Socio-Economic Assessment of the Households Along the Jalaur River System, Province of Iloilo, Panay Island

Reynaldo N. Dusaran
Randy Anthony V. Pabulayan
Central Philippine University, Jaro, Iloilo City

The socio-economic aspect of the study was conducted to determine the personal and household socio-demographic profile, organizational and socio-political involvement, economic activities and use of the river system resources by the dependent population; perceived importance of the Jalaur River System to households, immediate community and neighboring communities; and to identify problems, issues and concerns affecting the Jalaur River System. The one-shot survey design was used in collecting data from randomly selected sample households in sample barangays in the upstream, midstream and downstream areas of Jalaur River System through personal interview using a structured interview schedule. The respondents considered the Jalaur River as very important because it is the source of water for domestic use, irrigation, drinking and bathing of farm animals. It is also their source of food, and of their livelihood such as fishing, quarrying, gathering/cutting of trees or vegetation. Tourism, rituals, and cultural activities were also conducted in the Jalaur River. Despite recognizing its importance, some respondents in the downstream used the river as toilet and disposed their household waste and used water into the river, as well as the waste water of their livestock. Runoff waste water drained from neighboring farms eventually goes to the river and further pollutes it, likely explaining the observed decrease in the number of fish species and in the volume of fish catch. Nevertheless, some respondents claimed that the river could still be their source of income for 20 years or more.

KEYWORDS: biodiversity, conservation, fresh-water ecosystem, health, river, river system, socio-economic benefits

INTRODUCTION

River systems provide pathways for biodiversity species moving inland and seaward. This function has social, economic and conservation implications. Rivers are important to civilization because river water can be diverted for agricultural irrigation, industry, hygiene, and related uses. Most rivers also carry dissolved minerals and organic compounds. Some communities depend on the fish that live in or travel along rivers. Rivers can facilitate transport but can also be barriers to land transportation. They can be crossed by ferries, bridges, and tunnels. Because of the difficulty of crossing rivers, they have sometimes become territorial boundaries. Furthermore, damming a river to provide pressure for electrical generation affects the water level of parts of the river. Some rivers are also known for their recreational and aesthetic value (River Basin Report, 2003; River Systems of the World, 2007).

River systems, including watersheds, and surface and ground waters, are an integral part of the universal hydrologic cycle. Humans have become part of this cycle, both in their need for water and their effects on the quality and distribution of water. Humans cannot continue to exist without taking steps to be more in harmony with the environment. Developing sustainable river systems is an integral and critical element of promoting a better future for people throughout the world. Many of the issues facing populations living within river watersheds require interdisciplinary analysis if they are to be effectively studied (CSRS, 2006).

A better understanding of biodiversity helps to focus conservation efforts and political policies, as well as enabling us to address existing environmental problems. In the Philippines, however, only few studies were done on water resources and/or the river system. Freshwater ecosystems contribute to marine ecosystems since the rivers drain their waters to the seas. Most biodiversity studies are focused on the marine ecosystem and much is already known about this resource. It is important for the freshwater river system to be studied to establish a complete picture of the biodiversity status of both fresh and marine water resources.

Study Areas

There are 92 streams that traverse Antique and more than a hundred rivers and creeks in Iloilo but only 15 are considered possible sources

of irrigation. The Jalaur River is the main river in Panay. Its basin has a peak annual discharge of approximately 600,000 l/sec, and a minimum of 10,000 l/sec. Stream flows of the Jalaur River are greatly reduced during the dry season due to the continuing denudation of the watershed areas (http://www.geocities.com/darfu6/right. htm). The Jalaur River is also the main source of irrigation water of the rice fields in the municipalities of Central Iloilo. It originates from the Municipality of Calinog and passes the City of Passi and the Municipalities of San Enrique, Dueñas, Dingle, Pototan, Barotac Nuevo, Dumangas, Zarraga, and Leganes.

This study covered three locations along the upstream, midstream and downstream portions of the river. The upstream site was the Municipality of Calinog, where the Jalaur River originates; midstream site was the Municipality of Dingle while the downstream site was the Municipality of Leganes.

Objectives and Significance of the Study

The socio-economic aspect of the study was conducted to [1] determine the personal and household socio-demographic profile of the dependent population; [2] determine the organizational and socio-political involvement of the dependent population; [3] describe the economic activities and use of the river system resources by the dependent population; [4] determine the tourism, rituals and cultural activities involving the river system; [5] determine economic, tourism and other activities carried out by organizations or entities outside of the communities involving the river system; [6] determine the perceived importance of the Jalaur River System to the households, immediate community and neighboring communities; and [7] identify problems, issues and concerns affecting the Jalaur River System.

The result of the socio-economic assessment of the dependent population in communities along the Jalaur River System would be very useful in determining the present status of the Jalaur River System and the dependent population along the River. Specifically, the results of the study would be significant to the following:

Dependent Population. The study could provide information on their socio-demographic characteristics, quality of life, their economic and cultural practices and the implication of their practices to the present biological and physico-chemical status of the Jalaur River. This information could serve as basis in protecting the Jalaur River

system and in properly planning the economic and cultural activities conducted in the river.

Local Government Units. Findings of this study can be used by the local government units in coming up with local measures to protect, rehabilitate and maintain the Jalaur River System and its environs with the end view of enhancing the potential benefits from the Jalaur River system to the dependent population, their community and the neighboring communities.

National Government Agencies. The findings from this study can provide National Government Agencies necessary data inputs for policies, programs or projects to protect, rehabilitate and maintain the Jalaur River System to maximize the benefits that different stakeholders can derive from the river system.

Academic Community. The various results of this research undertaking would increase the existing body of knowledge about the Jalaur River System and its environs. Findings from this study could serve as additional inputs to instruction in the field of biology, chemistry, sociology, environmental science and other fields, as well as provide avenues for further research and basis for development and extension/outreach activities in the area.

METHODS

The socio-economic study was descriptive and utilized the one-shot survey design. The study population (n=788) included all the households in sample barangays in the upstream (n=198), midstream (n=318) and downstream (n=272) areas of Jalaur River System. The upstream, midstream and downstream sites were jointly decided by the research team based on their location along the Jalaur River. The barangays identified were those located right next to the river with households located within 100 to 200 meters from the river. The sample size (269) was computed based on the total number of households in the identified barangays and proportionately allocated to the sample barangays. Systematic sampling with random start on site was followed in identifying the sample survey respondents in each barangay.

The data were collected through personal interview using a

structured interview schedule with the household head or any responsible member of the household as respondents. Prior to the conduct of the actual data collection, the interviewers were oriented on the content of the instrument and trained on how to conduct a one-on-one interview. The research instrument was validated by expert jurors and was pre-tested in one barangay along Jalaur River System which was not be covered by the study. The instrument was modified and finalized based on the results of the pre-test. Data were processed at the University Research Center of Central Philippine University using Statistical Package for Social Sciences (SPSS) Version 12. Frequency distributions and means were the main statistical tools used for the descriptive analysis.

RESULTS AND DISCUSSION

Personal and Household Socio-Demographic Profile

About 43% of the households were residing within 100 meters from the Jalaur river, most particularly the majority (83.5%) of the downstream respondents while the majority of the upstream and midstream respondents were residing more than 200 meters from the Jalaur river.

The respondents had mostly attained secondary level of education (36.1%), particularly those in the downstream (49.4%) and in the midstream (32.2%). In the upstream, most (46.1%) of the respondents had elementary level of education.

Those in the upstream (47.6%) and the midstream (33.9%) were mostly into farming while those in the downstream were mostly (27.0%) into fishing. Although most of the respondents (41.3%) were earning Php 3,000 which was most particularly true in the upstream (63.5%) and at a lower extent (34.7% and 34.1%) in the midstream and downstream, respectively, their mean income values indicate that respondents from the midstream had the highest mean income (Php 8,749.71) and those in the upstream had the lowest (Php 3,823.23).

One third (33.8%) of the respondents had other sources of income that included mostly farming (25.3%), laborer (20.9%), and business (19.8%). From these other sources most of them (50.5%) had earned not more than Php 2,000.00 per month.

Most (40.5%) of the respondents had five to six members in their household with a mean household size of 5.6 members, considered

typical of a rural household. Although most of them (40.9%) had household members within an average age of 16 to 30 years, their mean average age values indicated that household members from the midstream were relatively older (32.8 years) while those from the downstream were relatively younger (22.1 years).

About six out of 10 (58.7%) respondents had households with two or more male members and only 46.8% had households with two or more female members. This observation that there were more male members than female members is supported by the mean values indicating that in all locations there were more males than females. Most of them (39.8%) had no members in school although most of them (40.9%) had one to two members of school age. This indicates that there were children who were of school age but were not in school.

Aside from the respondents, more than half (55.0%) of the respondents had one other member in the household who is working and three out of ten (30.1%) respondents had no other working members. Only 14.1% of the respondents reported that their households had a family business in the form of a sari-sari store (79.0%), and this was found true in all locations. More than a quarter (29.0%) of the respondents also claimed that they had other sources of family income in the form of allotment, true of all locations and most common in the upstream (88.9%) and least common in the downstream (38.1%).

About two thirds (65.8%) of the respondents' households had a total income from all sources of not more than Php 10,000.00 per month. The proportion of households in this income category was highest in the downstream (76.5%), and lowest in the midstream (56.2%). Overall, the respondents' households were earning an average of Php 13,906.50 per month with those in the midstream having the highest (Php 18,435.00) and those in the upstream having the lowest (Php 9,776.10). Given their total household income and the income of the respondents, overall, the respondents contributed an average of 45.21% to the total household income. This was highest in the midstream (47.46%) and lowest in the upstream (39.11%). Although most of the respondents in these areas were farmers and the farm sizes of those in the midstream were wider, there were more respondents who were in business and receiving pensions or allotments.

About half (50.9%) of the respondents' households spent not more than Php 5,000 per month but on the average, the respondents spent

Php 7,016.10 per month with those from the midstream having the greatest (Php 8,975.90) and those from the upstream (Php 5,036.30) having the lowest mean total household monthly expenses (Table 5).

Based on their mean total household monthly income and expenditures, it was estimated that the respondents can save an average of Php 6,890.40 or about half (49.5%) of their total household monthly income. Across locations, those from the midstream had the highest estimated savings (Php 9,459.10 or 51.3% of their income) and those from the upstream have the lowest (Php 4,739.80 or 48.5% of their income).

Among the different expenditure items, the respondents' households spent the most on food (43.0%) followed by education (26.5%) and medicine (10.8%). Those from the midstream and the upstream followed the same priorities but in the downstream, their third priority was recreation. In all items, those from the midstream had the biggest expenditures and except for medicine, those from the upstream had the smallest expenditure.

The typical breakfast for the respondents' households generally included rice (98.9%), fish (84.0%), vegetables (72.9%) and coffee/ *tahu* (ginger tea)/milk (81.8%) or juice/soft drinks (62.5%). Their usual lunch also generally included rice (99.6%), fish (97.4%), vegetables (94.1%) and coffee/tahu/milk (57.6%) or juice/soft drinks (57.9%) and dinner likewise included rice (98.9%), fish (91.8%) and vegetables (85.1%).

More than half (53.2%) of the respondents' households did not own their home lot which was most particularly true in the upstream (79.4%) and the downstream (64.7%). In the midstream, the majority (68.6%) of the respondents owned their home lot. Those who had home lots had an average of 1,867 sq m. This was highest in the midstream (2,488.9 sq m) and lowest in the downstream (426.3 sq m).

The households commonly own a variety of appliances and equipment which included television (70.6%), radio (63.6%), electric fan (51.3%), refrigerator/freezer (37.2%), sala set (36.4%) and stereo (32.0%). This trend was more or less true in all locations except that in the upstream, radio was the most widely owned followed only by television. It was also observed that except for the radio, those from the midstream had the highest proportion of respondents possessing the mentioned most commonly owned appliances.

The respondents' houses were mostly made of temporary materials (45.7%) such as bamboo and nipa shingles but this was true only for those in the upstream (58.7%) and the downstream (57.6%)

while most of those from the midstream (39.7%) had houses made of permanent materials. The respondents generally used electricity for lighting (83.3%), firewood as fuel (84.0%) and pump/artesian well as source of water for drinking and cooking (37.5%) but this was true only for those in the upstream (84.1%). Those from the midstream had water from a piped-in water system (61.5%) while those from the downstream bought water (47.1%) delivered to them.

The majority (71.4%) of the respondents' households had water sealed toilets, found true in all locations with those in the midstream having the largest proportion (78.5%) and those in the upstream having the lowest proportion of respondents. More than one fifth (21.6%) of the respondents had open pit toilets with those in the upstream having the largest proportion (31.7%) and an equal proportion of respondents (5.9%) from the downstream had no toilet or used the river as toilet.

More than three quarters (77.0%) of the respondents used open drainage for their waste water disposal with those in the upstream having the greatest proportion of respondents (87.3%). Only 10% of the respondents had a septic tank with those from the midstream having the highest proportion (14%). The data also revealed that about one fourth (23.5%) of those from the downstream disposed their waste/used water in the river.

To dispose their solid waste, more than half (56.1%) of the respondents practiced burning which was more particularly true in the midstream (66.9%). More than one third (38.8%) of those in the downstream just threw their garbage away and 5.9% disposed of their garbage in the river.

In terms of their level of living measured by their rating on a scale of one to nine, with one as lowest and nine as highest, at the time of the study half (50.2%) of the respondents had an average level of living. Their rating for level of living five years ago indicated that most of them (44.2%) had a low level of living, and their rating for five years from now shows that most of them (39.0%) expect a high level of living. Comparison of their present and future mean values also indicated that in all locations the respondents were optimistic of improvements in their living conditions in the near future.

The distance of the houses of the respondents from the Jalaur River has some implications to their sanitation and environmental practices. As observed, the majority of those from the downstream had houses within 100m from the river. Due perhaps to their distance from the river, it is in the downstream where the greatest proportion

of respondents had no toilet or used the river as toilet, drained their waste water into the river and just threw away their solid waste anywhere and into the river. It is also interesting to note that it is also in the downstream where most of the respondents are dependent on the river for their livelihood as fisherfolk. The data indicates that it is the households from the downstream themselves that could be polluting their important resource, the river. This finding was supported by the result of the bacteriological aspect of the project (Olaguer & Mendoza, 2010). Their findings indicated that Jalaur River is polluted since it was found to be contaminated with feces which could have come from both animal and human waste.

In all economic indications, those in the midstream appeared to be better off. The respondents and the households had the highest mean income, expenditures and savings as well. With their higher income, they were able to own bigger home lot areas, put up houses made of permanent materials, acquire the most appliances and had a piped-in water system.

It should be pointed out however, that the mean household monthly income of the households (Php 13,906.50) was lower than the average national monthly income (Php 14,333.33) (NCSB, 2006), particularly for those in the upstream and the downstream. Although their mean monthly income was lower, their estimated mean monthly savings were higher than the national mean monthly savings of Php 2,083.33 (NCSB, 2006) because their mean monthly expenditure (Php 7,016.10) was much lower than the national average family monthly expenditures of Php 12,250.00 (NCSB, 2006).

The use of firewood and charcoal as fuel in all areas should be looked into, most particularly in the midstream. Although a smaller proportion of the population was using firewood and charcoal in this area compared with the two other areas, more than three fourths of the households using the fuel was still an area of concern because of the presence of the Bulabog-Putian National Park (BPNP) in the area.

Organizational and Socio-Political Involvement

About half (50.9%) of the respondents reported that there were organizations in their respective communities but only 16.4% of them had household members who were members of these organizations. About one fifth (19.3%) of the respondents also claimed they had household members who were members of organizations outside of the community. At least 33.3% of them were involved with religious

organizations and about one third (31.2%) of them were officers. More than three quarters (81.2%) of them claimed that their household members were active members of their respective organizations.

The data revealed that organizational membership among household members was generally low but among locations, those in the downstream had a relatively higher level of organizational involvement. This was indicated by a higher proportion of respondents with household members who were members of organizations within and outside of their community and a higher proportion of respondents who were officers and active members in their respective organizations.

The great majority (87.0%) of the respondents had voted during the last election while less than one tenth (8.9%) of the respondents had been a candidate for an elective position generally on the barangay level only.

Economic Activities and/or Use of the River System Resources

About one third (30.5%) of the respondents' households were into crop farming, mostly rice farming (64.6%), most particularly those in the downstream (100.0%) and the upstream (91.7%). It was observed that those in the midstream were more into planting a variety of crops compared with those in the upstream and the downstream.

Of those who were into rice farming, more than half of them (56.6%) had rice farms of not more than half a hectare, particularly those in the upstream (75.8%). The average farm size of their rice fields was 0.92 ha with those in the midstream having the biggest (1.82 ha) and those in the upstream having the smallest (0.54 ha). For other crops, their biggest average farm size was for coffee (1.1 ha) and the smallest was for vegetables (742.5 sq m).

The majority (71.0%) of the respondents' households raised livestock. The majority (91.1%) of them raised poultry, followed by ducks (36.1%), pigs (31.9%), goats and carabaos. On the average, the respondents raised 4.9 heads of pigs, 16.5 heads of chickens, 6.8 heads of goats, 10.7 heads of ducks, and 2.2 heads of carabaos.

Across the three locations, those in the midstream had the greatest number of pigs, chickens and ducks while those in the upstream had the greatest number of goats and those in the downstream had the highest number of carabaos.

Those who planted crops mostly (57.1%) used inorganic fertilizer, particularly those in the downstream (90.0%) and in the upstream

(70.3%). Only 30.5% used organic fertilizer, most of them from the upstream (37.8%).

The majority (63.4%) of those who were into crop farming used chemicals. This was particularly true of those in the downstream (100.0%) and the upstream (86.5%). In the midstream, the majority (68.6%) did not use any means. The usual means to control weeds was by hand pulling (46.9%), found particularly in the upstream (54.8%) and the midstream (45.2%). Those in the downstream used herbicides (71.4%). Almost three fourths (72.1%) of those into crop farming had rainfed farms. This modality was true in all locations, except that those in the upstream had the highest proportion of respondents (97.2) and those in the downstream had the lowest proportion (46.2%). More than one third (38.5%) of those in the downstream also had tube well pumps.

Results showed that most of the respondents' households drained waste water into neighboring farms. More than one-third (34.0%) of the respondents who were into livestock farming produced waste water. The waste waters were drained into the Jalaur River (29.2%), into their own farm reservoir (27.7%), and to neighboring farms (20.0%).

Most of the respondents from the downstream area declared that they threw animal waste/manure into the Jalaur River but the majority of all respondents did not give any answer when asked how they disposed their animal waste/manure. Respondents reported that they were using the Jalaur River for their livestock farming. They used the river as bathing area for animals and as source of drinking water for animals.

There were 29% of the respondents who declared that they or another member of their household fished in the Jalaur River. There were 39 (upstream-8, midstream-24, downstream-12) respondents who practiced hook and line fishing. The usual catch of the majority was Tilapia (*Oreochromis niloticus*) while the others were able to catch Pantat (*Clarias batrachus*) and Carp (*Cyprinus carpio*). There were 49 (upstream-5, midstream-15, downstream-29) respondents who used Gill nets. Most of them had caught Tilapia followed by Shrimps (*Caridea*), Carp, and Alimosan (Plotosus canius). Only the respondents from the downstream area used fish cages (18 respondents) and fish nets (23 respondents). Of the 18 respondents who used the fish cages, one third reported to have caught big and small crabs and more than one fourth caught shrimps. Most of those who used fish nets had caught crabs. Others had caught mullet or *Gusaw* (Mugilidae)

and *Bulgan* (*Lates calcarifer*). Those who reported that they used other fishing methods revealed that they had caught crabs, shrimps, and fishes such as Tilapia and Carp.

Most of those who used hook and line reported that their volume of catch was less than two kilograms only. The volume of catch of most of those who used gill nets was also less than 2 kg but there were a few who reported that their volume of catch was more than 6 kg. One-third of those who used fish cages had a volume of catch of less than 2 kg and only a few had caught more than 2 kg. Some of those who used fish nets declared that their volume of catch was more than 2 kg. Most of those who used other methods reported that the usual volume of their catch was less than 2 kg but the others also said that they caught 2 to 4 kg and some even reported that they had caught more than 4 kg.

The value of catch of most of the respondents who were engaged in hook and line fishing was not more than P200.00 per fishing activity. Similarly, the value of catch of those who were engaged in gill net fishing was also not more than P200.00. But others reported that they can earn more than P400.00. More than one-fourth of the respondents who used fish cages reported the value of their catch was not more than P200.00 while those who used fish nets said that the value of catch could be more than P400.00. For those who engaged in other methods of fishing, the value of their catch could be more than P200.00.

One-third of the respondents had been involved in fishing activities for not more than 10 years, 29.5 % for more than 20 years, and 27.0 % for 11 to 20 years. Three-fourths of the respondents who engaged in fishing reported that the number of fish species in Jalaur River decreased. The majority of them also reported that the volume of fish catch in Jalaur River decreased.

More than one-third of respondents who were engaged in fishing had problems with illegal fishing methods used by other people, and more than one-fifth had problems with the waste products of sugar centrals thrown into the Jalaur River. They recommended that the government implement projects that could help eliminate illegal fishing and the barangays should implement rules to protect the river.

The economic activities of the respondents and their households further indicated concerns about the present state of the river system. As earlier presented, the respondents who were into rice farming, particularly those in the upstream and the downstream, generally used inorganic fertilizer, chemical pesticides and herbicides. Their waste/excess water was drained into neighboring farms and into the Jalaur

River. Even though they were using the river for bathing and drinking of their livestock, the waste/manure and waste water of their livestock also ended up in the river. These practices as well as the domestic household practices earlier discussed are possible explanations of the decreasing number of fish species and volume of fish catch.

The use of tube well pumps among farmers in the downstream should also be a point of concern since the area is already near salt water sources. Irreversible damage due to salt water intrusion could be avoided.

Tourism, Rituals and Cultural Activities Involving the River System

There were only nine (upstream=2, midstream=7) respondents who reported tourism activities in the Jalaur River. The respondents identified the *Biray sa Suba*, *Lantay* Race, Spring Water Resort, and Annual Girl Scout Camping as the tourism activities in the area. The respondents declared that these made the Jalaur River a well-known river and it also exposed the culture of the municipality and the Jalaur River. They recommended that the tourism activities should be properly organized and promoted, and more advertisements should be done to increase the number of people that will visit the river.

There were only 19 respondents who said that there were rituals done in the river. These rituals included fluvial parade, those done by quack doctors, and religious processions. The respondents explained that rituals were done to honor the patron saint and more than one-fourth added that these were done to cure diseases. Most of the respondents from the upstream, midstream and downstream areas either did not give any answer or declared that the rituals had no bad effect on the river. Most of them also recommended that doing these rituals should be continued.

The cultural activities conducted in Jalaur River identified by the majority of respondents were *lantay* race and fluvial parade. The purpose of the cultural activities according to most of the respondents were to give honor to the patron saint, contest, and for enjoyment. The respondents said that these cultural activities had no negative effect on Jalaur River. They recommended that to continue doing these activities, people should support them, and these should be properly organized.

The recommendations of the respondents should be considered. The institutionalization of these activities could be an appropriate

strategy to ensure the protection, maintenance and proper management of the Jalaur River System. Through these efforts, the economic benefits of the dependent population can also be sustained.

Economic, Tourism and Other Activities by Entities Outside of the Community

There were 36 (13.4%) respondents who reported that entities not from the community also engaged in economic activities in the Jalaur River. These activities included fishpond/fish cage operation, quarrying, salt making, and the Moro-boro spring resort. These entities included private businesspersons, the municipal government, and schools. The majority of respondents from the three areas said that economic activities of external organizations had no bad effect on Jalaur River. Some of them declared, however, that there were economic activities that resulted in more pollution in the river and the widening of the river bank. Although the majority of respondents did not give any recommendations to mitigate the effects of the identified economic activities near Jalaur River, some recommended that quarrying should be stopped, the government should take action, and some businesses should have proper waste/garbage disposal.

Some respondents had observed that there were also entities which were not from the communities who engaged in tourism-related activities in the river. They identified *biray sa suba* as the tourism-related activity involving these entities. Two-thirds of the respondents indicated that these tourism-related activities had no bad effect on Jalaur River. They declared that these activities served as an exposure of Jalaur River to other communities. The respondents recommended that activities be more organized, the river should be kept clean, and these should be held as an annual activity.

The operation of the external organizations, particularly businesspersons, involving the river system has to be properly looked into by the respective local government units (LGUs) and the immediate local communities to ensure that their operation will not in any manner result in negative impacts on the river and its immediate environs.

Perceived Importance of the Jalaur River System to the Households, Immediate Community and Neighboring Communities

More than one-third of the respondents considered the Jalaur River

as very important to the households, explaining that it is the source of water for household chores, source of food, and source of livelihood. More than half of the total respondents considered Jalaur River as very important to the community because it is the source of livelihood, source of water for drinking and bathing, and useful for the needs of the community. Most of the respondents from the three locations also said that Jalaur River was very important to the neighboring communities because it is the source of water for irrigation, useful to the needs of neighboring communities, and source of water for drinking and bathing of animals.

The generally perceived importance of the river system to the households, immediate community, and even the neighboring communities can also be used as basis for rallying support for the protection and proper management of the river system.

Problems, Issues and Concerns Affecting the Jalaur River System

The three major problems/issues/concerns affecting the Jalaur River System were the throwing of garbage in the river by households, use of pesticides/poisonous chemicals in farming, and floods. The respondents recommended that the Department of Environment and Natural Resources (DENR) take action and penalize those doing illegal activities in the river, government should implement flood control projects, such as afforestation to prevent flood and landslides, and a group to rehabilitate Jalaur River should be organized.

It appears that the respondents are conscious about the problems, issues and concerns affecting the Jalaur River System. They are also conscious of possible specific actions to address their observed problems, issues and concerns. This implies that the people themselves can be mobilized towards the protection and preservation of the Jalaur River System.

CONCLUSIONS AND RECOMMENDATIONS

Those in the upstream and the midstream were mostly into farming while those in the downstream were mostly into fishing. Those from the midstream had the highest mean income (Php 8,749.71) and those in the upstream had the lowest (Php 3,823.23). Deliberate

efforts should be made by concerned government agencies to assist households, particularly those in the upstream and the downstream to improve their household income and eventually improve their living conditions.

The respondents generally used electricity for lighting, firewood as fuel, and pump/artesian well as source of water for drinking and cooking, particularly those in the upstream. The use of firewood and charcoal as fuel by the respondents should be looked into. Alternative fuel sources may be introduced to the households.

Sanitation practices of the households indicate the use of open pit toilets among households in the upstream, no toilet or use of river as toilet in the downstream, general use of open drainage for waste water disposal and burning for solid waste disposal, and disposal of waste/used water into the river and throwing of garbage with some of it being thrown into the river in the downstream. The toilet facilities and the means of disposal of waste water and solid wastes of the households should be looked into by appropriate authorities and agencies.

Organizational membership among household members was generally low but among locations, those in the downstream had a relatively higher level of organizational involvement as indicated by a higher proportion of respondents with household members who were members of organizations within and outside of their community and a higher proportion of respondents who were officers and active members in their respective organizations. Organizational membership among household members should be encouraged through deliberate organizing efforts by concerned government agencies as well as non-government organizations.

Those who were farming use inorganic fertilizer, particularly those in the downstream and in the upstream, use chemicals, particularly those in the downstream and the upstream; and pulled weeds by hand, particularly those in the upstream and the midstream; but those in the downstream were mostly using herbicides. Farmers, particularly those using inorganic fertilizers and chemicals should be conscious that their drainage practices do not result in any damage in the river in any form.

Those into crop farming generally had rainfed farms but more of those in the downstream had tube well pumps. The putting up of tube well pumps, particularly in the downstream should be regulated to avoid problems that may arise later, such as salt water intrusion.

The respondents' drained waste water to neighboring farms and

the waste waters of livestock went into the Jalaur River, into their own farm reservoir, or to neighboring farms. The river was also used both as bathing area and as source of drinking water for animals. While livestock raising is encouraged to increase household income, conscious efforts should be made regarding the waste of the livestock not being disposed into the river.

There were cultural activities conducted in Jalaur River like *lantay* race and fluvial parade, the purpose of which included giving honor to the patron saint, holding contests, and for enjoyment purposes. The respondents recommended that these activities be continued and properly organized. Cultural and tourism activities should be institutionalized by the concerned municipalities with proper planning, organizing, implementation, and monitoring to make sure that these will not create any negative impact on the river system. As recommended by the respondents, the activities shall be supported by different sectors with proper dissemination to the general public to create awareness about Jalaur River and how it influences the culture of the community.

There were entities outside of the community including private business, the municipal government, and schools that engaged in economic activities in Jalaur River. They were involved with fishpond/fish cage operation, quarrying, salt making, and the operation of a spring resort. The respondents recommended that quarrying should be stopped, the government should take action, and some businesses should have proper waste/garbage disposal. Monitoring of all kinds of activities conducted in Jalaur River should be conducted to ensure the ban against illegal fishing, quarrying, and cutting of trees or vegetation. Municipal ordinances for the purpose of rehabilitating and protecting Jalaur River and for establishing policies for business groups who are planning to utilize the resources of the river shall be formulated. A watch group, *Bantay Jalaur*, could be organized by the concerned municipalities to help not only in monitoring the different activities but also in monitoring compliance to ordinances and policies.

The Jalaur River plays a very important role in the economic activities of the people in the immediate and neighboring communities. However, excess farm water drained into neighboring farms eventually goes into the river and the garbage/waste/animal manure pollutes the river. It is, therefore, necessary that the local government units (LGUs) see to it that there are proper drainage channels for excess farm water and proper disposal of garbage/waste/

animal manure. This can be done as an LGU or community project of the people residing near the river. Private businesses near the river should also be required to come up with the proper water/waste disposal facility.

The three major problems/issues/concerns affecting the Jalaur River System were the throwing of garbage in the river, use of pesticides/poisonous chemicals, and floods. The respondents recommended that the Department of Environment and Natural Resources (DENR) take action and penalize those doing illegal activities in the river, government should implement flood control projects and plant trees to prevent floods and landslides, and a group to rehabilitate Jalaur River should be organized. The Local Chief Executives of the municipalities along the Jalaur River should revive and make functional the already organized Jalaur River Management Council so that there shall be proper coordination in the formulation and implementation of ordinances/policies concerning the rehabilitation and protection of the river. Through the council, joint programs and activities can also be implemented by the different municipalities.

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