Aquaculture in the Philippines: Socio-economics, poverty and gender

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Abstract. The study analyzed the socio-economic, poverty and gender issues within Aquaculture in Philippines. The dependency of household income from Aquaculture on different socio-economic, institutional and market factors was tested. This was accomplished by a questionnaire survey of 285 farms spread across five villages (*barangays*) in two regions, namely Region III and Region IVA in Philippines dominated by different systems of Aquaculture. Results show that income from Aquaculture represents the only source or the main source of income for 63% of the respondents. Several factors significantly influence the household's income from Aquaculture including skills/training, type of management and institutional options. It is important to know why households involve themselves in Aquaculture, especially the poor households who depend on such income for gap-filling (supplementary income) or safety net function (to meet unexpected household needs). Overall, Aquaculture is providing new employment opportunities for poor, women and youth, despite constraints that include inadequate access to credit, lack of skills and licenses to fish farms. In the Philippines, several policies exist in support of the poor, but require political will for implementation. Aquaculture development programmes should be integrated with other sectors, prioritize the poor households whose only or main source of income is Aquaculture, bring necessary services closer to the vulnerable groups, make communication and knowledge dissemination more effective and user friendly, and encourage active participation of communities and fishers organizations in planning and implementation.
Key words: Aquaculture, Poverty reduction, Socio-economic, Women, Youth, Philippines

1.0 INTRODUCTION

Aquaculture, since 90s, expanded rapidly in the Asia-Pacific, both in terms of area and number of people engaged in the sector. The rapid growth has impacted the ecosystems, regional economy and social relations. Literature supports the argument that Aquaculture is a source of livelihood, food security and provides employment benefits to the poor (Barrow & Hall, 1995; Gregory and Guttman, 1997; Hambrey *et al.* 2000; Kongkeo, 1997; Stanley, 2003; Tacon, 2001; Williams, 1997). Some express concern at the marginalization of the poor in the process of rapid expansion and unsustainable growth in Aquaculture sector in the Asia-Pacific Region (Ahmed & Lorica, 2002; Edwards 2000; Haylor and Bland, 2001; Naylor *et al*, 2000). The "Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000", recognises that a large part of Aquaculture production comes from developing countries and that Aquaculture from these countries will continue to impact peoples' livelihoods, food security, trade, income generation, employment and poverty.

Farmers in the Asia-Pacific region contribute over 80 percent of the world's Aquaculture production, with China alone producing 50 percent of global production (Edwards and Demaine, 1997). The over riding fact is that, a majority of these farmers, operators, caretakers or labourers engaged in Aquaculture are poor. The poor are often characterized by low risk bearing ability, lack of rights to access and use the resources and weak entitlements to convert the resources into outcomes where they have access. Lack of coordination between sectors, unclear public/private sector responsibilities, insecure tenure and user rights, inadequate support from government, weak enforcement, rent seeking, lack of information sharing and little involvement of primary stakeholders, all contribute to the marginalization of the poor in one way or the other (Haylor and Bland, 2001).

Despite such problems and the engagement of a large number of poor households, there has been little research priority to explore the possibilities of Aquaculture to improve livelihoods of the poor. If Aquaculture is to play an even greater role in the alleviation of poverty, it is necessary that the actual and potential contribution of Aquaculture to poor and women be fully documented (Tacon, 2001). Recent shifts in development thinking do indicate some hope and a growing emphasis on poverty alleviation through Aquaculture (as indicated in the Bangkok Declaration of the Conference on Aquaculture in the Third Millennium, 2000). The regional governments need to go a step beyond declarations and fully implement the recommendations to address the specific problems of small-scale Aquaculture, especially initiatives that contribute directly or indirectly towards alleviation of poverty and improve participation of women. The initiatives by the Network of Aquaculture Centres in Asia-Pacific (NACA), FAO and other regional organizations is a major step to actively involve regional governments and increase awareness within the aquatic resource sector of the need to address poverty and the role of women more strategically (FAO and NACA 2002).

The present study is a part of an international collaborative research project funded by the European Union to mitigate impacts from Aquaculture in the Philippines. The main section of the paper is dedicated to the analysis of selected household characteristics and contextual factors including market and institutional options that impact household income from Aquaculture in the Philippines.

The study will address the following research questions to analyze the suitability of Aquaculture for poverty alleviation:

- What opportunities does Aquaculture provide for poor, women and youth in Philippines
- How do factors related to socio-economic, institutional and market conditions influence the household income from Aquaculture
- How does the income from Aquaculture relate to strategies for household diversification?

The overall objective is to examine whether Aquaculture is able to help the poor improve their livelihoods and if so, the desired changes and the role/future for the poor, women and youth in Aquaculture sector in the Philippines.

2.0 AQUACULTURE AND THE POOR

About 32 % of the households in the Philippines are considered poor which is equivalent to 4.531 million, of which 3.307 million come from the rural areas and only 1.246 million households from the urban areas (Yap, 2001). This is greatly disproportionate in view of the fact that, rural households constitute only 50.2% of the total. Overall, 16.5% of the total households in the Philippines, numbering 2.303 million can be considered below the

subsistence level and very poor. Here the disproportion appears to be even greater. More than two-thirds, numbering about 1.847 million families live in the rural areas and only 0.488 million in urban areas. The rural households have fewer options for earning their livelihoods as compared to the urban folk. The highly skewed distribution of the location of the poor shows the need to develop sectors such as Aquaculture for poverty reduction in rural areas and prevent migration to urban areas.

In rural areas, poor people's diversification strategies for livelihood may involve activities to earn income primarily from natural resources, including forests, fisheries or Aquaculture in common water bodies or in some cases wage labour. Often, the poor are placed in situations where they have restricted access to the natural resources and face periodic natural calamities. A significant part of their time and resources is spent in survival strategies, typical for countries like Philippines. Despite constraints, some of them manage to overcome the vulnerable situations and earn their livelihoods with the minimum resources. A very few studies have been taken up so far in Philippines to study the social and institutional isues that govern the participation of the poor in Aquaculture.

Such studies may help policymakers and government departments design and implement effective poverty reduction strategies. Income from Aquaculture has been an important part of rural income in many poor regions in the Asia-Pacific and especially for poor coastal communities, since they have fewer livelihood options.[1] The other motivating factor is the higher wages and returns Aquaculture is likely to provide to poor households. The share of income from Aquaculture in the total household income, whether Aquaculture is treated as a subsistence strategy or a cash income strategy by the households, and how they view Aquaculture as compared to other options such as livestock rearing, agriculture wage labourers in terms of scale and vulnerability, are important issues to undertsand, inorder to improve the opportunities for the poor.

Until the mid 90s Aquaculture research did not give adequate attention towards the problems of the poor and poverty alleviation. While at the same time social scientists did very limited analysis of the significance of Aquaculture for poverty alleviation. As compared to Forestry and Agriculture sectors, the understanding of contextual factors related to poverty within Aquaculture sector is very limited. The reason attributed is that Aquaculture has been a part of the Agriculture or Fisheries sector in most countries in the Region. With the rapid expansion, its significant contribution to the economy and the increasing number of poor, women and youth involvement in Aquaculture, there is now a need to improve the understanding of the context to take appropriate measures for poverty alleviation.[2] According to the World Bank, poverty not only means hunger and lack of shelter, but also not having access to resources, powerlessness and lack of representation. Since poverty is multi-dimensional, it has to be seen through a variety of indicators - levels of income, sources of income, social indicators, and indicators of vulnerability to risks and of socio/political access. Thus, any development intervention in Aquaculture sector must be based on a good

[1] The family income and expenditure survey of the National Statistics Office, Manila, in 2000 found the highest incidence of poverty (62%) among the agriculture, fishing, and forestry sectors. The income-generating potential created by the growing domestic demand and expanding international market for fish promises opportunities for reducing rural poverty through Aquaculture.

[2] The Millennium Development Goals call for a reduction in the proportion of people living on less than $1 a day to half the 1990 level by 2015. This means reducing from 28.3 percent of all people in low and middle income economies to 14.2 percent. The Goals also call for halving the proportion of people who suffer from hunger between 1990 and 2015.

understanding of the factors that constrain poor people, and of the ways in which poor people can use and derive benefits from aquatic resources.

Recent studies show a significant change in thinking about how Aquaculture can contribute to improve the livelihoods of the poor (Ahmed and Lorica, 2002; Edwards, 2000; FAO and NACA, 2002; Gregory and Guttman, 1997; Graaf and Latif, 2004; Hambrey *et al.* 2000; Haylor and Bland, 2001; Little et al 1999; NACA, 2006; Stevenson et al., 2002). In addition, some of the programs developed at the country level in the Asia-Pacific region not only aimed at increasing production, but also supported the entry of the poor in Aquaculture. For example, the Sustainable Aquaculture for Poverty Alleviation (SAPA) program in Vietnam is a good example to show how governments have started to focus on the poverty alleviation through Aquaculture. The SAPA strategy was formulated to contribute to the goal of poverty alleviation within the Vietnamese government's greater "Hunger Eradication and Poverty Alleviation" strategy (MOF, 2006). The SAPA strategy was designed to enhance the livelihoods of poor and vulnerable peoples through Aquaculture through local capacity building, improved access to information, improved communication among local stakeholders, and the dissemination of environmentally friendly, low-cost technologies. The effectiveness of such measures depends on their practicality and how well they address the specific problems of the poor in a given context and the way poor perceive a particular opportunity to support their livelihood. It is important for the planners to know, whether, the poor perceive income earning opportunities from Aquaculture as a safety net measure to meet unplanned family expenditure or a means to supplement current household income not adequate enough to meet the total houshold expenditure or as an opportunity to accumulate capital and step out of poverty. One of the main problems lies in the lack of a proper understanding of how the poor devise their strategies to earn their livelihood (Friend and Funge-Smith 2002).

Role of Income from Aquaculture in Rural Livelihoods

Income diversification is a distinguishing feature of rural livelihoods in many developing countries (Ellis, 2002; Vedeld *et. al.* 2005). Most rural households thus manage a broad portfolio of activities and income sources including agriculture, fisheries, livestock production, Aquaculture, wage labour etc. There could be several reasons for diversification, but the standard argument that it is a risk reducing strategy, is contested by Dercon (2000), who argues that diversification is not a very effective risk reducing strategy. According to him, diversification should be understood in terms of the constraints poor households face. When no single income source is sufficient to make both ends meet, the poor try to diversify and make use of whatever source of income is available to them for a reasonable living. Such a strategy makes them weak in the market and inefficient. Following this line of argument, income growth due the emergence of activities such as Aquaculture production for markets might result in less diversification and more specialized production and development of skills to the benefit of the poor. Diverisification can also be explained in terms of seasonality of various activities in Aquaculture. The absence of well functioning markets also leads to diversification, but this is not the case in developing countries. Neverthless, subsistence or cash incomes from Aquaculture supplement the household income, with a continuum running from households that depend entirely on Aquaculture as the main source of income to households that depend very little on it.

Income from Aquaculture can have different functions in rural livelihoods, like the forest products in case of poor forest dwelling communities: 1) It might act as a safety net, especially for the very poor households**,** to overcome unexpected income shortfalls or cash needs in the event of death, serious illness in the family, economic crisis, natural calamities etc ; 2) It might serve as a gap filling strategy, to support current household consumption thus preventing poor households going further down into poverty conditions; 3) Or

Aquaculture can provide substantial income and provide a way out (poverty reduction), either through a "stepping out" strategy (accumulation of capital and moving into new activities) or "stepping up" (intensification and specialization in existing activities). The later is more relevant if the objective is to help reduce poverty through Aquaculture development.

Safety net function is different from normal seasonal gap filling strategy that ensures survival during lean periods in other sectors such as Agriculture or fisheries. Since, the very poor do not have access to credit and formal employment sources, availability of employment opportunities in Aquaculture can supplement their income when crops fail, or when other choices are restricted. The safety net function supplements the household income and survival of poor in vulnerable conditions. This could be observed in situations where the income from Aquaculture is not a major income source and households use the income for supporting current consumption. Such a strategy may not be of much help to come out of poverty. For example, wage labourers in Aquaculture, may earn income sufficient for subsistence and not adequate for cash generation, unless the wages are high. This is a case of low product/service contribution and low integration into cash economy. Such a situation is common in areas where there is too much pressure on water resources, farms are located far from markets, and production or service conditions are not conducive for Aquaculture.

Alternate could be low product/service contribution and high integration into cash economy, where more than 50% of the household income is generated from Aquaculture, e.g., households whose major income source is Aquaculture. A few may prefer employment in Aquaculture to agriculture due to higher wages, better market access and high labour and product demand. Given proper socio-economic, environmental and institutional frameworks, Aquaculture can contribute significantly to the household income and provide a way out of poverty.

The third situation is high product/service contribution and high integration into cash economy, where households are engaged in specialized activity. This is possible, when the poor are trained and skilled (easy to demand more wages), or have access to resources and credit (easy to intensify production for markets), stable market and adapt to more intensive management. If Aquaculture is to be promoted as a tool for poverty alleviation, government has to come up with measures that can place the poor in such a context. The nature of household's dependence on income from Aquaculture and the characterization of households could help to formulate strategies or programs for poverty reduction. Such analysis will also help the relevant departments in prioritizing households or groups that are very poor, while issuing licences, making land allotments, providing subsidies and credit and developing skills.

3.0 STUDY AREA

The Philippines is an archipelago of some 7100 islands and 26.6 million ha of coastal waters with a total coastline of 17,460 km (Primavera, 2000). The landscape is constituted of freshwater and brackishwater areas, lakes, rivers and reservoirs offering tremendous potential for Aquaculture. The country is subdivided into 15 geopolitical regions for convenience of administration. Aquaculture statistics are compiled at each regional level and published by the Bureau of Agricultural Statistics (BAS).[3] Each region is characterized by a

[3] Of the total fisheries production in the Philippines in 2003, Aquaculture contributed the highest share of 40.2% followed by commercial and municipal fisheries at 30.7% and 29.1%, respectively. Total fishery production increased at an average annual rate of 2.5% between 1990 and 2002. Most of the increase was due to large increases in Aquaculture production (more than 6% annual production increase over this period). The fisheries industry employs around 1 million people or 5% of the country's labor force. Around 26% of these people are engaged in Aquaculture, 68% in municipal and smallscale fisheries, and 6% in commercial fisheries.

particular type of Aquaculture system, such as the Regions III and VI which dominate brackish water pond Aquaculture in terms of both quantity and value. Aquaculture has long been practised by coastal communities in the Philippines. It started with the traditional, low-density culture of milkfish in ponds mostly for local consumption and evolved into commercial based systems for the culture of various species of fish, shrimps, molluscs and seaweeds. Commodity wise, seaweeds contributed 68% to Aquaculture production in 2003 (by raw weight), followed by milkfish (17%), tilapia (9%), and tiger shrimp (2.4%). Aquaculture involves fish pens, cages, and ponds in fresh and marine waters and the mariculture of oysters, mussels, and seaweeds. At present Aquaculture fish production comes primarily from brackish water fishponds estimated at 239,323 hectares (ha) and freshwater fishponds (14,531 ha). Seaweeds culture is possible in open waters with fewer inputs and a viable option for poor in the Philippines. The Aquaculture subsector in Philippines has been identified in the Government's current Mid Term Development Program (2004–2010) as a sector whose increased growth will create new jobs and ensure food security in support of the country's drive toward economic development.

The study conducted field work on a farm-level survey of of 285 farms covering different Aquaculture systems including, brackish water ponds and cages, fresh water ponds and cages and marine cage systems conducted in 2006. The survey was primarily done in Laguna and Batangas (Region III), and Cavite, Zambales and Pampanga (Region IVA). The farms/respondents were selected by stratified random sampling based on the size of the farm, type of farming system (intensive, sem-intensive, extensive), main species grown (tilapia, shrimp, seaweed and milkfish) and ecosystem (fresh water, marine or brackish). Due to time and resource constraints, a larger sample survey was not possible in this study. The data were analyzed using a Statisical Package (STATISTICA). The data were subjected to multiple regression to analyze the dependence of household income on several selected socio-economic (size of farm, gender, age, technical capacity, other income options), market, institutional and community characteristics.

4.0 RESULTS AND DISCUSSION

4.1 Income from Aquaculture: socio-economic, institutional and market factors

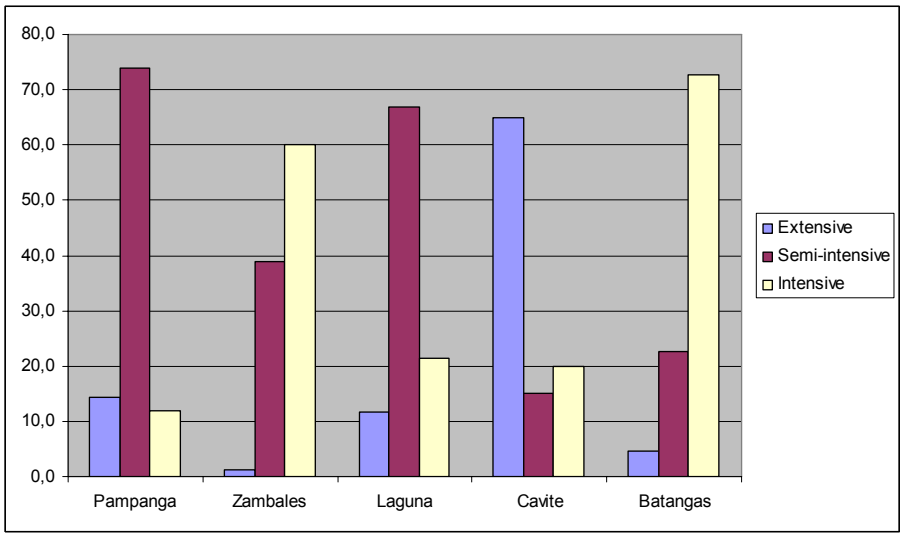
Farmers in the five areas surveyed largely practised extensive and semi-intensive type of management that together constituted 63% of the farms (Figure 1). A majority of these farms carried out prawns, seaweeds and milkfish farming. Intensive farming (on 37% of the farms) was practised mostly in the case of Tilapia. It was mostly the small farmers who cultivated seaweeds and milkfish in the areas surveyed. The reasons they attributed was that it required lesser inputs compared to other species, lacked the resources and skills to intensify production. Productivity was reported high in intensively managed farms as compared to semi-intensive and extensive. Nearly two-thirds of the farms (65%) had licenses to operate the farms, whereas, a third of them did not. The farmers used local materials to construct cages or pens, operated them for 2-3 seasons and abandoned them. Using local materials is practical, keeps the costs of setting up the cages or pens low, but at the same time they are easily vulnerable to damage. Poor farmers had fewer options and inadequate resources at their disposal. One of the suggestions that came out of the discussion with farmers was the improvement of the cage and pen designs using locally available materials that could keep the cost low, afforadable by the poor and at the same time keep them more durable.

A majority (78%) of the operators surveyed were also the owners of the farms. The remaining 22% were tenants on farms owned by others. Absentee landlordism is increasing in Philippines, as more operators choose to live in urban centres away from farms. As a result more farms are hiring caretakers to carry various activities on the farms. Living on the

farm influences productivity according to respondents and especially farm owners. It is the operator who normally takes the responsibility of managing the farm, financial issues, feeding, monitoring and guarding the farm. The owner (in case he is not the operator) and the operator (50-60: 40-50) share the profit from the final product on the farm. Most respondents felt that such a practise should be discouraged and licenses should be issued to farmers who actually operate and stay on the farms. Tenant farming is risky for poor operators in the event of natural calamities, theft, diseases etc., as they are normally not covered by insurance schemes. Natural calamities are quite frequent in the Philippines and seen as a problem in general by the respondents. Insurance schemes are not popular and they are not easy to be implemented, due to false reporting of damages, lack of resources to develop comprehensive insurance schemes, lack of resources for damage assessment and the inability of the poor to pay high insurance premium. One possible solution is to develop local co-operative insurance schemes where all farm owners, cage operators, labourers and care takers are made obligatory members and a certain minimum amount is collected along with license fees.

Caretakers were the poorest category of all the respondents, paid low and were least educated. Caretakers were normally appointed on monthly wages, to help in feeding, monitoring, water exchange and guarding the farm from thefts. It was normal for caretakers to learn skills from operators and gradually start as operators themselves. I32% of the respondents acquired skills through learning from colleagues on farms.

Figure 1. Type of management system on the farms surveyed



Results from the study indicate that income from Aquaculture represents a significant income source for majority of the households. The study assumed that income from Aquaculture and its share in the household income depended on several socio-economic characteristics, including the age, skills, whether full time or part time employed in Aquaculture, institutional options (rights to use and access water/land and permits to operate farms) and market factors. In order to test the assumption, relevant data were collected from different farms in five areas (Pampanga, Batangas, Zambales, Cavite and Laguna) located in Region III and Region IVA.

Table 1. Socio-economic and other characteristics of the sample

Characteristics	Group	Total (%)
Average Age	43 years	
Training in Aquaculture	Yes	63
	No	37
Engagement in Aquaculture	Part time	38
	Full time	62
Difficulty in market access	Yes	18
	No	.82
Rights to use common water and land resources	Yes	86
	No	14

Age: The average age of the respondents was 43 years. Age did not have a significant influence on the household income as evident from the analysis (Table 2). This could be explained by the fact that experience was important in Aquaculture sector, but certain jobs in Aquaculture were specially suited for young, especially activities that involved specific skills and technical inputs. Young people were preferred as caretakers (*bantay*) as they were required to stay on farms which were normally located away from homesteads. The counter argument is that young and educated may not prefer Aquaculture these days to other jobs in tourism, hotel and associated industries. During the field work in Batangas, it was observed that youth preferred to work in hotels, shops and tourist agencies rather than Aquaculture farms. Aquaculture could provide an opportunity for youth coming from poorer households to get employment and run their own farms. It is all the more important for a country like Philippines to develop employment opportunities for youth, as 38% of the population right now is below 15 years, while only 3.5% is older than 64 years old. Most of the young population will come into job market in the next 5-10 years.

Technical skills or training: Income from Aquaculture and level of skills or technical capacity to operate farms appear to be positively correlated. More trained and skilled workers/operators were able to run the farms better and thus higher productivity and generated more income. The variable skills/training was the most significant influencing the household share of income from Aquaculture (Table 2). This also explains why lack of proper skills and access to technology was seen as the main constraint in Aquaculture, reported by 60% of the respondents. Nearly two-thirds (63%) of the respondents did mention that they attended some kind of training programs according to the survey. The main sources for training were government departments like BFAR, Local Government Units (LGUs), neighbours, on farm learning etc. Only 42% of the respondents were beneficiaries of government training programs, whereas the rest 58% depended on private sources for training, including neighbours, on site learning and community organizations. Future training programs should consider involving private organizations, skilled individuals and fishers' organizations from local areas, as respondents seem to have more trust and easy to private sources for acquiring skills. Model farms owned by individuals could be identified in selected locations that could serve as demonstration farms. Training programs should be regularly

conducted and made obligatory for all license holders and farm operators as a prerequisite for operating farms, and target women and youth whose presence in Aqauculture is growing in Philippines.

Engagement in Aquaculture: The field study conducted in five areas in regions III and IVA indicated that Aquaculture was a full time engagement for 62% of the respondents and a part time activity for the remaining 38% respondents. The assumption was that if more employment options were available to the respondent, they may focus less on Aquaculture as an enterprise and vice versa. The counter argument is that having alternate sources of income or employment increases the capacity of the poor household to absorb risks and losses due to natural calamities, diseases etc. This is important for poor in Philippines, where natural calamities and other risks are high. The results from data analysis (Table 2) show that the variable full time or part time involvement in Aquaculture did not have significant influence on income from Aquaculture.

During the ongoing field survey, data were collected on whether or not the Aquaculture was the only/or main source of income, or whether other options were available to the respondent. According to a similar study conducted by Stevenson *et al.* (2003) on the brackish water pond Aquaculture in the Philippines, Aquaculture was the only source of income for 15%, and main source of income for 39% of the respondents. In the present study, Aquaculture was the only source of income for 22% of the households and the main source of income for 41% of the households to which the respondents belonged. In the latter category, members of the household were involved in other sectors or jobs which contributed income to the household. Alternative sources of livelihood included: fishing, wage labour, small business establishments in the locality that include, cloth and grocery stores, government jobs, poultry and animal husbandry. In case there is less diversification and Aquaculture is the only source or the major source of income, it is crucial to ensure through development programs that the particular operators have adequate financial and other resources necessary for entry and operation of a farm.

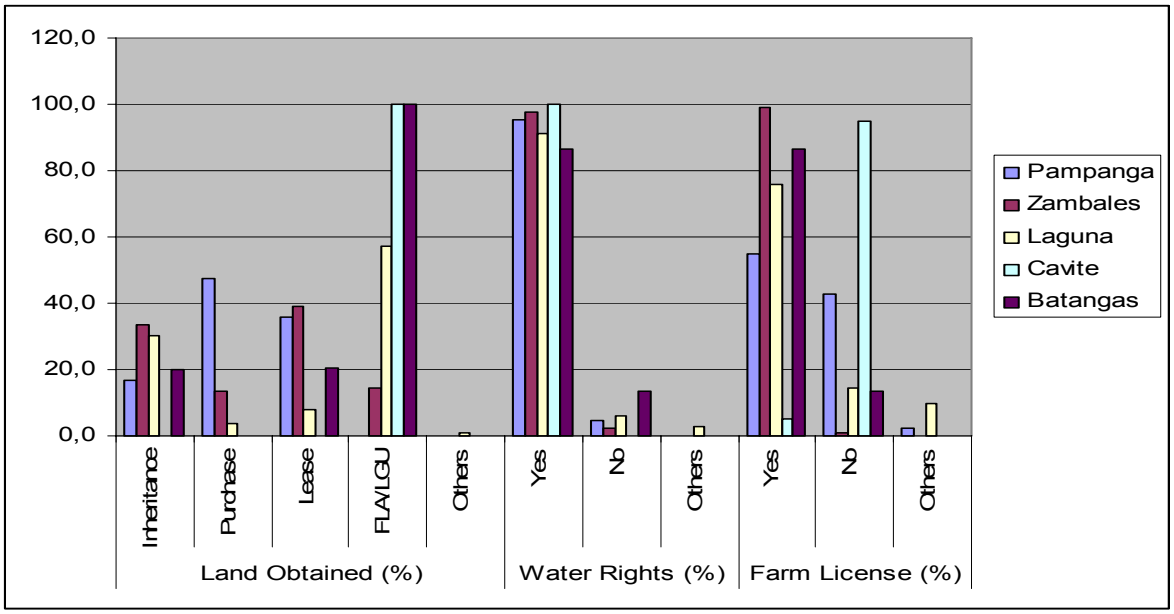
Market access: The variable market access did not have a significant influence on the household income share from Aquaculture. Farms located close to the markets have good market access which enables farmers to get a better price and more possibility for sale of produce from Aquaculture. On the contrary, it may also imply that closeness to the market provides more options for other source of employment and increase the labour costs difficult for small farms to afford. The impact of market access can vary depending on the context. In some areas where survey was conducted, the demand for fish from hotels, restaurants and local tourists was high. It offered better price as the farms could sell directly without the middlemen. At the same time, these sectors offered alternative employment for locals, making it difficult for the Aquaculture sector to find people to work on farms. The respondents especially the wage labourers, caretakers and youth, were positive towards the alternate options, since it increased their bargaining capacity. Two thirds of the respondents expressed that price fluctuations and middlemen take a significant share of profit away from them, seen as a constraint. It is the middlemen who decided the gate price influenced by several external factors and beyond the control of farmers. The majority of fish and lobster were sold and marketed live, mainly through local buyers who in turn sold to the major exporting companies.

Institutional options (Rights to use and access land and water): Households closer to water bodies with secure rights to use the water and land resources had better possibility to set up cages or ponds and generate income from Aquaculture than households who do not have such rights. This was supported by the analysis (Table 2) where the variable rights/permits to water and land is seen having a significant influence on the income.

Accroding to Cruz (1999) several communities in the coastal areas have traditional rights to use coastal waters which could be formalized to favour the entry of the poor into Aquaculture. In the present study, 86% of the respondents claimed having rights (formal and informal) to access and use water bodies for setting up farms (Figure 2). This included respondents who had traditional rights to use water by virtue of their profession and/or residence closer to the water bodies or by formal permits from the LGUs. In case of ponds, 27% of the respondents were operating on land that was located on private leased land, 68% on LGU/FLA land and the rest on unauthorized areas. A majority of the pond owners resided in nearby cities and leased out the land for others to operate. Tenants on such farms were interested in making short term profits which could lead to serious environmental damage in the areas. During the survey, it was difficult to assess, what respondents meant by claiming that they had rights to use water. This was because of several laws and departments that govern and have jurisdiction over water bodies in Philippines. There was lack of clarity, and the study did not get into more details due to some constraints. The respondents were not willing to discuss in detail about the issue of rights, for the fear of being reported.

In addition, social networks also helped poor to access resources needed for setting up cages or ponds and generate opportunities to earn income. These are difficult to quantify, but can be analyzed in terms of social capital. Bonding social capital was especially important for the marginal groups and poor in remote areas, because it helped them to access basic services. Bonding results when strong intra-community ties give kin and communities a sense of identity and common purpose. Bridging social capital that results when communities endowed with diverse intercommunity ties are in a stronger position to confront problems and take advantage of economic opportunities was not so encouraging in Philippines. Overall, extended families, religious groups, local informal councils, farmers networks constituted important sources of social networks to the rural poor in Philippines. The study indicated that more than a third (36%) of the respondents were members of local social groups and participated in the group's activities actively (43%) or occasionally (57%). Accroding to the respondents, local networks helped them to gain access to training courses, procurement of fingerlings, resolving conflicts between farms and getting licenses for fish farming.

Figure 2. Figure showing the way land was obtained, rights to use water and whether farms had licenses or not



The data subjected to a multiple regression test showing the dependency of household income share from Aquaculture (Y) on several independent variables is represented as follows:
Y = α + β1 (age) + β2 (type of management)+ β3 (training in Aquaculture)+ β4 (permits and rights)+ β5 (market access)+ β6 (engagement in Aquaculture)+ ε.
Y is the household income share from Aquaculture. The number of farms for the analysis included 97, and the level of significance 0.05.
To summarize, the household income share from Aquaculture was mainly influenced by variables including skills, type of management, whether farmer had rights and permits to operate the farm (Table 2). Whereas, age, market access conditions and type of engagement in Aquaculture did not have a significant influence on household income share from aqauculture. The listed variables explain only 33% of the variation in the household net income. One of the reasons could be that, variables such as farm size, species cultivated etc were not taken into account that might also impact the production and therby household income from Aquaculture. Overall, Aquaculture is becoming an increasingly important component of household income as observed from the results. During the survey 86% of the respondents expressed that Aquaculture provides them with better wages than agriculture or other sectors and that Aquaculture expansion in the region has benefited their families and income opportunities**.**

Table 2. Factors influencing Household income from Aquaculture

Variable	Standard error	Probability
Intercept	-188932	.040
Age	217438	.102
Type of management	216682	.047
Skills/Training	217985	.009
Engagement in Aquaculture	.216541	.083
Rights/permits to to use water (and farm fish)	217912	.020
Market access	208436	.200

R^2 = 0.33 Dependent variable: Household Income share from Aquaculture

A majority of the respondents interviewed in Zambales who were part time sea weed farmers, viewed Aquaculture as an acitivity that provided them income to supplement other household income sources like fisheries that was not adequate enough for them. Most of these farmers viewed Aquaculture as a gap filling strategy. This is similar to livestock keeping in addition to agriculture by small farmers who do not get adequate income to support the household. Some respondents, mostly the labourers who opted for seasonal or adhoc labour needs on fish farms viewed Aquaculture as a safety net measure. They had other sources of employment, but work on fish farms periodically during lean periods. A few poor farmers and operators took Aquaculture as a full time activitiy. The study suggest that such farmers should be prioritized while developing new aquaculture programmers, to ensure that they gain access to necessary services to operate farms effectively and help them out of poverty.

4.2 Gender and Aquaculture

Gender in general covers "the social roles of both men and women". According to Mosse (1993), gender relations are "the relations of power and dominance that structure the livelihood options of women and men" implying that gender is not fixed by biological divisions but by the social, cultural, religious systems of society. Studies related to gender and

development often refers to the simultaneous achievement of two goals:

1) The welfare goal: women's basic protection and welfare (education, shelter, food security), also called women's practical gender needs. 2) The empowerment goal: by providing access to, and control over resources and income generating opportunities, training and skills development and involvement in decision-making, especially to decide about how the income is to be spent, highly relevant to poverty alleviation. The ultimate goal should be to extend decision-making and empowerment gradually from the household to the wider community.

Traditionally, women in rural Asia have been an integral part of farming on small farms and contribute significantly to the household income (Monica and Anjana Bushan, 1996; Murray et al. 1998). Yet they have less access to income generating resources compared to men and their productivity remains low compared to their potential. At the household level they have wider responsibilities of family, children and household chores, besides securing food and helping in the farm activities. Inadequate analysis and documentation of their contribution to the household economy has been one of the reasons for not addressing their problems in new programs and policies. Gender analysis helps to identify the main actors and labour constraints within the household, based on which the components and interventions to further gender involvement can be reliably identified.

4.2.1 Gender and Aquaculutre sector in Philippines

The majority of the farms were owned by men and women were mostly used as labourers in the study areas. In general, women were paid less and also burdened with household work. The involvement of women was mostly observed in family enterprises and in some specific jobs, for e.g., fish processing industry and hatcheries which were considered as female jobs. Women's labour was seen as a significant contribution in poor households which did not have the capacity to hire labour from outside. This is also supported by other studies in Asia that indicate womens' crucial role in Aquaculture production. For example in parts of Vietnam and Cambodia, higher yields were obtained from fish ponds managed mainly by women (Nandeesha, 1994). In Thailand and China, they often took the main responsibility of farm and Aquaculture production because of male migration to cities. IWomen's role was especially prominent when the cages or ponds were located close to their homesteads in the study area. Traditionally, women have been involved in different stages of small-scale Aquaculture and are active caretakers of fish in homestead ponds, hatcheries, cages or even in rice fields (FAO, 1987). The study showed that women were involved in Aquaculture mainly because it provided them with better income earning opportunities than other sectors (32%), or their families owned the farms where they had to share work or due to lack of other employment options. Women were involved in various stages of Aquaculture in Philippines and their role is growing significantly in certain areas like fish processing industry (Table 3).

Table 3. Role of women in general in Aquaculture in Philippines

Pond preparation	Women share work with men in small Aquaculture farms owned by households.
Seed collection and hatcheries	This is an important area where women are preferred to work, especially in hatcheries.
Feeding and guarding	In most household owned farms women share the responsibility of feeding, cleaning and guarding.
Accounting and book-keeping	Women are being hired by commercial farms to carry out accounting and book-keeping.
Seafood processing industry	Women dominate in the seafood processing industry in Philippiens, besides they are also involved in seaweed

	processing in homesteads, planting and harvesting of saweeds
Marketing of fish	Women dominate in marketing of fish in most rural areas in Philippines and also taking over urban markets
Development works, governance, research etc.	Increasingly more women are taking up Aquaculture as a means of livelihood and profession

Despite their positive contribution, women faced some constraints in Philippines, but the situation was more encouraging for their participation. The following factors were discussed during the field survey:

1. **Skills and training**: Lack of skills was viewed as one of the main constraints for entry of women into Aquaculture. In Pampanga, all the female respondents expressed lack of skills as the main constraint, as there were not many training programs targeting women. Male-female contact socially is not a problem in Philippines unlike in countries like Indonesia, Malaysia and Bangladesh. Whereas, several studies show that female extension workers are often best for reaching women (Bueno, 1997). Zaman (1998) from his study in Bangladesh shows that some of the training programmes designed were not women friendly. However the study agrees that training programmes in Aquaculture should be designed to facilitate participation of women (Zaman, 1998; Nandeesha, 1994). They should be conducted close to villages or homesteads, made simple with the use of more visual aids for the benefit of women who are not literate and organized during the day when women are free from household chores.
2. **Physical and social mobility**: In some communities women are restricted to move away from homesteads for work. This is closely linked to religion, class or caste to which the household belongs. Such *socio-cultural restrictions* limit women's contribution to household income and narrow down options for employment and income sources. In southern India, women's involvement is limited to hatcheries in the backyards and not preferred to work grow out ponds (Shaleesha and Stanley, 2000). However, in Philippines this is not seen as a constraint and women do not have any restrictions to move around to seek jobs. Only 14% of the women respondents in Zambales saw physical or social reasons as a limiting factor to be involved in Aquaculture. A third of the women respondents in Pampanga viewed household duties as a limiting factor.
3. **Other factors**. The other limiting factors included credit facilities and ownership of farms. It was observed in some farms that the farm licenses were in the name of women, but they were actually operated and managed by males. In general, there was less discrimination of women in Aquaculture in Philippines and was not seen as a problematic issue.

4.2.2 Benefits of women's participation in Aquaculture

On the contrary, women's participation is changing with the mounting pressure on land and water resources, environmental degradation, out-migration of male family members and increasing rural poverty. Integrating gender in Aquaculture according to respondents*:*

- benefited women through an increase in household income and improvement in nutrition (practical needs/efficiency goal);
- helped women gain control over their own livelihoods and improved their status both within the household and the community (strategic needs/empowerment).
- Improveded access to income and livelihood options
- Increased fish availability for family consumption, an important source of animal protein for poor rural households

- Higher household income due to added human capital inputs in Aquaculture
- Increased participation in various decision-making processes within the family.

To ensure better involvement of women in Aquaculture development as well as improve the economic condition of women, the following aspects are to be considered:

- A better understanding of the existing gender relations in the community and the household must be gained by institutions/organisations working for the development of Aquaculture. Participatory technology development may offer more scope to incorporate women's experiences.
- Successful cases of women's involvement in Aquaculture should be emphasised. Aquaculture training and extension efforts should be improved by taking a more holistic approach that encompasses women's time use, household responsibilities, literacy levels, as well as all aspects of their daily chores.
- Development of indicators to ensure that the involvement of women is monitored on a regular basis so that their activities or participation in Aquaculture can be re-focused regularly.
- Even though women were the ones who did the retail marketing of fish in Philippines, their information on market was very limited. A mechanism is necessary to expose women to more extensive market information and to link them to a wider market network.

5 OPPORTUNITIES AND CONSTRAINTS IN AQUACULTURE

In recent years, small-scale Aquaculture has been introduced in many parts of the Asia and has made important contributions to income generation and employment of the rural poor. Since Aquaculture requires only modest investments in physical and human capital, it is assumed that it has greater potential to raise the income of the poor compared with other agricultural activities. According to Edwards (1999) “Aquaculture contributes to the alleviation of rural poverty directly through small-scale household farming of aquatic organisms for domestic consumption and/or income; or indirectly through employment of the poor as service providers to Aquaculture or as workers on aquatic farms of wealthier farmers; or indirectly by providing low-cost fish for poor rural and urban consumers.”

5.1 Opportunities

Overall, respondents felt that Aquaculture provided them with options for employment and income generation. Aquaculture provided opportunities to different age and social groups:

1. ***For the whole family including women and children***.

   Aquaculture has the potential to increase the household income in areas where it is difficult to find other sources of employment and thus support the current consumption. Availability of family labour in very poor households complemented the needs of Aquaculture during various phases of production, as per the survey. The general trend was that the poorer the households the larger the participation of the family members in various on-farm activities in Aquaculture. This was more conspicuous for households where Aquaculture was the only source or the main source of income. Such households were more concernced about basic inputs and services in order to set up cages or ponds and run the farms.

2. To the poor households

A number of the activities in different phases of Aquaculture require labour all throughout the year that suit the poor who were dependant on daily wage labour. The agricultural labour and landless households considered Aquaculture as an opportunity to eran extra income during lean periods. Aquaculture provides additional labour and higher wages compared to agriculture in many areas in the Asia-Pacific region (Hambrey et. al. 2001). The study also had similar observations. Competition from agriculture increases the

bargaining power of landless and the poor who might demand more wages. In practise, it may not be easy for the landless to bargain, as large farm owners can hire labour from outside rather than from local villages as observed in many farms in Philippines. The study showed that, some of the respondents were not locals and migrated into the area to take up aquaculture. Interventions from local municipalities in such situations helps to regulate large farm owners to hire certain agreed minimum number (quota) of workers from local areas on the farms. Such a condition could be laid out in the licence agreement as part of the conditions.

Table 4. Importance of different benefits that could result from Aquaculture to various end user groups

User groups	**As a source of employment**	**Income**	**Food Security**	**Poverty Alleviation**	**Needs**
Landless poor (cage operators, caretakers, labourers)	Very Important	Very Important	Important	Very important	High priority (policy, financial, technical)
Women (labourers, processing, marketing)	Important	Important/ supplementary	Important in household diet	Important	Priority (policy support, training)
Small farmers (owners, operators)	Supplementary	Important	Supplementary	Variable	Priority (policy, licences)
Rural youth (technicians, cage operators, caretakers	Variable	Variable/ Important	Variable	Variable	Priority (training, financial)

3. ***By sale of fish in the market and post harvesting/processing especially for women***.

Activities including, harvesting, sale of fish in the local markets, sorting and cleaning, processing fish etc, all need some semi-skilled labour which are usually taken up by women in the Asia-Pacific region. Men did not compete with women in such activities due to lower wages and also socio-cultural reasons as observed in the study area. With the increase in number of fish farms and production, there seems to be a growing need for semi-skilled women work force in the area. The demand was high during the harvest periods and in fish processing sector. The increasing demand for women in Aquaculture as wage labourers is likely to enhance the bargaining power of women in the household and the in the market.

4. In processing units, transportation, packing, operation and maintenance of large farms etc. for youth

Youth have certain skills that suit the specific requirements of Aquaculture sector, for example, transportation of fish, packing, operation and maintenance of farms in large fish farms where certain activities are mechanized. There is a need for skilled work force which suits the participation of youth in fish farming. In Philippines, it is a good opportunity for youth to tap the emplyomen potential and for government to customize

training programs in order to encourage easy absorption of the youth in Aquaculture sector. Fish farms at schools increase awareness, early exposure and training. In the study are, some initiatives were reported to set up hatcheries in a few schools the study area. Such measures could also help to educate children at school by including Aquaculture in the school curriculum.

5.2 Constraints

In some situations, the main constraints for the poor to enter and sustain themselves in Aquaculture sector are social, economic and institutional factors, which restrict their access to resources, rather than the availability of resources (Tacon and Barg, 2001), whereas, in others, the key constraints may include, limited access to appropriate Aquaculture technologies and inadequate resources. In the five areas surveyed, nearly a half of the respondents complained that they did not receive any kind of help such as credit, seed, training etc. or other services from the government. Some of the major constraints according to respondents that affect Aquaculture production were disturbances from severe weather conditions (47%), diseases (25%) and bad water quality (20%) and lack of proper feed. Surprisingly, factors such as credit or access to land and water were not seen as constraints by respondents.

The most pressing constraints affecting production according to respondents were in the following order:

1. *Risks due to natural calamities*
2. *Threats from disease outbreaks*
3. *Deteriorating water quality*
4. *Inputs: access to feed and markets*
5. *Effective support services (technical and institutional support)*

If Aquaculture is properly planned there are considerable opportunities for poor people's entry (Friend and Funge-Smith, 2002). From experiences and lessons derived from various development projects implemented by governments and civil society organizations in several developing countries (Bangladesh, Cambodia, India, Laos, Nepal, Philippines, Thailand and Viet Nam), the FAO and NACA (2002) recommended measures for appropriate targeting of poor people, targeting the landless, creating opportunities for the poorer people, targeting the women, strategies for collective action, caution in providing subsidies and gratuities and adopting livelihood approaches. The assistance needs to recognize specific and prevalent features of poverty among the intended beneficiaries, including the means of overcoming key barriers for entry into Aquaculture and adoption of technologies, and to mitigate risks to which the poor are particularly vulnerable. The ADB (2004) studies of small-scale freshwater Aquaculture in Bangladesh yielded strategies for targeting the small and poor households which focused mostly on; secure access and use rights to land and water, financial and human capital assistance, training, and back up plans to face risks (floods, theft, diseases), which are quite common.

If Aquaculture is to play a greater role in the alleviation of poverty, it is recommended to:

- Develop a farm insurance scheme to protect the poor against natural calamities and diseases. A number of poor respondents sustain their livelihood on a monthly or seasonal basis. If the farm or fish cage or pen is damaged in a typhoon or bad weather, they find it difficult to recover and absorb the losses without external financial support. Shrimp farmers expressed were more concerned with disease outbreaks.
- Implement measures to improve water quality. Respondents realize the impact of bad water quality on production. Improving water quality is not the priority for government or private agencies. This requires an integrated effort, co-operation between sectors,

farmers' participation, to monitor water quality, check excessive use of feed and chemicals on farms.

- Improve market information and facilities to market the product, especially for poor farmers operating fish farms in rural areas.
- Invest in building the institutional capacity, training of poor and women, and increasing the knowledge base concerning sustainable Aquaculture practices to manage the sector. This is in line with Tacon and Barg (2001) findings from their studies of Aquaculture potential for reducing poverty.
- Secure rights to land and water (special provisions to landless and households below poverty line

Small-scale Aquaculture may be one of the few options for poverty alleviation of poor households in coastal communities, which are among the most impoverished (Philips, 2002). Poor fishers culture molluscs and seaweeds in the Philippines. These require minimum inputs which are suitable for poor households. Most commonly practised systems by the poor are extensive and in cases where they get some financial support they switch over to semi-intensive system. Due to lack of access to capital and inputs the poor often tend to go for extensive system of cultivation, which reduces the productivity, quality etc, and gives lower price in the market. This vicious cycle needs to be broken, if the strategy is to promote the entry of the poor into commercial production and help them to accumulate capital.

6.0 POLICY INITIATIVES

As a part of the study, a round table meeting of some key stakeholders (including representatives from BFAR, NGOs, Research sector) in Aquaculture sector was conducted in Manila in December 2006. During this meeting important issues were identified that would help in better management of Aquaculture and the improvement of water bodies in Philippines. The group suggested an ecosystem based approach as an option to address the current problems within Aquaculture in Philippines. This requires close co-operation between relevant government agencies and other stakeholders to manage identified watersheds within their limits. The Local Government Units (LGUs), the Department of Nature and Environmental Resources (DNER) and the Bureau of Fisheries and Aquatic Resources (BFAR) local agencies were identified as the key actors in Aquaculture. Co-ordination and funding was seen as the basis for an ecosystem based approach. Strengthening capacity at the local level, especially of LGUs and other bodies who have the legal and administrative authority was considered useful by several stakeholders. If the ecosystem based approach is opted, it would need the identification of ecosystems or water bodies as the units of planning. Within each ecosystem, the LGUs need to be identified and among them champion Local Government Units LGUs to be listed that can serve as an example for others to follow. Existing models like the Laguna Lake Development Authority (LLDA), the existing coastal resource management plans and the Philippines eco- governance projects were seen as important starting points to look at future management plans for identified water bodies. The study suggests the following measures to be taken in order to ensure that the poor, women and youth are included in any future development programs.

At the national level:

- Certain national policies like RA 8850 (the Fisheries Code)) and RA 8435 (Agricultural and Fisheries Modernization Act), mention "poverty alleviation" and "social equity" as one of the objectives.
- In addition, there is a need to increase emphasis on Aquaculture for poor in national social and economic development plans and policies, with the view to enhance

institutional and financial support for the sector. Initiatives are already being taken in this direction, but not adequate to address immediate constraints faced by the poor. [4]

- Allocation of national budgets for training of the poor and women in Aquaculture is a necessary priority.
- Integration of relevant sectors to bring services closer to the farmers and make it easy for the entry of poor into Aquaculture. The challenge is to ensure that the National Fisheries and Aquatic Management council treat poverty agenda with priority.
- To set up a separate fund under the corporate social responsibility head with mandatory contributions from large farms. This fund can support the poor who need credit to operate small farms.

At the regional level:

- Promotion of regional cooperation and customizing legal frameworks for effective cooperation.
- Using the existing plans (BFAR Fisheries management plans, Mariculture highways, The DNER Coastal Resource Management Plans, etc) and plan for future Aquaculture development defining clearly the role of marginal communities.
- Pilot projects to be developed and extended to the district and village level with the active participation of BFAR.
- Improved cooperation in Aquaculture management, which should be oriented to strategic and cross-sectoral matters, such as capacity-building of the poor, co-ordination of relevant sectors, etc.
- Exchange of experiences among researchers and managers on the formulation and enforcement of measures proposed in national policies.
- Closer cooperation among national and regional governmental organizations and international and local NGOs in the promotion of participation of poor.
- The water bodies should be divided into coherent management units, which should be the basis for planning of Aquaculture development, and integrated with other sectoral development plans.

At the local level

- To motivate and strengthen LGUs to co-operate with other relevant agencies dealing with Aquaculture development programs. The Law (RA 8550) recognizes BFAR as a line agency and also provides BFAR some legitimacy to interact with other relevant agencies dealing with Aquaculture. This could be the legal basis for interaction at the local level.
- To provide authority and improve capacity of community organizations or village councils to monitor the farms to make sure that regulation are enforced. To ensure the participation of farmers in planning and implementation.
- To strengthen the capacity of organizations in planning, monitoring, and data bases etc. at the local level. It can help to maintain simple databases at the local level for the benefit of the poor and agencies dealing with poverty reduction programs.
- To organize/strengthen fish farmers associations at the local level (based on experience from Japan). The associations can serve as a platform for representation of the poor and their problems. The law (RA 8550) encourages participation of local

[4] The Aquaculture subsector has been identified in the Government's current MTPDP (2004–2010) as a sector whose increased growth will create jobs and ensure food security in support of the country's drive toward economic development. But it does not focus on the involvement of the poor, rather it emphasizes on the intensification and increasing production intensity, diversifying existing commodities and fishery farms, or expanding fisheries production in inland waters.

communities in Aquatic resource management through Fisheries and Aquatic Resources Management Council (FARMCs). Priority should be given to the poor while issuing permits, rights and licenses for Aquaculture.

7.0 CONCLUSION

Aquaculture in Philippines is expanding rapidly and also becoming an important source of income and employment for the rural poor, women and youth. The study also shows that Aquaculture has the potential to increase the household income in rural areas where it is difficult to find other sources of employment and thus support the current consumption and meet unexpected cash needs. Since Aquaculture requires only modest investments in physical and human capital and it has greater potential to raise the income of the poor compared with other agricultural activities. It is essential that the rural poor get support in the form of training services, access to credit, quality seed material and market access. In line with the present development strategy of the Philippines Government which focuses on the country's rural poor, Aquaculture can become a potential engine for rural economic growth and poverty reduction provided the strategy is put into practice with the active involvement of the marginal groups for whom the strategy has been developed.

The study suggests that rather than creating new agencies, it is necessary first to look at the policies and institutions that already exist in Philippines, and that can facilitate the entry of poor, women and youth into Aquaculture. What is needed is an integrated institutional framework where the relevant polices, formal departments (LGUs, BFAR and DENR local agencies) and informal institutions to be pulled together to manage Aquaculture development programs in order to vulnerable groups. A number of measures can be initiated at the local level, for example**,** improving the cage designs using locally available materials, issuing licenses only to farmers who operate the farm themselves and prioritizing the poor, developing local co-operative insurance schemes to include poor, legitimizing community networks, increasing training programs, improving communication channels, strengthening fishers organizations etc. Security of tenure is an important issue and farmers are concerned about the rights to access and use common waters. The contexts of the poor are diverse and need to be addressed in a holistic and systems approach in future Aquaculture development programs.

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