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Post-harvest Processing, Poverty Among Fishers and Fishery Resource Management in Lagonoy Gulf (Philippines)

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Key words: Post-harvest processing, Poverty, Fishers, Fishery Resource Management, Lagonoy Gulf.

Abstract

The contribution of post-harvest- processing-based livelihood activities to poverty of fishers in Lagonoy Gulf (Philippines) was studied in the context of fishery resource management . Data were gathered through a household survey of fisherfolks in Lagonoy Gulf, participatory resource assessment of selected fishing villages, and documentary analysis. The results were also analyzed relative to implementation of the livelihood component of the national fishery resource management programs in the area.

The survey revealed that the average fishery household income of fishers has almost doubled over the past 13 years ago, a significant proportion of which is from municipal fishing, indicating the fisherfolk household's dependence to capture fisheries for livelihood. The increase in household income did not result to a corresponding improvement of the poverty situation in the sector. Analysis of the sources of family income showed that an insignificant proportion of fishers engage in value-adding post-harvest fish processing, largely employed on catch of species of low value that could not be absorbed by the fresh market, e.g. on siganid fry. primarily to preserve excess seasonal catch, largely the fermentation of low-priced species like siganid *Siganus sp.* fry and anchovies, drying, and hot smoking of tuna that are unsold at the end of the day. The limited post-harvest processing activity in the gulf is primarily due to the high dependence of the fisherfolk income on daily fish catch, which is barely enough to provide the family's daily food and basic needs. Seventy-eight percent of the respondents are below the poverty threshold and 63% are below the food threshold. Individually, fishers have very limited capacity to avail of additional income which can be derived from value-adding post-harvest fish processing activities. Daily catch is immediately sold for cash to finance food and other basic needs. Fisherfolks are not motivated to venture on additional income from value-adding activities on catch because of limited access to capital and very limited market link for disposal of processed fishery products.

Two major national fishery resource programs were implemented in the gulf, aimed to capacitate fisherfolks to engage in alternative livelihood ventures as organized groups. However, supplemental income from post-harvest processing of fish catch received very minimal focus among income-generating projects that were identified by fisherfolks.

Lagonoy Gulf is a large and deep body of water located approximately 123°31'37" E to 124°20'36" E longitude and 13°44'30" to 13°10'33" latitude in the Bicol region, Philippines. It is a rich fishing ground, providing a base for a wide array of socio-economic activities including fishing, to the communities in 151 barangays in 15 municipalities in three provinces. In 1990, the results of a socio-economic and investment opportunity study (SEIOS) (PRIMEX, 1991) characterized the fishers in the area to be of limited educational attainment, large household size, whose income which is largely dependent on fishing, is not sufficient to meet daily basic and food requirements of the family. Decreasing volume of fish catch and extreme poverty in fisherfolk households describe the coastal fishing communities.

A limited number (6.5%) of households in coastal barangays engage in fishery-related activities, that are very important means of subsistence and additional cash to support basic family needs (PRIMEX, 1992):

The corresponding resource and ecological assessment study in 2004 reported an extraction rate of 9.3 mt/km²/yr, an exploitation above the estimated annual potential yield of 2-5 mt/km²/yr for Philippine inshore by Marten and Polovina (1982), indicative of the need for an effective fishery resource management program for the gulf.

Fishery resource management in Lagonoy in the recent two decades came in two waves, originating from the national level, namely, the Fishery Sector Program (FSP) in 1990 to 1995, and the Fishery Resource Management Project (FRMP) which covers the period 1998 to 2004.

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Two municipalities, namely Malinao, Albay and Presentacion, Camarines Sur were able to avail of the Community-Based Coastal Resource Management Project (CB-CRMP), which was implemented in 1998 to 2003.

Implemented by the Department of Agriculture through the Bureau of Fisheries and Aquatic Resources, the FSP aimed to regenerate coastal resources, rehabilitate the coastal environment and alleviate poverty among municipal fishers through income diversification.

The second wave of the national governments Coastal Resources Management (CRM) program is the FRMP. Based on the achievements of FSP, its objectives are basically the same with the FSP (resource depletion and poverty), but with more focused strategies and target groups. For example, the income diversification component promotes micro-enterprises, especially on mariculture, among pre-organized self-reliant community groups. As part of developing self-reliance, financing of alternative income projects is savings based.

Implemented by the Department of finance through various government agencies, e.g., the Department of Environment and Natural Resources (DENR), the Department of Agriculture (DA), the Department of Interior and Local Government (DILG), etc, Community Based Coastal Resources Management Program's (CBRMP's) main focus are natural resource management and livelihood development.

Faced with limited or declining resources, one logical scheme for sustainable production is value-adding. This involves the application of appropriate technology to transform raw produce to desired forms that involve the addition of labor and technology costs into the value of the raw commodities and the optimum utilization of the raw material; and in effect create income-generating activities. Value-addition maybe implemented to levels that is most efficient, depending on the capacity of the sector, including but not limited to technical capacity. In Fisheries, this involves processing technologies, which include the different processes and techniques employed in the post-harvest processing handling, processing and marketing of aquatic products from the time of harvesting to final utilization. In general, the application aims to: prevent or delay spoilage, reduce post-harvest losses, and produce convenience food.

This study aims to look into the forms and level of utilization of post-harvest processing technologies to increase the value of catch and to create livelihood activities in line with the implementation of fishery resource management programs in Lagonoy Gulf.

Materials and Methods

The primary data in this report were from the results of 1000 household survey respondents and from key informant interview of municipal/city planning development officers or municipal/city agricultural officers, Municipal Fishery and Aquatic Resource Management Council chairs, and the Participatory Resource Assessment (PRA) in fifteen coastal barangays.

The secondary data were gathered from the 2000 National Census, reports and other documents from local government units. Changes in the status of the fisherfolks were analyzed relative to the 1991 Lagonoy Gulf SEIOS project report.

Household Survey

A standard semi-structured household questionnaire provided by the Bureau of Fisheries and Aquatic Resources (BFAR) augmented with some questions on CRM projects, status of fishery resources and additional socio-economic indicators, was administered by enumerators to a responsible person in fisherfolk households.

Sampling. A two-level stratified random sampling design was employed to select the 1000 respondents. Stratification was based on the distribution of fisherfolk households in the 15 municipalities, and the distribution of fishing gear types in 68 of the 151 coastal barangays based on the fishing gear inventory of the Coastal Fishery Resource Assessment component of this project. The respondents were allocated proportionately to the population of fishers in the barangays and then to the population number of gears by type. Respondents were chosen randomly from a list of fisherfolks in the barangay, classified by seven (7) major gear type(s): hand instrument,

handlines, longlines, seine net, liftnet, barriers and traps, gillnet. The list of fishers in the barangay was obtained from either the barangay secretary or presidents of fisherfolk organizations in the barangay.

Participatory Resource Assessment (PRA)

The PRA tools which were used in the study were based from Pido *et al.* (1996), and include: historical lines perceptual transects, 24-hour activity chart, resource maps, strengths, weaknesses, opportunities, and threats (SWOT) analysis. Focused group discussions (FGD) were employed on contentious issues and concerns on specific CRM interventions, e.g. Marine Fishery Reserves. Participants to the PRA were coordinated through the municipal/city mayors and the punong barangays by cooperators of the Socio-economic Assessment component teams. The participants include representatives from the barangay council, fisherfolk organizations, fishers, women and youth sector, and non-government organizations.

Statistical Analysis

Data were analyzed using appropriate measures of central tendency like the mean, standard deviation, and correlation using the Statistical Tool pack of the software Windows Excel, and Statistica. The poverty indicator measures, namely the Lawrence curve and Gini Coefficient were computed using GenStat, 9th edition.

Results

Status of Fishing, Fish Processing, and Poverty

The National Statistics and Census Bureau census data reveal that from 1990 to 2000 (reaching 912,830), there has been a 12% increase in the total population of the 15 municipalities bordering the gulf and a 41.1% increase in the coastal barangay population. However, the survey data on the number of years in fishing and year of entry to fishing (see Figure 1) reveal a smaller proportion in the number of entrants over the past ten years. The results of the parallel fishing gear survey in 2004 (Dioneda *et al.*, unpublished data) show a 40% increase over the same period. Fish production, on the other hand, decreased by 7% (Dioneda *et al.* 2005), revealing an increase pressure

to the fishery resources.

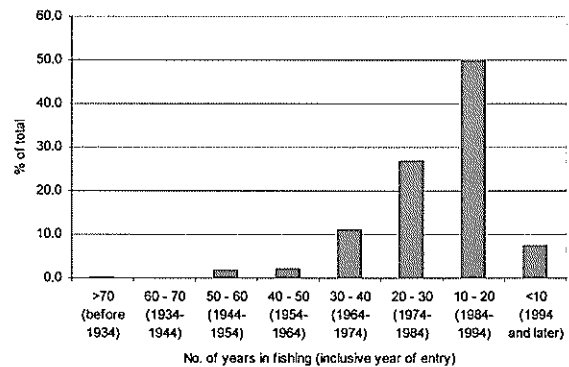


Fig. 1. No. of years of fishing and year (range) of entry to fishing occupation.

From the same study (Dioneda *et al.* 2005), thirty-nine (39) families of bony fish and 13 invertebrates were enumerated to compose the catch in the Gulf. Among the finfishes, Family Scombridae, mainly tunas, compose 55% of catch followed by Engraulidae (22%), a family of small pelagics. Siganids comprise 2% of production, which includes both fry (20%) and adult (80%).

The average fisherfolk household income in the Gulf is P59,288.87, which is almost twice the income of the sector 13 years ago, (P26,270.00 based on SEIOS data, unpublished data). However, the frequency distribution of income of the respondents, shows that 74% of the respondent households earn less than P39,565.00. Household income is skewed towards the lower range of income, although the results of the survey show that fishing household income has almost doubled over the last 13 years ago (see Figure 2).

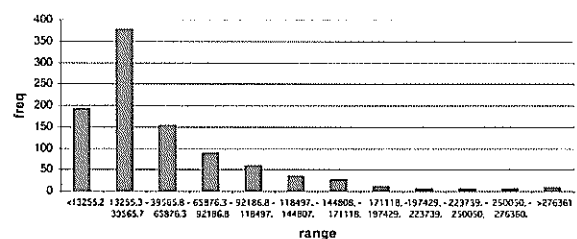


Fig. 2. Frequency distribution of total household income of fishers.

Fishing still accounts for a significant proportion of household income in the fisherfolk household. As percentage of total income, it ranges from 1% to 100%, averaging 75.8%, at an average of P32,009.06, ranging from P100 to P500,000.00. Income from municipal fish-

ing gears averages P28,873.8, with P150 as the lowest and P300,000.00 as the highest. Wide variability is indicated by the high standard deviation (P30,780.87). Income from municipal gear operation represents 69% of the total fishing income and 75% of the total household income, showing the significant role of municipal gears and therefore exploitation of municipal waters in the income of fishers.

The wife's contribution to household income averages P19,574.54, with a minimum of P900.00, and a maximum of P19517.54. Only 24% of the housewives have income, 75% of whom earn P19,987.70 or lower. The wives' contribution to total income ranges from 1 to 100% of the family income, averaging 28%.

The per capita income in the fisherfolk household in reveal that almost 95% of the respondents were earning within the lower ranges of income level. Per capita income ranges from P 125 to P 250,000 averaging P 10,910, equivalent to an average of \$0.60 a day, ranging from \$0.007 to \$13.69 in terms of the international standard of a dollar-a-day allocation. The income is also highly disproportionate across the population as shown by the high Gini coefficient (0.5695).

The increase in total household income did not produce a corresponding improvement in the poverty situation of the sector, due to the significant reduction in the buying power of peso from the early 1990's to the early 2000's. In 1991, as reported in the SEIOS, the average household income was P 26,270.00 per annum, which was found to be relatively smaller than composed to the other occupational groupings and the estimated poverty in the region, implying that the fisherfolk household was relatively worse off than the other households in the same barangay

Poverty incidence in terms of the proportion of those who fall below poverty threshold based on per capita income is 77% and the food threshold is 63%. These members of the fisherfolk households registered a shortfall of an average of P 8,281 to cross the poverty line and an average of P 3,974 to meet the food threshold. On the basis of a minimum dollar-a-day per capita allocation, poverty incidence is at 85%. These depict a poverty incidence that is worse than the regional situation of 49% poverty incidence, and 26.6% food threshold incidence, a region

that is ranked the third poorest regions in the country.

More detailed analysis of the poverty situation revealed a far worse situation among the female (78%) segment compared to the male sector (75%) ($\text{Chi}^2 = 5.28, p=0.02$). Similarly, food threshold gap is also significantly worse ($\text{Chi}^2=6.94, p=0.008$) among the females (65%) compared to the males (62%). The same scenario is shown in the dollar-a-day criteria, with 83% incidence among the males and 86% among the female sector.

Table I enumerates the distribution of livelihood activities in the gulf, showing very minimal activity in fish processing. These are mainly involve fermentation of siganid and anchovies. Interview of limited processors in the area reveal that this maybe related to the catch composition from the gulf. Tuna and tuna-like fishes compose 55% of catch, which fetch a prime price when fresh. Fishers resort to hot smoking or broiling only to preserve extra catch. The availability and price of ice, limits the practice of icing excess catch. Interview of one fisher-processor revealed that no price is added to the fish after broiling because the intention of the activity is mainly for preservation purposes. In the 1990 survey (PRIMEX, 1991), involvement in fish processing compose only 1.5% of the total respondents.

Another fish processing activity in the gulf is fermentation of anchovies. Although anchovies comprise 22% of total production (Dioneda *et al.* 2004), seasonal excess production is not processed due to difficulty in accessing capital and market link for fermented fish.

Siganids the identified raw material in one of the livelihood projects (siganid fry salting) compose only 2% of production, which includes both fry(20%) and adult (80%). Downtrend in production and estimates show maximum sustainable has been attained in 2001. Production in 2004 was only 1/5 of 2001 production. Because of this information, the local government of Tabaco City passed an ordinance prohibiting catching of siganids from the month of February to July in 1997, but implementation was suspended in 1999 pending the establishment of scientific basis.

Even for siganids, the purpose of salting is mainly to preserve excess seasonal catch, not for value-adding. For other species, sales form the average volume of catch is barely enough to provide the daily basic needs of the fam-

ily. Without or with limited alternative or supplemental livelihood, the fisher has to sell his daily catch to provide the family's basic needs. The production distribution data (Dioneda *et al*, 2005) in Table 2, support the observation of the fishers. The mean catch for the handline, which compose more than half of the number of gear units, is only at 5.6kg/trip

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Comparatively, in San Miguel Bay (another fishing ground in the region), 30% of fish landed are processed before being sold to consumers, which prevents oversupply during peak months (Esporlas, 1982). The products include dried-croaker, smoked round scad, herring other small pelagics, salted/dried sergestered shrimp (*Acetes* sp.) and anchovies. Volume of production vary from small scale (for household consumption) to large scale processing, employing several workers in their operation.

Table 1. Distribution of livelihood activities of the respondents.

Livelihood	No.	%
Agriculture	40	2.19
Aquaculture	5	0.27
Entrepreneurship	58	3.17
Fish Vending	27	1.48
Fishing	1139	62.24
Fish Processing	1	0.05
Handicraft Making	129	7.05
Laborer	95	5.19
Professional	24	1.31
Public Official	10	0.55
Public Service	12	0.66
Service	290	15.85
	1830	100.00

Table 2. Number of units, and production of fishing gears in Lagonoy Gulf.

Fishing Gear	Number of units	% (no units gear/total)	Mean (kg/trip)	Production (MT)	%
Handline	6330	42.24	5.6	15316.32	58.79
Longline	344	2.30	3.68	131.50	1.2
Gillnet	2291	15.29	17.23	3321.89	12.75
Liftnet	1113	7.43	31.84	3239.20	12.43
Seines	2582	17.23	41.61	2872.32	11.02
Hand instrument	1086	7.25	3.99	435.21	1.67
Barriers and traps	1240	8.27	8.22	555.17	2.13
Total	6330	100.00		26053.61	100

Conclusion

The results indicate limited fish processing activities in Lagonoy for the purpose of adding value to fish catch. The activities include primarily salting of excess seasonal catch siganid fry and anchovies. This maybe attributed to the already high price of tuna, which compose the major proportion of the fish catch in the Gulf. Increase in the volume of salted anchovies from seasonal glut is not taken advantage of because of poor market link and limited capitalization. Hot smoking of tuna catch is resorted to preserve seasonal excess in tuna catch due to the unavailability or high price of ice.

Livelihood activities based on fish processing to add value to fish catch in not among the identified livelihood projects of the fishery resource management programs and projects implemented in the gulf. Declining fish catch which is traced to decreasing fish stock, resulting from high fishing pressure, resulted to exacerbated poverty incidence among fisherfolks.

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