The Impact of Rapid Migration on Environmental Stability: Insights from Analysis of Demographic Trends in Palawan

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Introduction

This study presents demographic findings from research on the impact of rapid in-migration and population growth on the ability of coastal environments to adapt and accommodate this growth. Coastal regions of the world are among the most rapidly changing human landscapes. Shifts in migration and fertility behavior across time have resulted in population pressures that often degrade marine resources and regional ecosystems. Governments and coastal zone managers are currently facing the consequences of this interaction between population and the environment. The rush of poverty to the coasts has overwhelmed many established communities and institutions that represent traditional patterns of sustainable resource use.

This phenomenon of environmental degradation is most intense in the coastal nations of Southeast Asia. These areas often lack the resources and infrastructure to successfully manage the impacts of too many people pursuing too few resources. International efforts to promote coastal resource development have experienced widespread failure. The introduction of new and often inappropriate technologies or management strategies have consistently disrupted functioning resource systems and have led to the loss of human, cultural and social capital (Pollnac, 1996; Dyer and McGoodwin, 1994; McGoodwin, 1990; Bailey, 1988; Bailey et al., 1986; Emmerson, 1980; Kent, 1987; Royc,e 1987; Smith, 1979; World Bank, 1984).

This paper discusses the demographic consequences of migration on the growth on population size within a small island province in the nation of the

Philippines. The primary focus of the present analysis is to establish a demographic baseline for the growth of local population. This baseline data will be used to develop scenarios of growth that can be integrated with qualitative data to explain resource usage in a coastal environment and how resource utilization changes in the face of population stress.

Research Framework

Originally funded by the MacArthur Foundation, the Palawan Coastal Resource project represents a multidisciplinary collaboration between demographers, anthropologists and marine scientists. The research design is based on the premise that helping communities understand the interrelationship between population shifts and behaviors on one hand, and their capacity to impact environmental conservation and management on the other, can be more effective than attempting to impose a system of external controls with little or no local input. This position is consistent with ongoing regional and national initiatives in sustainable co-management of the coasts (Pomeroy and Pido, 1995). This study also recognizes that despite efforts in promoting sustainable management of coastal resources, the Philippines still suffers from widespread resource depletion in the coastal zone directly linked to poverty and overpopulation (FSP, 1990). Creating sustainable management strategies requires external support and assistance in integrating national and regional conservation agendas and management institutions within a framework of local community experience and knowledge.

The interactions between population dynamics and resource utilization operate along a series of unmeasured distributions. An area experiencing rapid population shifts due to migration may be responding to environmental pressures at the migrants' place of origin or be the result of emerging opportunities in the place of destination. Migrants who introduce social behaviors and attitudes similar to the existing population are less likely to disrupt the environment than those who bring in new ideas and behaviors. This process has been clearly established in the Philippines where work by Fawcett and Gardner (1994), Cruz, et. al (1992, 1988), and Western (1984) have all offered dramatic evidence of the impacts that migration can have on environmental degradation. Conversely, there is an equally powerful group of demographic researchers who argue for the benefits of population growth and migration as a spur to economic and technological development. Work by researchers such as Simon (1990), Simon and Kahn (1984), Reppeto and Holmes (1983), and Lynch and Talbot (1988) have provide compelling arguments for the benefits of growth and population change when properly

managed by the local community. This aspect of control is key to understanding population impacts on the environment.

Research Methodology

This paper, which is an outgrowth of fieldwork in Palawan Province, the Philippines during June and July of 1998 and 1999, presents demographic research on population growth. As is increasingly the case in funded research, time and resources are diminishing while the need for a rapid turnover of information into measurable outcomes are increasing. In response to this need, the multidisciplinary team employed what are commonly referred to as Rapid Assessment Procedures or RAP. RAP represents a series of data collection techniques initially developed within anthropology but which are now being employed in a variety of social sciences. The RAP approach allows field data to be rapidly collected and evaluated in process so as to establish baseline evidence to guide more rigorously controlled research designs if warranted. This approach fits in well with the research needs of the current project. We had a short field period to establish several key factors in order to justify the expenditure of research funds for a fuller study:

1. Was migration a significant component of population growth in the research site?
2. Was this migration focused on the coastal zone of the study site?
3. Were there significant environmental outcomes associated with both migration flows and the destination site of these flows?

The interdisciplinary team fielded an array of exploratory studies during the 1998 field work period in Palawan to address these three concerns.

Demographic Methodology

Three independent demographic surveys were field tested and administered. These studies gathered baseline information on 1) migration behavior, 2) social resources in migrant squatter communities and 3) business sector responses to population growth.

The preliminary migration survey tested 17 key questions drawn directly from a multinational baseline survey design funded by the United Nation

and currently being fielded in Vietnam, Ethiopia, South Africa and Guatemala by the Population Studies and Training Center of Brown University.[1] The results from the baseline migration questionnaire are directly comparable with results from the studies based at Brown, allowing us to ultimately compare migration patterns in Palawan to results from other nations in the developing world. The full multination survey instrument was fielded in the summer of 1999 using a sample that is representative of the Palawan province. One of the strengths of the multination survey instrument employed is the fact that the results from the McArthur study can be used for comparative work on the costs and benefits of migration on the environment in Palawan and in other nations.

The social resources survey was a survey performed by the Catholic Diocese of Palawan Province. This was a representative survey of 484 squatter households in the city of Puerto Princesa. The strength of the Catholic church in Palawan provided the physical manpower and contacts with the communities to field a large scale survey. However, the Diocese lacked the computer resource and training to process or use the information effectively. The Diocese agreed to allow the research team to have access to this data as they lacked the resources to input, tabulate and analyze this information. This access provided us with invaluable baseline information on the economic and demographic characteristics of the community to form baseline hypothesis tested during the second year.

The business sector study was a baseline census of 100 businesses along the central business corridor of Puerto Princesa City. The census obtained information on migration status of the owners, duration of stay in present location, redundancy of services, and diversity of products provided by the business community.

Anthropological Methodology

The anthropologists in the research team conducted a series of in-depth qualitative interviews with the leaders of 17 selected communities within the central provincial area. These interviews, called "cultural mappings" collected a rich series of data on the shared resources of the community, the size and structure of community interactions and the residents' patterns of environmental exploitation. These mappings tracked the manner in which

[1] Dr. Sidney Goldstein, Principal Investigator. PSTC. Box 1916, Brown University, Providence, RI 02912.

the communities used the environment to extract a living and how these environmental behaviors have changed in response to population growth and change. One specific community was selected for intensive study and a member of the team spent an extensive period of time within the community performing participant observation and travelling with fishermen as they performed their day to day economic activities. This information will prove invaluable to the validation of quantitative hypotheses derived from the survey data combined with the cultural mappings.

Another focus of the anthropologists in our team was to determine if there were significant regional socioeconomic differences in the province of Palawan. The outcome of this effort clearly demonstrated that Puerto Princesa formed a distinct socioeconomic sub-region and that there were two additional sub-regions in the province, one to the north and the other to the south of Puerto Princesa. A general contact network was mapped and data on specific types of contact were collected for Puerto Princesa . This information will prove invaluable to the cross validation of quantitative hypotheses derived from the survey data combined with the cultural mappings.

Marine Biology Methodology

The marine biologists performed a series of coastal surveys to evaluate the level of environmental health for coral reefs and coastline areas, the health and size of fish populations used for economic purposes, and indications of destructive resource practices such as dynamite fishing or cyanide use on coral reefs. Specifically a series of manta-tows were done to evaluate the quality of the coastal sea floor, beach surveys were conducted to collect data on human and non-human refuse on coastlines, and onsite interviews were performed with local fishermen and developers in the Palawan province.

Demographic Evidence of Change

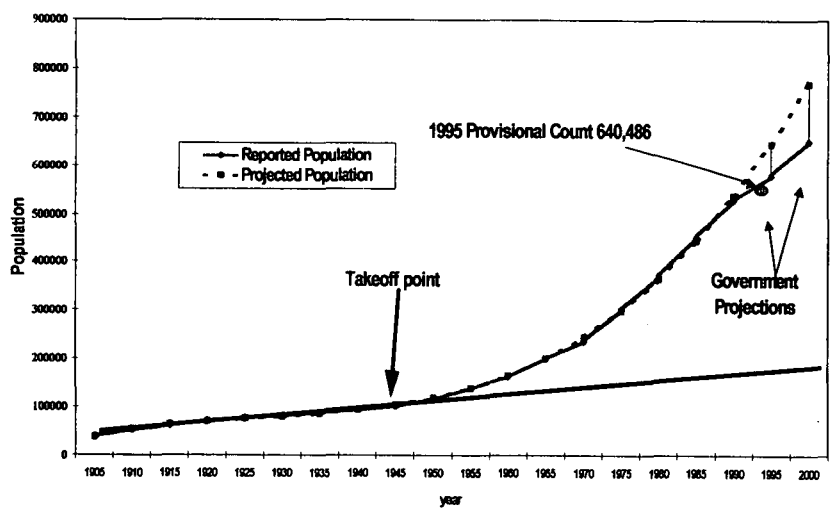
Palawan is of special concern to the Philippines due to its rich storehouse of natural resources and its rapid continuing growth since the end of World War II (WWII). Known as the "last frontier" of the Philippines, it offers an array of natural resources including fishing, forests and minerals that have largely been lost in other areas of the country because of cost associated with rapid development. Because Palawan remains comparatively unspoiled, it has become a focal point of government agencies and NGOs concerned with the protection of Philippine natural resources.

However, as a last frontier, Palawan is also seen to provide unlimited resources and a ready supply of economic livelihood. Thus, it attracted large-scale migration that resulted in population boom, and over the course of a few decades, Palawan became the second largest province in the Philippines. This paper will review the historical process of change in the population composition of Palawan and suggest potential scenarios for continued growth in the future.

Growth across time

Figure 1 presents total growth of the province of Palawan between the years 1905 and 2000. Because census data in the Philippines has varied temporally across the century, we have smoothed the reported census totals across time into 5-year intervals using linear interpolation. This allows us to calculate standard rates of population growth and to evaluate the pace of growth in a uniform manner. The analysis also assumes that growth between these intervals was uniform, which may not be the case, but lacking other information, it is a reasonable approach for examining the change in Palawan's population growth across time.[2]

Figure 1: Variance between observed exponential growth and projected growth for Palawan: 1905 to 2000



[2] Censuses were administered in the Philippines in 1903, 1918, 1939, 1948, 1960, 1970, 1975, 1980 1990 and 1995.

Figure 1 shows that as of 1905, the total population of Palawan stood at 40,144 individuals, but by 1990 it had increased to a total population of 528,287 individuals. In other words, the population of Palawan had grown 13 times its original size in the span of 85 years. Growth has not been uniform across time, however, and Figure 1 shows clearly that the most rapid period of growth has occurred during the post war period between 1945 and 1990. The bottom line in Figure 1 approximates the path of population growth from 1905 to the point of takeoff between 1940 and 1950. By 1950 the pattern of population growth in Palawan has clearly diverged from its historical track and assumed a new and far more rapid pace of population growth.

The pace of growth since 1945 has exceeded growth that would be expected under an assumption of natural replacement at one end, and exponential growth at the other. The broken line in Figure 1 represents a polynomial functional form calculated to the observed growth between 1905 and 1990 and then extrapolated to the year 2000 (Formula 1). The functional form accommodates the greater than exponential growth (Formula 2) observed during the post-war population boom and continues this growth into the next century. This function form provides a near perfect fit for the observed population trend data with an R^2 of .99.

$$Y = 205.12x^3 + 3394x^2 + 23388x + 18679 \quad \text{(Formula 1)}^3$$

$$Y = 35064e^{(0.1402x)} \quad \text{(Formula 2)}$$

This functional form is used to evaluate the accuracy of published projections prepared as part of the analysis of the 1990 census of population. The government's projected population growth for the province of Palawan for the years 1995 and 1990 is represented by the solid line in Figure 1. Our estimates for the same year, based upon the functional form provided in Formula 1, are represented by the dotted line. The published projections are based upon assumptions of moderate declines in both fertility and mortality and some moderation in the pace of migration into Palawan after 1990. These assumptions unfortunately prove to be overly optimistic for the 1990-1995 interval. Provisional tabulations released by the Philippine government based upon the 1995 Census of Population indicate that the observed population in 1995 stood at 640,486 individuals. This represents an underestimate of over 63,000 individuals based upon published projection figures. The functional form did a far more accurate job in estimating the

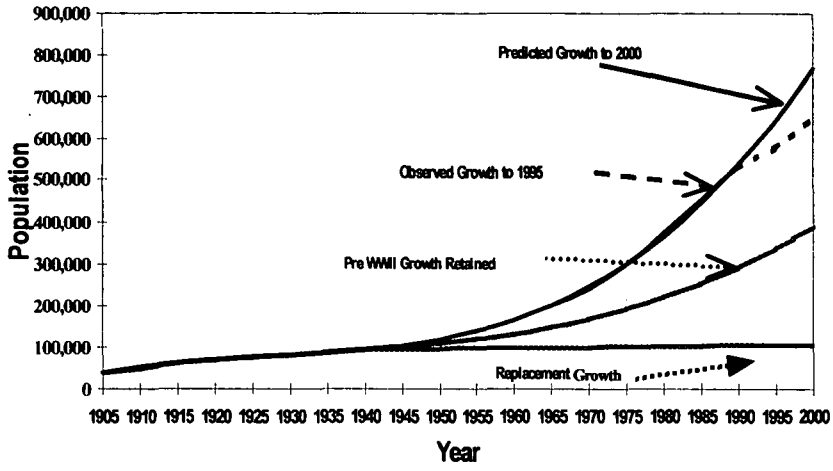
[3] Where the value of x is metered to the scale of 1 to 20 with each unit representing a 5-year interval from 1905 to 2000, i.e.: 1905(x)=1; 1910(x)=2.... 2000(x)=20.

anticipated population in Palawan as of 1995 and only overestimated the enumerated population by approximately 4,000 individuals.

This suggests that the population of Palawan has continued to grow at the same rate that as has been observed since 1945. The anticipated decline in population growth after 1990 did not materialize and Palawan remains a highly attractive place of destination for migrants from other areas within the Philippines.

Alternative Patterns of Growth

Figure 2 and Table 1 summarize the impact of the population growth in Palawan by presenting a series of alternative growth scenarios based upon observed trends for the region. The projections help place the current population size within a comparative perspective of potential population outcomes that did not occur. Table 1 summarizes a series of population alternative for Palawan. Column 3 of the table presents the smoothed five-year population totals obtained from census enumeration of the province between 1903 and 1990 and provides published projections for the years 1995 and 2000. The next column presents an assumption of low growth. This projection simulates what the population of Palawan might have been



if the rates of growth observed before 1945 had been maintained across time (Formula 3). The next column carries this a step further and estimates the level to which the observed population would have had to be suppressed to maintain zero population growth across time. The next column calculates the growth of the population from 1995 to 2000 using the functional form defined in Formula 1. Variation from observed and expected population size based upon census figures is also provided with the five- year growth rates under each assumption of population growth.

$$Y = 91.727x^3 - 1784.4x^2 + 17274x + 24101 \qquad \text{(Formula 3)}$$

Figure 2 presents the various scenarios graphically, providing a demographic picture of what Palawan might have been if certain population conditions had existed. The bottom line represents the assumption of no growth. By forcing the population from 1945 to experience a maximum growth rate of 1 percent we obtain what is essentially zero population growth. The population grew from 40,000 individuals in 1905 to 102,000 individuals in 1945 and then essentially stops, rising only to 107,000 individuals by the year 2000. This assumption is clearly unreasonable, and could only be maintained by either consistent near replacement fertility and no gains in mortality or by high rates of out-migration from the province of Palawan across time. None of these requirements are meet as fertility rates remains high, and clear improvements have been made in both morbidity and mortality. Similarly, migration has consisted primarily of high in-flows with only negligible outflows across time. Still this pattern represents a useful insight into the extremes that Palawan would have had to experience for its remarkable rate of growth since 1945 not to have taken place.

Our low growth scenario is more reasonable as it assumes only that demographic progression would remain much the same in Palawan as had been observed from 1905 to 1945. As can be seen by comparing the PreWW2 growth line in Figure 2, maintaining pre-war demographic patterns would have had a major impact on observed population growth in Palawan. By 1990, the expected population would have been smaller by over 236,000 individuals or a total population of 292,134 compared to an enumerated population of 528,287. This difference has had tremendous implications for the development of infrastructure within the province because water, sewer, roads and electricity are all better suited to the pre-war pattern of growth than to the rate of growth that actually occurred. Even so, however, the momentum of population can be seen taking off after 1945 even with the more modest assumptions of growth made by the low growth model. The period between 1945 and 1950 must be seen as pivotal for the current demographic structure of Palawan and greater understanding of the changes

that occurred in the province during that period might provide insights into the population mechanisms which continue to impact on the population structure of the province.

The remaining lines in the chart represent the scenarios discussed in Figure 1, but it should be emphasized that the expectation of a moderation in the pace of growth expected between 1990 and 1995 did not occur and future rapid growth should be anticipated. If present trends of population growth were to remain in force for another decade, the population of Palawan could easily exceed a million individuals.

Returning to Table 1, we would like to discuss briefly the observed rates of growth for the province across time. Looking at the column for the five-year growth rates using census data we can see that, on average, the province has been increasing by 17 percent every five years since 1905. Looking at both the alternative assumptions of population growth and the individual five-year growth rates, we can see that this pattern of growth has varied across time. While both the observed census rates of growth and the estimates based upon Formula 1 reflect the same average growth of 17 percent every five years, if Palawan had continued to follow the historic pattern of growth seen up until 1945 the average growth rate would have dropped to 12 percent every five years rather than 17 percent. As noted above, this five percent decline in average growth represents a net loss of 236,000 individuals by the year 1990. The assumption of no growth results in an even further reduction in average growth across time with only a six percent increase in population every five years resulting in a net loss of almost 550,000 individuals by 1990. These differences emphasize the increasing importance that population momentum is playing in the growth of Palawan.

The various assumptions of five-year growth rates are summarized in Figure 2. This figure provides some insight into the differences between the official projections for the 1995 population and the enumerated population. The line labeled "observed growth to 1995" in Figure 2 represents the pattern of five-year growth seen for census enumeration while the solid line labeled "predicted growth to 2000" line represents the five-year growth rates obtained through the use of the smoothed functional form defined by Formula 1. Looking at the rates obtained from the observed data it can be seen that the rate of growth has experienced periodic cycles of increasing and decreasing growth. The 1990 census year represents the third consecutive period of declining growth rates so it was a logical assumption to predict a fourth period of decline. Unfortunately, the predicted decline in growth

from 17 percent to nine percent was too extreme to be realized in the five-year interval so the projection seriously underestimated the potential growth for the province. The functional form in Formula 1 is far less sensitive to periodic swings in the growth rate so it was able to accommodate the declining pattern of five-year growth rates while maintaining the population inertia required to anticipate the continued rapid growth of the province's population.

It should also be noted that the functional form defined by Formula 1 reflects a gradual decline in the five-year growth rates as it crosses into the next century. This is reassuring as it suggests that the current rate of growth in Palawan may moderate in the future. Still, the existing population momentum makes continued growth a certainty for the coming decades.

RAP Survey Results

The examination of population growth across time clearly reflects the impact of rapid population growth in the province of Palawan. The post WWII population boom has reshaped the face of the province and seriously strained infrastructure that were not created to handle such an influx of people. Untreated sewage in the provincial capital, for example, continues to be conveyed to the coast through a series of open and closed drainage ditches that traverse the city. Squatter communities have filled all available land and new construction uses stilts and pilings to extend houses out over the water of Honda Bay adjacent to Puerto Princessa City. While civic and municipal authorities have policy initiatives in place and in planning phases to address these issues, long term planning is hampered by the lack of understanding of both the size of migration and the impact migrants are having on resource utilization.

One of the key goals of our fieldwork periods was to measure and access the level of migration behavior in Palawan and the intentions of the migrants. Migration intentions are an important aspect of understanding the implications of resource use by new groups. It is generally assumed, for example, that short term or circular migrants will make little investment in maintaining the ecological stability of the region of destination while migrants with long term intentions will have an incentive to invest in environmental management in order to maintain resources for ongoing use. Unfortunately, in areas such as Palawan, the stress related to rapid and uncontrolled population growth can increase the competition for limited resources to the point where community norms controlling the local management of ecological resources break down, and intensive resource exploitation can emerge. Similarly, the

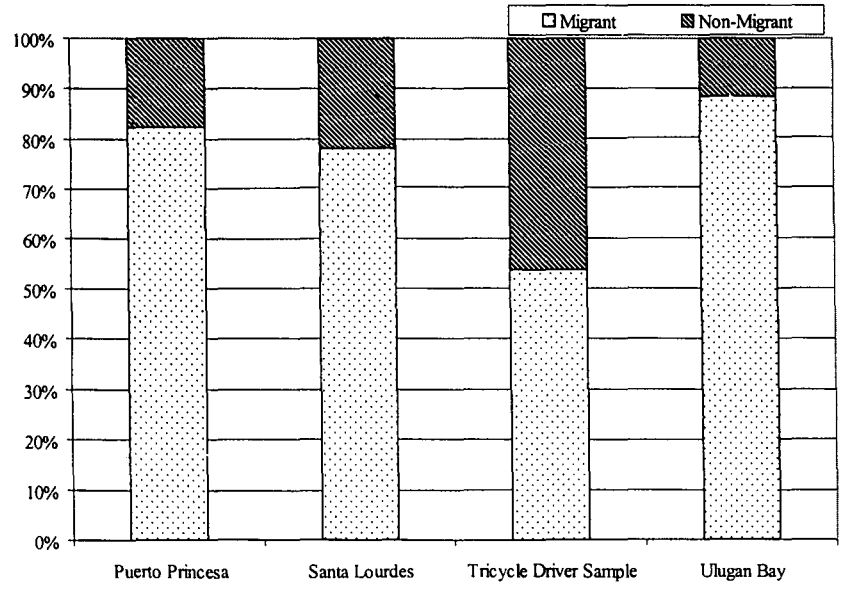
introduction of new migrant groups can introduce new ideas, techniques and tools for resource extraction that can replace traditional patterns of folk management and consequently strain coastal environments.

To get baseline measures on the pervasiveness of migration among the adult population in Palawan we fielded a short survey measuring migration behavior and intentions among 200 individuals in the Phase 1 study area. The study was administered randomly using techniques developed by the World Health Organization for rapid assessment of epidemiological concerns in squatter communities. The survey consisted of 17 questions that quickly evaluated the migration status of the individual, their reasons for migration and intentions for the place of destination.

Migration Sample

Figure 3 presents the sample distributions from the baseline migration intentions survey by the four selected population clusters. The Puerto Princesa sample represented a series of communities both permanent and non-tenured (squatter) within Puerto Princesa City. The St. Lourdes sample was specifically chosen as it represented a distressed squatter community on the fringe of social and environmental resources. St. Lourdes is a squatter community built upon a man-made landfill extending into Honda Bay.

Figure 3: Distribution of migrants versus non-migrants in sample selection clusters: Palawan, 1998



Composed of the tailing from an abandoned mine complex, the people live on land contaminated with a mixture of chemicals including arsenic once used to leach copper from the dirt and rock extracted from the mine. The Ulugan Bay sample represents an isolated fishing community located on the western coastal region of Palawan off the China Sea. This community fishes exclusively and ships their produce to Puerto Princesa for sale and distribution.

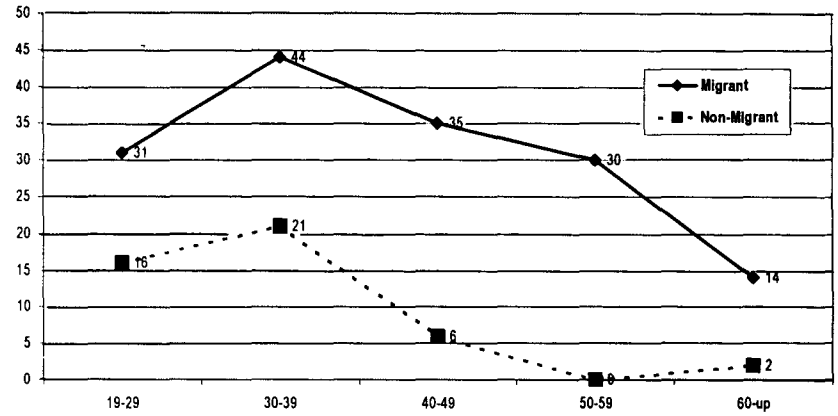
The tricycle drivers were a specialized sample taken to test this occupation as an entry level employment opportunity for new migrants to Palawan. Tricycle drivers operate small two stroke motorcycles with an additional passenger cart attached to the side of the motorcycle. These drivers represent the mass transit system for Palawan, providing inexpensive transportation to both urban and rural dwellers. Quite often the tricycles are rented from a distribution organization. Under this system, drivers pay the distributor a fixed fee for the daily use of the tricycles and can keep all profits in excess of that fee, excluding the costs of petrol, oil, and maintenance of the vehicle. Because of the limited capital investment required to be a tricycle driver, immigrants to Palawan can find ready employment in this occupation with minimal initial costs. Our assumption was that immigrants would use the tricycle driver position as a stepping stone to more desirable employment once they had established themselves in the community.

In general, it can be seen from Figure 3 that migrants predominated in all four samples. Among those interviewed in Puerto Princesa, St. Lourdes and Ulugan Bay, approximately 80% of all respondents were immigrants to Palawan from other provinces in the Philippines. Among tricycle drivers, we found that the proportion of migrants was markedly smaller and only about 55% of this sample had migrated to Palawan during their lifetime. Our general assumptions regarding the relationship between this occupation and migrants was largely invalidated by the interview process that found that tricycle driving was a status occupation sought by many members of Palawan as a preferable alternative to other employment opportunities. Overall, however, the distribution of our sample clearly reflected the strong impact that migrants have on the population composition of Palawan.

Composition of the Migrant and Non-Migrant Populations

Figure 4 reflects the age distribution of migrant and non-migrant populations as respondents to our migration intentions survey. The impacts of migration are clearly seen in the different age structures of the migrant and non-

Figure 4: Distribution of migrants and non-migrants by age, Palawan, 1998



migrant populations. While the migrant population reflects a normal age distribution (i.e., a high proportion of young adults and a steady decline in population size as the age group gets older), the non-migrant population is skewed towards the young population with few if any elderly representatives. This is reflective of the way in which migration has essentially reshaped and replaced the original pre-WWII population of the province. Few if any members of the current population can trace their origins to Palawan and the new "native born" Palawanians are first and second generation children of migrants who came to this province in the post-WWII era.

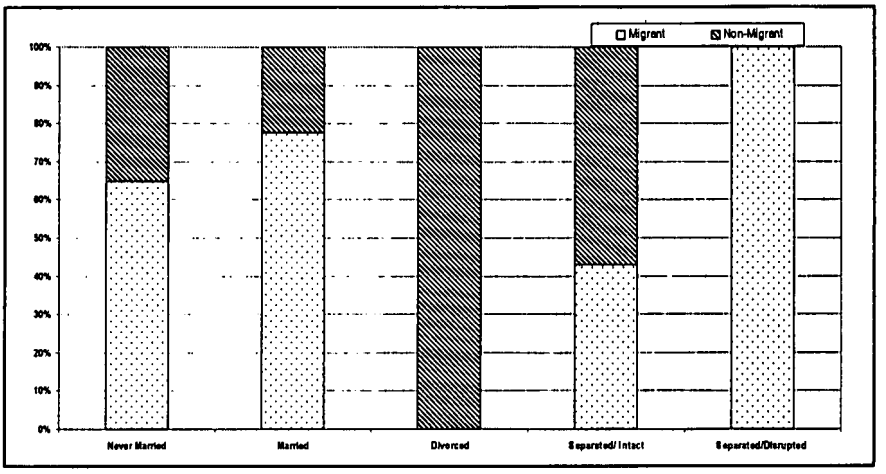
Some measure of the permanence of the migration to Palawan can be inferred from Figure 5 showing the distribution of migrants and non-migrants by marital status. While a marked proportion of migrants are either never married or separated from their spouse, the predominant marital status of non-migrants in "currently married, spouse present". While this variable is time sensitive[4], it is assumed that married migrants with spouse present will have stronger ties to their community of destination and be more involved in the responsible use of environmental resources shared by the community.

Reciprocity between Origin and Destination

As ties to the community of origin and destination can be more directly measured than through the use of proxies such as marital status, specific

[4] In that the respondent could have married either prior to or subsequent to the migration event.

Figure 5: Distribution of migrants and non-migrants by marital status, Palawan, 1998



questions regarding exchange responsibilities were asked in the baseline migration survey. Figure 6, for example, shows the level to which migrants have established kin networks in Palawan. The presence of kin networks reflects the level of social responsibility to this place of destination and the level of potential long term commitment a migrant may feel with Palawan as opposed to their place of origin. Looking at Figure 6, it can be seen that almost 70% of all migrants reported having established kin networks in Palawan suggesting that migrants have begun to develop long term ties to the community based in family support systems. The fact that family exchange systems are becoming internalized in the place of destination is

Figure 6: Frequency of kin among migrants to Palawan

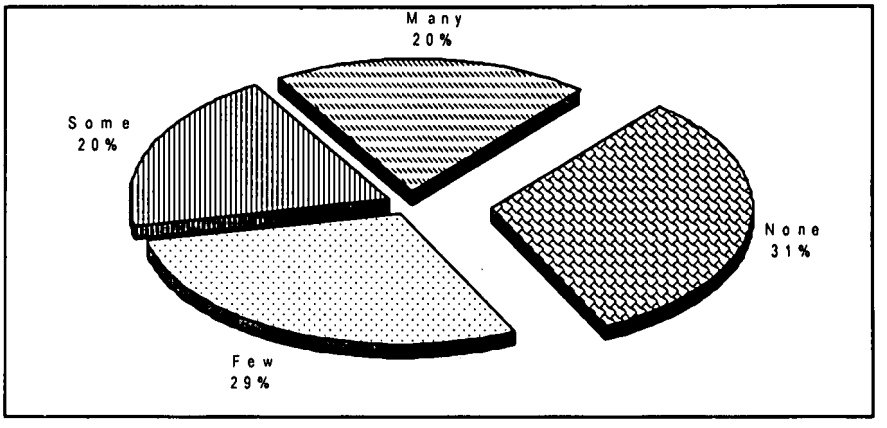
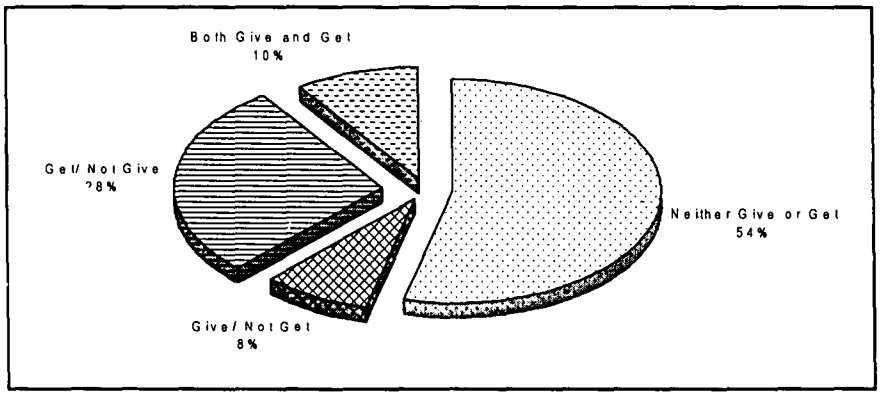


Figure 7: Pattern of gift exchange between destination and origin among migrants in Palawan



also supported by the finding in Figure 7 that reflects reciprocal exchanges between the place of origin and destination. It can be seen in Figure 7 that almost 55% of all migrants to Palawan report that they neither give nor receive goods or services with their place of origin and only 10% of all migrants still regularly engage in exchange behavior with there place of origin. Overall, this lack of exchange suggests a breaking of ties with the place of origin and supports the general contention that the move to Palawan was a permanent one for most migrants.

Conclusions

This paper examined the historic precedents of the rapid population growth in Palawan province. The demographic results show clearly that the growth of Palawan's population is a post-WWII phenomenon. Since the end of the war, the population of this province has grown at a phenomenal rate that can only be largely attributed to migration at a massive scale. This migration seems permanent in nature, and the population of Palawan is now being further modified by the fertility behavior of second and third generation migrant families.

Despite this long term commitment to the community and to the use of coastal resources, the environmental condition of Palawan is perilous at best. Theory would argue that this would not occur unless significant stresses were being placed upon normative behaviors towards resource utilization. As a result, we would like to briefly review the overall findings of the study to help resolve this paradox of simultaneous commitment and exploitation of the shared resources of the community.

Analysis of data suggests that the sudden and unanticipated growth of Palawan due to migration has overwhelmed the historical social processes which have helped maintain reasonable patterns of environmental use along coastlines in the past. The preliminary results also suggest that the migrants brought in new resource extraction techniques which were more efficient than those previously employed by non-migrants but were also more destructive. The expected pattern of community control of resources known as "folk management" had been undermined by migration influxes in the short term, and severe environmental damage to the coastal environment had occurred by the time of the study. Quantitative evidence indicate, however, that new patterns of "folk management" are emerging as migrant groups establish themselves in Palawan and that some form of environmental awareness may help moderate coastal damage in the years to come.

Geographical differences in management practices are also observed based upon the level and timing of migrant groups into the area. Less densely populated areas of Palawan showed somewhat lower levels of coastal wastage compared to more densely populated areas. Meanwhile, the tenure of migrants seems to have less of an impact on short term use of resources. From a heuristic perspective, the analysis of population growth in Palawan provides a template for multidisciplinary research using demography as its primary research framework. Despite the disparity of the disciplines among researchers actively involved in the fieldwork and data gathering process, we were able to test a series of uniform hypothesis and obtain preliminary validation of hypotheses using disparate methods of information collection.

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Table 1. Pattern of population growth for the province of Palawan, Philippines, 1905-2000

	Year	Observed Population	Low Trend	No growth	Trend	Low Trend Variance	No Growth Variance	High Trend Variance	Population Density	Census	Low Growth	No Growth	Observed Growth Rate
1	1905	40,144	39,683	40,144	38,878	-460	0	-1,265	2.69				
2	1910	51,263	52,249	51,263	53,520	987	0	2,257	3.44	1.28	1.32	1.28	1.38
3	1915	62,382	62,349	62,382	63,835	-33	0	1,454	4.19	1.22			
4	1920	71,398	70,533	71,398	71,055	-865	0	-343	4.79	1.14	1.19	1.22	1.19
5	1925	77,260	77,351	77,260	76,409	92	0	-851	5.19	1.08			
6	1930	83,122	83,355	83,122	81,129	233	0	-1,993	5.58	1.08	1.13	1.14	1.11
7	1935	88,983	89,093	88,983	86,445	110	0	-2,538	5.97	1.07			
8	1940	95,073	95,117	95,073	93,588	45	0	-1,484	6.38	1.07	1.10	1.08	1.08
9	1945	102,070	101,977	96,023	103,789	-93	-6,047	1,719	6.85	1.07			
10	1950	115,669	110,223	96,984	118,279	-5,446	-18,685	2,610	7.85	1.13	1.08	1.08	1.06
11	1955	139,169	120,406	97,953	138,288	-18,763	-41,216	-881	8.85	1.20			
12	1960	162,669	133,075	98,933	165,046	-29,594	-63,736	2,377	9.85	1.17	1.07	1.07	1.07
13	1965	199,652	148,782	99,922	199,786	-50,870	-99,730	134	10.85	1.23			
14	1970	236,635	168,076	100,921	243,736	-68,559	-135,714	7,101	11.85	1.19	1.07	1.07	1.08
15	1975	300,065	191,508	101,931	298,129	-108,557	-198,134	-1,936	12.85	1.27			
16	1980	371,782	219,628	102,950	364,195	-152,154	-268,832	-7,587	13.85	1.24	1.07	1.01	1.11
17	1985	450,035	252,987	103,979	443,164	-197,048	-346,055	-6,871	14.85	1.21			
18	1990	528,287	292,134	105,019	536,267	-236,153	-423,268	7,980	15.85	1.17	1.08	1.01	1.14
19	1995	577,416	337,621	106,069	644,735	-239,795	-471,347	67,319	16.85	1.09			
20	2000	651,442	389,997	107,130	769,799	-261,445	-544,312	118,357	17.85	1.13	1.09	1.01	1.17
							Average Growth:			1.17			

Source: Census of the Philippines: 1990