

## Practices, awareness and attitudes of Maranao farmers in three watershed barangays in Masiu, Lanao Del Sur, Philippines towards the protection and conservation of the Lake Lanao Watershed

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**Abstract.** The study determined the practices, awareness and attitudes of Maranao farmers in the Lake Lanao Watershed in three watershed barangays namely: Gabar Sawer, Lanco Dimapatoy and Lacadun in Masiu, Lanao Del Sur, Philippines and their implications to the protection and conservation of Lake Lanao Watershed. The awareness and attitudes of the farmers are geared towards the conservation and protection of the said watershed to serve the needs of the people living within the watershed. The socio-demographic and economic characteristics of the respondents have no significant relationship with their farming and forest products extraction practices. Most of the Maranao farmers have an idea on the implications of their farming and forest products extraction practices toward the protection and conservation of the Lake Lanao Watershed in Masiu, Lanao Del Sur. The findings of the study also implied that the Maranao farmers of the Lake Lanao Watershed should be considered partners in program development. Participatory approach in program planning, development and implementation is deemed most appropriate for the stakeholders who lived in and depended on the natural resources in the area for their subsistence.

**Key Words:** forest product extraction and farming practices, awareness, attitude and conservation.

**Introduction.** The basic cause of watershed degradation is a combination of ignorance and economic backwardness of people, outdated social system, overpopulation and overgrazing. These factors lead to cultivation of land without adequate soil and water conservation and of land basically unsuitable for sustained agriculture. They lead to spreading shifting cultivation, involving permanent forest land, reduction of forest fallow period, with soil exhaustion and inefficient conservation of forests (Saplaco 1998; Sosmeña 1991).

Lake Lanao has an area of 35,660 hectares and it is the second largest lake in the Philippines. It serves as a catalyst in the industrial development of Mindanao. It is the water reservoir in which steady supply of water comes the Lake Lanao Watershed. It is the main source of water from which the series of hydroelectric power generation plants along the grid of the Agus River depends. It is highly reliable source to meet the much needed power requirements of Mindanao Island. It also serves other purposes such as irrigation, navigation, domestic, religious, fish, farming and recreational purposes (Gallardo 2009).

It had been noted by the DENR-MANCOM (2005) that some farmers who reside in the Lake Lanao Watershed believed that conservation of the environment have been least understood by the farmers themselves. New innovations should be welcome as congruent to their belief system. Without proper intervention, watersheds are mostly now in varying

degrees of degradation and will be in great risk of being permanently impaired to deliver many goods and services vital to society. However, recent government projects involving community participation like Community Based Forest Management project (CBFM) have helped much in the rehabilitation of the degraded watershed areas in various parts of the country. However, the implementation of the government programs and projects has been adversely affected by various forest products extraction practices among the Maranao farmers and commercial logging companies who have less regard for the conservation of residual trees and tree planting programs.

It has been acknowledged that there has been limited information on the practices, awareness and attitudes of the Maranao farmers in Masiu, Lanao del Sur, Philippines towards the protection and conservation of the Lake Lanao Watershed. Moreover, this study would reinforce and fill-in the gap in the dearth of knowledge about the farming and forest extraction practices of the respondents.

The municipality of Masiu is located in the eastern portion of the Lanao del Sur, Philippines where the area of study, the three (3) barangays, namely: Gubar Sawer, Lanco Dimapatoy and Lacadun are located. These barangays cover about 40 percent of the total area of the municipality of Masiu, Lanao Del Sur. They comprise more than 1,000 hectares of paddy/lowland farms, about 3,000 hectares of upland and 900 hectares of forested areas. About 30 percent of the forested areas have economic value for logging and for extraction of minor forest products.

Masiu has vast lands for agriculture in its total land area. The communities of the three barangay's land area have been planted with annual crops and perennial trees. Giant bamboo (*Dendrocalamus asper*) predominate the landscape. Minor agricultural crops grown are bananas, vegetables, fruit trees and root crops. Rice, the primary seasonal crop grown, is planted mostly in low-lying areas to include corn which ranks second.

This study was conducted to highlight the farming and forest extraction practices, awareness and attitudes of the Maranao farmers in Masiu, Lanao del Sur, Philippines towards the protection and conservation of Lake Lanao Watershed. This was conducted considering that there is dearth of information on the farming and forest extraction practices, awareness and attitudes particularly their implications on the protection and conservation of the Lake Lanao Watershed. This study would fill-in that gap of knowledge. A great deal could be learned from the practices, awareness and attitudes of the Maranao's communities in Masiu, Lanao Del Sur.

**Methodology.** The target population of the study are the Maranao farmers residing in the Lake Lanao Watershed in the three barangays of Masiu, Lanao Del Sur. The sample was determined based on combination of convenience and quota sampling. The study was conducted treating one hundred (100) respondents taken from 40% of Maranao farmers in the three barangays, namely: Gubar, Sawer with 100, Lanco, Dimapatoy with 88 and Lacadun with 62 forest occupants within the municipality of Masiu, Lanao Del Sur.

The criterion used in choosing the respondents was that they should be Maranao farmers who are residing one of the three barangays (Figure 1).

**Data collection.** The questionnaire used was subjected to content validation through the help of one forester and an expert in the social science. These persons were also requested to study the first draft of the research instrument and who gave their comments on grammar, appropriateness of terms used, and clarity of sentences and relevance of each item to the variables under study. The final revised instrument was pilot-tested to determine its reliability.

There are three parts of the survey questionnaire (see Annex 1). The first part focuses on finding out the socio demographic and economic characteristics of the respondents. The second part of the questionnaire surveys on resource extraction and farming practices of the respondent's in which they were asked to respond with "agree" "no idea", and "disagree" after each item. The third part probes into the awareness and attitudes of forest occupants toward the Lake Lanao Watershed.

Permission and approval for the conduct and administration of the questionnaires in this study was taken from the Local Government Unit - Municipal Planning and Development Officer (LGU-MPDO) of Masiu, Lanao Del Sur. The researcher with the help of two research assistants administered the questionnaires to the Maranao farmers. Unstructured interview was also undertaken to substantiate the data collected.

This research utilized both qualitative and quantitative approaches in meeting the objectives of the study. Frequency counts and percentages were used to describe the socio-demographic and the socio-economic characteristics of the respondents. Likewise, the responses to the questionnaires were summarized using the above methods. The study assessed the respondent's farming and forest extraction practices. The awareness and attitudes of the respondents on the protection of Lake Lanao Watershed were likewise determined. The Chi-square test was used to determine the relationships between the socio-demographic and economic characteristics and the farming and forest extraction practices of the respondents.

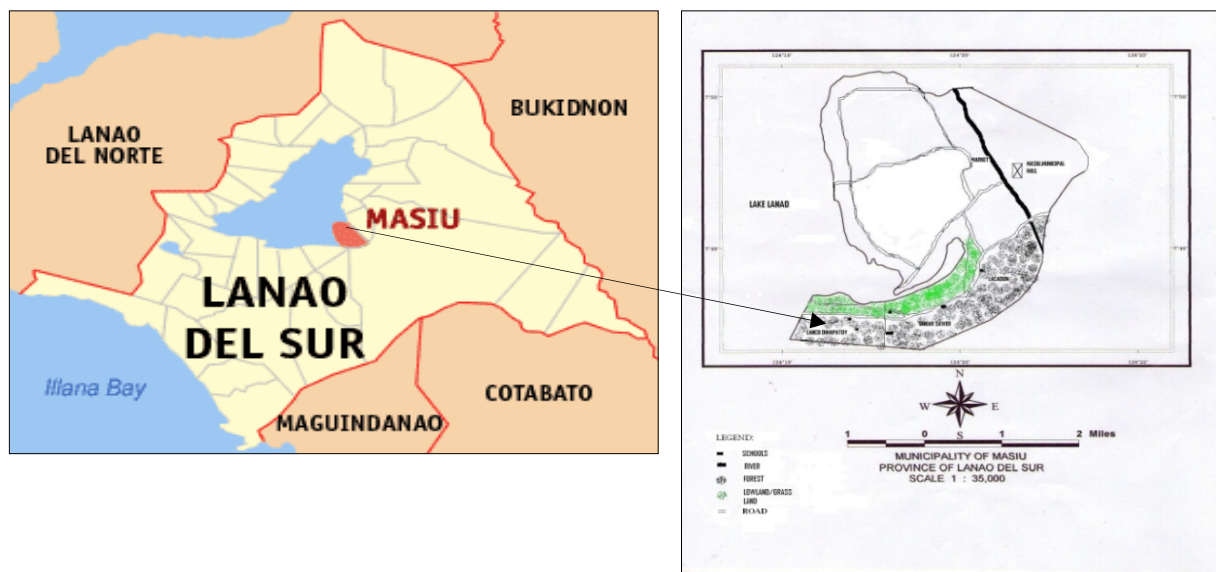


Figure 1. DENR-ARMM, FMB compilation map. Showing the location of study in the Municipality of Masiu with the three watershed barangays namely: Gubar Sawyer, Lanco Dimapatoy, Lacadun, Lanao del Sur.

**Results and Discussion.** One hundred percent (100) of the respondents are male. They are all males because in the Maranao tradition women are not allowed to work in the field. The wives stay in the house to take care of the children and keep the house clean. Majority (81%) of the respondents are married. Twenty-four percent (24) of the respondents have a family size of three (3) and below, 50 percent have a family size of four to seven (4-7) and 26 percent have a family size of eight (8) and above.

With regards to educational attainment, 29 percent finished elementary school, while 20 percent reached college level. Majority of the respondents (51%) are high school graduates since, according to them, poverty has been the primary reason why they cannot continue to pursue further education (Table 1, where N represents the number of respondents while percentage represents the different frequency of the figure - which is available for all the Tables).

A key informant said that the respondents' children have the "Madaris" Arabic education on Saturdays and Sundays and elementary school or Philippine secular education from Mondays to Fridays. Crossing and Soldian, a sitio of Gubar Sawyer, has established secondary schools since 2009, namely the Lacoto High School and The Sultan Alimoden High School. Lanco Dimapatoy, has a primary school but no secondary school, and barangay Lacadun has only an elementary school.

Table 2 shows that 65 percent or majority of the respondents have an income of 57, 252 to 128,783 pesos annually (P 4,771.00 - 10,732.00/month) and about 29 percent of them have an income of P 56,000.00 and below annually (P 4,667 and

below/month). It can be gleaned from the table that 72% of the respondents have 2 to 3.49 hectares of farm which may be considered adequate for them to earn a living. Forty eight percent occupy 2-3 hectares of forest land and fifty percent of the respondents have 2 to 3 hectares of titled land.

Table 1  
Socio-demographic characteristics of the respondents

<i>Characteristics</i>	<i>N</i>	<i>%</i>
<i>Age (years)</i>		
37 and below	32	32.0
38-49	36	36.0
50 and above	32	32.0
<i>Sex</i>		
Male	100	100.0
Female	0	0.0
<i>Civil status</i>		
Single	10	10.0
Married	81	81.0
Widowed	9	9.0
<i>Family size</i>		
3 and below	24	24.0
4-7	50	50.0
8 and above	26	26.0
<i>Educational attainment</i>		
Elementary	29	29.0
High School	51	51.0
College	20	20.0

Table 2  
Socio-economic characteristics of the respondents

<i>Characteristics</i>	<i>N</i>	<i>%</i>
<i>Annual income (in Peso)</i>		
56,000.00 and below	29	29.0
57,252 – 128,783	65	65.0
129,000 and above	6	6.0
<i>Area of farm (has)</i>		
1.9 and below	19	19.0
2.0 – 3.49	72	72.0
3.5 and above	9	9.0
<i>Type of farm land area - forest land (has)</i>		
1 and below	43	43.0
2 – 3	48	48.0
4 and above	9	9.0
<i>Type of farm land area - titled land (has)</i>		
1 and below	42	42.0
2 – 3	50	50.0
4 and above	8	8.0

A key informant said that a wife of one farmer who had a store with the business of buying and selling of rice and corn as well as chicken feeds have an income of P 6,000.00 to P 7,000.00 per month (P 72,000.00-84,000.00/annum) including her husband's farming income. Some of the farmers are in living in subsistence since they have no other income aside from farming because of their limited area of farm. Sometimes crop pests and diseases attacked their farms which would affect, if not reduce, their income.

Farming is their prevailing occupation. They also raised livestock to augment their income. Upland farmers are sometimes engaged in illegal logging or timber extraction. When asked about the land ownership, some mentioned that they are not the owners of the farm lots they farmed and they would give royalty (Kapamagugupa in Maranao) to the owners. Understandably, there were cases when the land owner spend/supply materials, like carabao or tractor and chemical fertilizers used in farming in which the

yield to be harvested would be divided into two, one half for the farmer worker and the other half for the landowner. When the owner of the farm lot does not spend/supply carabao/tractor used for farming, the yield would be divided as follows: one third would go to the farm lot owner and two thirds to the farmer/tenant.

Maranao farmers' economy in Masiu, Lanao Del Sur, Philippines, is based on rice and corn agriculture, fishing, government employment and businesses. In fact, Lanao Del Sur was virtually self-sufficient until a decade ago, when some of the farmers turned to business or to industrial and public employment, leaving behind their paddies and upland to fallow. Those who stayed on the land continued to farm in the traditional manner, utilizing a carabao or a cow to plow and harrow the fields. The traditional Maranao farmers in the three barangays in Masiu produced only enough rice to feed their family due to their limited farm land.

In Lanco Dimapatoy a key informant said that due to unstable peace and order condition in the area caused by family feuds, some areas of land could not be utilized for farming for fear of being hit in the cross fire between opposing families. Family feud (RIDO) is a prevalent and continuing Maranao tradition.

A key informant mentioned that in Gubar Sawer, growing vegetables had provided the farmers' family regular fresh and nutritious food everyday of the year. The vegetables that would not be consumed are sold to give additional income for other family needs. Some of the farmers follow the bio-intensive way of gardening in order to improve the quality and quantity of vegetables produced in their homes. This method of gardening helped improve family health and food security. Many nutritious foods could be taken from the garden. Fishing is the secondary source of their income, either from Lake Lanao or in Malaig River.

Some farmers raise fish in the family backyard in fishponds which ensure a supply of fish for the family. It also helps bring down family expenditure for food. Fish and vegetables are part of their daily meals, but are fast becoming scarce in the market and are becoming costly too (DOH et al 2000).

Table 3 shows the cash crops grown by the farmers in the three barangays. The farmers cultivate at least twenty (20) kinds of cash crops such as rice, corn, abaca, onion, tomato, string beans, sweet potato, ginger, soybeans, cucumber, peanut, chili, eggplant, cassava, among others. These results indicate that the farmers' planted rice and corn as their main crops. Planting of rice is usually undertaken during the rainy season in the months from May to October in the hinterland farms, while during the dry season the farmers devote to corn farming. However, in the lowland irrigated farms, rice is always the agricultural mainstay.

The farmers raise a variety of cash crops and plantation crops consistent with the Community Based Forestry Management Program (CBFM) of the Department of Environment and Natural Resources (DENR) to provide livelihood in the upland communities in order to enhance their economic condition.

Table 4 shows fourteen (14) kinds of plantation crops and two (2) other major crops (cacao and bamboo). A key informant said that farmers also cultivate a variety of plantation crops as support crops in addition to their mainstay crops. These are fruit trees like coconut, banana, mango, marang, calamansi and others to augment their income. They also use the plant parts as vegetables, like jackfruit, core of the banana's pseudo-stem and coffee leaves as alternative food sources.

Table 5 shows the traditional farming practices of the respondents. Some farmer's practiced "slash and burn" converting the forests into agricultural lands or settlement areas to expand their areas for cultivation. Some farmers had tried to live-out from Lanao del Sur to invest in business outside when they have capital, because farming provides only meager income to the family. Much more, when farmers have very little portion of land to farm or if they were only tenants, they prefer to go into business.

Table 3

Frequency and percent distribution of cash crops grown by the respondents\*

<i>Cash crops grown</i>	<i>Scientific name</i>	<i>N</i>	<i>%</i>
Rice	<i>Oryza sativa</i>	93	28.70
Corn	<i>Zea mays</i>	89	27.47
Onion	<i>Allium cepa</i>	24	7.41
Cassava	<i>Manihot esculenta</i>	16	4.94
Tomato	<i>Lycopersicon esculentum</i>	16	4.94
String beans	<i>Phaseolus vulgaris</i>	13	4.01
Sweet potato	<i>Ipomea batatas</i>	11	3.40
Ginger	<i>Zingiber officinalis</i>	9	2.78
Soybeans	<i>Glycine max</i>	9	2.78
Cucumber	<i>Cucumis sativus</i>	8	2.47
Peanut	<i>Arachis hypogaeae</i>	7	2.16
Pepper	<i>Capsicum annum</i>	5	1.54
Eggplant	<i>Solanum melongena</i>	5	1.54
Squash	<i>Cucurbita spp.</i>	4	1.23
Mongo	<i>Vigna radiate</i>	4	1.23
Ampalaya	<i>Momordica charantia</i>	4	1.23
Radish	<i>Raphanus sativus</i>	3	0.93
Pechay	<i>Brassica rapa</i>	2	0.62
Garlic	<i>Allium sativum</i>	1	0.31
Cowpea	<i>Vigna unguiculata</i>	1	0.31
Total		324	100

\*multiple responses

Table 4

Frequency and percent distribution of plantation crops grown by the respondents\*

<i>Crops grown</i>	<i>Scientific name</i>	<i>N</i>	<i>%</i>
Coconut	<i>Cocos nucifera</i>	29	21.64
Banana	<i>Musa sapientum</i>	28	20.90
Mango	<i>Mangifera indica</i>	12	8.96
Marang	<i>Artocarpus odoratissimus</i>	12	8.96
Calamansi	<i>Citrus spp.</i>	10	7.46
Durian	<i>Durio zibethinus</i>	9	6.72
Rambutan	<i>Nephelium lappaceum</i>	9	6.72
Guava	<i>Calyptropsidium sartorianum</i>	7	5.22
Avocado	<i>(Persea americana)</i>	5	3.73
Lanzones	<i>Lansium domesticum</i>	4	2.99
Ipil-ipil	<i>Leucaena glauca</i>	1	0.75
Coffee	<i>Coffea spp.</i>	1	0.75
Jackfruit	<i>Artocarpus heterophylus</i>	1	0.75
Star-apple	<i>Chrysophyllum cainit</i>	1	0.75
Cacao	<i>Theobroma cacao</i>	3	2.24
Bamboo	<i>Bambusa vulgaris</i>	2	1.49
Total		134	100

\*multiple responses

Table 5

Traditional farming practices\*

<i>Practices</i>	<i>N</i>	<i>%</i>
Slash and burn	15	3.59
Zero cultivation	9	2.15
Plowing only once with farm animal	100	23.92
Plowing and harrowing	100	23.92
Monoculture cropping	22	5.26
Zero farm chemicals	79	18.90
Rotation cropping	93	22.25
Total	418	100

\*multiple responses

Plowing only once with the farm animal and plowing and harrowing are the most common practices applied since the soils in their farm are fertile. According to a key informant, plowing and harrowing is the traditional farming often used since it is the best method for maintaining soil fertility. Monoculture cropping is also adopted by the traditional farmers; they repeatedly plant rice through the years without applying chemicals. The respondents also believed in compost treatments like rice straw compost and animal manure application in their farms. However, they have limited information on the long-term effects of these applications on soil properties and on paddy rice yields.

Table 6 reveals the modern farming practices of the respondents. It shows that the respondents conserved and protected trees on-farm and off-farm tree plantations. They practiced zero burning and use tractor for full soil cultivation and in plowing and harrowing.

Table 6

Modern farming practices\*

<i>Practices</i>	<i>N</i>	<i>%</i>
Trees are conserved and protected on farm plantation	96	16.44
Trees are conserved and protected off-farm plantation	96	16.44
Zero burning	100	17.12
Full soil cultivation	98	16.78
Tractor cultivation	99	16.95
Plowing and harrowing	95	16.27
Total	584	100

\*multiple responses

Table 7 shows the top three major forest products extraction practices of the respondents namely; small timber gathering (33.79%), round wood gathering (32.42%) and lumber gathering (31.05%).

Table 7

Major forest product extraction practices\*

<i>Practices</i>	<i>N</i>	<i>%</i>
Round wood gathering	71	32.42
Lumber gathering	68	31.05
Small timber gathering	74	33.79
Large timber gathering	6	2.74
Total	219	100

\*multiple responses

One of the respondents said that the farmers do not frequently extract forest products, except when they would make their shanties/houses. They cut down residual trees (10 to 30 cm in diameter) which is against the watershed conservation and protection of Presidential Decree 705 otherwise known as the Revised Forestry Code of the Philippines, series of 1975 as amended. The extent of exploitation of these major forest products and its effects on Lake Lanao Watershed has not been studied and is beyond the scope of this study.

With regards to round wood gathering, a key informant said that the lumber dealers are the ones who finance the chainsaw operators who cut down the trees and tow the logs to the slicers in the sawmill yard (bandsaw). There are two small sawmills located in Gubar Sawyer and the third one in Lacadun.

Timber poaching prevailed in the forested areas somewhere in the boundary between the municipalities of Masiu and Butig since 1995. Forest occupants illegally cut old trees using chainsaws. After cutting the trees, the logs are sliced into flitches (with dimensions of 12"x12"x12') and are hauled from Masiu to Marawi City lumber distributors. In bringing these products to Marawi they load the flitches to a boat at night and transport them. A key informant said that not all forested areas of the three barangays are usable for commercial or economical exploitation. Only one-third of the forest areas could be used for commercial activities like logging, production of oleoresin,

bamboo, rattan and firewood. Some forests are too deep in the interior that it is not economically productive to do logging there.

Table 8 shows the top five minor forest products extraction practices of the Maranao farmers namely: bamboo gathering (43%), charcoal making (40%), firewood gathering (10%), wild plant gathering (4%) and bees and wax gathering (2%).

Table 8

Minor forest product extraction practices\*

<i>Practices</i>	<i>N</i>	<i>%</i>
Fire wood gathering	20	10.0
Charcoal making	81	40.0
Bamboo gathering	85	43.0
Rattan gathering	2	1.5
Bees honey and wax gathering	3	2.0
Wild plant gathering	8	4.0
Wild animal gathering	1	0.5
Total	200	100

\*multiple responses

One of the respondents said that they only cut bamboos and rattans within their area of the farm, if available. Gathering of minor forest products is tolerated by all the farmers of the three barangays, as long as it is not for commercial purposes and is limited for personal use and for food. Likewise, they admitted that they do not do these frequently since they are aware that these practices would lead to degradation of the watershed.

A key informant admitted that erosion and flash floods are the results of deforestation, non-planting of trees in the hinterland and the cultivation of marginal hilly lands. They also believe in the rehabilitation and sustainable management of the country's forest resources and trees, which are the habitat for birds, bees, monkeys and other wildlife.

Table 9 shows that majority of the respondents with a mean response of 92.83% to all awareness items except for the effects of agricultural farming practices on the watershed and erosion (66% are not aware) are aware of the need to protect and conserve Lake Lanao Watershed for the sustainability of water resources in Lake Lanao. Almost all of the respondents are aware of the need to protect forests which will redound to conservation and availability of water, served as important habitat for wildlife and protect soil from erosion.

Table 9

Frequency distribution of the awareness of Maranao farmers on watershed protection and conservation

<i>Awareness items</i>	<i>Aware</i>		<i>No idea</i>		<i>Not aware</i>	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
Forests should be protected	99	99.0	1	1.0	0	0.0
Forests conserve water	99	99.0	1	1.0	0	0.0
Watershed protect the water source	99	99.0	1	1.0	0	0.0
Water is coming from watershed	99	99.0	1	1.0	0	0.0
Forest is the habitat of wildlife	99	99.0	1	1.0	0	0.0
Crops can be grown with trees	99	99.0	1	1.0	0	0.0
Soil is protected by forest trees	90	90.0	2	2.0	8	8.0
Agricultural farming practices have an effect on watershed and erosion	34	34.0	0	0.0	66	66.0
DENR personnel are satisfactorily exerting effort on reforestation	99	99.0	1	1.0	0	0.0
Soil erode when trees are cut down	99	99.0	1	1.0	0	0.0
Water is lost when trees are cut	99	99.0	1	1.0	0	0.0
Water becomes turbid when soil erode	99	99.0	1	1.0	0	0.0
Mean		92.83		1.0		6.17



Table 10 indicates the respondents' attitude towards the protection and conservation of Lake Lanao Watershed. They recognize the importance of the watershed areas which continuously supply water to Lake Lanao which is used, among others, for the generation of hydroelectric power by the National Power Corporation (NPC). This supplies 75 percent of the power needs in Mindanao (DENR- MANCOM, 2005).

Table 10

Frequency distribution of the attitudes of Maranao farmers on watershed protection and conservation

<i>Attitude items</i>	<i>Agree</i>		<i>No idea</i>		<i>Disagree</i>	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
I pay much attention to the protection of the watershed	99	99.0	0	0.0	1	1.0
I listen to the advices of the DENR personnel on the protection of the watershed	99	99.0	0	0.0	1	1.0
I recognize the importance of water	100	100.0	0	0.0	0	0.0
I participate in forest conservation	100	100.0	0	0.0	0	0.0
I observe discipline in water conservation	100	100.0	0	0.0	0	0.0
I understand what watershed is	99	99.0	0	0.0	1	1.0
I observe an attitude of forest protection and conservation	100	100.0	0	0.0	0	0.0
I believe that water in Lake Lanao comes from the watershed	100	100.0	0	0.0	0	0.0
I agree that water becomes turbid when soil is eroded from the uplands	97	97.0	3	3.0	0	0.0
I plant trees in my farm	100	100.0	0	0.0	0	0.0
I help protect wildlife in the forest	95	95.0	2	2.0	3	3.0
I follow soil and water conservation practices	100	100.0	0	0.0	0	0.0
I follow prescribed procedures in farm inputs	100	100.0	0	0.0	0	0.0
Mean		99.15		0.39		0.46

Table 11 shows the results of the Chi-square analyses to determine the relationship between selected socio-demographic characteristics of the respondents and their farming practices. It indicates that no significant relationships were found between the socio-demographic characteristics and their farming practices ( $p > 0.05$ ). This implies that the difference between observed and the expected responses of each category are due to chance alone. The  $df$  represents the deference frequency while  $X^2$  represents the denominator of the probable-value ( $p$ -value).

Table 11

Chi-square analyses of relationship between socio-demographic characteristics and farming practices of respondents

<i>Socio-demographic characteristics</i>	<i>df</i>	<i><math>\chi^2</math> value</i>	<i>p-value</i>	<i>Remark</i>
Age	2	0.883	0.643	Not significant
Civil status	2	0.066	0.968	Not significant
Family size	2	0.006	0.997	Not significant
Educational attainment	3	2.040	0.564	Not significant

Table 12 indicates no significant relationships were found between the socio-economic characteristics of the respondents and their forest products extraction practices ( $p > 0.05$ ). This implies that the differences between the observed and expected responses for each category are due to chance alone.

Table 12

Chi-square analyses of the relationships between socio-economic characteristics and major forest product extraction practices of the respondents

<i>Socio-economic characteristics</i>	<i>Df</i>	<i><math>\chi^2</math> value</i>	<i>p-value</i>	<i>Remark</i>
Annual income (Peso)	4	2.758	0.599	Not significant
Area of farm (has)	4	7.465	0.113	Not significant

In this study, the farming and forest extraction practices, awareness and attitude have been highlighted. All of the respondents are male. In terms of their civil status 81 percent are married, fifty-one percent are high school graduates showing that the respondents are generally educated and literate. Sixty five percent (65%) of them had 57,252.00 to 128,783.00 annual income (P 4,771.00 to P 10,732.00/month) indicating low economic condition of the respondents. Seventy-two percent had 2 to 3.49 hectares of farm land. Generally, they plant rice and corn and other cash crops.

Their farming practices are done either through cultural/traditional and modern farming methods. With regards to traditional farming practices, the respondents admitted that they practiced a) plowing only once with farm animal, and b) plowing and harrowing. They also practiced rotation and monoculture cropping. Modern farming practices include zero burning, tractor cultivation, full soil cultivation, and plowing and harrowing. They also conserve and protect trees both on and off-farm plantations.

The respondents extract major forests both for commercial and for personal uses. The lumber dealers are the ones financing the chainsaw operators to cut down trees. The logs are towed to the sawmill operators in barangays Gubar Sawer and Lacadun, respectively. Allegedly, these operations are "illegal" and some of the flitches ("tablon") are transported and brought to the lumber distributors in Marawi City. Personal uses of lumber are for making houses and/or shanties. Gathering of minor forest products are attributed mainly to charcoal making and bamboo gathering.

Results of the Chi-square tests showed no significant relationships between selected socio-demographic and socio-economic characteristics of the respondents and their farming and forest extraction practices. These results indicate that the differences between the observed and expected responses due to these characteristics are mainly due to chance alone.

**Conclusion.** The study attempted to determine the practices, awareness and attitudes of Maranao farmers in Lake Lanao Watershed in Masiu, Lanao Del Sur.

Farming is the main occupation of the respondents. They plant rice and corn as the main crops together with other cash crops. Since not all of them own the land. They derive additional income by gathering major and minor forest products. It has been highlighted in this study that "illegal logging" has been sporadically practiced by some respondents. However, the extent of this exploitation and its effects on the Lake Lanao Watershed conservation and protection are beyond the scope of this study. All the respondents are fully aware and their attitudes reveal that they are conscious about the need to conserve and protect the Lake Lanao Watershed. However, there is a need to address the "illegal logging" and "slash and burn" practices which are done out of necessity to eke-out additional income since these will certainly result to the degradation of the Lake Lanao Watershed if left unabated.

**Recommendations.** Based on the results of the study, the following are recommended:

1. The national government, through the regional and local offices/line agencies, must exert collaborative efforts in ground implementation of advocacy programs for the reforestation of deforested areas in the three Watershed barangays.
2. The program planners must give due consideration to include in some aspect of the planning process the rehabilitation of Lake Lanao Watershed. The active involvement of several stakeholders in the area of study in consideration of their socio-economic status and possible contribution to program implementation.
3. The program implementers should jointly exert more effort to undertake serious awareness advocacy program for the protection and conservation as well as in the development and rehabilitation of the Lake Lanao Watershed. They should encourage the activities and involvement of the Maranao farmers and various stakeholders in the area geared towards the development and rehabilitation of the Lake Lanao Watershed.
4. There is a need for the active involvement of various stakeholders, including the Maranao farmers, in program planning, development and implementation. When they are actively involved and their stake in the Lake Lanao Watershed are addressed they will also become active partners in the conservation and protection of the watershed.

5. To provide tenure security and organize Maranao farmers into forest communities especially those dependent and partially dependent on forestlands in the context of a Community Based Forest Management Agreement. This program promotes sustainable forestry and upland farming practices that offer both immediate and long-term benefits to these communities, in particular and the Lake Lanao Watershed in general.

## References

- DENR-MANCOM, 2005 Management Committee Meeting (MANCOM). Environmental Protection in the Lake Lanao to Support in Sustainable Livelihood. January 25, 2005, ARRM, Liaison Office, Rada St. Legaspi Village Makati City, pp. 1-2.
- DOH, DILG, DECS, 2000 An Approach to School Community Health Education and Promotion, A Joint Project of the Department of Health and the Philippine Health Development Program and World Bank, 45 pp.
- Gallardo O. C., 2009 Reliability of Lake Lanao as a Reservoir to Agus 1 Hydro-electric Plant RST Model. <http://lakelanao.com/main/?p=40>. Posted by Anisha on September 2, 2009.
- Presidential Decree 705 otherwise known as the Revised Forestry Code of the Philippines, series of 1975.
- Saplaco S. R., 1998 Watershed Management Techniques. Department of Forest Resources Management, College of Forestry, U.P. Los Baños Laguna, Philippines.
- Sosmeña Jr. G. C., 1991 Decentralization and Empowerment. Bureau of Local Government Supervision, Department of the Interior and Local Government. Manila, Philippines, pp 1.
- Tamises F., 1938 Philippine Forests and Forestry. DENR, Diliman, Central Office, Manila, Philippines, volume 1.

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## Survey Questionnaire

### Part I. Basic Information About the Respondents

Direction: Please give the needed information on the items that best correspond to your answers.

#### A. Socio-demographic characteristics of the respondents

Age \_\_\_\_\_  
 Sex \_\_\_\_\_  
 Civil Status \_\_\_\_\_  
 Family size \_\_\_\_\_  
 Highest Educational Attainment \_\_\_\_\_

#### B. Socio economic characteristics of the respondents

Annual Income \_\_\_\_\_  
 Area of Farm \_\_\_\_\_  
 Ownership of Farm \_\_\_\_\_  
 a. Forest land (yes) \_\_\_\_\_ How many hectares? \_\_\_\_\_  
 b. Titled land (yes) \_\_\_\_\_ How many hectares? \_\_\_\_\_

### Part II. Some Farming and Resource Extractive Practices of the Maranaos in the Lake Lanao Watershed in Masiu, Lanao del Sur

Please check the Farming and Forest Product Extraction Practices you are engaged inside the watershed

1. Agree (A),
2. No idea (NI),
3. Disagree (D).

<b>A. Farming Practices</b>	<b>1</b>	<b>2</b>	<b>3</b>
<i>1. Cash crops commonly grown</i>			
a. rice	—	—	—
b. corn	—	—	—
c. vines/creeping vegetables	—	—	—
d. erect food crop	—	—	—
e. leguminous crops	—	—	—
f. others (please specify) _____			
<i>2. Plantation crops grown</i>			
a. coconut	—	—	—
b. banana	—	—	—
c. marang	—	—	—
d. calamansi	—	—	—
e. others (please specify) _____			
<i>3. Traditional farming practices</i>			
a. slash and burn	—	—	—
b. zero cultivation	—	—	—
c. plowing only once with farm animal	—	—	—
d. plowing and harrowing	—	—	—
e. monoculture cropping	—	—	—
f. zero farm chemicals	—	—	—
g. rotation cropping	—	—	—



**B. Attitude**

Please check in the column below the extent of you awareness on the item below.

- 1. Agree (A),
- 2. No idea (NI),
- 3. Disagree (D).

1. I pay as much attention to the protection of the watershed	—	—	—
2. I listen to the advices of the DENR personnel on protection of watershed	—	—	—
3. I recognize the importance of water	—	—	—
4. I participate in forest conservation	—	—	—
5. I observe discipline on water conservation	—	—	—
6. I understand what is a watershed	—	—	—
7. I observe the attitude of forest protection and conservation	—	—	—
8. I believe that water in Lake Lanao comes from the Watershed	—	—	—
9. I agree that water becomes turbid when soil erode from the uplands	—	—	—
10. I plant trees in my farm	—	—	—
11. I help protect the wildlife in the forest	—	—	—
12. I follow soil and water conservation practices	—	—	—
13. I follow prescribed procedures in farm inputs	—	—	—