

Socio-Economic Conditions, the Status of Fisheries and Agriculture and the Adaptive Capacities of Households and Communities in San Miguel Island, Albay, Philippines in the Kuroshio Sphere of Influence

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Abstract

A study designed to evaluate the socio-economic conditions, the status of the fisheries and agriculture and the adaptive capacities of households and communities in the Kuroshio sphere of influence was carried out in 2007 from a random sample of 1,035 household's respondents in San Miguel Island, Philippines. Participatory resource assessment (PRA) methods and multi-stakeholders processes (MSP) tools were used in data collection from a cross-section of all sectors in the community.

Key findings showed that the island economy depends largely on agriculture (44%) and fisheries (28%). Forty-six percent (46%) of the population are actively earning while about 68% of wives are unemployed, some 17% are earning an average of Php. 6,200 per annum from mat making. The per capita income distribution corresponds to 79% poverty incidence with 66% of the surveyed population falling below the food threshold. Using the international standard of a dollar a day per capita, 86% of the population earns less than a dollar a day. The mean household size is 5.7 with a relatively higher dependency ratio of 60% and the majority of the population have only reached an elementary level of education.

In the fisheries sector, 84% are fulltime, 57% own boats that are either motorized (43%) or non-motorized (57%) and the remaining 43% are renter-borrowers. Fishing is affected by southwest (November to March) and northeast monsoons (June to October) and is generally good from April to May. Fishing is characterized by low catch per unit effort. A similar observation was reported by the NSCB (2005), Soliman *et al.* (1995 and 1999), and Soliman *et al.* (1999). As a counter-measure, a Marine Fishery Reserve (MFR) was established in 1997 with reports of successes and failures, lessons learned and controversy as well.

The agricultural sector is characterized by traditional farming methods in small land holdings (1.38 ha) with an average annual income of PhP 19,800, planting primarily root crops and crops with short farming cycles as it lessens the risk of potential damage caused by climatic variability.

As regards adaptive capacity, it should be noted that 20-22 typhoons enter the Philippines jurisdiction annually, mostly from the Pacific where the Kuroshio Current originates. As such, the people have developed adaptive measures particularly those related to life preservation and avoidance of the loss of life and property. It should be stressed therefore that the influence of the Kuroshio Current should never be underestimated. The fact is, gains from years of struggle to reduce problems associated with poverty can be wiped-out by single extreme events. Adaptive capacity and coping mechanisms are also influenced by complications arising from poverty, poor governance, environmental degradation and uncontrolled population growth. Although both the high income and low-income groups are at risk, the latter will suffer most. Therefore, the government should consider long-term solutions that offer capacity-building and social preparations, income generating opportunities, capital and other support services which are ecologically sustainable and will permit an acceptable level of well-being for all the people particularly those in the vulnerable sectors.

Keywords: adaptive capacities, socio-economic conditions, status of fisheries and agriculture, Kuroshio Sphere

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Introduction

The Kuroshio Current is a warm current in the western Pacific Ocean that flows northeast from the Philippines along the eastern coast of Japan. This area is sometimes referred to as Typhoon Alley because of the severe tropical storms occurring mostly between July and October that follow the Kuroshio's warm-water energy path that strikes the coasts of the Philippines, China, Japan, and Korea. Thus, the Philippines have always been experiencing the long-term influence of the Kuroshio which has had a multifaceted influence on the economic and social development of the Philippines.

In the Philippines, San Miguel Island is one of the vulnerable areas continuously influenced by the Kuroshio Current. Unfortunately, the term was not well known to many islanders despite its impacts on the coastal environment and marine ecology, fisheries and agriculture and the socio-economic conditions of the people in dynamic manner not until a collaborative project was started in March 2006. Without their knowledge, the Kuroshio has molded their adaptive capacities to the dynamic changes over a long time with very limited research or published work on the subject.

This paper presents the state of the socio-economic conditions, fisheries and agriculture, and the adaptive capacities of the households and communities in San Miguel Island with the aim of recommending options to enhance the level of socio-economic conditions, reduce vulnerability to climate change and enhance the coping mechanisms and the resilience of the people.

1. Objectives

The general aim of this project is centered on the socio-economic conditions, status of fisheries and agriculture and the adaptive capacities of the households and communities in San Miguel Island in the Kuroshio sphere of influence. Specifically, the objectives are:

- a. To determine the socio-economic status of the people in San Miguel Island,
- b. To describe the development of fisheries and agriculture on the island,
- c. To determine the adaptive strategies of households and communities in San Miguel Island to changes in fisheries and agriculture and
- d. To propose policy options that could enhance the adaptive capacities of households and communities in San Miguel Island.

2. Materials and Methods

Relevant data were obtained from a random sample of 1,035 household respondents which constitutes forty-two (42%) percent of the total households in San Miguel Island. Participatory resource assessment (PRA) tools such as Key Informant Interview (KI), resource mapping, 24-hour activity charts, historical timelines, current reality checks and focus group discussions (FGD) were used. The respondents and participants included local village officials, small-scale and commercial fishers, farmers, fish vendors, local entrepreneurs, youth, teachers, women and other interested parties. PRA was conducted in the six villages (*barangays*) in the island.

A semi-structured questionnaire was used to collect relevant data from the household heads and key informants. Secondary data sources were also obtained from relevant reports, published and unpublished literature and records.

3. Results and Discussion

1) Socio-economic conditions of households and communities

The island's geographic location on the east coast of Tabaco Bay and south of Lagonoy Gulf makes it highly vulnerable to the influence of the Kuroshio Current. The following points of information provide an overview of the socio-economic conditions of households and communities in the island.

(1) Socio-economic profile

San Miguel has a population of 13,484 which is 1.36 times higher than the 1995 registered population of 9,8521 (NSO, 2000). Based on a recent survey, their socio-demographic profile consists of the following:

- Average household size: 5.7
- Average age of household heads: 46 years old and 45 years for wives
- Educational attainment: 41.37% (husband) and 36.94% (wife) elementary graduate
- Occupation: 44% farming (husband), 27.91% fishing (husband) and 17.% mat making (wife)
- Average income from agriculture: PhP2,000 to 120,000
- Average fishing income: PhP8,000 to 510,000
- Average occupational experience: 22 years for fishing and 30 years for farming
- Lot ownership for agriculture: 49.44% owned, share tenant 43.66% and leased 6.90%

- Population of young dependents (0-15): 40.08 %.
- Old dependents group (70 and above): 5.43%
- House ownership: 81.75% owned
- Lighting facilities: 47.43% Kerosene lamp and 25.12% do not have any lighting facilities.
- Boat ownership: 57.31% owned and 42.69% either rented or borrowed.
- Type of Boat: 43.37% motorized and 56.63% non-motorized.
- Fishing Gear: multi-gear is used.

(2) Socio-demographic profile

The 1035 respondent households had a total population of 5,932, with a mean household size of 5.7, which is higher than the Tabaco City average of 5.46 (NSCB, 2005), the regional average of 5.24 and the national average of 5.0, but equal to the Lagonoy Gulf (location of San Miguel Island) statistics (Pelea *et al.* 2004).

The household population is young with a mean age of 24 years. Dependency (age 15 and under) level is high (59.92%). The average number of children is 3.7, lower than the national average of 5.0 and the regional average of 5.24. Almost all the family members stay with the family resulting in a heavy burden to household heads as bread winners.

A slightly higher percentage of the population is male (51.7%). Migration is low, with 95% of the residents born in the province of Albay, and 90.4% have not moved out of the island. Average educational attainment is low, with the majority of both husbands (67.4%) and wives (61%) only reaching elementary level.

(3) Employment, income and poverty

Forty-six percent (46%) of the working age population is actively earning. The majority of hus-

bands are farmers (44%). Fishing is the second major source of livelihood (27.91%). The majority of wives are unemployed (68.35%), but for the employed, the most common source of income is mat making from Karagumoi (*Pandanus simplex*), with 17% of wives earning an average of Php. 6,203 per annum. Other sources of income for the wives are farming (4%), business (4.7%) and services (4%).

The distribution of annual household income (Fig. 1) shows a convergence in the lower income bracket, namely: 57% in the Php. 11, 000 to 50, 000 range, 19% in the Php. 51, 000 to 100, 000 range and 10% in the below Php. 10, 000 bracket. The distribution corresponds to a mean per capita income of Php. 10, 427, which is notably is lower than the regional poverty threshold of Php. 12, 661.

The per capita income distribution corresponds to a 79% poverty incidence, worse than the regional situation at 49%. Sixty-six percent (66%) of the surveyed population falls below the food threshold, more than twice the regional figure of 26.6%. Using the international standard of a dollar a day per capita, 86% of the population earns less than a dollar a day. The findings are in agreement with the results of the socio-economic survey of Lagonoy Gulf fishers (Pelea *et al.* 2004) where 77% of the surveyed population was below the poverty threshold and 63% below the food threshold.

A comparison of the mean income from the different sources as shown in Table 1 indicates that professional employment, 3.3% of the population, provides the higher mean income of more than one hundred thousand. It is notable that the second highest income is from fishing with supplemental sources ($x = 78,680$). Business provides the 3rd highest ($x = 51,324$) followed by fishing with some supplemental sources of income. The supplemental sources for fishers are farming, or work as rice

Table 1. Income sources in San Miguel Island

Income Source	No. HHM	%	Annual Income (Php/peso)			
			Min	Max	Mean	SD
Farm	475	28.91	2,000.00	120,000.00	19,538.23	689.20
Farm +	29	1.77	1,000.00	64,800.00	27,972.41	2455.65
Fish	300	18.26	3,750.00	243,000.00	43,673.57	2273.47
Fish +	28	1.70	8,000.00	510,000.00	78,680.36	18360.80
Mat making	188	11.44	800.00	56,000.00	6,203.86	506.12
Making+	4	0.24	2,000.00	20,000.00	8,250.00	4049.18
Services	489	29.76	2,000.00	504,000.00	41,528.94	2133.07
Professionals	54	3.29	11,400.00	600,000.00	116,958.80	13294.54
Businesses	54	3.29	1,500.00	288,000.00	51,324.81	7293.03
Supported/pension	22	1.34	6,000.00	48,000.00	22,113.64	2431.74
Total	1643	100.00				

millers, laborers, barangay patrol officers or as construction workers.

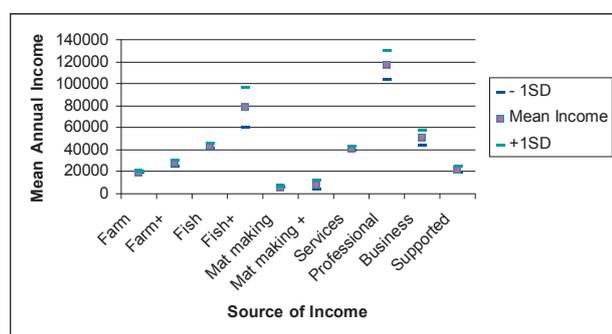


Fig. 1 Distribution of annual income

It is likewise notable that even with supplemental income, farming provides a comparatively low source of income. This is attributed to the small farm size ($x = 1.38$ ha) and low output activities. The supplemental income sources for the farmer are fishing, laboring, barangay volunteer activities and carpentry. The services sector including labor provides a relatively higher income compared to farming.

The distribution of the respondents across the income range for each income source is shown in Table 2. It may be observed that supplemental income fishing and farming is able to shift distribution to a slight degree to the higher income level, although in general income on the island is low.

Participatory resource assessment results also affirm that changes in weather patterns affect agriculture and fisheries in various ways with major implications for production. For example, greater drought or severe flooding may practically destroy agricultural crops or reduce fish catches as fish may migrate to deeper waters with increasing temperatures. Rising water temperatures may also reduce the upwelling of food that the fish in the upper layers depend on (World Fish Center Annual Report, 2006). Changes in the southwest monsoon (*Habagat*) and the northeast monsoon (*Aminhan*) bring rough seas which limit fishing hours.

The lack of employment opportunities is one of the key reasons for the movement of people towards urban centers hoping for better jobs, higher wages and a higher standard of living. It is common in the island that the

Table 2. Distribution of income by source

Income Range	Farm		Farm +		Fish		Fish +		Mat making	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
below 10,000	131	27.58	1	3.45	25	8.33	1	3.57	163	86.70
11,000 - 20,000	229	48.21	10	34.48	65	21.67	2	7.14	20	10.64
21,000 - 30,000	56	11.79	9	31.03	51	17.00	4	14.29	2	1.06
31,000 - 40,000	27	5.68	3	10.34	51	17.00	3	10.71	1	0.53
41,000 - 50,000	10	2.11	5	17.24	23	7.67	1	3.57	0	0.00
51,000 - 60,000	11	2.32	1	3.45	29	9.67	6	21.43	1	0.53
61,000 - 70,000	2	0.42	0	0.00	12	4.00	3	10.71	1	0.53
71,000 - 80,000	5	1.05	0	0.00	9	3.00	1	3.57	0	0.00
81,000 - 90,000	1	0.21	0	0.00	9	3.00	2	7.14	0	0.00
91,000 - 100,000	2	0.42	0	0.00	6	2.00	0	0.00	0	0.00
above 101,000	1	0.21	0	0.00	20	6.67	5	17.86	0	0.00
Total	475	100.00	29	100.00	300	100.00	28	100.00	188	100.00

Income Range	Mat making +		Services		Professionals		Businesses		Pensioners	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
below 10,000	3	75.00	34	6.953	0	0	7	12.96	3	13.64
11,000 - 20,000	0	0.00	121	24.74	6	11.11	7	12.96	7	31.82
21,000 - 30,000	1	25.00	128	26.18	4	7.407	9	16.67	8	36.36
31,000 - 40,000	0	0.00	61	12.47	1	1.852	7	12.96	2	9.09
41,000 - 50,000	0	0.00	32	6.544	1	1.852	7	12.96	2	9.09
51,000 - 60,000	0	0.00	34	6.953	2	3.704	6	11.11	0	0.00
61,000 - 70,000	0	0.00	4	0.818	1	1.852	1	1.85	0	0.00
71,000 - 80,000	0	0.00	30	6.135	3	5.556	2	3.70	0	0.00
81,000 - 90,000	0	0.00	10	2.045	3	5.556	1	1.85	0	0.00
91,000 - 100,000	0	0.00	8	1.636	5	9.259	0	0.00	0	0.00
above 101,000	0	0.00	27	5.521	28	51.85	7	12.96	0	0.00
Total	4	100.00	489	100	54	100	54	100.00	22	100.00

young educated sector usually move out to urban areas where their skills and knowledge can be put to use for productive purposes. This clearly indicates that people always look for better options elsewhere to sufficiently meet their minimum basic needs (Gavino, 2003). It is also interesting to note that women are engaged in mat making and fish vending to augment household income.

It is also evident that government infrastructure and social services have been provided; unfortunately extreme weather disturbances have severely damaged these facilities including human settlements. According to the Asian Development Bank (2001) report, access to various essential assets like human capital, physical capital, natural capital, financial capital and social capital is a major problem in the Philippines. As such, the productivity and income of farmers and fishers in general remain low and highly variable. This is attributable to a number of factors including poor management and a range of socio-economic constraints. Hence, people and the community struggle to make a living under the constraints of resource scarcity and limited employment opportunities. So, they either get out of poverty or sink into it.

2) The status of fisheries and agriculture

(1) Fisheries and fishing

Fishing is a way of life in San Miguel Island where 84.21% of the population is fulltime fishers. About 57.31% own boats that are either motorized (43.37%) or non-motorized (56.63%) and the remaining 42.69% either rent or borrow, in exchange for catch at an agreed split of two shares for the boat owner and one share for the renter-borrower. Fishing boats are also important for transport services.

Fishing operations are seasonally affected by the southwest monsoon (November to March) and the northeast monsoon (June to October); and generally are good from April to May. Fisheries are characteristically multi-species and multi-gear, predominantly gill net (*palutang*, *pangki*, *palundag*, and *largarete*), bag nets, seine nets and hand lines for catching tuna, small pelagic, large demersal and coral reef fishes. Tuna and tuna-like fishes, grouper, round scads, coral fishes, rabbit fish, anchovy, snapper, parrot fish, mackerel, mullet, big eyed scads, cobia, and sardines, are the most frequently caught fish. Other marine products harvested by gleaning during low tide include sea cucumber, crabs, squids, cuttlefish, octopus and other economically important invertebrate species.

The fishing grounds include but are not limited

to Tabaco Bay, Lagonoy Gulf, San Miguel Bay in Camarines Sur, Sorsogon Bay, Albay Gulf and the areas off-Catanduanes Island in Sirangan and Palumbanes Island facing the Pacific Ocean.

(2) Status of the fisheries

As in most areas in the country, fishing is characterized by declining fish catches and higher fishing efforts. This was confirmed by the NSCB (2005) which reported a drop of 3.5% in fish production in 2004. In 1995, similar observation was reported by Soliman *et al.* (1995 and 1999) that 12 out of 15 major commercially important species are heavily exploited. Furthermore, the Lagonoy Gulf-Resource and Ecological Assessment report reveals that 4 out of 7 species examined were found to be highly exploited largely with the use of gill nets (Soliman *et al.* 1995). Records of fish extraction showed a 20mt/km² / yr level (Soliman *et al.* 1997) in SMI and 9.3mt/km² / yr in the entire gulf (Soliman *et al.* 1995). Without effective gulf-wide management in place, this situation might be even worse than expected as the population might double over the next 10 years. Despite this sad reality, the agriculture, fishery and forestry sectors accounted for 40.3% of the total number of employed persons in 2004 (NSCB, 2005).

(3) Resource management and conservation awareness

Fisheries are of paramount importance because of their economic contribution to the livelihoods, employment and incomes of the people. Unfortunately resource management and conservation is not well known amongst people living in situations of extreme poverty. The first successful attempt towards resource management and conservation in SMI was the establishment of the Marine Fishery Reserve (MFR) in Sagurong by virtue of Resolution No. 04 series of 1997 by Sangguniang Barangay of Sagurong with technical assistance provided by Prof. Victor S. Soliman of Bicol University, Tabaco Campus. The MFR provided impetus to other local government units (LGU) to realize the value of marine protected areas and fisheries management. This resulted in the development of a vision, long espoused by the local leaders, towards sustainable development, which implies a balance between resource utilization and development, protection and conservation of the island's resources and environment.

Unfortunately, not everybody was happy, thus this story is one of successes and failures, lessons learned and controversy too. On the positive side, the fishers have learned to realize that illegal fishing contributed to

the problem of low fish catches. They also realized the interconnections between the environment, the population and consumption. Today, the MFR is a reminder of the unsustainable past and an opportunity for the future. In summary, people who have a short sighted vision and are interested only in short-term-gains coupled with the realities of the Kuroshio Current and global climate change are putting immense pressure on the island's coastal resources and its sustainability.

(4) Farmers and farming

Farming is one of the major economic activities in the island. From a base of abaca, coconut, and sugar-cane, it gradually shifted to root crops, corn and other crops with short farming cycles as observed in the upland communities of Angnas, Hacienda, Rawis and Visita.

The tenurial system dates back to the Spanish regime, whereby a tenant-landlord tenurial system still exists for 43.66% of the farmer's population, despite the comprehensive agrarian reform program (CARP). Evaluation showed that 49.44% of the farmers own land and a few (6.9%) are leasing the land they farm. The average farm size is 1.38 hectares with an average annual income of PhP 19,783.51 which is lower than the year 2000 family income of 72,367.00 in Albay (NSCB 2005).

The three most important agricultural crops farmed are cassava (*Manihot esculenta*) (31.38%), sweet potato (*Ipomea batata*) (29.59%) and corn (*Zea maize*) (21.94%) (Table 3). Other crops planted include rice (16.04%), coconut (6.52%), vegetables (3.35%), banana

(0.93%), peanut (0.93%) and karagumoi (0.74%). Karagumoi is the source of raw materials for the mats made by most wives using water buffalo (46.67%) and swine (24.44%) at backyard level (Table 3). Water buffalo (carabao) are raised as essential as work animals.

Farming is constrained by the high cost of farm inputs, transport, handling and hauling, which makes local farm produce uncompetitive in the city market. As a result, they are compelled to sell at a dictated price to middlemen in the island who in some cases also provide loans at fixed interest rate or in exchange for catches or farm products.

It is also worth noting that farmers and fishers do not keep any farm or fishing records. Success is measured by practical mathematics: total yield minus the amount of the loan. If the remaining yield can still support their food requirement until the next harvest, it is profitable. But, if the harvest is just enough or not enough to pay their loan, things would be difficult for them and they would be compelled to make another loan.

(5) Status of agriculture

With small land holdings and traditional farming methods (using family labor, without fertilizers or pesticides), farming is generally characterized by low production. Modern land preparation technology such as terracing and contouring is seldom practiced. Similar findings were reported by the Asian Development Bank (2007) and the number of environmentally poor is likely to increase with the advent of global warming.

The cropping pattern is principally mono-crop and

Table 3. Agricultural crops and animals raised by households

Agricultural Crops Raised	No. of Farmers	%
Root crops (i.e. sweet potato and cassava)	123	31.38
Corn (<i>Zea maize</i>)	116	29.59
Rice (both upland and rain fed rice)	86	21.94
Coconut (<i>Cocos nocifera</i>)	35	8.93
Vegetables (i.e. string beans, egg plant, pechay, gabi, etc.)	18	4.59
Banana (<i>Musa sapientum</i>)	5	1.27
Peanut	5	1.27
Karagumoi (Materials for mat making)	4	1.02
Total	392	100.00
Animals Raised by households		
Animals raised	No. of households	%
Native Chicken	9	10.00
Swine	22	24.44
Cattle	17	18.89
Water Buffalo (Carabao)	42	46.67
Total	90	100.00

agricultural crops planted always anticipating seasonal variability to avoid potential damage from strong winds and typhoons in particular. There are a few hectares of rain fed rice farms found in Hacienda.

The island has a few agricultural facilities such as access roads, concrete pathways, multi-purpose concrete pavements, deep wells, small water impoundment and more recently, 24-hour electricity. Irrigation largely depends on the natural springs and is rain fed. The island has a small water impoundment facility (SWIFT) constructed in Hacienda. It should be noted that about half of Asia's poor live in rural areas and these include specially vulnerable groups who, like fishers, have few economic opportunities (Asian Development Bank 2007).

3) Adaptive capacities of households and communities in San Miguel Island

Being an archipelagic country, the Philippines is highly vulnerable to natural hazards which include tropical cyclones, flashfloods, storm surges, and coastal erosion to name a few. On average, it faces at least 20 typhoons a year, seven (7) of which are considered destructive.

(1) Key geographic and physical features

San Miguel Island is situated off the east coast of Tabaco Bay and south of Lagonoy Gulf. Its geographic location (123° 45'33. 5"E longitude and 13° 24'30.6" N latitude to the corner of 123° 50'E longitude and 13° 20' 40.8" N latitude) believed to be influenced by the Kuroshio Current, makes the island vulnerable to any

weather disturbances originating from the Pacific Ocean (Fig. 2).

The island has a total land area of 44.08 km², characterized by hilly to mountainous and slightly rolling areas, and plain and elevated areas at about 35 m above sea level. The island consists of three upland villages (Angas, Visita and Hacienda) and two coastal villages (Rawis and Sagurong). The island can be reached by motorized boat in about 20 or 30 minutes from the Maritime Port of Tabaco City travelling to Rawis or Sagurong, respectively.

(2) Climate variability and the impact of extreme events

The climatic conditions prevailing in the island are characterized by no distinct dry season but with very pronounced maximum rainfall from November to January. The island has pronounced warmth and humidity throughout the year with a mean temperature of 26°C and humidity ranging up to 80%. The warmest temperature is experienced in May with a mean temperature of 27°C. Recently, however, climate variability and extreme events impacted the island severely damaging people, settlements, infrastructure, and property. Because of its proximity to the Pacific Ocean where the Kuroshio Current originates, it can be expected that extreme events are most likely to occur in the future too and for this reason, residents have to make adjustments to improve their adaptive capacities and resilience.

A study by the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) conducted over the last fifty years, revealed that extreme climate change events are now inherent in the Philippine climatic system (PAGASA 2004). This creates natural disasters (i.e. storm surges, floods, strong winds and prolonged rain or drought) that may result in loss of life, damage to property and livelihood and environmental modifications. It also spares no one, rich or poor. Historical timeline data reveals that the most important extreme event experienced over the last 10 years in SMI was Typhoon *Reming* (8:00 A.M. to 5:00 P.M. of November 30, 2006) with gusty winds reaching more than 260 km per hour, accompanied by heavy precipitation. This typhoon practically destroyed almost everything from coastal settlements and infrastructure to livelihoods and livelihood assets (i.e. fishing boats, farm crops and implements, etc.) including shoreline morphology, coastal bathymetry and the near shore marine environment. The heavy rain accompanying the typhoon created further destructive effects on the livelihood of the fishers and farmers as flooding also abetted high sedi-



Fig. 2 Map of San Miguel Island, Albay, Philippines

ment load and silt to critical coastal habitats around the island.

(3) Adaptive capacities of households and communities

The Kuroshio Current’s influence in the island is usually in the form of climatic and weather variability disturbances. In response to these experiences, households and communities have developed adaptive measures particularly those related to life preservation and the avoidance of loss of life and property. Table 4 presents the adaptation measures developed in response

to significant events that impacted their lives. Though vulnerability varies with socio-economic groups, all are at risks. Obviously, the more affluent households live in houses made of durable materials and permanent structures. In addition, affluent families are more resilient and have better coping mechanisms than the poor who do not have savings and lack access to the capital required to repair or restore their houses and livelihood assets.

Adaptive capacity and coping mechanisms are also influenced by complications arising from poverty, poor governance, environmental degradation and uncontrolled population growth. Therefore, efforts that focus

Table 4. The impact category, experience and adaptation measures in SMI

Impact Category	Experience	Adaptive Measures
Climate/Weather Related Disturbances such as tropical cyclones/typhoons, storm surges, and flooding	<ul style="list-style-type: none"> • Damage to life and property brought about by typhoons, storm surges, flash floods and shoreline erosion • Coastal houses wiped-out by storm surges, big waves and strong winds • Livelihood assets totally damaged (i.e. fishing craft, fishing gear, farm crops, farm implements, etc.) • Destruction of all infrastructure and inundation • Limited communication equipment in the area 	<ul style="list-style-type: none"> • Temporary evacuation to designated centers • House relocation from coastal to safe upland areas • Shifting from light materials to more durable and stronger materials in house construction • Seeking the assistance of relatives for temporary relief and accommodation or loans • Procurement of battery operated radio sets as a source of weather forecast information
Agriculture and Fisheries Impacts	<ul style="list-style-type: none"> • Damage to agricultural crops, farm structures, implements and support facilities • Damage to fishing craft, gear and other fishing paraphernalia • Siltation of fishing grounds and critical habitats i.e. sea grass & seaweed beds and coral reefs • Marine Fishery Reserve destruction due to encroachment into the core area of the reserve 	<ul style="list-style-type: none"> • Planting of root crops and other agricultural crops with short-farming cycles, resistant to changing weather patterns • Repair/procurement of new fishing craft and fishing gear (mostly provided as relief, donation or grant from various NGO’s and NGA’s) • Gleaning for macro-invertebrates along tidal flats, fringing reefs, mangrove swamps and other areas • Mat making • Finding alternative sources of income like laundry, domestic help, Pedi-cab driving, construction worker/helper, baggage/mail carrier, etc.
Health	<ul style="list-style-type: none"> • Diseases particularly among children due to lack of potable drinking problems, water, food shortage and sanitation problems 	<ul style="list-style-type: none"> • Resorting to herbal medicine • Availment of medical missions provided by NGO’s and NGA’s
Economy	<ul style="list-style-type: none"> • Means of livelihood and income sources totally wiped-out • Lack of livelihood opportunities and/or limited employment opportunities • Agricultural crops totally damage i.e. coconut and abaca • Support infrastructure damaged 	<ul style="list-style-type: none"> • Out-migration to urban centers • Acceptance of food for work programs • Alternately farming and fishing or vice-versa • Budget tightening and the practice of economy measures
Environment	<ul style="list-style-type: none"> • Shoreline erosion particularly along the eastern coastline of the island 	<ul style="list-style-type: none"> • Mangrove reforestation. • Water shed development. • Seeking for government assistance for shoreline protection. • Stopping illegal fishing activities • Establishment of Marine Protected Areas (MPA)

on increasing resilience and the adaptive capacity of the most vulnerable sectors, the poor and marginalized, must be pursued. On the other hand, the current government approach is basically reactive in nature as it is focused more on disaster preparedness and mitigation, rather than providing long-term adaptation programs designed to reduce socio-economic vulnerability and resource sustainability. A similar observation was noted by Perez (2002) relative to the creation of disaster management coordinating councils in all LGU's.

With people and the community struggling to make a living under the constraints of resource scarcity, limited employment opportunities and threats of climate variability and disturbances, they either get out of poverty or sink into it. For example, weather anomalies such as La Nina and El Nino have had a serious impact on agricultural productivity as prolonged or intense dry and wet seasons destroy customary planting and harvesting cycles particularly the rain fed crops. This threatens the island livelihood and food security of the people. Another sad reality is the encroachment of people inside the Marine Fish Reserve (MFR) after the typhoon "Reming" in order to survive starvation and conditions of extreme poverty. It could be realized from this experience that individual responses may vary because of specific needs and vulnerabilities. Working together and strengthening cooperation to find appropriate solutions that reduce the risk factors will serve the best interest.

Summary and Conclusion

The Kuroshio Current is a warm current in the western Pacific Ocean that flows northeast from the Philippines along the eastern coast of Japan. This area is sometimes referred to as Typhoon Alley because of the severe tropical storms occurring mostly between July and October that follow the Kuroshio's warm-water energy path which strikes the coasts of the Philippines, China, Japan, and Korea. Thus, the Philippines have been experiencing the long-term influence of the Kuroshio which has a multifaceted influence on its socio-economic development, including people's adaptive capacities and resilience to climate change. Although both the high income and low-income groups are at risk, the latter suffers more because of its economic inadequacy and lack of access to resources. It should be noted that the Typhoon Reming experience in 2006 has shown that the gains from years of struggle to reduce problems associated with poverty were wiped-out by a single extreme event. Island residents also affirm that changes in weather patterns believed to be influenced by the Kuroshio affect agricul-

ture and fisheries in many ways and have major implications for production.

The island features a young household population with a high dependency level which cause a heavy burden on the family bread winner. The island has a 79% poverty incidence, even worse than the regional situation. Of the surveyed population 66% are below the food threshold, more than twice the regional figure of 26.6% or using the international standard of a dollar a day per capita, 86% of the population earn less than a dollar a day. This is clearly, the reason for the movement of people towards urban centers looking for better options elsewhere.

San Miguel Island has a multi-species fishery with multiple-gear for catching tuna, small pelagic, large demersal and coral reef fishes with production characterized by low catch per unit effort. On the other hand, farming is traditional with root crops and crops with short farming cycles being favored as an adaptive strategy against potential damage caused by weather disturbances. Other adaptive measures are related to life preservation and the avoidance of loss of life and property in particularly. Obviously, their adaptive capacity and coping mechanisms are influenced by complications arising from poverty, poor governance, environmental degradation and uncontrolled population growth. Efforts focusing on increasing the resilience and the adaptive capacity of the most vulnerable sectors, the poor and marginalized, must be pursued.

Government approaches are also seen as reactive and strategies presented are more focused on disaster preparedness and mitigation opportunities, rather than providing long-term adaptation programs designed to reduce socio-economic vulnerability and improve resource sustainability. It is therefore recommended that efforts for providing capacity-building, income generating opportunities, capital and other support services which are ecologically sustainable and which will permit an acceptable level of well-being for all the people must be given preferential attention to avoid loss of life and damage to property and the resource base upon which our economic activities depends.

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