm.).

If this is so, three broad approaches can be envisioned. The first is to take no action and allow the present pattern of resource allocation to continue to evolve in favor of the trawlers. In view of their proven effectiveness and economic efficiency, even a gradual increase in numbers of trawlers would result in their landing an increasing share of the catch. This may lead to increasing rates of out-migration among small-scale fishermen and/or a further decline in their income from fishing.

The economic efficiency of trawlers in San Miguel Bay is a strong argument in favor of a fishery dominated by this gear type. Approximately 500 fishermen man the trawlers which operate within the Bay and they account for 47% (by weight) of total landings. The remaining 5,000 fishermen using less productive types of gear account for the remaining 53% of the catch. The implication is clear: fishermen using trawlers are almost ten times as productive (per unit of labor) as are those using other gear types. Moreover, even though trawlers are relatively capital intensive, the total investment in the trawler fleet of San Miguel Bay is significantly less than that of the aggregate investment in boats and gear which make up the small-scale sector (Table 41).

Table 41. Investment costs in pesos of trawlers and small-scale gears, 1981.

Type of gear	No. of units	Replacement cost/unit (1981/82)	Investment by type
Trawlers			
Small	75	55,000	4,125,000
Medium	20	70,000	1,400,000
Sub-total			5,525,000
Small-scale (major gears only)			
Motorized gill-net	350	13,000	4,550,000
Non-motorized gill-net	150	2,800	420,000
Mini trawl	188	9,200	1,729,600
Liftnet	171	12,200	2,086,200
Fish corral	89	9,100	809,900
Sub-total			9,595,700
Total			15,110,700

Note: Based on actual count in 22 fishing communities surveyed plus estimates for communities not sampled. These estimates were made on the basis of known population, numbers of fishing households, and types of gear prevalent in these communities.

In any economy, regardless of stage of development, issues of efficiency and productivity deserve careful attention. Yet other issues need to be considered in designing programs of fisheries management and development. One such issue concerns the biological impact of trawling. Trawl gear is non-selective, capturing large volumes of fish and invertebrates which are saleable only as fish meal.

When small-meshed trawl nets are used, as they are in San Miguel Bay, large numbers of undersized fish of commercially valuable species are sold as chicken (and pig) feed. The "mixed species" (which consist of undersized commercial species and non-commercial species) caught by trawlers and processed into fish meal represent 16% of the total catch from San Miguel Bay (Table 40).

Referring to all fin fish other than anchovies, Pauly and Mines (1982) state that the use of fine meshed trawl nets "skew the size and age distribution of fish caught in San Miguel Bay towards smaller and younger forms, to the detriment of the small-scale fishery, of the offshore fishery, and ultimately to the detriment of the San Miguel Bay trawl fishery itself."

A second important issue relating to the competition between trawlers and small-scale fishermen is that of equitable access to and distribution of the resource among competing groups. It is on this point that the economically efficient trawlers compare poorly with the small-scale sector. Ownership of trawlers is concentrated in relatively few hands. Trawlers are capital rather than labor intensive and provide fewer employment opportunities than the small-scale sector. Using the figures presented in Table 41, the investment capital necessary to provide employment to each of the 500 trawler crewmen is ₱11,050. For the small-scale sector the average investment is less than ₱2,000 per fisherman.

Were there alternative economic opportunities available to small-scale fishermen who are competing with the trawlers, one could argue that a major displacement of labor from the small-scale sector would be beneficial for all concerned. The exploitation of San Miguel Bay would be left to capital-intensive but efficient trawlers and surplus labor would be absorbed into other sectors. In the absence of viable alternatives, however, such a strategy raises important issues of economic justice. It is unlikely that there will be an official policy calling for the displacement of small-scale fishermen from fishing grounds they have exploited over many generations. The wisdom and fairness of encouraging increased concentration of fishing power (i.e., the trawlers) in the hands of a few individuals also can be questioned. Given the absence of viable alternatives to fishing, it well may be that increasing incomes for small-scale fishermen can best be accomplished by reducing or eliminating competition from the more capital-intensive trawlers. This is likely to be the case in San Miguel Bay since there is substantial overlap in the species exploited by small-scale and trawler fishermen. Existing fishery management regulations, if enforced, would be adequate to reduce the level of trawling in the Bay and there is ample legal precedent in the Philippines for closing certain fisheries to certain gear types.*

Increasing employment is a worthy goal. Increasing the small-scale fishermen's share of the catch is likely to result in a wider distribution of what profit is to be derived from the fishery and certainly will result in increased availability of local employment. In the absence of any limitations on access to the fishery, however, increased incomes will attract new entrants to the fishery. Ultimately, this added fishing effort will result in further decline in the catch per unit of effort and, thus, incomes. Limiting or banning trawlers could be criticized if the result was sharing of poverty rather than providing opportunity for economic advancement.

Developing alternatives to fishing remains of critical importance in the long run. In the case of San Miguel Bay, alternative opportunities to fishing depend on broader processes of development within the Bicol Region as a whole. Reallocation of access to the Bay's resources could lead to improved incomes and standards of living for the vast majority of the fishermen who operate there. Whether in the long term this goal will be met depends to a large extent on developments outside the fishery sector and the ability of the larger economy to absorb a rapidly growing labor force in productive pursuits.

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*Since this was written, a five-year ban on the operations within San Miguel Bay of all commercial trawlers (i.e., those displacing over 3 t) has been instituted (March 1982). However, smaller trawlers, which are the most numerous category, are unaffected.

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Glossary

Balao: A tiny sergestid shrimp, used as a condiment in cooking and making shrimp paste.

Banca: Small boat, either motorized or non-motorized. *Bancas* often have outriggers, in which case they may also be known as "pumpboats."

Barangay: The lowest level of government administration, the *barangay* includes both settled areas (the *barrio*) and the surrounding countryside. A number of contiguous *barangays* make up a municipality. In urban areas *barangays* are analogous to political wards, or neighborhoods that have administrative functions performed by the *barangay* leadership.

Barrio: A settled area, used most often in reference to rural villages.

Basnig: A type of fishing gear known as a liftnet, used to capture small pelagic species which are attracted to the net with the aid of lights.

Biyayang Dagat: Literally "Bounty of the Sea", this is a government program designed to provide a source of unsecured loans which will allow fishermen to purchase boats and gear.

BRBDP: Bicol River Basin Development Program.

Cadang-cadang: A viroid disease affecting coconut trees which ultimately kills the tree itself.

Cogon: Elephant grass *(Imperata cylindrica).*

FCA: Fuel Cost Adjustment.

Hud-hud: A type of simple fishing gear used to catch *balao;* the *hud-hud* is essentially two poles arranged in a V-shape with mosquito netting. The operator walks in shallow water pushing the net before him, scooping up the *balao.*

Ipil-ipil: A large leguminous tree *(Leucaena leucocephala)* whose leaves are useable as animal fodder.

Itik-itik, kuto-kuto, mangquerna: These various names are used in reference to a type of mini trawl used to capture *balao* and fish in San Miguel Bay.

Kapitan: Literally captain, as in *kapitan barangay.*

MSY: Maximum sustainable yield.

NACIDA: National Cottage Industry Development Authority.

NCSO: National Census and Statistics Office.

NEDA: National Economic and Development Authority.

Nipah: A palm *(Nipa fruiticus)* whose leaves are commonly used as thatching for roofs and walls.

Panke: The generic name for gill-nets, of which several different types are used by fishermen of San Miguel Bay.

PNR: Philippine National Railways.

Población: The community where the seat of municipal government is located. The *poblacion* is usually but not always the largest community in the municipality.