

Household Asset Allocation Decision (HAAD): An Alternative Approach to Analyze Demand for Mangrove Forest Goods

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Abstract

This paper explores and analyzes the impact of household asset allocation decision (HAAD), with special focus on labor allocation, to the demand for mangrove forest goods (MFG). The cross-section data are the result of a survey involving 250 respondents from two fishing villages in Mercedes, Camarines Norte. The increase of surplus labor tends to increase the demand for MFG while the increase in labor for productive activities has negative impact on the demand for MFG. The coefficient for the surplus labor is significantly different from the hypothesized value of 0. The coefficients of the socio-economic variables to some extent conformed with economic intuition but the R^2 of the regression models manifest that the empirical evidence do not conform with theoretical validity of the variables. Only the distance of the households from the mangrove forest is found to be significant, the rest of the variables do not vary from the hypothesized value of 0. The paper concludes that surplus labor and distance of the household from the mangrove forest are vital factors that policy makers must consider in order to protect the mangrove forest from depletion and deterioration. The paper recommends the development of entrepreneurial activities and programs strongly built within the framework of the people's organization in the village.

Keywords: *household asset allocation decision, labor surplus, mangrove forest goods*

INTRODUCTION

This research explores the importance of household asset allocation as a mitigating factor on the household's dependence on the mangrove forest. It looks at the amount of household assets utilized by subsistence households to consume mangrove forest goods. It also analyzes the impact of asset usage on the demand for mangrove forest goods.

Two fishing villages, namely, Cayucyucan and Apuao Grande in Mercedes, Camarines Norte, were chosen as sites for the evaluation of the impact of the villages' economic activities to natural resources, particularly the mangrove forest. The fishing town of Mercedes, which is located along the coast of San Miguel Bay, is about 300 kilometers southeast of Metro Manila (see Figure 1).



Fig. 1 Location of Mercedes (Legend:---- to Manila: ___ Cayucyucan & Apuao Grande)

Poverty is identified as the main reason for the unprecedented depletion and deterioration of the resource cover and quality of natural resources, respectively. Table 1 presents the socio-economic profile of the villages.

Table 1: Socio-economic Demographic Profile of Cayucyucan and Apuao Grande

Socio-Economic Profile	Cayucyucan	Apuao Grande
Geographical location	Part of mainland	Eastern portion of Mercedes
Distance from Mercedes	30-45 minutes via Manguisoc,	30-45 minutes from mainland Mercedes
Mode of transportation	Tricycle and boat	Tricycle and boat
Estimated Monthly Income	Php1,400.00	PhP 4,663.00
Major Livelihood	Fishing	Fishing
Total Mangrove Forest	30 hectares	11 hectares
Total Land Area	275.64 hectares	478.12 hectares
Number of Households	181	126
Total population	848	623

Source: ISO PRA,2005

The two villages' socio-economic profiles speak of subsistence economies. Despite their proximity to the municipality - whose distance is traveled via a combined boat and tricycle ride - both villages are below the poverty thresholds declared by the National Economic Development Authority (NEDA) on a national level.

Two important resources provide the local villagers with their livelihood: the mangrove forest and the sea. The mangroves provide food, fuel and, housing materials. The sea provides them their major livelihood, as about 80 % of the local community depend on fishing (CBCRM, 2000, p.8). The local villagers recall that there was once a rich ecosystem in their village, as the relationship between forest and sea provided a rich and abundant supply of fish catch. The old mangrove forest cover was much larger and the trees thicker and taller. Fishing time was generally shorter with a larger fish catch.

Today, the local villagers still depend on the mangrove forest and the sea, but the abundance of harvest from these resources has declined. The ecosystem no longer provides the needed support to sustain the people's level of living. The alarming decline in the mangrove forest threatens human survival, marine and forest life, whose existence is not independent of each other.

Increasing the awareness of the significance of protecting, conserving and reforesting mangrove forest had been concretely defined by national and municipal ordinances. Ordinances provide the economic justification for mangrove management by giving wider scope of involvement of LGUs in mangrove management. The local government code (LGC) in 1991 effected an administrative power shift that placed coastal local governments and cities at the forefront of resource management. Under the LGC, mangrove conservation and implementation of community-based forestry projects have been devolved from the Department of Environment and Natural Resource (DENR) to the LGUs.

Even with the implementation of the ordinances, stakeholders and the local community did not adhere to the limits and control embodied in the ordinances. In the coastal areas, poaching of mangrove products is a serious concern. The problem is poverty. Control is difficult when one accounts for the impoverished condition of these villages. The major livelihood of these villages generates incomes frequently below poverty threshold. Thus, the mangrove forest is often a source of goods and services to augment household consumption.

The concrete impact of these ordinances remains to be seen. For as long as people live in a subsistence condition, the utilization of mangroves for its economic functions will continue. The local community will trade-off the long term benefits of protecting and conserving mangroves with its current consumption and production activities.

Focus and Objectives of the Research

This study offers a new perspective, by introducing the household asset allocation decisions (HAAD) approach to assess the consumption of mangrove forest goods (MFG). This area of interest is indirectly explored in the work of Ellis (2000) and broadly implied in the SL framework. Rooted on the concepts of sustainable livelihood approach (SLA), the HAAD is used to analyze micro-economic decisions and their broad impact to policy and institutional context on the sustainability of natural resources while maintaining the people's well-being and improving their capabilities. SLA views the subsistence villages' access to certain assets; their strategies and ways of combining

them in the pursuit of beneficial livelihood outcomes that meet their own livelihood objectives (DFID, 1999).

The investigation is guided by four related questions:

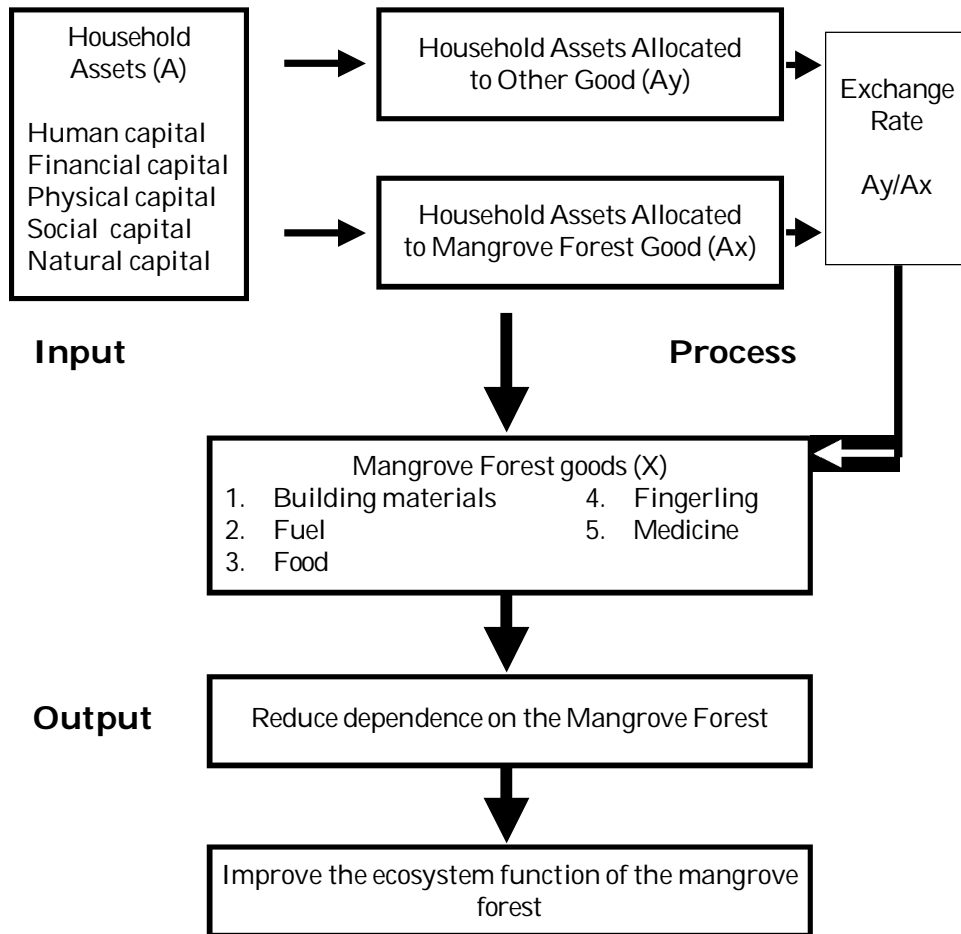
1. What are the types and value of assets owned by the households in subsistence villages?
2. What is the proportion and how much is the monetary value of the household assets (Surplus assets) allocated to mangrove forest goods (MFG) and other goods (OG)?
3. What is the impact of each household asset allocated to MFG on the households demand for MFG?
4. How do socioeconomic-demographic variables influence households demand for MFG?

FRAMEWORK OF ANALYSIS

Household Asset and Its Impact on the Demand for MFG

The framework utilizes the input-process-output (IPO) technique of analyzing the impact of household asset allocation on the economic activities of the household, i.e. the demand for mangrove forest products. It is expected that once the impact is measured, the reason for the household's behavior can be explained in order to attain the desired output. In this case, the desired output is to formulate strategies that can lead to the improvement of the ecosystem functions of the mangrove forest.

Figure 2. Expected impact of household asset diversity on mangrove forest dependence



The framework utilizes a portion of the sustainable livelihood (SL) framework found in the works of Ellis (2000) and Carney (1998). The framework integrates to the SL framework to the demand for mangrove products identified by Sathirathai (1998), UNEP (1994), White and Cruz-Trinidad (1998). The framework provides a checklist of household livelihood assets from which the households constructs a diverse portfolio of activities to improve their standard of living (Ellis 1998) and afford them of better and more goods.

The concept of livelihood revolves around the opportunity set afforded an individual or households by their asset endowment and their chosen allocation of those assets across various activities to generate a stream of benefits most commonly measured as income (Ellis, 2000). In subsistence villages, the life support from natural resource is very important. The rural village's subsistence existence in itself cannot offer an opportunity for household to own asset that allows them better opportunity to earn additional income. Low household asset diversity is one major factor that causes the depletion of the natural resources in coastal or rural poor villages.

The general argument on which the framework is premised is the idea that the rapid depletion of the mangrove forest is rationalized by low level of income because of the inability of the households to diversify livelihood as a result of limited households assets. The dependence of the household on mangrove forest goods is perpetuated by households' limited asset diversity. This limits the households' access to other income generating opportunities and therefore most household assets are utilized to access mangrove forest products. Small consumption of mangrove forest products when done by a larger community becomes a threat to the existence of the mangrove forest. The impact of the households' activities in the mangroves is reflected in the loss of the coastal village's major source of livelihood - fishing. Studies show that there is a relationship between the depletion of the mangrove and the diminishing fish catch per unit effort (CPUE)¹ of the household (see Ruitenbeek,1992).

Assets are fundamental to livelihood strategies. Options are important; being poor is often a case of getting trapped with no option, usually increasing, instead of reducing, regulatory restrictions on the access to the mangrove forest. The growth of other income sources might be expected to reduce the need for coastal dwellers to carry out extractive practices in local environments for survival. Diversification contributes positively to livelihood sustainability in rural households. Diversification can potentially provide environmental benefits in two ways. One is by generating resources that are then invested in improving the quality of the natural resource base. The second is by providing options that make time spent in exploiting natural resources less remunerative than time spent doing other things.

Modeling the Subsistence Villages Household Asset Allocation Decision

Benefit is synonymous to the concept of utility. Individuals are willing to pay a price for commodities perceived to bring them benefits or utility. Their capability is defined by the households' asset shown in Table 3. In the short run the physical, financial, natural and social assets do not vary. Only labor varies in the short run.

Table 3: Household Assets

Description /Notation	Definition by the DFID(1999)	Operational Definition
Human Capital(H)	Represents the skills, knowledge, ability to labor and good health that together enable the firm to pursue different strategies. Parameters are: employment, gender, skills, knowledge, abilities, age and health;	The number of household members currently employed and spends a certain number of hours for productive activities.
Financial Capital(F)	Denotes the financial resources that enables the firm to adopt different strategies. Parameters are financial resources, investments, access to insurance and government support.	The amount of cash or money spent by the households for fuel and repair and maintenance of their physical capital.
Physical Capital(P)	Comprises the basic infrastructure and producer goods needed to support the activity.	The units and amount of (fishing and farming) equipment and (fishing) gears owned by households.
Social Capital(S)	Represents the resources upon which firm draws in pursuit of their economical objectives. These are developed through social and economical networks, memberships and relations to trust, access to institutions and political associations.	This refers to the village people's organization where the household is a member.

Natural Capital(N)	It is the term used for the natural resource stocks which are useful for the economic activity. It can encompass both tangible (land, forest, water) and intangible aspects (biodiversity, atmosphere, aesthetic quality).	This refers to the natural resource stocks, aside from the mangrove forest, useful in the economic activity of the villages.
Total Asset(A)	Capital assets.	Refers to the total household asset made up of human (H), financial (F), physical (P), and social (S)

In subsistence villages, the choice of consuming goods from the mangrove forest had become a vital part of their existence because of the limited opportunity for them to earn cash income constrained by meager asset endowment. The household consumes two types of goods, good X and Y, as Table 4 shows.

Table 4: Types of Goods Consumed by the Households

Notation	Operational Definition
X	refers to the mangrove forest products or goods freely obtained by the households. Good X is measured in terms of the amount and units of goods harvested in the mangrove forest. Only the direct use value of the mangrove forest was included in the valuation of good X.
Y	refers to the "other (market) goods" obtained by the households out of the income earned from asset allocated to income (cash) generating activities. The amount and units of good Y is measured in terms of the profit from economic activity.

The household allocates its assets to obtain two types of goods, good X and good Y.

A_x = refers to the household assets allocated to obtain mangrove forest products or goods.

$$\text{Thus, } A_x = H_x + F_x + P_x + S_x \quad (\text{eq. 1})$$

A_y = refers to the households asset allocated to the main source of livelihood to obtain "other (market) goods".

$$\text{Thus, } A_y = H_y + F_y + P_y + S_y + N_y. \quad (\text{eq.2})$$

Therefore

$$A = A_x + A_y \quad (\text{eq. 3})$$

The model that we would like to test is,

$$X = f(A_x, A_y)$$

The regression model is,

$$X = a + b_0A_x + b_1A_y + e \quad (\text{eq.4a})$$

Assuming the standard error is normally distributed, the regression model is,

$$X = a + b_0A_x + b_1A_y \quad (\text{Eq. 4b})$$

In the short run, P, F, S and N are zero, so that A_x and A_y are the human assets.

The expected behavior of the dependent variables is presented in Table 5.

Table 5: The Predicted Behavior of the Independent Variables

Variables	Description	Sign of Coefficient	Predicted behavior
X	Value of demand for MFG		
Ax	Asset allocated for MFG	+	An increase in surplus labor will increase the demand for MFG
Ay	Asset allocated for OG	-	An increase in assets allocated for productive activities decreases the demand for MFG

To further explain the dependence of the household on the mangrove forest good, we could also include the impact of the households socioeconomic-demographic variables.

Assuming there is no difference in the asset allocation decisions of the households the model is specified as follows:

$$X = \beta_0 + \beta_1(\text{SED})$$

where: SED = Socioeconomic demographic characteristics of the households.

$$X = a + b_0A + b_1Gi + b_2Ei + b_3O + b_4HHS + b_5HHE + b_6MO + b_7K + e_i \quad (\text{eq.5})$$

Table 6 presents the notation, description of the variable, the expected sign of the point estimate and the predicted behavior of the variable using Pearson correlation.

Table 6: The Predicted Behavior of the Socio-economic Variables

Description/ Notation	Expected sign of the correlation coefficient	Predicted behavior
Age (A)	Positive	It is expected that as one is older, he cannot be economically productive thus he demand more goods from the mangrove forest..
Gender(G)	Positive	Female headed households are likely to be dependent on the mangrove forest goods than male headed households.
Educational attainment(E)	Negative	The educational attainment of the respondent minimizes his use of the mangrove (i.e. he is probably employed), therefore dependence on the mangrove must be lower
Occupation(O)	Negative	The type of occupation that the respondents have, affects their usage of the mangrove services, hence, those employed in the non-fishing sector must have a lower demand for mangrove forest goods
Household Size(HHS)	Positive	The larger the household size, the more likely that there more users of the services of the mangrove forest, hence, they are likely to more dependent to the mangrove forest than say a smaller household.
Household expenditures (HHE)	Positive	The higher the household expenditures, households have a greater tendency to augment household consumption from the mangrove forest than one whose household expenditure is lower.
Membership in organization (MO)	Negative	If among households, there are more members in an organization, the demand for MFG will be less.
Distance of the household's house from the mangrove(K)	Positive	The farther the household from the mangrove forest, his demand for mangrove forest goods is likely to more than one who resides within the mangrove cover.

The Data Set

The data set used in understanding the rural villagers' dependence on mangrove forest goods was taken from the household survey of 250 households in the two fishing villages. The measures for the data sets are as follows:

Table 7: Description of the Data Set

Variable	Notation	Measure
1. Mangrove forest good	X	The units or value of mangrove forest goods harvested or collected by the households.
2. Human capital	H	Hours spent in the mangrove/number of household labor and hours spent fishing/number of household labor
3. Financial capital	F	The amount spent for fuel and repair and maintenance of physical capital
4. Physical capital	P	The units and value of fishing equipment and gear owned by the household
5. Social capital	S	People's organization in the community where the household is a member. 0 = if the household is a member of the organization, 1 = otherwise.
6. Natural capital	N	The number of natural resources in the village

METHODOLOGY

The survey and the questionnaire

The questionnaires used in the survey comprised sections on socio-economic characteristics, attitudes and perceptions, uses of the mangrove forests, scenario information, and value elicitation. Photographs of the pristine vs. the degraded condition were shown to the respondents to describe the hypothetical market scenario. The photographs served also to describe and communicate the ecological good of interest. The mangrove photographs were used to act as a device to help respondents obtain a good picture of the ecological good in question. The goods derived from the mangrove are valued using current market prices or if this is not available, the goods were priced using the price of the closest substitute for the product based on a market survey done by the researcher.

Selection of enumerators

The enumerators were local coordinators of the ISO, and in-school and out-of-school youth who are residents of the two fishing villages. A two-day orientation and workshop was conducted to insure that sections in the questionnaire were well understood by the enumerators.

Population of the Study and Quota Sampling

Given the limitation of survey method, the researcher chose complete enumeration. Complete enumeration is like a census where all households are respondents to the survey. Of the data of the number of households in the barangay census about 81% were interviewed. Households who were not interviewed were not in their houses at the time of the survey; some refused to answer the questions during the interview, while some houses are temporary shacks with no one residing in them.

Qualitative interviews and feedback sessions

Before the actual survey was undertaken, the author interviewed key informants on the uses and services of the mangrove forest; their role in the management of the mangrove forest; and their perspective about the attitudes of the local community. Their responses were used to frame the questionnaire in this survey which is patterned after Bann's questionnaire. A pre-test of the questionnaire was conducted before the actual survey.

When the data were processed, the results were presented to the local community for revalidation. The local communities' reaction to the outcome of the survey was used as an input to remove "outliers" - data with extreme values. The local community accepted the result of the survey as this reflects the perceived current value of the mangrove forests.

RESULTS AND DISCUSSION

This part presents the result of the study. It has four sub-sections, which corresponds to the four research questions. The sub-sections are as follows: the types and value of assets owned by the households; the HAAD; the impact of HAAD to the demand for MFG; and, finally, the test for correlation and theoretical validity of socio-economic variables with the demand for MFG.

Types and Value of Assets Owned by Households in Subsistence Villages

Table 8: Types and Value of Assets Owned by the Households

Types of Assets	Description		Value per annum in Php	
			Total	Value per capita
Human Capital	Labor hours(1,161.6 hours a week, 6.05/person)		1,024,800	5,376
Financial Capital	Cash for	Fuel	5,730,768	68,208
		Repair and maintenance	137,184	1,056
Physical Capital	Motorized Banca		2,639,200	29,990
	Non-motorized Banca		218,316	2,695
	Jungle Bolo and other cutting equipment ²		140,758	697
	Nets ³		1,659,449	21,551
	Others		44,420	3,173
Physical Capital	The household is a member		111	
	The household is not a member		139	

Source: Own data from the household survey

The households in the villages spend an average of six hours and five minutes a week fishing and gathering MFG. Its monetary value is Php121 per person which is below the minimum wage in the region.⁴ In a week, a household must hold at least a cash-on-hand amounting to Php1,421 to buy fuel for their motorized *banca* (boat).

The top three assets with the highest values are: cash for fuel; the combined value of motorized *banca* and nets; and labor. As expected among fisherfolks, the household invests heavily on a *banca* and fishing nets. Of the investments made by the household, the highest is made on the acquisition of a motorized *banca* followed by spending on fishing nets.

The feeling of community in the village is expressed in terms of their membership to an organization. Of the 250 households, less than half are members of an organization.

The Household Asset Allocation Decision (HAAD)

Table 9: The proportion of Household Assets Allocated for Mangrove Forest Goods and Other Goods

Types of Assets	Description		Proportion allocated to	
			MFG	OG
Human Capital	Labor hours*		398.10	763
Financial Capital	Cash for	Fuel*	0	119,391
		Repair and maintenance*	0	2,858
Physical Capital	Motorized Banca		0	2,639,200
	Non-motorized Banca		0	218,316
	Jungle Bolo and other cutting equipment ⁵		140,758	0
	Nets ⁶		49,784	1,161,614
	Others		0	44,420
Social Capital	The household is a member**		74	
	The household is not a member		37	

**This refers to IIMC Members

Table 9 presents the pattern of HAAD. The households would allocate a great deal of their assets to economic activities that yield the major source of income. An accounting of a typical household's asset in the village shows a family who owns at least a fishing equipment, a bolo or japsaw, family members capable to work, and some cash for fuel, repair and maintenance of the fishing equipment. The allocation of household asset is simple: most assets are for the major source of

income, while excess assets like family members who do not fish or farm, are expected to augment consumption and income by going to the mangrove forest.

In these activities, most of the time it is the excess assets of the household that are utilized thus giving the household a perception that the mangrove products are free aside from the fact that mangrove forest products grow without much production inputs from the households.

Table 9 reveals that a large proportion of the household assets are allocated on the generation of income which could enable the household to buy other goods. This table infers that households, when given a choice, desire more goods bought from cash income. The MFG in this case remains a second best choice for the households.

Thus, during economic shocks, households are likely to depend on MFG leading to the depletion of the natural resource in the long run.

The Demand for MFG and the Analysis of the Impact of HAAD to the Demand for MFG

In subsistence coastal villages, household consumption is generally augmented with goods from the mangrove forest. Indigenous peoples, communities, and coastal villages that live on the fringes of the forests rely on the forest resources for most of their consumption goods such as food, fuel, traditional, medicines, shelter (materials) and even clothing. Their well-being depends extensively upon the forest (Kramer et al., 1997).

Table 10: Estimated Value of the Demand for Mangrove Forest Goods (MFG)

Mangrove Forest Goods	Households = 204		Estimated Market Value*
	Number of Demander	% Distribution	
Building Materials	73	38	140,180
Fuel (Firewood and charcoal)	28	14	32,160
Food	159	78	531,304
Medicine	52	25	105,976
Total			859,620

Source: Own data *Estimated at current market price 2006

Table 10 shows that food remains to be the most important contribution of the mangrove forest to subsistence households. The proportion of the estimated market price food from the mangrove forest is 62%. The combined estimated market value of building materials and plants with medicinal properties accounts for 29% of the total value. The remaining 9% represents the proportion for fuel. This has a significant implication as this show a strong will among the local government unit (LGU) in implementing municipal ordinances on the protection of mangrove. Prior to this, firewood and charcoal production are the major reasons for the reduction of the mangrove cover in the villages.

In a subsistence coastal village the economic activities of the household revolve around the mangrove forest. The mangrove forest is sought for its products and services. It augments food consumption when fishing, the major source of livelihood, is not possible due to inclement weather. It is a major source of food to augment the meager income in the village. Trees in the mangrove forest provide the households with firewood and charcoal for cooking and to some extent construction materials for house repair or fencing.

In subsistence villages, more likely the excess assets are surplus labor whose marginal product is almost zero, driving rural villages into subsistence existence (Ranis, 2004). This argument is tested and the result of the regression model is presented in Table 11.

Table 11: Point Estimate of the Impact of HAAD to the Demand for MFG

Parameters	Coefficients	t Stat	P-value	Decision
Intercept	3658,214753	5,522057664	1,02797E-07	
Labor MFG	310,00382	1,629343989	0,104806408	Reject Ho
Labor OGH	-37,6287281	-0,329383058	0,742209147	Accept Ho
R ² =0.013	N=204	a=0.10, and 0.15		

The sign of coefficients agree with the predicted behavior. The regression model confirms the intuition that an increase in surplus labor (surplus) increases the demand for mangrove forest goods. Gustav Ranis (2004), quoting Rosentein-Rodan (1953), designated surplus labor as hidden rural savings which could be mobilized via re-allocation to higher productivity activities. When surplus labor is re-allocated to income generating activities, the household's dependence on the mangrove forest goods will decline. The p-value is significant at $\alpha=0.10$ and 0.15 but not significant at $\alpha=0.05$.⁷ The R² is very low, this means that only 1.3% is predicted by the model correctly.

From a fixed amount of household assets in the short run, the household allocates and re-allocates labor asset as it may see fit to maximize benefits, thus if household allocates more labor to productive activities, the demand for MFG will decline as the result of the regression model show. The p-value however shows that the coefficient is not significant from 0.

The result validates Ellis (1999) argument on livelihood diversification. In Table 9 labor and nets are allocated for both MFG and OG, while the rest of the assets are exclusively allocated for fishing. This insinuates a low livelihood diversification in the villages. The asset owned by the households give little room to diversify their livelihood thus when productive activities declined, surplus assets from production are used to gather MFG to augment consumption. This result affirms Allisson and Ellis' (2001) findings that diversification can strengthen livelihoods and improve rather than degrade natural resources.

The Impact of the Socio-economic profile to the Demand for MFG

Table 12: The Socio-economic Profile and Descriptive Statistics of the Households

Socio-economic indicators	Category	Descriptive Statistics
Age	Average Age	43
	Youngest	21
	Oldest	85
	Less than or equal to mean(%)	54
	Above Mean (%)	46
Gender (% distribution)	Male	62
	Female	38
Educational Attainment (% distribution)	No Education	3
	Primary School	69
	High school	21
	College Level & Vocational	7
Occupation (% distribution)	Unemployed	5
	Fishery	63
	Agriculture	
	Laborer, gov't worker, professional, Others, Agri-fishery	1010
		12
Household Size	Average HH Size	5
	Largest	14
	Smallest	1
	Less than or equal to mean(%)	62
	Above Mean (%)	38
Number of family members working (% distribution)	Average number of working family member	2
	Largest	9
	Smallest	0
	Less than or equal to mean(%)	88
	Above Mean (%)	12
Household monthly expenditure	Average HH Expenditure	3477
	Highest Expenditure	42,000
	Lowest Expenditure	50
	Less than or equal to mean(%)	67
	Above Mean (%)	33

Membership in an organization (% distribution)	Non-member	56
	Member	44
Membership in the IIMC (% distribution)	IIMC	67
	Others	33
Distance of house from the mangrove	Average Distance (in meters)	385
	Farthest	4,000
	Nearest	1
	Less than or equal to mean(%)	68
	Above Mean (%)	32

Source: Own Data

More than a half (54%) of the respondents are younger or within the mean age of 43. The youngest to be interviewed in the survey is 21 years old while the oldest is 85 years old. The households are generally patriarchal as the households who responded to the survey are predominantly headed by a male with only 38% headed by a female.

Just like any subsistence village, a large proportion of the respondents, 69%, finished primary school. In the Philippines, primary schooling provides one with the rudiments of functional reading, writing and counting. In contrast only 7% are college or vocational graduate.

Given the low educational attainment of most household heads in the village, they rely heavily on fishing as the major source of income. Agriculture has a very small proportion of the economic activity in the villages as land for agricultural purposes are predominantly utilized for residential purposes. This is also expected of coastal villages and island economies where opportunity for fishing, more than farming, offers a better prospect to earn income.

The average household is composed of five family members. Most households would have at least five members, as households having more than five members are only 38% of the households surveyed. Within the nucleus of the household unit, majority of the households have at least two members of the family who are working,⁸ while only 12% would have no one and more than two members of the family working.

The survey revealed that the average monthly income to support a family of five is PhP3,477 or PhP695 per person per month.⁹ The data validates literature that coastal villages are among the poorest sector in the Philippines (cf. Callanta, 1988), with an income below the poverty threshold.¹⁰

In poor villages, households are vulnerable to economic shocks. Financial safety nets are limited to savings, if there are any, and a strong family and community support (HDR, 2001). As a safety net for financial shocks, subsistence villages form organizations or cooperative to cushion the impact of sudden economic shocks (for example inflation). In terms of membership in an organization, more than a half of the households are not members although a large percentage still, 44%, are. Of the 44% who are members of an organization in the village, 67% of them are actively involved in the Inter-island Management of Coastal Resources (IIMC).

The mangrove forest, which provides most of the non-cash consumption of the village, is on the average, accessed 385 meters from the villagers' house. Most of the villagers, 68% of them, reside within the periphery of the mangrove forest, while the rest, 32%, live a further away from the mangrove forest.

The socio-economic profile described a picture of poverty in the villages of the coastal area of the Philippines. Poor as they are, there are two most important natural resources that support their economic well-being - the sea and the mangrove forest. Both are important sources for non-cash and cash consumption.

Table 12 provides the scenario to establish the influence of the socio-economic variables on the demand for MFG. Table 13 presents the correlation analysis.

Table 13: Result of the Correlation Analysis between the Demand for Mangrove Forest Goods (MFG) and the Household's Socio-economic Profile

	Demand	A	G	E	O	HHS	NFW	HHE	MO	K
Demand	1									
A	0,08888	1								
G	0,03538	0,05497	1							
E	-0,0323	-0,1858	-0,1899	1						
O	-0,0021	-0,0566	0,31259	-0,3198	1					
HHS	-0,0237	-0,1012	0,01851	-0,0849	0,1631	1				
NFW	-0,0068	0,02445	0,08118	0,0517	-0,029	0,34019	1			
HHE	0,043	-0,1497	-0,0114	0,03063	-0,0355	0,24221	0,06975	1		
MO	-0,0219	0,01443	-0,1198	0,10501	-0,1877	0,0242	-0,027	0,12364	1	
K	0,15586	-0,0192	-0,2139	0,06817	-0,1175	0,03895	-0,0633	-0,0708	0,07985	1

Source: Own data

Table 13 shows the result of the Pearson correlation.¹¹ The demand for MFG is positively correlated to age (A), gender (G), household expenditures (HHE) and the distance of the households from the mangrove forest (K). The demand for mangrove forest is negatively correlated to education (E), occupation (O), household size (HHS), the number of family working (NFW), and the membership in the organization (MO). The sign of the coefficients are as expected. However, the extent of the value of the Pearson coefficients shows very low correlation between the paired variables, the demand for MFG and socio-economic variables, as explanatory variables. This insinuates that socio-economic variables cannot fully explain the dependence of the subsistence villages on the mangrove forest. This intuition is validated by the result of the regression model presented in Table 14.

Table14: Point Estimate of the Impact of the Socio-economic Variables to the Demand for MFG

Parameters	Coefficients	Standard Error	t Stat	P-value	Decision
Intercept	1528,006031	2659,439987	0,57455932	0,56625502	NS
A	38,53459632	29,84930925	1,290971124	0,198249945	NS
G	698,9141543	861,8238299	0,810971025	0,418376098	NS
E	-37,98735706	167,7071458	-0,226510068	0,821043215	NS
O	52,6147859	1026,186129	0,051272166	0,9591614	NS
HHS	-122,9363158	206,1589724	-0,596318047	0,551657942	NS
NFW	45,29967623	456,4564611	0,099242053	0,921048559	NS
HHE	0,252460546	0,21453864	1,176760261	0,24073303	NS
MO	-413,3169996	801,3917624	-0,515748999	0,606616995	NS
K	1,83178704	0,723451824	2,532009704	0,012133703	S
R2 0.05	N=204	a=0.05			

Source: Own data

The result of the regression shows that the p-values are generally higher for all coefficients except for K. This means that generally the coefficients of the socio-economic variables do not significantly vary from 0. This means that except for the distance of the household from the mangrove forest, the households have fairly the same amount of MFG demanded.

Those households located further and near the mangrove forest are seen to vary in the amount of MFG demanded. The result of the regression show that as the household is more distant from the mangrove forest, the amount of MFG demanded tends to be higher; in contrast those nearer the mangrove forest cover has lower amount of MFG demanded.

The economic intuition behind this observed behavior can be explained by the households concern on cost of effort. Households who are distant from the mangrove maximizes their time going to the mangrove forest, by carefully estimating a week consumption for fuel and food. In contrast, households need not decide in similar manner as there is less effort exerted in reaching the mangrove forest.

The R^2 explains only 5% of the relationship between demand for MFG and the socio-economic variables. The theoretical validity of the variables is not confirmed by the regression model. In similar paper analyzing willingness to pay (WTP) vis-à-vis socio-economic variables the R^2 could be as low as 3% (Willis and Garrod, 2000). To explain this result, the researcher borrows the same reasoning from Willis and Garrod (2000). The demand for MFG is not as much founded on the socio-economic circumstances of the households but on their preferences (which are harder to measure) - and, in this case, it could be a result of the strict implementation of ordinances on the protection of forest and coastal resources.

CONCLUSIONS AND INSIGHTS

The result of the survey showed that the socio-economic circumstances in the subsistence village are similar across households, making it difficult to isolate which variable explains the high demand for MFG. The HAAD provided new insight on the impact of surplus labor as the major contributing factor on demand for MFG.

The household assets and HAAD reflected the subsistence village economic dependence on natural resources. The socio-economic profile of the households in the subsistence village provided the social and economic circumstances at which the households form their decisions and behavior on choice of economic activities. Subsistence villages are not capable of holding jobs that provide a permanent source of income. They seek occupations concentrated within the economic space in the village, often where the natural resources are. These activities provide lower than poverty threshold incomes and do not assure permanence of income.

The result of the regression model confirmed economic intuitions. The taxonomy of human capital in subsistence villages is a threat on the sustainability of natural resources. The issue of resource degradation and sustainability should be explained by constrained choices made by households rather than poor policy implementation. Understanding household behavior can result to better and responsive policy options. The findings in this research recommend for the empowerment of the households rather than a restrictive-penalizing policy option.

The presence of surplus labor in subsistence villages remains a constant issue that has to be confronted by policy makers. Although considered as the hidden rural savings, its utilization will have to depend on the quality. Penalizing the household from accessing MFG may reduce the encroachment of mangrove forest, but it does not assure protection. Solving the problem at its root cause - i.e. the quality of surplus labor - policy makers have to be realistic in implementing programs that aims to upgrade rural labor. Training them to become entrepreneurs, presenting them the opportunity for processing the village raw products, and providing soft loans to start the business are workable programs rather than subsidizing them to undertake a vocational course. The presence of an organization in the village can provide the necessary administrative control for village-based projects and monitoring procedures to report progress of the program.

This paper therefore concludes by quoting Chambers and Conway (1992): "A livelihood comprises the capabilities, assets and activities required for a means of living; A livelihood is sustainable when it can cope with and recovers from stresses and shocks... while not undermining the natural resource base."

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ENDNOTES

¹ For instance, in the work of Sathirathai (1998), the headman of the fishing village in Surat Thani, observed the decline in the yields of their fishery products due to the decline of mangrove cover lost to shrimp farming.

² The local term in the village for a jungle bolo is "itak". Included under this item are ax, saw and chain saws.

³ This would include "biyakos and silo."

⁴ The minimum wage in the Bicol region is Php142 per day (source: NSCB).

⁵ The local term in the village for a jungle bolo is "itak". Included under this item are ax, saw and chain saws.

⁶ This would include "biyakos and silo."

⁷ The level of significance can be usually higher than $\alpha=0.05$ for exploratory research <<http://www.answers.com/topic/statistical-significance#after-adi>>. Different levels have different advantages and disadvantages. A very small α -level is less likely to be more extreme than the critical value and so is more significant than a high level of values. However, smaller α -levels run greater risk of failing to reject a false null hypothesis (a type II error) and so have less statistical power. The selection of an α -level inevitably involves a compromise between significance and power and the consequently between the type I and type II error.

⁸ This is understood in the village as fishing or working eight hours in industries or services.

⁹ Household expenditure was used as proxy to estimate household monthly income.

¹⁰ Annual per capita Php13,916 at the National Capital Region (NCR) and Php12,825 in the Bicol Region (2000 FIES, National Statistics Office). See also World Bank Report, 2001.

¹¹ The full correlation matrix is presented for other readers who may want to expound the analysis of the variables. This paper discusses only the predicted behavior in Table 6.

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