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REGIONAL FISHERIES LIVELIHOODS PROGRAMME
FOR SOUTH AND SOUTHEAST ASIA
PHILIPPINES (GCP/RAS/237/SPA)

**REGIONAL FISHERIES LIVELIHOODS PROGRAMME
FOR SOUTH AND SOUTHEAST ASIA (RFLP) – PHILIPPINES**

**REPORT ON THE TRAINING NEEDS ASSESSMENT, ASSESSMENTS OF
LANDING SITES, ICE PLANTS, FISH HANDLING, FISH PROCESSING,
MARKETING, AND THE TRAINING CONDUCTED IN NORTHERN MINDANAO
(9 MUNICIPALITIES AND 2 CITIES)**

Activity Code Output 3

“Measures for improved quality of fishery products and market chain”

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Report on the Training Needs Assessment, Assessments of Landing Sites, Ice Plants, Fish Handling, Fish Processing, Marketing, and the Training Conducted in Northern Mindanao (9 Municipalities and 2 Cities)

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LIST OF ACRONYMS AND ABBREVIATIONS

BET	<i>Barangay</i> (village) Extension Trainer
BFAR	Bureau of Fisheries and Aquatic Resources
cGMPs	Current Good Manufacturing Practices
CNFIDP	Comprehensive National Fisheries Industry Development Plan
CSW	Chilled seawater
DSF	Dipolog School of Fisheries
EAF	Ecosystems Approach to Fisheries
FAO	Food and Agriculture Organization of United Nations
FDA	Philippine Food and Drug Administration
FPE	Fish Processing Establishment
GMP	Good Manufacturing Practice
HACCP	Hazard Analysis Critical Control Points
HDPE	High Density Polyethylene
IC	International Consultant
ISDA	In-glass Sardines in Dipolog Association
JRMSU	Jose Rizal Memorial State University
KI	Key informant
LGU	Local Government Unit
LSDEC	Livelihood Skills Development and Enhancement Center
LTO	License-to-operate
MAO	Municipal Agriculture Office/Officer
MIMAROPA	Marinduque, Occidental Mindoro, Oriental Mindoro, Romblon, Palawan
NC	National Consultant
NGO	Non-Government Organization
PFDA	Philippine Fisheries Development Authority
PH	Post-harvest
PH NC	Post-harvest National Consultant
PRPs	Pre-requisite programs
PS	Polystyrene
RFLP	Regional Fisheries Livelihoods Programme
RFLP PHI	RFLP Philippines
SLED	Sustainable Livelihoods Enhancement and Diversification
SSOPs	Sanitation Standard Operating Procedures
TESDA	Technical Education and Skills Development Authority
TNA	Training Needs Analysis/Assessment
TOR	Terms of Reference
WIF	Women in Fisheries
ZANORTE	Zamboanga del Norte Provincial Government
ZDN	Zamboanga del Norte

GLOSSARY OF PHILIPPINE LANGUAGE TECHNICAL TERMS

Abo - driving fish into a net (destructive fishing method)

Alangan tuloy - medium sized sardines

Alamang – *Acetes* shrimp

Bagis - Surgeon fish (*Acanthurus/Naso* spp.)

Baleng-baleng – beach seine

Bangus - milkfish

Barangay - a village, district or ward

Barla - snake mackerel

Binulabid gamos - salted fish from anchovy fry

Bolado or Bangsi - flying fish

Comprador or kumprador - middlemen/buyer

Foam - polystyrene box

Galonggong or Modlong - roundscad

Kaping – fish drying tray

Kinilaw - pickled or marinated fish (raw fish in vinegar, and other spices)

Lupoy - juvenile sardines

Matang baka or kabalyas - big eyed scad (*Selar crumenophthalmus*)

Mata-mata system - estimation by looking

Pabangog or pabiti - dynamite fishing

Poblacion - town/municipality center

Pula Ikog - red tail roundscad

Pusit or Nokos - squid

Sari-sari store – small convenience store

Saramulyete or malitubong - goatfish (*Upeneus vittatus*)

Sinaing - boiled salted fish

Tubli - fishing with the use of chlorine

Uyap or Oyap - Alamang shrimp

EXECUTIVE SUMMARY

The RFLP Programme goal in improving post-harvest practices in fisheries is generally aimed at improving fish quality and diversity of value adding and subsequently, profitability of fisheries. Over the long run, enhancing effective and competitive post harvest handling and processing of fish produce will reduce wastage, stimulate markets and create supplemental livelihood opportunities for coastal communities.

The output of the Consultant is designed to contribute to the attainment of Programme Output 3 – *measures for improved quality of fishery products and market chains*. The International Consultant (IC) has provided specialist technical assistance to needs assessment, design of workable strategic and logistical interventions to improve fish handling, preservation, processing for value adding, marketing, distribution and other similar interventions directed at improving returns and market potentials for fresh and processed fish in the 11 (originally 12) municipalities and 2 cities covered by RFLP Philippines (RFLP PHI). Such interventions should be able to link and mutually reinforce other Outputs of the Programme, especially alternative livelihoods development and fisheries co-management.

The IC employed three approaches to accomplish the tasks provided in the Terms of Reference (ToR; Annex 1): training needs assessment (TNA); assessments of landing sites, fish processing establishments (FPEs), ice plants, small scale fishers, and survey of fresh and processed products in public markets; and conducting of a training course.

The TNA was undertaken to attempt to a) profile the various sectors (women's groups, fishers, government personnel etc.) currently involved in the RFLP Project; b) find out their problem areas regarding post harvest fisheries and marketing; and c) find out the way they learn best and which training methods would suit them most, in order to help in designing a training which matched their needs. Additional information on the career/livelihood goals and problems encountered by the respondents was also gathered during the assessment.

The second approach, the conduct of assessments, was carried out in fish landings, small scale fishers, fish processing establishments (FPEs), ice plants and included a survey of fresh and processed products in public markets. The aim was to determine the current state of the fish handling, processing and marketing in the project sites. The survey on fresh fish and processed fish and fishery products in public markets and a supermarket in Dipolog City was to find out the available species during the monsoon season and the origin of fresh and processed fish and fishery products in the project sites. Specifically, this was carried out to gather information on the potential of species of fish (aside from the commonly used raw materials for processing), which are particularly available during the monsoon season and of low cost. These “new” raw materials can be further explored for the application of appropriate processing methods. The field work activities were undertaken from August 14- 26, 2011.

Lastly, a training course on fish handling and processing was conducted from 27-29 September 2011 at the compound of the Livelihood Skills Development and Enhancement Center (LSDEC). Fish handling and processing was identified in the TNA as the most preferred training topic by the target groups. The participants of the course were members of the Barangay Extension Trainers (BETS), fishers, fish vendors and the staff of the Bureau of Fisheries and Aquatic Resources (BFAR), key staff of LGU-MAO (Local Government Unit-Municipal Agriculture Office), the NC of RFLP and ISDA (In-glass Sardines in Dipolog Association).

The IC formulated specific recommendations based on the findings which are summarized below. In general, the IC recommends that in all the activities that the PH NC of RFLP-PHI will undertake, the PH NC should work in close collaboration with the staff of BFAR, LGUs-MAOs, Livelihoods, Micro-finance components and Co-management fisheries component staff.

1. Capacity Building through Training Activity

The training activity which focused on the topics below should be continued. The BETs should be given the main tasks to carry out the activity with close supervision from the PH NC-BFAR tandem and in the presence of a LGU-MAOs staff. However, before the start of the barangay training, it is advisable to conduct a 2-day workshop in order to orient the BETs and LGU-MAOs on how to carry out the training effectively. Furthermore, confidence can be better built up if they develop the attitude of self-study e.g. reading technical literature. The PH NC should provide them with easy to understand technical materials. Otherwise there is a real danger that the wrong information will be conveyed to beneficiaries during the training courses.

- a. Hands-on training on fish handling, with the emphasis on the use of proper containers and chilling methods: proper “wet” icing and chilled seawater (CSW), in several fishing Barangays should be undertaken.
- b. Fermentation of adult sardines using hastened fish sauce production. The use of mechanical means such as grinding, use of elevated temperature (exposure to sun) and constant agitation should be highlighted.
- c. Smoking and value-addition of fish and fishery products, should focus on sardines (when in season) and low value species e.g. *barla* (snake mackerel) and cultured species such as *bangus* (milkfish) and *tilapia*. Utilization of “new” raw materials from species of low cost and available all year round should be explored further.

Food safety should be integrated in any training course in order to instill in the participants the importance of basic hygiene and other food safety management tools (HACCP, PRPs, GMP) when handling fish and fishery products.

2. Equipment and Facilities Support

The IC identified a range of equipment and infrastructure needs for hygienic handling and processing of fish. The provision of these material inputs is a strategic opportunity for the RFLP, but may also require interventions from other donors or financing sources. In all cases, the provision of equipment and facilities should be accompanied by training and awareness raising on the use of such inputs.

- a. Insulated containers

Polystyrene boxes (PS or locally called “foam”) are widely used to store, transport and distribute the fish catch in the project sites. However, there are many disadvantages in the use of this type of container e.g. it is difficult to move due to absence of hand grips, there are no drainage holes to remove melt-water, it becomes unhygienic once the cells are destroyed (cleaning becomes more difficult when the cells are destroyed thus resulting in unhygienic condition of the container), and it has a short life span if handled roughly.

For fishers’ organization (small-scale fishers), women’s associations and vendors, RPLP should consider providing them with insulated boxes with all the necessary features of a good container, e.g. high density polyethylene (HDPE) boxes. These containers should slowly replace the currently used

polystyrene boxes. Continued use of dirty PS containers is likely to pose serious health and environmental problems. PS contains styrene which is a possible human carcinogen. Fish and marine life mistake PS pieces as food and ingest it, detrimentally affecting the aquatic food chain. Even for land animals, PS can be a threat, as claimed by a participant during the training, ducks in the project sites usually peck at the PS pieces. The toxic substance can then be passed on to human beings if the eggs and the duck meat are consumed. Along the coasts in the project sites, discarded pieces of PS were widely seen.

b) Salting/brining vats

Provide women's associations with appropriate salting/brining vats. The associations should be able to award the equipment to selected members who are engaged in fermented, salted and dried products processing. The use of brining vats such as rubber tire garbage bins should be discouraged due to the toxic substances they contain. Additives in tires consist of toxic chemicals such as cadmium, chromium, copper, aluminum etc. which are added to the rubber to prevent bacterial decay. Used tires are not meant to be used as food contact materials. The IC recommended to the NCs of the livelihoods and micro-finance components to secure vats which are made from food grade quality materials.

c) Ice maker

Setting up ice making equipment in strategic places such as Salug, Liloy, Roxas, Rizal, Sibutad and L. Postigo should be considered by the project. When selecting sites for ice making machines, special attention should be given to the availability of a good source of potable water. There is no guarantee that the ice presently being produced in the convenience (*sari-sari*) stores and even the ice plants in the RFLP PHI area of geographic coverage is manufactured from potable water. RFLP PHI should verify this situation by funding appropriate water testing if necessary.

d) Fish drying tools/smokehouse equipment

Provide women's associations, especially those engaged in fish drying, in Katipunan, Salug and Dapitan City (Selinog Island) with appropriate drying trays ("kapings") with protective covering. The design of the drying trays has already been discussed by the IC with the NCs for livelihoods and micro-finance. Both are now aware of the requirements for the trays.

Support the construction of solar dryers in some municipalities with suitable areas (e.g. Salug, L. Postigo and Selinog Island). Solar dryers will give an opportunity to dried fish processors to continue their activities even during the monsoon season. As already discussed by the IC with the NCs for livelihoods and micro-finance, proper site selection is important for the construction of solar dryers. Solar dryers should be sited away from near shore areas because of possible erosion, and the influence of extreme weather events such as wind and sea water surges which could easily destroy the structure.

Provide smokehouses (drum-type) to those who would like to venture into fish smoking. Smoking of fish is one of the best alternative methods that can be adopted particularly during the monsoon season. Raw materials for this process are readily available. There are many species of fish which can be used as raw materials such as scads, mackerels, sardines, bullet tuna, cultured species (milkfish and tilapia) and other low cost species of fish (*barla*). Even the fuel materials for the smoking process are very accessible e.g. coconut husks which abound wherever coconut trees are found and these are common in the area. The use of this fuel would clean up the beach and waters in the project sites, which are full of discarded coconut husks.

e) Landing site/processing center

Provide financial support to the rehabilitation of the landing site in West Poblacion, Salug where a fish processing center for the women's association is being planned. Technical advice on the design of the landing site and the association should be provided by the project.

Almost all municipalities (except Salug) have no landing site infrastructure. RFLP should find ways to tap other donor agencies to support the construction of landing sites. The availability of proper landing sites is essential for bottled sardine establishments to meet EU export requirements, a market which many local bottled sardine processors would like to access. The EU demands that there should be a proper landing place where fishers supplying raw materials to bottled sardines processors can take and market their catch.

f) Market fish stalls

Support some municipalities (e.g. Liloy) to establish hygienic and proper fish stalls for local vendors. In some municipal "wet" markets, there is a need to rehabilitate the existing fish stalls; many stalls are already dilapidated and are insanitary due to a water shortage to clean the fish stalls and displayed seafood.

3. Technical Advice

a) ISDA

The members of the association are beset with various problems ranging from a seasonal lack of raw material to meeting the requirements for the BFAR HACCP accreditation. Hence, the project should continue supporting ISDA members (GASO, Alenter, Tito Mike's and Tita Rosa Food Products) by providing technical advice on compliance with the BFAR HACCP accreditation requirements (e.g. drafting of HACCP plans, PRPs, and GMP), labeling, testing etc.

During the recently conducted training course, some bottled sardines manufacturers stated their intentions to trial fish sauce fermentation and fish floss/fish flake processing. RFLP should provide technical advice to interested entrepreneurs.

b) Start-up and on-going livelihoods

Encourage groups or individuals who want to start a business in bottled sardines to adopt other processed products such as fish sauce, value added products (fish balls, tempura etc.), smoked fish, fish floss and flakes etc. which do not require high capital investments and specialized equipment, e.g. a pressure cooker. Furthermore, the processing methods of the aforementioned products are not dependent on the supply of a single species as raw material; and are not reliant on fine sunny weather as is the case with drying.

With the seasonal shortage of sardines at certain times of year, promoting the production of bottled sardines as an option is likely to put poorer households at risk. Poor families in particular require a constant source of income which cannot be realized by bottling sardines, a livelihood which can only be conducted for 3-4 months per year. It is more realistic to have a multi-faceted low technology livelihoods means which are not dependent on a single aquatic species or on the weather. For example fish flakes can be produced year round by almost any household.

The manufacture of the bottled sardines should only be undertaken by companies/groups that are committed and able to comply with all the technical and legal requirements. Food safety is non

negotiable. Food commodities such as bottled sardines and bottled *alamang* (shrimp paste) though belonging to low risks products can, if done incorrectly, result in food safety hazards like Botulism if precautions are not properly taken. An established process schedule has to be determined for every product/variant to attain the desired sterilization value. This must be done through heat penetration studies/determinations. There are processing establishments in the project sites that already manufacture the product and are even engaged in product development, but are not complying with food safety requirements e.g. established process.

Some extra precautions should be taken when manufacturing value added products from comminuted/minced raw materials such as fish balls, *quikiam*, and *longganisa* (fish sausages). These foodstuffs are high risks products due to their limited shelf-life (should be kept refrigerated) and their susceptibility to contamination during preparation.

In general, emphasis should be given to the adoption of preservation and processing methods (drying, salting, fermentation, roasting, cooking) which are simple (low technology) and which do not need sophisticated expensive equipment and high capital investment.

c) Cold storage

RFLP PHI should provide technical support by re-designing the layout of the processing area of the cold storage facility. Key points that need addressing include:

- Installation of hand washing and sanitizing facilities (sink, automatic faucets, automatic hand dryers, hand sanitizing equipment and a footbath) at the entrance to the main processing area. Hand and raw material washing facilities in the main processing area should also be provided;
- Provision of a raw material receiving area (with footbath) and washing facilities for raw materials;
- Removal of access doors to toilets from the main processing area;
- Physical separation of the freezing equipment from main processing area;
- Provision of a packaging area with hand washing facilities; and,
- Provision of storage areas for packaging supplies and cleaning supplies and materials.

RFLP PHI should also provide the staff of the facility with check lists of all the requirements to keep it functional (equipment, utensils etc.). Additional support could be through on-the-job training (OJT) of the staff on how to prepare the raw materials (fish) for the cold storage, once the facility is already fully equipped with the necessary equipment.

4. Miscellaneous

The PH NC should keep himself informed on emerging new species caught by the local fishers which can be potential raw materials for fish processing. He could get the information from the LGU-MAOs who carry out regular monitoring of the fish in the public markets.

Furthermore, if new fish species are identified as becoming scarce or endangered, the PH NC should notify the relevant authorities and initiate the immediate discontinuance of the use of the species for processing. People whose livelihoods are being supported by the project should be advised to use alternative raw material species.

As already discussed by the IC with the NCs for livelihoods and micro-finance, the number of approved livelihoods for bottled sautéed *alamang* (shrimp paste), should be limited in the first instance to only two beneficiaries. This has been decided because of the problem in securing sufficient raw

materials. If the manufacture of the product were more widely promoted, there might be a danger of over-exploitation of the resource base.

The IC also recommended that all NCs look into the possibility of having desalination equipment or something similar on the island of Selinog (population = 835) to resolve the problem of both salt supply and the supply of potable water. The possibility of using solar energy and agro-waste energy source should also be explored. Agro-waste utilization on the island would reduce the debris which is accumulating on the beaches and which is regularly washed onto the shores of the island.

Consumer education or awareness raising campaigns on food/fish safety, e.g. consumption of low quality and contaminated fish and fishery products and the utilization of immature (juvenile) species of fish for processing, should be intensified. An active campaign should include public markets, FPEs and schools so that fishers, vendors, “compradores”, processors, students and consumers all become aware of the gravity of the problem.

1. BACKGROUND INFORMATION

1.1. Regional Fisheries Livelihoods Programme for South and Southeast Asia (RFLP)

The Regional Fisheries Livelihoods Programme (RFLP) which is funded by the Government of Spain started its activities in September 2009. The project is being executed by the Food and Agriculture Organization of the United Nations (FAO) in Cambodia, Indonesia, the Philippines, Sri Lanka, Timor-Leste and Vietnam. In the Philippines, RFLP Philippines (RFLP PHI) has its national office in Dipolog City, Zamboanga del Norte, and activities are conducted in collaboration with the Bureau of Fisheries and Aquatic Resources (BFAR), which is the national fisheries agency. Currently 9 municipalities (originally 10) and 2 cities are involved in the project. The cities consist of Dipolog and Dapitan while the 9 municipalities are comprised of Liloy, Salug, Leon Postigo, Sindangan, Manukan, Roxas, Katipunan, Sibutad and Rizal.

The overall goal of RFLP is to achieve improved livelihoods and reduced vulnerabilities of small-scale fishing communities in the participating countries and in the South and Southeast Asian region. The project's target outcome is to strengthen the capacity among participating small-scale fishing communities and their supporting institutions towards improved livelihoods and sustainable fisheries management. The six expected outputs are:

1. Co-management mechanisms for sustainable utilization of fishery resources;
2. Measures to improve safety and reduce vulnerability of fisher communities;
3. Measures for improved quality of fishery products and market chains;
4. Strengthened and diversified income opportunities for fisher families;
5. Facilitated access to micro-finance services for fishers, processors and vendors; and
6. Regional sharing of knowledge in support of livelihood development and reduced vulnerability for fisher communities and of sustainable fisheries resource management.

The third RFLP output which covers “Measures for improved quality of fishery products and market chains” falls under the component of Post-Harvest and Marketing (PHM) of Aquatic Products. The activities in this component support outputs 1 (Co-management mechanisms for sustainable utilization of fishery resources), 4 (Strengthened and diversified income opportunities for fisher families) and 5 (Facilitated access to micro-finance services for fishers, processors and vendors).

The PHM structure is based on the principles of the ecosystems approach to fisheries (EAF) management necessary to foster more sustainable resources management practices; and on elements of the Sustainable Livelihoods Enhancement and Development (SLED) approach for creating supplemental livelihoods opportunities and enabling the adoption of sustainable livelihoods and feasible micro-enterprise projects. Furthermore, if applicable it should be based on the Village Savings and Loan Associations (VSLAs) schemes; and linking eligible small-scale fishers and women's groups to soft-loan facilities and other modes applicable to facilitate access to credit and micro-financing programs. All program activities are expected to have gender and disability mainstreamed. Hence, women in fisheries (WIF) will be an integral part of target beneficiaries (Sobreguel, 2011).

1.2 Project Sites

Zamboanga del Norte is the largest province of the Zamboanga Peninsula in terms of land area. It is bounded by two major basins: the Bohol Sea on the northeast and the Sulu Sea on the northwest (Fig.1). Along the stretch of its coast are four bays which are the main fishing grounds of the coastal communities: Murcielagos Bay, Dapitan Bay, Dipolog Bay, and Sindangan Bay. The province is rich in marine and mineral resources. Commercial fishing is primarily for yellowfin tuna, while sardines are important for small-scale fishers. About half of the province's land area is devoted to agriculture.

Zamboanga del Norte province has 27 cities and municipalities, 13 of which are situated in the coastal zone. Among the 13 cities and municipalities, only 12 were originally designated as project sites, which are eventually divided into three (3) clusters. Cluster 1 comprises one city (Dapitan City) bounded by Dapitan Bay and two municipalities (Rizal and Sibutad) bounded by Murcielagos Bay; Cluster 2 includes one city (Dipolog City) and three municipalities (Katipunan, Roxas and Manukan) along Dipolog Bay; and Cluster 3 covers the five municipalities (Jose Dalman¹, Sindangan, Leon Postigo, Salug and Liloy) which are located along the Sindangan Bay (JRMSU, 2011).

Dapitan City

Dapitan City is the first chartered city in the province of Zamboanga del Norte. The City has a total land area of 29,521 ha (29.52 km²) with 50 barangays. Seventeen (17) of the barangays are coastal barangays while two (2) are island barangays. The total land area of the city proper is 193 ha which represents 1.33 percent of the entire land area.

Dapitan is called the “Shrine City of the Philippines” by virtue of Presidential Decree No. 105, issued on January 24, 1973 by President Ferdinand E. Marcos (Artajo, 2008). The *Subanens* were the earliest settlers of the City. Three-fourths (75%) of the land is agricultural, 16% timberland, 2% park and open spaces, 2.1 % tourism area, and others are used as residential, commercial, institutional and for other purposes .The city has a fairly warm temperature and average relative humidity. April and May are the warmest months while December, January and February are the cold months. Highest precipitation occurs during the months of January, June, July, October, November and December (City Planning and Development Coordinator's Office, Dapitan).

Rizal

The municipality of Rizal is located in the eastern part of Zamboanga del Norte. In 1950, Executive Order No. 385 issued by President Elpidio Quirino created the municipality of Rizal. It is classified as

¹ The 4th RFLP PHI national coordinating committee meeting, 3 August 2011 agreed to remove Jose Dalman municipality from the RFLP PHI area of geographic coverage because of a lack of cooperation from the major.

partially urban and a 5th class² municipality. It has 22 barangays, six of which are coastal barangays: Balubohan, Sebaca, Damasing, Nangka, Mabunao, and Nasipang. The *Subanens* were the first inhabitants of the municipality.

Sibutad

The Municipality of Sibutad is found in the northern part of Mindanao, between latitudes 7 to 8⁰ E and longitudes 120 to 121⁰ N. It is bounded to the north and west by Dapitan City, South by the Municipality of Rizal, and east by Murcielagos Bay. It is forty seven (47) kilometers away from the City of Dipolog.

Sibutad existed as a barrio of Dapitan City for forty seven years (1912 – 1959). It was created into a municipality on July 9, 1959 by virtue of an Executive Order No. 344 signed by President Carlos P. Garcia. “Sibutad” was derived from the Visayan term “*Sibut*”, handy fishing paraphernalia usually used by early settlers in catching fish and shrimps. Fish and shrimps used to be abundant in the brooks and rivers around Sibutad. Considering that the place is a rich fishing ground, the term “*Sibut*” must have been of lasting significance, thus “*Sibutad*” was born. Sibutad is a fourth class Municipality in Zamboanga del Norte (CBMS 2010; MPDO 2010).The municipality has a total land area of 6,556.93 ha consisting of 52.58% agricultural land, of 43.45% forest/watershed, 2% residential, 0.64% industrial, 0.23% commercial, and 0.02% tourism area.

Dipolog City

The city got its name from the Subanen dialect “Di-pag”, meaning ‘across the river’. Through the years, this was corrupted by mis-pronunciation and intermingling of Visayan and Subano words into what it is today "**Dipolog**". Dipolog is known for its wild orchids and its sardine industry which stems from the rich fishing area off its shores. It is known as the "Gateway to Western Mindanao" through the Western Nautical Highway and has also been called the "Bottled Sardines Capital of the Philippines" (http://www.dipologcity.org/city_profile.html).

It is situated in the northwestern part of the Province of Zamboanga del Norte, comprising 1.89% of the total area of the province, which is 720,594 ha. On its North is Dapitan City, on the East is Polanco, on the South is Katipunan and on the West is the Sulu Sea. The city has rolling terrain with lowlands along its western coast facing the Sulu Sea. It has a number of waterways. Other rivers, small creeks and streams also traverse the area (http://www.dipologcity.org/city_profile.html).

Katipunan

Katipunan is a changeover from its initial name Lubungan which started as a “parochia” established by the Franciscans in 1700’s. By virtue of Executive Order 21, it became a constituted municipality in 1914 comprising the municipalities of Manukan, Ponot and Roxas making it the biggest municipality

² The Philippine municipalities are divided into income classes according to their average annual income during the last three calendar years:

1st class P50,000,000 or more; 2nd class P40,000,000 or more but less than P50,000,000; 3rd class P30,000,000 or more but less than P40,000,000; 4th class P20,000,000 or more but less than P30,000,000; 5th class P10,000,000 or more or less than P20,000,000; and 6th class below P10,000,000.

Cluster 1	
	Rizal
	Sibutad
	Dapitan City
Cluster 2	
	Dipolog City
	Katipunan
	Roxas
	Manukan
Cluster 3	
	Jose Dalman
	Sindangan
	Leon Postigo
	Salug
	Liloy



Fig. 1. Map showing Zamboanga del Norte province and the RFLP Philippines Project Sites (JRMSU, 2011)

of ZaNorte until 1950. Lubungan was changed to Katipunan from the word “Tipon” which signifies unity in 1936 by virtue of Commonwealth Act 3832 (JRMSU, 2011).

It is approximately between the latitude 8° 19' N and longitude 123° 14' and 123° 21' E. On its west is Roxas, on the south is Sergio Osmeña, on the east is Dipolog City (14 km away) and on the north is the Sulu Sea. It has a total land area of 24,412 ha with a generally rugged terrain. Its shoreline stretches to about 5 km from its boundaries. (<http://www.katipunan.zamboangadelnorte.com>).

Roxas

Roxas was formerly known as Langatian before it was raised to its status as a town on June 17, 1967 by virtue of R.A. 5077, after which it was separated from the Municipality of Katipunan. It is located at 8°31'14.3" N Latitude, and 123°13'44.7" E Longitude. Its western fringe is Manukan, its eastern side is Katipunan, up north is the Sulu Sea while down south is Sindangan and Siayan (Roxas Socio-Economic Profile, 2010).

The town has a gentle to moderate topography in the northern part fronting the coastal areas of the Sulu Sea, and has moderate to very steep slopes in the southern part which is made up of hills and mountain ridges. Two-thirds of its area is hilly ground and only one-third on level ground. It is crisscrossed by four wide rivers: Dohinob Daku, Dohinob Diut, Tangian and Piao Rivers, and three creeks: Irasan, Langatian and Minang Creeks. The areas located along the banks of the rivers are prone to flooding. These areas are located at Dohinob, Denoman, Marupay, Piñamar, Piñalan, Pangologon, Piao and Langatian.

Manukan

Manukan from the local term “manok” was a former barrio of Katipunan. It became a town in 1951 by virtue of the Executive Order signed by President Elpidio Quirino. It is located in the southern part of Zamboanga del Norte approximately 38 kilometers away from Dipolog City.

It has a total shoreline of approximately 18 km and has a fairly warm temperature throughout the year with a mean annual temperature of 27° C. Due to a very short dry season, the relative humidity is comparatively high and constant. Tropical cyclones occur occasionally in the area.

Sindangan

It is one of the pioneering municipalities of the province of Zamboanga del Norte and is known as the fishing capital of the province. Prior to its creation as a municipality, it was once an isolated barrio of the municipality of Katipunan. It became a town on December 22, 1936 by virtue of Executive Order No. 97, signed by then President of the Commonwealth of the Philippines, Manuel L. Quezon.

Leon Postigo

The municipality of Leon Postigo is located in the southern part of Sindangan, the mother municipality from which it was curbed out. It was formerly known as Bacunganand and was created as a municipality through the Batas Pambansa 204 in March 25, 1982.

Salug

Salug is a 3rd class municipality in Zamboanga del Norte. It was created by virtue of Republic Act 2310 on June 21, 1979. However, “Araw ng Salug” (Salug Day) is annually celebrated on the 18th day of September (www.salug.zamboangadelnorte.com).

Liloy

The municipality of Liloy is a 3rd class municipality. It was once a barrio of Sindangan. It was created and became a duly constituted municipality by virtue of Executive Order No. 469 issued by President Elpidio Quirino on August 22, 1951. It is a fishing ground of the northwestern towns of the province of Zamboanga. It is also known as "The Peanut Capital of ZaNorte". A huge portion of the territorial jurisdiction of Liloy had been taken away as a result of the creation and separation of Salug in 1959 and later of Tampilisan in 1978 (www.wikipedia.org/wiki/Liloy).

2. INTRODUCTION

In 2010, the Philippines' Gross National Product (GNP) went up by 7.16 percent. Gross Domestic Product (GDP) grew by 7.33 percent. The agriculture and fishery sector, which contributed 17 percent to GDP, contracted by 0.34 percent (BAS, 2011a).

The total quantity of fisheries production in 2010 was 1.61 percent or 82,024.82 metric tons lower than the 2009 level. Municipal fisheries and aquaculture outdid the 2009 production levels with aquaculture providing the biggest contribution to the total fisheries production growth in 2010. There was an increase of 1.62 per cent in the municipal fisheries production while that of aquaculture surpassed the 2009 record by 2.68 percent. Commercial fisheries, on the other hand, experienced a 0.49 percent decline in production quantity as shown in the table below.

Table 1. Philippine Fisheries Production, 2008-2010

Item	2008 ('000 mt)	2009 ('000 mt)	2010 ('000 mt)
Total	4,966.9	5,079.9	5,159.5
Commercial	1,226.2	1,253.9	1,242.1
Marine	1,151.3	1,159.9	1,184.1
Inland	181.7	188.7	187.3
Municipal	1,333.0	1,348.6	1,371.4
Aquaculture	2,407.7	2,477.4	2,546.0

Source: BAS (2011a)

In 2010, commercial fisheries production reached 1,242,100 metric tons. It was down by 0.49 percent or 6,179 .65 metric tons from the 2009 level. Eight (8) regions recorded production shortfalls while another (8) regions managed to post output gains. The decline in production was largely attributed to the lower quantity of fish landing in Sarangani and South Cotabato as fishing grounds for tuna became limited. This was due to the restriction on the use of purse seine in some foreign waters such as Indonesia and Papua New Guinea. The production gains were due to more fishing operations as encouraged by generally fair weather conditions that prevailed in the regions. Abundant catch of in-season species was reported, specifically Indian sardines, that was unloaded at the private landing site in Zamboanga City during the third quarter of 2010. The positive performance was largely attributed to generally fair weather that prevailed in most parts of the regions during the second half of the year. On the other hand, the decline in production was due to the effects of the El Niño phenomenon during the first half of 2010 (BAS, 2011b).

Production from marine municipal fisheries started to slow down during the first half of 2010, with 1.15 percent decrease over the same period of 2009. The quantity of landed fish was reduced by 2.71 percent during the second quarter of the year as a result of the El Niño phenomenon. Fish tended to migrate to cooler water and veered away from the sea surface making them difficult to capture. The scarcity of pelagic fish schools discouraged fishers from venturing out into the sea during those months.

The quantity of aquaculture production in 2010 was estimated at 2.5 million metric tons. It recorded a 2.68 percent increase from the 2009 level. Production growth was observed in all mariculture environments, especially, seaweeds. On the contrary, there were setbacks in all brackishwater environments while production of aquafarms from freshwater environment displayed positive prospects. Seaweeds accounted for more than half (70.73 percent) of the total aquaculture production by weight in 2010. Output increases were particularly noted in Zamboanga Peninsula, Western Visayas and MIMAROPA (Marinduque, Occidental Mindoro, Oriental Mindoro, Romblon, Palawan) Central Philippine provinces. Good quality planting materials, good climatic condition and lesser incidence of ice-ice disease were reported in Zamboanga Peninsula during the first and third quarters

of 2010. The increasing demand and better prices offered by traders and processors prompted seaweed growers to expand their area planted/harvested (BAS, 2011b).

The major fish species landed by municipal fishing boats were big-eyed scad (*matang-baka*), roundscad (*galunggong*), frigate tuna (*tulingan*), Indian sardines (*tamban*), fimbriated sardines (*tunsoy*), yellowfin tuna (*tambakol*), anchovies (*dilis*), skipjack (*gulyasan*), Indian mackerel (*alumahan*) and squid (*pusit*) (BAS, 2011b). The main export destinations for tuna were the United States of America and Germany.

The 2006-2025 Comprehensive National Fisheries Industry Development Plan (CNFIDP) of the Republic of the Philippines, Department of Agriculture, Bureau of Fisheries and Aquatic Resources (BFAR) articulates the priorities of BFAR and expected results during the 20-year period, defining seven priority projects, which include post-harvest fisheries. Post-harvest has been recognized as a sub-sector in fisheries which is focused on two clusters of fisheries issues: (i) uncompetitive fish and fishery products and (ii) post-harvest losses. Over the past years, CNFIDP has developed and established fisheries post-harvest projects which address two main post-harvest issues: poor product quality and post-harvest losses. Poor product quality is addressed through the development of national quality standards for fish and fishery products, whereas the constraint in weak marketing strategies is covered by projects on marketing and promotion of Philippine fish and aquatic products and development of new value-added fishery products (Sobreguel, 2011).

Furthermore, there are two projects articulated in the CNFIDP that directly address the issue of post-harvest losses: (i) reduction of fisheries post-harvest losses via “cold-chain system” by establishing the necessary infrastructure facilities, as well as instituting the standardization of fish processing methodologies to reduce post-harvest losses and maintain high quality products; and (ii) model villages for Philippine fisheries post-harvest which aims to develop model villages for fisheries post-harvest through combined research, technology development, adoption and community-based fisheries management. The CNFIDP supports the development of comprehensive programs in the other fisheries sub-sector affecting post-harvest, municipal fisheries: (i) infrastructure and post-harvest facilities development for municipal fisheries which addresses the need for adequate infrastructure support for cold storage facilities and fish landing centers; and (ii) development of domestic supply chain and expansion of export markets which is a response to the concern on low prices of aquaculture products by improving the distribution and marketing of fishery products (Sobreguel, 2011).

The RFLP Programme goal in improving post-harvest practices in fisheries is generally aimed at improving fish quality and diversity of value adding and subsequently, profitability of fisheries. Over the long run, enhancing effective and competitive post harvest handling and processing of fish produce will reduce wastage, stimulate markets and create supplemental livelihoods opportunities for coastal communities. Therefore, the RFLP Programme in post harvest fisheries can be considered as fully supportive of the CNFIDP. The output of this consultancy is designed to contribute to the attainment of Programme Output 3 – *measures for improved quality of fishery products and market chains*, through provision of specialist technical assistance to conduct a training needs assessment, design of workable strategic and logistical interventions to improve fish handling, preservation, processing for value adding, marketing, distribution and other similar interventions directed at improving returns and market potentials for fresh and processed fish in the 12 municipalities/cities covered by RFLP Philippines (RFLP PHI). Such interventions should be able to link and mutually reinforce other Outputs of the Programme, especially alternative livelihoods development and fisheries co-management. The Terms of Reference of the consultancy are appended in Annex 1.

3. METHODOLOGY

Relevant documents of the project particularly those dealing with post-harvest were reviewed by the IC. These included the monthly activity reports of the Post-Harvest (PH) National Consultant (NC), Mr. Jonelo T. Sobreguel, the RFLP Inception Report prepared by Mr. William Bourne on the start-up activities, plans and programs for RFLP and the RFLP Baseline Report of JRMSU (RFLP 2011) on the inventory of some primary and secondary data. The aim was to find out the initiatives already undertaken and provided by the project in post-harvest and marketing. The IC particularly took note of the constraints and problems encountered by the target groups (fishers, women's groups, fish processors and other interested groups). At the start of the work of the IC in Dipolog, Zamboanga del Norte (ZDN), the situational report of the NC was not yet available. The report was provided to the IC last Sept. 26, 2011. Due to this limitation, the IC proceeded to design the necessary survey questionnaires for the Training Needs Assessments (TNA) and other assessments that were subsequently implemented.

The field work activities were undertaken from August 14- 26, 2011. The field work was conducted in the 9 municipalities and two (2) cities of the Province of Zamboanga del Norte (ZaNorte). Three types of methods were used during the field work: survey-questionnaire/assessments, interview and observation.

The LGU-MAOs and some BETs served as key informants during the field work. They were a good source of obtaining information on the respective municipalities and provided valuable information about which *barangays* (villages), processors, and public markets etc. to visit. The IC and NC together with the municipal agriculturist or fisheries technician and some BETs of the respective municipalities and cities visited the following sites:

1. Liloy (Poblacion, Barangay Baybay and Kayok)
2. Salug (West and East Poblacion)
3. L. Postigo (Poblacion, Barangay Balec-Balec, Polandok)
4. Sindangan (Poblacion, Barangay La Conception)
5. Manukan (Poblacion, Barangay Linay, Don Jose Aguirre and Punta Blanca)
6. Roxas (Poblacion, Barangay Pasil, Lower Irasan and Langatihan)
7. Rizal (Poblacion, Barangay Mabunao and North Mapang)
8. Sibutad (Poblacion, Barangay Libay and Sinipay Island)
9. Katipunan (Poblacion, Barangay San Antonio)
10. Dapitan (City and Selinog Island)
11. Dipolog (City Market, Port, Barangay Laoy, Olingan, and Barra)

For the Training Needs Assessment (TNA), a semi-structured questionnaire (Annex 2) was used to survey/interview the RFLP beneficiaries, focusing on the members of the various Women's Associations, LGUs and fish processors. At least 5 members of the Women's Associations in every municipality and city were interviewed. Likewise, the municipal agriculturists and fisheries technicians who served as key informants (KI) in the nine (9) municipalities and two (2) cities were requested to answer the questionnaire. Interviews were conducted in Filipino and in the local dialect (Visaya). The IC explained the contents of the questionnaire to the respondents by going through the questions one by one before the respondents could fill in the survey forms.

Specially designed checklists (Annex 3A-D) were used to assess small-scale fishers/boats, landing sites, fish processing establishments (FPEs) and ice plants. The checklists, adopted from the European Union - Africa, Caribbean, and Pacific Project (EU-ACP, 2005), were modified to meet the

assessment requirements. During the assessments of small-scale fishers, additional questions were asked such as time and frequency of fishing per day, duration of fishing, source, quantity and cost of ice used during fishing.

Finally, open-ended questionnaires (Annex 3E) were used to gather information on the fresh fish and processed fishery products being sold in some “wet” and dry markets, including a supermarket in Dipolog City. Information on the place of origin of the fish and processed products was included to determine the place of origin or source of the fish and processed fish being vended. Furthermore, the potential of other species of fish (aside from the commonly used raw materials for processing), which are particularly available during the monsoon season and of low cost, should be explored for the application of appropriate processing methods.

A training course on fish handling and processing was conducted from 27-29 September 2011 at the compound of the Livelihood Skills Development and Enhancement Center (LSDEC). Fish handling and processing has been identified in the TNA as the most preferred training topic by the beneficiaries. The participants of the course were members of the Barangay Extension Trainers (BETs), fishers, fish vendors and the staff of the Bureau of Fisheries and Aquatic Resources (BFAR), key staff of LGU-MAO (Local Government Unit-Municipal Agriculture Office) from the 9 municipalities and 2 cities, the NC of RFLP and ISDA (In-glass Sardines in Dipolog Association).

The data and information gathered are mostly presented in descriptive, qualitative form and some quantitative data are provided as well. Additional information through observation and interviews were noted down and discussed in the report.

4. MAIN FINDINGS

4.1 Training Needs Assessment (TNA)

In line with the training activities of the project to improve the capacity of the beneficiaries (fishers, processors, WIF, LGU-MAOs), a training needs assessment (TNA) was conducted by the IC. This was carried out mainly to better understand the target groups' training requirements so training topics/areas could be properly identified and courses aptly designed. Information on the career/livelihood goals and problems encountered by the respondents were also gathered during the assessment.

4.1.1 Facts on the Respondents

Out of the 114 persons who answered the questionnaire, 11% were male and 89% were female. At the start of the survey, some small scale fishers were considered as respondents, however, the approach was given up because most of the fishers were reluctant to undergo the questioning. In contrast to the assessment made of small scale fishers, most others agreed to answer the questionnaire on small scale fisheries. The fishers who were initially interviewed asserted that they do not need any fish processing training. Some fishers believe that fish processing is women's concern. But some signified their interest to learn more about fish handling.

The age of the respondents ranged from 19 - 71 years old. More than half of the respondents on this item (n=94), 56% had reached secondary level (High School) while only 14 % had only attained primary level (Elementary) schooling. Most of those respondents with Tertiary level (college) education were the LGU-MAOs, 30%. The highest degree achieved by the LGU-MAOs was a Bachelor's degree (Annex 5).

Regarding career goals, among those who responded (n=52) to the query, 64% mainly wanted to start up a business or expand their present family business, while 15% wanted to export their dried fish products. Only 6% wanted to start up livelihood projects for their groups/associations.

4.1.2 Problem Identification

On problem identification, 67% of the respondents (n=51) declared that financial constraints or lack of capital was the main hindrance to fulfilling their career/livelihood goals. 20% claimed that they had problems searching for new markets for their products, particularly for dried fish and fermented shrimp/*alamang*. Other problems identified were technical, political and environmental in nature. These were lack of raw materials, fish and *alamang* for processing, 8%, difficulty in drying during the rainy season, 6%, enforcement of fishery laws e.g. the rampant use of beach seine, '*baleng-baleng*', in some municipalities, 4%.

4.1.2.1 Proficiency and Training Topics

The complete proficiency of the respondents (n=25) concerning the training topics specified in the questionnaire was 44%. However, 32% of those who replied to the query believed that they still need additional training in the areas concerned. The top six preferred topics chosen by the respondents (n=83) which were considered potential training topics were: fish handling and processing, 82%, selective traditional and value added fish and fishery products, 69%, processing matured sardines into fish paste and sauce, 68%, *bangus* deboning, 63%, smoking (*bangus* and pelagic) and product development, 59%. It is worthwhile to note that four of the topics (package training) chosen by the respondents were training topics which had already been offered by RFLP. Unexpectedly, the HACCP training topics on cGMP/SSOP/PRP, HACCP and HACCP Certification, only garnered 44.6% and 43.4%, respectively which could mean that the respondents were not so interested in these topics or they did not consider the topics to be of priority to them.

4.1.2.2 Recent Training

As regards to training undergone in the last three years, only 23 respondents had the opportunity to participate in any training. Thirteen respondents had participated in training courses under RFLP while the rest have attended training courses provided by the LGUs and other government agencies such as LSDEC and NEDA/ILO. The training courses conducted by the LGUs and LSDEC in 1990 had focused on bottled sardines while the one offered by NEDA/ILO in 2001 had covered fish smoking.

4.1.2.3 Attitudes towards Training

On the question regarding the opinion of the usefulness of the training recently received, 83% of the respondents (n= 24) claimed that all of the training courses undergone by them were needed to enable them to do their job. Some 12% asserted that a minor part of the training they had undergone was irrelevant, but that the majority was useful.

Furthermore, 74% of the respondents declared that they perform their present work/tasks better upon completion of the training. Some 26% responded that only some of the training helped in the execution of their present job.

With regard to how much time on the job was needed to learn to perform sufficiently all tasks, 38% replied that they required less than a week to learn how to adequately do all tasks. The same number of responses, 29% stated that one week to 1 month was required in order to learn how to perform adequately their job and 29% required a month to three months to learn how to carry out the tasks sufficiently for their job. Only 5% declared that they needed at least three to six months to do their tasks adequately. No response was given to the least or most liked aspects of the training courses attended by the respondents.

4.1.2.4 Self Study Attitude

Besides training, only 29% of the respondents (n= 68) read informative/technical literature on their own. A similar number of responses (31%) were given by those who claimed that they read informative/technical literature only sometimes or never.

More than fifty per cent of the respondents (n=72) implied that they usually prefer somebody to explain the handouts to them. Some 18% can learn by reading the literature by themselves but this they can do with a little difficulty. There were those who find reading handouts alone somewhat difficult (13%) while 8% find it very difficult to do self study by reading the literature provided to them. Some 51% make notes and write down important points when studying from books or notes, (n= 63) while others either underline important points, 29% or do both, 13%.

As to experience on instructional methods such as lecture, educational film, slides with audio tape, educational TV, demonstration and practical exercises and computer-assisted learning, 80% of the respondents (n=56) had frequent exposure to lecture as a method of instruction. However, only a few, some 16% had some exposure to demonstration and practical exercises. Exposure to educational films and slides with audio was extremely low, with 4% for both methods of instructions.

4.1.2.5 Computer Literacy

Another important aspect was the exposure of the respondents (n=56) to computers in the execution of their job/livelihood. The vast majority, 90%, had no exposure to computers. This could be due to the fact that most of the respondents only reached elementary level schooling. Furthermore, computers have no role yet in the nature of the job the respondents are currently performing.

4.1.2.6 Overall Comments

Only 28 interviewees provided additional comments at the end portion of the survey questionnaire. Some 39% percent commented that they were particularly keen to learn more about fish handling, processing and value chain. Further comments were: requirements for post harvest facilities (e.g. fish landing infrastructure, ice maker, fish processing equipment); curtailing the operation of beach seine (*baleng-baleng*); and to have livelihoods training on pig raising, sewing, buying and selling of fish and garments and to own a “sari-sari” (small convenience) store.

4.1.2.7 Conclusions and Recommendations

Training courses in fish handling and processing should be the main focus of the PHM activities. Furthermore, fish paste and fish sauce manufacture using adult sardines, value addition of fish and fishery products, *bangus* deboning, smoking of *bangus* and pelagic species and product development should be further provided by the RFLP PHI. All the critical findings of the survey such as the methods of instruction to be adopted e.g. lecture and practical exercises should be taken into consideration when designing the training courses. Special attention should be given to the background educational level and the understanding level of the participants.

4.1.2.8 Limitations of the Survey

Use of lengthy questionnaires is not advisable due to the inability of the respondents to fully comprehend the questions. Due to the diverse educational background of the respondents, getting feedback to the questions was very challenging. Although the interviewer together with some local women’s association members explained the queries, many respondents were still unable to answer the questions properly. Some respondents even tried to copy the answers of their co-members. The IC had however emphasised the importance of giving their personal opinions and not to copy from others.

4.2. Assessments

4.2.1 Fish Landing Sites

Except for the municipality of Salug, the remaining eight 8 municipalities and two cities do not have any infrastructure for the landing of fish. Thus, a so-called centralized landing site for the fish catch is non-existent in the project sites. Although, a small thatched “*nipa*” shed (Fig. 2) exists in one of the *barangays* in the municipality of Liloy but this shed was intended for the catch of larger boats (>10 GT). The place serves as a public landing place for small scale tuna fishers so they can weigh and sell their catch to the middle-traders or “compradors”. A private landing area was also allotted to some buyers of tuna. Small-scale fishers usually land their catch where their fishing boats are kept. These are usually in close proximity to the fishers’ place of residence.



Fig. 2 .A “nipa” shed landing site in Liloy

The IC was informed that there is a plan to rehabilitate the landing site in West Poblacion, Salug (Fig.3). During the improvement of the landing infrastructure, it is envisioned to build a fish processing center for the women's association. The present structure of the landing place has many deficiencies which need to be addressed in order to upgrade it to international standards. It is not only the infrastructure which requires improvement but the existing handling, processing, hygiene and sanitation practices at the site as well. Many people are using the site for various purposes. Animals (dogs, chickens and ducks) freely roam the area which is not conducive to good hygiene and food safety practices.



Fig.3. Landing site in Salug

To date, there is a plan in the town of Katipunan to build a landing place near the port which is currently being constructed. When asked personally by the Katipunan Mayor if the landing site should be integrated with the port, the IC recommended that the fish landing site should be separate from the port.

4.2.2 Ice Plants

Ice supply is a serious problem in Zamboanga del Norte. In Salug, ice comes either from Labason, which is approximately 21 km away, or from Pagadian, about 47 km by land. Ice supply in Leon Postigo comes from the same source. In Sindangan, there is a commercial-scale ice production facility and another one which is a LGU-run liquid quick freezer, funded by a grant from National Agribusiness Corporation (NABCOR) (Fig 4).



Fig. 4. Government-run ice plant in Sindangan

The source of ice in Rizal and Sibutad is mainly from *sari-sari*³ stores, neighborhood small convenience stores. Rizal and Sibutad have serious problems obtaining ice due to the poor farm-to-market roads. In both municipalities, fishers transport their catch to major fish ports using boats but this involves considerable expense on their part to cover fuel costs. Roxas and Manukan can get their

³ A *sari-sari* store is a convenience store found in the Philippines. The word *sari-sari* is Tagalog meaning "variety". Such stores form an important economic and social location in a Filipino community. They are present in almost all neighborhoods, sometimes even in every street. Most *sari-sari* stores are privately owned shops and are operated inside the shopkeeper's house (www.wikipedia.org).

ice from Dipolog City but the majority of ice is sourced from nearby *sari-sari* stores. The LGU-run liquid quick freezer in Katipunan is used for small-scale ice production. This facility is a grant from the Department of Agriculture-National Agribusiness Corporation (DA-NABCOR).

Selinog Island in Dapitan City obtains ice from Dapitan City, Dipolog City, Dumaguete City or Siquijor. In Dapitan City, there are two ice facilities, one is a commercial-scale and the other one is a family-scale facility. In Dipolog City, there are two ice plants servicing the area. One is a LGU-run ice plant located at the fish port and the other is a privately owned, commercial-scale facility.

The PH-NC and the IC visited 7 ice plants in the project sites: 2 in Sindangan, 2 in Dapitan City, 1 in Katipunan and 2 in Dipolog City. Majority of the ice plants manufacture ice blocks; blocks are of varying sizes ranging from 10-160kg. The prices of ice manufactured in the RFLP project sites are shown in Table 2. The price of ice block ranges from P1/kg –P4.00/kg. In most instances, the cost of the ice blocks is inclusive of mechanical crushing of the ice.

Table 2. Ice Plants in the project sites Zamboanga del Norte (Region 9)

Ice Plant	Production/day	Cost of ice
1. National Cold Chain Program Liquid Quick Freeze Project MEEDO- Municipal Economic Enterprise Development Office Goleo, Sindangan	144 blocks Ice in plastic bag	P25/10 kg P1/bag
2. La Roche, Sindangan	350-400 blocks	P25/50 kg
3. Gaso Ice plant, Dapitan City	60 blocks Ice in plastic bag (450-500g)	P80/33kg P2/pc
4. Dapitan City Ice Plant with Cold Storage	200 blocks (low season) 700 blocks (peak season)	P275/120kg
5. LGU, Liquid Quick Freezer Poblacion, Katipunan	ice in plastic bags	P2/pc
6. Fish Port Complex, Dipolog City Govt. Ice Plant	100 blocks (low season) 250-300 blocks (peak season)	P50/22 kg
7. Dipolog Ice Plant Dipolog City	20-30 blocks (low season) 80 blocks (peak season)	P280/160 kg

In the assessment of the above-mentioned ice plants, hygienic manufacture of ice blocks is insufficient. Most of the commercial ice plants do not give particular attention to the safety of the ice⁴ being manufactured. In most cases, dirty water is used in unmolding of the ice blocks (Fig. 5). Water is re-used several times even if the water is already very turbid from dirt and rust from the moulds. Although, all of the facilities assessed claimed that potable water is used (as required by the



Department of Health, DOH-PFAD) for the manufacture of ice, contamination from the mould, poor condition of ice storage area, water used for unmolding, poor state of ice crusher, the open and poorly maintained facilities and surrounding environment etc. cannot be ruled out.

Fig.5. Ice blocks from a commercial ice plant

4.2.3 Fish Handling Practices

4.2.3.1 Small Scale Fishers

Although 68% of the fishers (n= 62) own polystyrene boxes, only 38% of them (n=42) use ice on board the fishing boat. This was gathered from the assessment made in 9 municipalities and 2 cities. The fishers (n=62) claim that due to the short fishing duration and time of fishing (before sunrise or after sunset); there was no need to chill their catch. 77% of fishers (n=33) go out to fish twice a day. Of those who went fishing during the day (n=33) most spent 3-5 hours fishing, while those who went fishing at night, 66% (n=24) spent 2-4 hours at sea. Fishing activities were often carried out either early in the morning, between 04.00 - 08.00 hours or in late afternoon to evening (17.00 – 21.00 hours). Use of ice during fishing was practiced only if fishing was carried out at night and when the fisher planned to stay out for longer periods (usually more than 5 hours). Ice used for chilling was commonly available in the *barangays’ “sari-sari”* stores. Some fishers, who have refrigerators at home, produce their own ice. Each ice bag weighs between 400 g – 500 g; the price ranged from P 1.25 - P 2.00 per bag i.e. P 4.00 per kg. The use of crushed ice from ice blocks was rarely practiced by small-scale fishers. Ice blocks were mainly used on board the larger boats (>10 GT boats). Ice blocks used in the area came from Ibil and Sindangan. Re-use of un-melted ice was not uncommon among the fishers.

The usual method of chilling in the municipalities was “wet” icing, that means packing the fish in ice most often with the plastic bags still intact as practiced by many fishers and buyers (“compradores”) alike. The quantity of ice used is generally not sufficient to thoroughly cool the fish. Some fishers rely on the buyers to provide the ice or do the icing upon landing. If fishing is carried out during the day, the buyers usually do the icing of the fish. In the project sites, polystyrene⁵ (PS or locally called “foam”) boxes were widely used by small-scale fishers either to store the ice brought during fishing or

⁴ The ice being sold in the project sites is used for various purposes such as cooling of soft drinks, beer, bottled water and preparation of cooled drinks. Oftentimes, ice is added directly to the drinking water. Thus the determination of the quantity of ice required for fisheries will be complicated unless a survey is conducted.

⁵ Polystyrene is the technical term used for this type of plastic packaging. PS is the abbreviation following ISO (International Organization for Standardization) standard. Extruded closed-cell polystyrene foam is sold under the trademark Styrofoam by Dow Chemical. This term is often used informally for other foamed polystyrene products.

for chilling the fish upon landing. A handful of fishers were using plastic buckets or pails to keep the catch; often during the lean season when the fish catch was low.

Polystyrene boxes were also popular for the transport of fish from the landing place to the market or to the fish processing plant. However, the box has many limitations. For one, it is difficult to clean (once the cells/pores are damaged, filth easily accumulates in them). Due to absence of grips/handles, it is difficult to move. Furthermore, the box does not last long (the lifespan can be less than 3 months if roughly handled); and melt-water is difficult to drain due to the absence of a drainage system.

Most of the PS boxes being used by fishers, vendors and processors appear unhygienic due to the broken cells with deep rooted filth which is difficult to get rid of. Although some fishers line the foam boxes with plastic bags to contain the chilled fish, the risk of contamination cannot be ruled out because the boxes do not have drain holes to allow melt-water to drain away. In most cases, the fish were immersed in dirty and bloody melt-water. Some fishers and vendors even wrap masking tape around the foam boxes in order to lengthen the container life span, but the difficulty of transporting or moving them still persists if there is no supplemental wooden frames used (Fig. 6).



Fig. 6. Polystyrene boxes with wooden frames to support and strengthen the containers

4.2.3.2 Handling Practices in “Wet” Markets

The municipality of Liloy does not have a fixed infrastructure for selling fish after the main market was burned down recently. There is another ‘wet’ market for fish in *Barangay Bay-Bay* where the stalls are mobile. The movable stalls used by the vendors are made from wooden tables with plastic covers. There are no drain holes in the tables thus the vendors resort to the use of sponges to remove the water from the fish. The wet sponge is a good source of contamination for the fish because it can harbor bacteria, moulds and dirt due to the continuous soaking with fish drip. The drip from fish is usually tainted with blood, a good source of nutrients for bacteria.

The fish are displayed for sale on the tables without the benefit of ice; and may be kept for hours before being sold. However, high value species like shrimp are displayed in the City market with ice. Majority of the fish vendors recycled the fish on display by putting the fish back in the insulated container, usually PS boxes, together with the melt-water. It was observed that melt-water was not removed from the containers; the common practice by the vendors is to simply add new ice to the fish-melt-water mixture (Fig. 7). Any unsold aquatic products are returned in the ice box for sale the next day. It appears that this handling practice is widely used in the “wet” markets surveyed.



Fig.7 Adding ice to the fish-melt water mixture

4.2.4 Fish Processing Practices

Drying, salting and fermentation of fish and fishery products were widely practiced at the project sites. Dried whole and split fish are manufactured in several municipalities and cities (Fig. 8). The practice is still very traditional which means that the drying of fish is carried out directly under the heat of the sun. This method is very dependent on the weather elements. For whole fish, sardines, squids, anchovies, slipmouths, juvenile roundscads and other pelagics are the main raw materials. Split fish are also produced mainly from pelagics such as scads, mackerels, roundscads, etc., and coral reef species e.g. siganids, caesio/fusilier, surgeon/unicorn fish etc.



Fig. 8. Drying of whole and split fish

Sobreguel (2011) reported that some processors have developed *matamata* system (estimation by looking) in sorting or sizing fish for drying. For example, *alangan tuloy* (medium-sized sardines) are claimed to be ideal for drying. Disturbingly, juvenile sardines or “lupoy” are also processed for drying in some project sites. Moreover, the drying of juvenile eels (conger and moray) in Sinipay Island is common. One processor informed the IC that he would like to export the product.

The salting/fermentation of fish paste uses primarily sardines and anchovy fry for the production of “guinamos” and “binulabid gamos”. *Binulabid gamos* (anchovy paste) is already an established product by an entrepreneur in Sinipay Island, Sibutad (Fig.9).



Fig. 9 Anchovy paste “Binulabid gamos”

Fermentation of *Acetes* (“alamang”) or salted “oyap” and some matured/adult anchovies are also prevalent in the project sites. Furthermore, matured sardines or less fatty fish are also used for fish paste processing in Bucana-Sicayab, Dapitan; Olingan, Dipolog and in Bantayan, Sindangan (Sobreguel, 2011). The products are sold in the public markets as a fermented product or in the case of “oyap”, it is further cooked (“sautéed”) with some spices and ingredients. Some well-established processors are already processing in bottles the “sautéed *alamang*” product.

One particular product that is being manufactured in San Pedro, Dapitan, makes use of oysters. The products are fresh, salted or “acidified” (with coconut vinegar and some spices) oysters packed in bottles. These are being sold displayed in small booths along the main road.

There are some serious hygiene and food safety concerns e.g. insect infestations in the dried products being manufactured in Selinog Island in Dapitan City. Another quality issue is the formation of “chalky white” appearance on the surface of dried fish (Sobreguel, 2011). These concerns were confirmed during the IC’s visit to the island. Upon inspection of the products being dried, the IC noted that some split fish being dried were infested by blow-fly maggots. During the rainy season, maggot infestation of the product is not uncommon during the drying process. Drying of fish becomes difficult during the monsoon season as flies are particularly attracted by the moist environment in the fish. This is aggravated by the fact that fish is dried without any protective screen covering, which gives flies free access to the products during the drying process (Fig. 10).



Fig. 10. Drying of fish in the project sites

On the other hand, the “chalky” white deposits on the surface of the dried product may be due to the presence of high quantities of impurities (e.g. calcium and magnesium sulfates) in the salt used for brining the fish. This condition can also be aggravated by the absence of fresh water on the island for the brine preparation and washing off of excess salt after brining. People in the island depend on rain

for their freshwater. For half of the year, there is no source of freshwater except for the water which is delivered by large boats or by barges to the island.

In general, the manufacture of processed products in the RFLP sites is mainly done in the processor's backyard due to lack of appropriate processing infrastructure. The fish processing establishments (FPEs) assessed were unsophisticated and made from indigenous "nipa" and "bamboo" materials (Fig.11). Furthermore, the equipment used for processing e.g. brining vats and drying trays (made from bamboo slats locally called "kapings") were crudely made and most looked unhygienic. It appears that the processors were unconcerned about the cleanliness and the maintenance of the tools they were using for processing. Most processing equipment is used as long as it can serve its purpose, until it eventually becomes worthless.



Fig. 11. Fish processing establishments

It is alarming that some fish processors were using waste bins made from used car tires to brine fish (Fig. 12). Additives in tires consist of toxic chemicals such as cadmium, chromium, copper, aluminum etc. which are added to the rubber to prevent bacterial decay. Used tires are not meant to be used as food contact materials.

Some processors make use of broken down refrigerators, wooden vats, dug-out canoe etc. In several places visited, it was not uncommon that chicken and dogs were roaming freely around the processing premises and even had direct access to drying trays. In some fishing villages, the drying racks were built quite high (more than a meter high) to prevent the access of dogs, but chickens and birds still had access to the products even at this height. Under these conditions, contamination of the product with pathogenic bacteria e.g. *Salmonella* and *E. coli* is unavoidable.



Fig. 12.Garbage tire bins used for brining

The IC also observed that bloody wastewater from traditional processing was improperly disposed of by processors, being discarded on the ground where the processing activity was conducted, thus attracting flies and other pests into the processing area. When asked about this by the IC, some processors claimed that solid wastes (heads, tails, scales etc.) were discarded together with other household wastes.

Another serious sanitary practice concern was the alleged use of near shore seawater for brining small fish i.e. anchovies. RFLP baseline information indicated that excreta of dogs, cats, chicken and

possibly humans at beaches may often be mixed with near shore seawater during high tides. This is however not surprising due to the absence of potable water in some coastal barangays (Sobreguel, 2011).

The IC also visited some established processing plants particularly the manufacturers of bottled sardines: Alenter, Gaso, Tita Rosa, Tito Mike's, Basic Flavor Inc., Sindangan Spanish Sardines Savers Association, Manukan Savers Association and PARBFAMCO (Palandok Agrarian Reform Beneficiaries Fisheries and Agriculture Multi-Purpose Cooperative) (Fig.13). Unfortunately during the visit, none of the FPEs was producing bottled sardines due to the unavailability of raw materials. The IC was able to see the inside of facilities of GASO, Tita Rosa, Basic Flavor, Sindangan Spanish Sardines Savers Association, Manukan Savers Association and PARBFAMCO.



Fig. 13. Bottled sardines processing establishments

No proper assessment was made due to the inactivity in the FPEs during the visit. In the Gaso FPE, no activity was being carried out, but the IC inspected the premises. The area was very small, with the whole production being conducted in an area of only 4 x 4 m. At the time of the visit, the establishment was under renovation but the IC was able to interview the owner. The FPE was engaged in product development in order to add more variants to its current flavors. However, the IC has reservations regarding the activity. The FPE already manufactures and distributes its products, but has not yet established its “process schedule”. Establishing the process schedule through heat penetration studies is extremely critical in assuring the food safety of bottled products.

Another FPE visited was the “Tita Rosa” facility. During the inspection, the FPE was installing a mechanical dryer and a retort. According to the Administrator, the company was looking at the possibility of diversifying into other processed products. The officer-in-charge of the Fisheries Post Harvest Technology Division (FPHTD), BFAR Central Office had come to the establishment to train the personnel on milkfish deboning, smoking and value-added products.

Tito Mike's and Alenter did not allow the IC and NC to see the facilities but some feedback from the management was obtained. According to a staff of Alenter, there was no harmonization in the auditing made by the competent authority (CA) from the Central Office in BFAR, Manila and the provincial branch. He further claimed that decisions made by the provincial CA were often reversed by the national CA.

The IC was able to discuss some issues with the owner of Tito Mike's. He raised the problem of raw materials supply and the quality of tap water supplied by the city. He declared that the water entering his processing plant was oftentimes positive for *E. coli* and he needed to constantly address this problem otherwise his LTO (license to operate) would not be renewed. The IC also had the opportunity to talk to his wife who brought up current problems of meeting the requirements for export particularly to the EU. She lamented that it was quite difficult to meet EU requirements. She also mentioned constraints in exporting to the US. She claimed that previously, exporting to the US was easier but since an incident when one local export consignment was detained due to

contamination with “filth” or due to traces of visceral organs in the processed sardines⁶, it was now much more difficult to export to the US. Currently all exported bottled sardines from Dipolog are put on the “watch” list of the US FDA.

The Sindangan Spanish Sardines Savers Association, Manukan Savers Association and PARBFAMCO in Leon Postigo were similarly inspected. The IC considers the first two establishments to barely meet the criteria requirements stated in the assessment checklists. There are numerous areas in the FPEs, particularly PARBFAMCO, which need to be improved. Upgrading the present condition of this specific FPE to an acceptable standard would require financial assistance from a donor agency.

4.2.5 Marketing of Fish

Information on the species and origin of fresh fish and types and source of processed products was gathered to determine where the local fish catch and processed products were being marketed and also to find out the source of processed products in particular. The survey also attempted to find out if the processed products could also be produced in the target municipalities and cities. A total of 173 vendors (136 females and 37 males) of fresh and processed fishery products participated in the survey.

4.2.5.1 Fresh Fish

The fish distribution and marketing of fish in the project sites is mainly controlled by middle-traders (*compradores* or *kumprador*) from the localities or those coming from the cities. Some fishers have financiers who provide informal credit in return for an assured supply of fish. This practice is typical for those supplying fish to the bottled sardine processors. In some instances, the wives of fishers vend the fish around the *barangay*. The IC observed that some buyers of fresh fish come to the landing area on a motorcycle with mounted polystyrene boxes (Fig. 14). These buyers sell the fish in the various *barangays* in their municipalities or in some cases they transport aquatic products to upland *barangays* which are inaccessible by normal land transport. In Dipolog fish port, large scale middle-traders (both women and men) use trucks to deliver the fish to the customers (Fig.15); some distribute the fish to the “sari-sari” stores along the main roads. The distribution sites usually cover several municipalities.



Fig. 14 Fish box mounted on a motorbike



Fig. 15. Truck loaded for fish distribution

Auctioning of fish is usually conducted by secret bidding or whispering. This was confirmed by the middle-trader when the IC asked them while in the process of negotiating the price of the commodity. The fish landed in the port by large commercial boats has very little ice left upon landing, so the

⁶ Contrary to the claim, the US FDA considers the presence of visceral organs as a potential botulism hazard.

buyers tend to ice the fish once it has been sold to them (Fig. 16). Very occasionally small-scale fishers will sell their catch to a ‘*comprador*’ who further markets the fresh fish directly after buying the commodity. During the survey, the IC interviewed a ‘*comprador*’ who had set up a temporary buying/selling station in one of the informal landing areas. The *comprador* maintained that she usually puts a 15-20 % mark up on the fish bought from fishers. Fishers claim that this practice was acceptable to them because they do not have to ice the fish nor market the fish themselves (Fig.17).



Fig 16. Auction of fish in Dipolog fish port

The PH-NC and the IC together with the LGU-MAOs for the respective municipality or city went to survey the fresh fish being sold in public markets. In most cases, the “wet market” was integrated within the public market where other produce (vegetables, fruits, chicken, eggs and other wares) were being sold. Table 3 shows some selected species of fresh fish commonly marketed during the monsoon season (Fig. 18). The fish included in the tabulation are those species which were being sold in the majority of the 9 municipalities and 2 cities visited.

Fig. 17. A
comprador’s temporary
buying/selling station



Table 3. Some Selected Fresh Fish in the “Wet” Markets of RFLP Sites

Species/Family, Local Name (Visayan Name)	Market	Price/ kg in Pesos	Place of Origin/Source
1. <i>Rastrelliger brachysoma</i> “Hasa-hasa” (“Anduhaw”)	1. Liloy 2. Salug 3. L. Postigo 4. Roxas 5. Dipolog 6. Sibutad	120 50-100 80 100 70-120 120	1. Liloy 2. Salug 3. Gampis, Sindangan, Bantayan Pasil, Villaramos 4. Zamboanga City, Sindangan, 5. Punot, Sicayab, Siari 6. Libay
2. Gempylidae (snake mackerels) “Barla” (elongate)	1. Sindangan 2. Liloy 3. Salug 4. L. Postigo 5. Manukan 6. Katipunan	50 40 30-60 30-50 40 50	1. Liloy 2. Moman; Baybay, Liloy 3. Salug, Labason 4. Liloy 5. Disacan 6. Punot, J. Dalman; Dipolog
“Barla” (short)	1. Salug 2. Sindangan 3. Roxas	80 40 80	1. Salug 2. Siari 3. Motibot, J. Dalman
3.Indian Sardines (<i>Sardinella lemuru</i>) “Tamban” or “Tuloy” (“alangan” or medium)	1. Liloy 2. Salug 3. L. Postigo 4. Sindangan	40 10-50 30-40 20-25	1. Patawag, Liloy 2. Salug, Labason 3. L. Postigo 4. Palandok, L. Postigo

	5. Roxas 6. Katipunan 7. Dipolog 8. Dapitan	40 40 50 60	5. Pasil, Roxas 6. Dipolog; Nabilid, Roxas 7. Sindangan 8. Dipolog; Dapitan
4. Roundscad (<i>Decapterus macrosoma</i>) “Galunggong” or “Modlong” (mestizo)	1. Liloy 2. Salug 3. Sindangan 4. Katipunan 5. Dipolog 6. Dapitan	70 80-100 90 80-100 70-100 80-100	1. San Juan, Gutalac 2. Salug 3. Gampis, Sindangan; Labason 4. Dipolog; Roxas 5. Sicayab; Sindangan; Zamboanga City 6. Dipolog
5. Milkfish (<i>Chanos chanos</i>) “Bangus” or “Bangos”	1. Liloy 2. Katipunan 3. Dipolog 4. Dapitan	120 120 80-100 80-100	1. Patawag, Liloy 2. Sicayab, Dipolog 3. Polo, Dapitan; Sicayab, San Pedro, Dapitan 4. Polo, Dapitan, Liang, Dapitan; Lagbas, Polo

During the survey, almost all the species of fish, including crustaceans (shrimps), cephalopods (squids, octopus), mollusks (bivalves and univalves) and seaweeds (*Caulerpa*, *Eucheuma* etc.), being sold in the “wet” markets were listed down using the local “Visayan” names. Regrettably, there was not enough time to find out the scientific and common names of most of the fishery products inventoried. Mollusks and seaweeds were commonly sold in heaps. The IC noted that some species threatened by over-fishing and caught illegally had found their way into local markets e.g. baby sharks, baby moray eels and a lot of juvenile yellowfin tuna.



Fig. 18. Aquatic products being sold in the public markets

4.2.5.2 Processed Products

Dry markets were also checked during the survey to get information on the processed products available in the municipalities and the two cities. Several processed products, salted/dried and fermented fish were being vended in the “dry” markets in the project sites. Processed fishery products in the markets were dominated by dried pelagic species such as sardines, anchovies, mackerels, flying fish and scads, either whole or split. Many reef fishes e.g. nemipterids, siganids, fusiliers, and surgeon fish were also processed into split dried products. Several dried products originate from Zamboanga City, as shown in the label markings on the packaging (carton and wooden boxes) used for transporting the foodstuff. The products were commonly displayed and sold in the open without packaging (Fig. 19); only a very few products e.g. dried squids were packaged in polyethylene bags. Based on the information gathered from some local dried fish processors, locally manufactured products were rarely sold locally except for those coming from Selinog and Salug. The prices of dried products depend on the species and quality of the product. Quality wise the locally produced dried products were of better quality than those coming from

Zamboanga City.



Fig. 19. Processed fishery products

It is alarming that some of the processed products in the public markets were already in a very poor state (advanced rancidity and very moldy) but were still being vended in several markets. It seems that there is no consumer protection regarding this issue. Mould growth and subsequently production of mycotoxins in products could pose severe health risks to the consuming public. Some mycotoxins e.g. ochratoxins from mouldy fish are considered as human carcinogen.

Fermented products (“*gamos*” and “*alamang* or *oyap*”) were sold in the market per drinking glass⁷ and/or packaged in plastic bags. Fermented “*alamang*” was sold either uncooked or sautéed with some added ingredients (Fig. 20). Sometimes the sautéed “*alamang*” was sold together with fresh fish. In this case, the likelihood of cross-contamination of the cooked product is highly probable. Table 4 shows the various processed products being vended in the project sites.



Fig. 20. Fermented “*gamos*” and fermented “*alamang*”, uncooked or sautéed

Table 4. Selected Processed Fishery Products in the “Dry” Markets of RFLP Sites

Species/Family, Local Name (Visayan Name)	Market	Price/ kg in Pesos	Place of Origin/Source
1. Roundscad (<i>Decapterus macrosoma</i>) “Galunggong” or “Modlong” Split-dried	1. Manukan 2. Katipunan 3. Dipolog	120-140 160 100-130	1. Dipolog, Labason 2. Dipolog 3. Surf, Baybay Sur
2. Goatfish (<i>Upeneus vittatus</i>) “saramulyete” or “malitubong” Whole dried	1. Salug 2. Sindangan 3. Manukan 4. Dipolog 5. Sibutad	80-100 140 130 80 120	1. Salug 2. Naga, Zamboanga, Sibugay 3. Dipolog 4. Dipolog, Surf 5. Dipolog
3. Slipmouth	1. Liloy	80	1. Zamboanga City

⁷ In the Philippine public markets, fermented alamang is mainly sold by volume not by weight. The most common means is through the use of a drinking glass.

<i>Leiognathus splendens</i> “sapsap” or “Palotpot” Whole dried	2. Salug 3. Dipolog 4. Dapitan 5. Sibutad 6. Roxas 7. Katipunan 8. Dipolog	80-100 80-100 100 100 80, small 140, small 60, small	2. Ipil; Zamboanga City 3. Surf, Baybay Sur 4. Dapitan 5. Dapitan 6. Dipolog 7. Dipolog 8. Surf
4. Indian Sardines (<i>Sardinella lemuru</i>) “Tamban” or “Tuloy” Whole dried	1. Salug 2. Salug 3. Sindangan 4. Dipolog	100, medium 30-40, small 50, small 50-80, small	1. Salug 2. Salug 3. Gampis 4. Liloy, Baybay Sur, Laoy, Olingan
5. Surgeon Fish <i>Acanthurus/Naso</i> spp. “Bagis” Split-dried	1. Katipunan 2. Dapitan 3. Dipolog	180 180 150-160	1. Dipolog 2. Selinog 3. Laoy; Baybay Sur
6. Flying fish <i>Cypselurus</i> spp. “Bolador” or “Bangsi” Split-dried	1. Manukan 2. Roxas 3. Katipunan 4. Dipolog	140 120 180 40, small 120-140	1. Labason 2. Dipolog 3. Labason 4. Labason, Laoy, Surf, Baybay Sur
7. Garfish <i>Strongylura</i> sp. “Balo” Split-dried	1. Salug 2. Sindangan 3. Dipolog 4. Dapitan	160 140 140 190	1. Zamboanga City 2. Zamboanga City 3. Surf, Baybay Sur 4. Aliguay
8. Big-eyed Scad <i>Selar crumenophthalmus</i> “matang baka” or “gutob or kabalyas” Split-dried	1. Salug 2. Sibutad 3. Dipolog	140 120 130	1. Liloy 2. Dipolog 3. Laoy
9. Squid <i>Loligo</i> sp. “Pusit or Nokos” Split dried	1. Sindangan 2. Dipolog 3. Dapitan	500-600 400 500	1. Zamboanga City 2. Pagadian 3. Aliguay
10. Acetes “Alamang or oyap” Salted, fermented	1. Liloy 2. Salug 3. Sindangan 4. Dipolog	140 70 100 120-140	1. Zamboanga City 2. Ipil 3. Gampis 4. Cebu

Some of the processed fishery products being vended in the biggest supermarket in Dipolog were also recorded (Table 5). The majority of the manufacturers of the products were based in Zamboanga del Norte. It is already apparent that some of the manufacturers have already diversified into using milkfish as a raw material. Some traditional products such as “*kinilaw*” (pickled/marinated fish) were manufactured and sold in the supermarket. There were already many variants introduced by the local producers into the local market.

Table 5. Processed fishery products in Dipolog Supermarket

Name of Manufacturer	Products type/Variants	Price in Pesos
1. Zaragosa (ZDN)	1. <i>Kinilaw</i> (pickled) style fish (hot) 2. salted fish, as appetizer (regular) 3. salted fish, as appetizer (hot) 4. gourmet dried sardines (spicy) 5. Portuguese style, Sardines in corn oil	65 65 65 79 69

	6. Portuguese style, Sardines in corn oil, mild	69
2. Montaño (ZDN)	1. Sardines in tomato sauce, Regular 2. Sardines in corn oil, regular 3. Sardines in pure olive oil, regular 4. Milkfish in corn oil, regular 5. Milkfish in olive oil, white wine	62.50 62.50 89.50 74.95 106.50
3. Bueno (ZDN)	1. Sardines in tomato sauce, spicy 2. Sardines in corn oil, regular 3. Sardines in corn oil, spicy 4. Gourmet dried sardines, spicy 5. Milkfish in corn oil, spicy 6. Sautéed Alamang in corn oil	66 66 66 83 73.95 65.95
4. Dona Elena (ZDN)	1. Sardines in pure olive oil, regular 2. Sardines in corn oil, mild 3. Sardines in corn oil, regular	114 91 91
5. CDO (NCR)	1. Spanish Sardines	86
6. 555 (Zamboanga City)	1. Fried sardines in soya oil, hot and spicy (can)	19

4.2.6 Potential “New” Resources and Processing Technologies Application

The survey made in the various “wet” markets has led to the identification of fish species which were available and low cost during the monsoon season. Information on the available fish resources during the monsoon period can open up new avenues for the application of other processing methods, apart from drying and salting which are usually practiced in Northern Mindanao. As proven in the recently held training where “barla” (*Gymnophthalmus serpens*, snake mackerel), a gempylidae species, see Fig. 21, was used for processing. This species is typically 60 cm in standard length, but can grow up to 100 cm. It is pelagic-oceanic and lives at a depth range of 0-600 meters (www.FishBase.org). Also, there were other species available which were tentatively identified as *Rexea solandri*, Fig. 22 or *Thyrsites atun*, Fig. 23. The “barla” species lend themselves well to processing methods such as smoking, marinating/pickling and value added products e.g. fish balls, fish floss and fish flakes. The species is also caught by small scale fishers. Fishes of the gempylid family (also known as “gemfish”) are used as food fish in many parts of the world, and are the basis of commercial fisheries in New Zealand and elsewhere.



Fig. 21. *Gymnophthalmus serpens*



Fig. 22. *Rexea solandri* (?)



Fig. 23. *Thyrsites atun* (?)

The IC also noted that there were other fish species which may be “new” commercially. These species included the tripletails (*Lobotes surinamensis*, family Lutjanidae), locally called as “sea tilapia” (Fig. 24), and an unknown species locally known as “lawayan” or some call it “Philippine salmon-like fish” (Fig. 25), possibly another (immature) gempylid species. There is the possibility that these resources are abundant in the waters off Zamboanga del Norte. If so, the exploitation of these species could ease

the pressure on the small-scale fishers since large boats operators could focus their efforts on catching these resources instead of competing with them; the small-scale fishers would then be left alone to fish within the 15 km. fishing area. The application of processing methods that can be applied to these species should be explored further by RFLP PHI to promote these new resources.



Fig. 24. Tripletails



Fig. 25. (?)



Fig. 26. “Lawayan”

4.2.7 Constraints and Challenges

4.2.7.1 Raw Material Supply

Sardines are known to be abundant in Zamboanga del Norte from December to May with the peak months being March to April, coinciding with the months of high zooplankton biomass in the area (Hermes and Villoso, 1985). In Sindangan Bay, the Indian oil sardines, *Sardinella lemuru* are commonly caught during those months. Another species, the rainbow sardine, *Dussumiera elopsoides* contributes a very small proportion to the catch. Juveniles are observed to be abundant during the months of December and January. Sardine fishing and processing (dried and bottled) used to be the major livelihoods source for most coastal inhabitants in the Province. In 2005, NEDA claimed that there were about 23 registered bottled sardine producers in the Province, most of which were in Dipolog City.

The problem of raw material supply is also felt by the buyers of tuna, blue marlin and swordfish. They relocate temporarily to the municipality of Liloy in order to meet the start of the landing run of these valuable species. Similar to the so called “food hunters” who search for new ingredients or exotic spices in the most remote places in the world, these buyers or “compradores” must also travel around the country chasing the most coveted fish. According to these people, some of their clients were prepared to pay whatever price they asked for quality raw material. The clients of these buyers were exporters based in General Santos, Davao, Zamboanga City and Metro Manila. The “compradores” alleged that it was getting harder to find the correct fish size required by their clients (Fig. 27).



Fig. 27. Yellowfin tuna landed in Liloy and Dipolog

The most affected sector when stocks are over-fished are the small scale fishers. They usually have an average catch of 2-3 kg per trip. However, there are instances where a fisher returns empty handed after spending 3 hours at sea. During the survey, this grim situation was witnessed by the IC in two Barangays in Liloy.

4.2.7.2 Bottled sardines processing

There are several problems in the production of bottled sardines. The most critical problem is the supply of raw material during the ‘off’ or lean season. During the assessment, all the FPEs: Alenter, Gaso, Tita Rosa, Tito Mike’s, Basic Flavor Inc., Sindangan Spanish Sardines Savers Association, Manukan Savers Association and PARBFAMCO (Palandok Agrarian Reform Beneficiaries Fisheries and Agriculture Multi-Purpose Cooperative) had already been idle for several months due to a shortage of sardines for processing. In addition to the seasonality of *tuloy* and the adverse weather conditions (as the FPEs also employ sun drying⁸ during the production of bottled sardines), other concerns such as losses due to spoilage (pop-up, cap leakage), the rising costs of other ingredients (oil, carrots, chilies, etc.) beset both the small- and larger-scale fish processing entrepreneurs.

The IC had the opportunity to visit the processing establishments of Mendoza and Montaño Foods Corporation in Dipolog City last October 4, 2011. The Montaño proprietor reported that they were diversifying into bottled sautéed *alamang* and even venturing into fruit preserves from local harvest because of the shortage of sardines for processing. The IC discussed the potential of maximizing the utilization of the processing waste during the production of bottled sardines. Around 30% of the whole fish is solid waste when sardines are bottled according to the President of ISDA, and this is normally discharged into the sea. The IC suggested that the company could better utilize this valuable resource by processing it into fish sauce. The proprietor promised to do this the next time the company manufactures bottled sardines. Another option that RFLP PHI should investigate further would be the use of bottled sardine processing waste as a feed input for aquaculture.

4.2.7.3 Cold Storage

The 300-mt BFAR-ZANORTE Cold Storage Facility in Dapitan City was built in order to address the problem of seasonal supply of sardines in the region. It has a floor area of 5,000 m², and is supposed to operate with 2 contact freezers which can freeze 500 kg fish in 3 hours or about 2 tons/day at -35°C. The 285 m³ chill-room can hold up to 50 mt of fish at 5-10°C. There are six 182 m³ cold storage rooms

⁸ This processing step is done to remove surface moisture before frying.

at -18°C that can hold up to 50 tons each. To date, however, the cold storage has not been officially turned over by the contractor to the Provincial government of Zamboanga del Norte and the BFAR in Region IX. Both government agencies are running the facility. Even prior to the official turnover, the facility has already several deficiencies in terms of the plant layout and with some faulty equipment including the contact freezer (only one of the two has been delivered and installed). The contractor will have to rectify these deficiencies before it can become fully operational.

The abovementioned problems will reduce the effective operational capacity of the plant to the detriment of the clients who plan to use it before the sardine season comes in December. Moreover the processing area layout is poorly designed for the hygienic preparation of the raw materials for storage. The ISDA members are the main potential clients of the facility's full services, with ISDA members dropping off fresh fish at the facility, for the facility operators to process prior to frozen storage. The IC also learned that the water supply connection in the facility was cut off due to unpaid water bills to the City water distribution agency.

4.2.7.4 Resource Management, Political and Socio-economic Factors

The bays of Murcielagos and Dapitan are considered rich in marine resources, though the stocks are believed to be less healthy than 10 years ago. These bays have supported the needs of the local communities thus far. However, the existence of illegal fishing – use of dynamite in Dapitan City and the uprooting of coral in Sibutad (Abalone Fishing) – if uncontrolled and unregulated, will threaten the marine habitat resulting in reduced bio-diversity and production (JRMSU, 2011).

Illegal fishing by large commercial fleets inside the 15 km municipal boundary using modern fishing technologies e.g. radar, sonar, purse seine, and super light was raised as a serious concern among small fishers. Piracy in Liloy, Leon Postigo and Salug was reported as an equally serious issue; small and medium sized fishing boats are often held for ransom by armed pirates who take the catch, fishing gear, engines, boats and even lives. The loss of income due to piracy is said to average about 7 days of income annually (Sobreguel, 2011).

Many important commercial fish species breed during the new moon period, in many waters. This is the basis for the declaration of the monthly closed fishing season in the Bay. Jose Dalman, Leon Postigo and Salug have municipal ordinances banning fishing for three days, one day before the new moon, the new moon day and the day after the new moon (JRMSU, 2011). Violation of this local fishing ban is sanctioned by a monetary penalty of P 1,500 per offense (*Sec. 12, Ordinance No.06-02 Leon Postigo; Sec.1, Ordinance No. 24, s, 2008 Salug*).

Another issue is the culture of non compliance among small fishers. For instance, although there is a 3 day fishing ban during the breeding time, and the prohibition is embodied in local ordinances of Jose Dalman, Leon Postigo, Sindangan, and Salug, some fishers ignore the ban. Small fishers also tend to violate other ordinances such as the use of destructive fishing practices e.g. using compressors when harvesting fish and *Andres Andres* (a bivalve/mollusk), *tubli* fishing (use of chlorine), *abo* fishing (driving fish into a net), *pabangog or pabiti* (dynamite fishing), superlight, cyanide fishing, collecting juvenile fish, etc. (Sobreguel, 2011). While capture of fry or juvenile species is illegal, during the IC's visit to some municipalities, widespread use of fine meshed beach seine, locally known as "baleng-baleng" (Fig. 28) was seen. Fry of grouper, catfish, eels, mullets, whiting and flat-fish are the main bulk of the beach seine catch.



Fig. 28. Beach seine and the harvest in Liloy

Numerous baby sharks, juvenile yellowfin tuna, moray and conger eels were not spared from the fishing methods being employed by the local fishers (Fig. 29). Although at the time of the visit in the area, there was a ban on the use of under-sized meshed fishing nets, some municipalities had made an exemption for the harvesting of anchovies. In the municipalities where this was allowed, only the anchovies were openly sold in the market, while next to the town, unsorted catch dominated by the fry of commercial species was on sale. This shows the lack of fisheries management coordination among the municipalities when it comes to the implementation of ordinances.



Fig. 29. Juvenile yellowfin tuna, conger eels, sharks and moray eels

Other reported destructive practices were small-scale sand and gravel quarrying, illegal cutting of mangroves, improper waste and garbage disposal, open defecation along the sea shore, uprooting of coral reefs because of abalone fishing, etc. Collecting *lupoy* (juvenile sardines) is widespread. *Lupoy* is being used for drying, salting and fermentation. Processing of *lupoy* was observed by the IC in some municipalities. Many other fish species are caught and marketed undersized e.g. moonfish and juvenile sardines in Dipolog City market. The products were even prominently displayed in the public markets, presumably because none of the local authorities are enforcing fisheries regulations.

4.3 Training on Fish Handling and Processing

31 participants attended the training course on ‘Fish handling and processing’ (see Annex 8) which was delivered 27-29 September 2011, of which 20 were women. Nine of the attendees came from women’s groups, 5 from fishers’ groups, 6 from LGU-MAOs, 5 from BFAR Provincial office, Dipolog City & 1 from BFAR Region 9 office, 3 from ISDA, and 2 from LSDEC. A total of 3 hours was spent on theory (lecture) and 15 hours on practical exercises. The thrust of the training was on the use of ice (wet icing and chilled sea water, CSW) and proper containers for the maintenance of fish

freshness. The freezing of fish was also discussed and the practical exercises focused on the use of the liquid quick freezer in the Province's Cold Storage. Emphasis was also given in the hastened method of fish sauce fermentation using adult sardines. In order to speed up the fermentation, the raw material was ground to increase the surface area so that enzymes can easily act on the fish flesh. Other practical exercises included bottled fish products in marinades/pickle sauce, fish flakes, fish floss, smoking of low value fish (e.g. *barla*) and “*sinaing*” boiled salted sardines and tuna (see training photos, Fig. 30). Tempura, Japanese style was also taught to a number of women, who wanted to learn the procedure for the preparation. This group of women reported that they did not have an opportunity to do the practical hands-on during the previous training course conducted by RFLP PHI. The group had already requested the IC at the start of the training; sardines were used as raw materials.



Fig. 30. Training photos

4.3.1 Participants

The participants had varied educational background which was a challenge to the IC. The lecture was mostly conducted in the Pilipino language but difficulty arose with some English technical terms for which there were no direct translation in the local language. Some participants seemed to be receptive but it was difficult to tell if they really understood what was being discussed because they never asked questions. Before the commencement of the practical exercises, the IC instructed the participants to read the procedures and to ask the IC for clarifications. Moreover, the participants were instructed to strictly follow the procedures. In spite of the instructions, complications still occurred when some trainees modified the procedures which resulted to some problems e.g. adding the flour and cornstarch to the fish meat before the addition of the other ingredients. The IC had to explain that the addition of the ingredients had to be based on the sequence of ingredients' appearance in the listing stated in the procedure. For instance, salt should be added first to the fish meat ahead of the other ingredients. Salt is required to bring out the gelling properties of the fish protein.

4.3.2 Lecture

The topics of the lecture focused on chilling, freezing, fermentation, smoking, marinating or pickling, packaging and waste management. The IC considered the topic on waste management in fish processing very relevant due to the observations made during field work. During the discussion, it turned out that the waste from the bottled sardines processing, consisting of 30% of the raw material, were simply discarded into the sea. Every part of the fish becomes a valuable raw material, especially as stocks decline.

4.3.3 Practical Exercises

The emphasis of the practical hands-on part of the training was on the use of ice (wet icing and use of chilled sea water, CSW) and proper containers in order to maintain the freshness of the raw material. Hands-on training on block freezing of pelagic species like sardines, shrimps, and squid was also done. Freezing of sardines and big sized species e.g. grouper using the liquid quick freezer was conducted with glazing after freezing. Different methods of thawing the frozen products were likewise practiced.

The utilization of low cost and available all year round raw materials was also highlighted. For instance, “*barla*” presents opportunities. The fish is not preferred by many fish eaters because of its appearance and the presence of many bones. Some consumers even claim that it has a “urine” odor. However the fish was used during the practical exercises and converted into value added products such as fish balls in marinated/pickled sauce (European and Philippine styles) and bottled, fish floss, fish flakes and smoked, the acceptability of the fish was unexpectedly very high. In the Hedonic scale of 1-9, (1= like extremely and 9= dislike extremely), all the products garnered a 1-3 rating (“like moderately” to “like extremely”) from the 26 evaluators. This could be due to the fact that “*Barla*” meat is quite lean, with a mild flavor and a light color. The mild flavor characteristic of the meat is an advantage because there is no need to add more spices to mask the flavor. The so called “urine” off odor was not detected in the products. The “urine” odor may be a problem when the fish is no longer fresh; this could be the urea odor or “ammoniacal” which is associated with shark and often detected in some species of tuna, respectively. According to some participants, the fish is available all year round and the price is almost comparable to sardines (“*tuloy*”) when sardines are not in season.

Table 6. Types of Value –Added Products

Species of Fish	Product
1. Indian Sardine (“ <i>Tuloy</i> ”)	Fish flakes, fish floss, smoked, “ <i>sinaing</i> ”, fried sardines in marinate/pickle sauce (European and Philippine styles), fish balls in marinate/pickle sauce (European and Philippine styles), tempura
2. Snake Mackerel (“ <i>Barla</i> ”)	“ <i>Barla</i> ” floss, smoked, fish balls in marinate/pickle sauce (European and Philippine styles)
3. Roundscad (“ <i>Pula Ikog</i> ”)	Fish flakes, fish floss, fish balls in marinate/pickle sauce (European and Philippine styles),
4. Milkfish (“ <i>Bangus</i> ”)	“ <i>Bangus</i> ” flakes
5. Skipjack	Tuna flakes, “ <i>sinaing</i> ”
6. Trevally jack	fish balls in marinate/pickle sauce (European and Philippine styles)

A total of 21 value-added products were prepared by the trainees. Sensory evaluation of the products was carried out using a 9-point hedonic scale. In general, all the products were acceptable, with a rating of “like slightly” (4) to “like extremely (1)”, though there may have been positive bias since the trainees had processed the products themselves.

5.0 RECOMMENDATIONS

The IC formulated specific recommendations based on the findings which are summarized below. In general, the IC recommends that in all the activities that the PH NC of RFLP-PHI will undertake, the PH NC should work in close collaboration with the staff of BFAR, LGUs-MAOs, Livelihoods, Micro-finance components and Co-management fisheries component staff.

1. Capacity Building through Training Activity

The training activity which focused on the topics below should be continued. The BETs should be given the main tasks to carry out the activity with close supervision from the PH NC-BFAR tandem and in the presence of a LGU-MAOs staff. However, before the start of the barangay training, it is advisable to conduct a 2-day workshop in order to orient the BETs and LGU-MAOs on how to carry out the training effectively. Furthermore, confidence can be better built up if they develop the attitude of self-study e.g. reading technical literature. The PH NC should provide them with easy to understand technical materials. Otherwise there is a real danger that the wrong information will be conveyed to beneficiaries during the training courses.

- a. Hands-on training on fish handling, with the emphasis on the use of proper containers and chilling methods: proper “wet” icing and chilled seawater (CSW), in several fishing Barangays should be undertaken.
- b. Fermentation of adult sardines using hastened fish sauce production. The use of mechanical means such as grinding, use of elevated temperature (exposure to sun) and constant agitation should be highlighted.
- c. Smoking and value-addition of fish and fishery products, should focus on sardines (when in season) and low value species e.g. *barla* (snake mackerel) and cultured species such as *bangus* (milkfish) and *tilapia*. Utilization of “new” raw materials from species of low cost and available all year round should be explored further.

Food safety should be integrated in any training course in order to instill in the participants the importance of basic hygiene and other food safety management tools (HACCP, PRPs, GMP) when handling fish and fishery products.

2. Equipment and Facilities Support

The IC identified a range of equipment and infrastructure needs for hygienic handling and processing of fish. The provision of these material inputs presents a strategic opportunity for the RFLP, but may also require interventions from other donors or financing sources. In all cases, the provision of equipment and facilities should be accompanied by training and awareness raising on the use of such inputs.

- a. Insulated containers

Polystyrene boxes (PS or locally called “foam”) are widely used to store, transport and distribute the fish catch in the project sites. However, there are many disadvantages in the use of this type of

container e.g. it is difficult to move due to the absence of hand grips, there are no drainage holes to remove melt-water, it becomes unhygienic once the cells are destroyed (when the cells are destroyed, cleaning becomes more difficult resulting to unhygienic condition of the container), and it has a short life span if handled roughly.

For fishers' organization (small-scale fishers), women's associations and vendors, RPLP should consider providing them with insulated boxes with all the necessary features of a good container, e.g. high density polyethylene (HDPE) boxes, with drainage holes etc. These containers should slowly replace the currently used polystyrene boxes. Continued use of dirty PS containers is likely to pose serious health and environmental problems. PS contains styrene which is a possible human carcinogen. Fish and marine life mistake PS pieces as food and ingest it, detrimentally affecting the aquatic food chain. Even for land animals, PS can be a threat, as claimed by a participant during the training, ducks in the project sites usually peck at the PS pieces. The toxic substance can then be passed on to human beings if the eggs and the duck meat are consumed. Along the coasts in the project sites, discarded pieces of PS were commonly seen.

b) Salting/brining vats

Provide women's associations with appropriate salting/brining vats. The associations should be able to award the equipment to selected members who are engaged in fermented, salted and dried products processing. The use of brining vats such as rubber tire garbage bins should be discouraged due to the toxic substances they contain. Additives in tires consist of toxic chemicals such as cadmium, chromium, copper, aluminum etc. which are added to the rubber to prevent bacterial decay. Used tires are not meant to be used as food contact materials. The IC recommended to the NCs of the livelihoods and micro-finance components to secure vats which are made from food grade quality materials.

c) Ice maker

Setting up ice making equipment in strategic places such as Salug, Liloy, Roxas, Rizal, Sibutad and L. Postigo should be considered by the project. When selecting sites for ice making machines, special attention should be given to the availability of a good source of potable water. There is no guarantee that the ice presently being produced in the variety stores and even the ice plants in the RFLP PHI area of geographic coverage is manufactured from potable water. RFLP PHI should verify this situation by funding appropriate water testing if necessary.

d) Fish drying tools/smokehouse equipment

Provide women's associations, especially those engaged in fish drying, in Katipunan, Salug and Dapitan City (Selinog Island) with appropriate drying trays ("kapings") with protective covering. The design of the drying trays has already been discussed by the IC with the NCs for livelihoods and micro-finance. Both are now aware of the requirements for the trays.

Support the construction of solar dryers in some municipalities with suitable areas (e.g. Salug, L. Postigo and Selinog Island). Solar dryers will give an opportunity to dried fish processors to continue their activities even during the monsoon season. As already discussed by the IC with the NCs for livelihoods and micro-finance, proper site selection is important for the construction of solar dryers. Solar dryers should be sited away from near shore areas because of possible erosion, and the influence of extreme weather events such as wind and sea water surges which could easily destroy the structure.

Provide smokehouses (drum-type) to those who would like to venture into fish smoking. Smoking of fish is one of the best alternative methods that can be adopted particularly during the monsoon season.

Raw materials for this process are readily available. There are many species of fish which can be used as raw materials such as scads, mackerels, sardines, bullet tuna, cultured species (milkfish and tilapia) and other low cost species of fish (*barla*). Even the fuel materials for the smoking process are very accessible e.g. coconut husks which abound wherever coconut trees are found and these are common in the area. The use of this fuel would clean up the beach and waters in the project sites, which are full of discarded coconut husks.

e) Landing site/processing center

Provide financial support to the rehabilitation of the landing site in West Poblacion, Salug where a fish processing center for the women's association is being planned. Technical advice on the design of the landing site and the association should be provided by the project.

Almost all municipalities (except Salug) have no landing site infrastructure. RFLP should find ways to tap other donor agencies to support the construction of landing sites. The availability of proper landing sites is essential for bottled sardine establishments to meet EU export requirements, a market which many local bottled sardine processors would like to access. The EU demands that there should be a proper landing place where fishers supplying raw materials to bottled sardines processors can take and market their catch.

f) Market fish stalls

Support some municipalities (e.g. Liloy) to establish hygienic and proper fish stalls for local vendors. In some municipal "wet" markets, there is a need to rehabilitate the existing fish stalls; many stalls are already dilapidated and are insanitary due to a water shortage to clean the fish stalls and displayed seafood.

3. Technical Advice

a) ISDA

The members of the association are beset with various problems ranging from a seasonal lack of raw material to meeting the requirements for the BFAR HACCP accreditation. Hence, the project should continue supporting ISDA members (GASO, Alenter, Tito Mike's and Tita Rosa Food Products) by providing technical advice on compliance with the BFAR HACCP accreditation requirements (e.g. drafting of HACCP plans, PRPs, and GMP), labeling, testing etc.

During the recently conducted training course, some bottled sardines manufacturers stated their intentions to trial fish sauce fermentation and fish floss/fish flake processing. RFLP should provide technical advice to interested entrepreneurs.

b) Start-up and on-going livelihoods

Encourage groups or individuals who want to start a business in bottled sardines to adopt other processed products such as fish sauce, value added products (fish balls, tempura etc.), smoked fish, fish floss and flakes etc. which do not require high capital investments and specialized equipment, e.g. a pressure cooker. Furthermore, the processing methods of the aforementioned products are not dependent on the supply of a single species as raw material; and are not reliant on weather elements as in the case of drying.

With the seasonal shortage of sardines at certain times of year, promoting the production of bottled sardines as an option is likely to put poorer households at risk. Poor families in particular require a

constant source of income which cannot be realized by bottling sardines, a livelihood which can only be conducted for 3-4 months per year. It is more realistic to have multi-faceted low technology livelihoods means which are not dependent on a single aquatic species or on clement weather. For example fish flakes can be produced year around by almost any household.

The manufacture of the bottled sardines should only be undertaken by companies/groups that are committed and able to comply with all the technical and legal requirements. Food safety is non-negotiable. Food commodities such as bottled sardines and bottled *alamang* (shrimp paste) though belonging to low risks products can, if done incorrectly result in food safety hazards like Botulism if precautions are not properly taken. An established process schedule has to be determined for every product/variant to attain the desired sterilization value. This must be done through heat penetration studies/determinations. There are processing establishments in the project sites that already manufacture the product and even engage in product development but which are not complying with food safety requirements e.g. established process.

Some extra precautions should be taken when manufacturing value added products from comminuted/minced raw materials such as fish balls, *quikiam*, and *longganisa* (fish sausages). These foodstuffs are high risk products due to their limited shelf-life (should be kept refrigerated) and their susceptibility to contamination during preparation.

In general, emphasis should be given in the adoption of preservation and processing methods (drying, salting, fermentation, roasting, cooking) which are simple (low technology) and which do not need sophisticated expensive equipment and high capital investment.

c) Cold storage

RFLP PHI should provide technical support by re-designing the layout of the processing area of the cold storage facility. Key points that need addressing include:

- Installation of hand washing and sanitizing facilities (sink, automatic faucets, automatic hand dryers, hand sanitizing equipment and a footbath) at the entrance to the main processing area. In addition hand and raw material washing facilities should also be provided in the main processing area;
- Provision of a dedicated raw material receiving area and washing facilities for raw material;
- Removal of access doors to toilets from the main processing area;
- Physical separation of the freezing equipment from main processing area;
- Provision of a packaging area with hand washing facilities; and,
- Provision of storage areas for packaging supplies and cleaning supplies and materials.

RFLP PHI should also provide the staff of the facility with a check list of all the requirements to keep it functional (equipment, utensils etc., see Annex 10). Additional support could be through on-the-job training (OJT) of the staff on how to prepare the raw materials (fish) for the cold storage, once the facility is already fully equipped with the necessary equipment.

4. Miscellaneous

The PH NC should keep himself informed on emerging new species caught by the local fishers which can be potential raw materials for fish processing. He could get the information from the LGU-MAOs who carry out regular monitoring of the fish in the public markets.

Furthermore, if new fish species are identified as becoming scarce or endangered, the PH NC should notify the relevant authorities and initiate the immediate discontinuance of the use of the species for processing. People whose livelihoods are being supported by the project should be advised to use alternative raw material species.

As already discussed by the IC with the NCs for livelihoods and micro-finance, the number of approved livelihoods for bottled sautéed *alamang* (shrimp paste), should be limited in the first instance to only two beneficiaries. This has been decided because of the problem in securing sufficient raw materials. If the manufacture of the product were more widely promoted, there might be a danger of over-exploitation of the resource base.

The IC also recommended that all NCs look into the possibility of having desalination equipment or something similar on the island of Selinog (population = 835) to resolve the problem of both salt supply and the supply of potable water. The possibility of using solar energy and agro-waste energy source should also be explored. Agro-waste utilization on the island would reduce the debris which is accumulating on the beaches and which is regularly washed onto the shores of the island.

Consumer education or awareness raising campaigns regarding food/fish safety, e.g. consumption of low quality and contaminated fish and fishery products and the utilization of immature (juvenile) species of fish for processing, should be intensified. An active campaign should include public markets, FPEs and schools so that fishers, vendors, “compradors”, processors, students and consumers all become aware of the gravity of the problem.

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ANNEXES

Annex 1. Terms of Reference of the Mission

The Programme's goal in improving post-harvest practices in fisheries is generally aimed at improving fish quality and diversity of value adding and subsequently, profitability of fisheries. Over the long run, enhancing effective and competitive post harvest handling and processing of fish produce will reduce wastage, stimulate markets and create supplemental livelihood opportunities for coastal communities.

The output of the Consultant is designed to contribute to the attainment of Programme Output 3 – *measures for improved quality of fishery products and market chains*. Under the overall guidance and administrative supervision of the FAO Representative in the Philippines, the direction of the Regional Programme Manager in FAO Regional Office in Bangkok, technical guidance of the Senior Technical Advisor and in coordination with the RFLP National Programme Coordinator in the Philippines, the International Consultant (IC) will provide specialist technical assistance to needs assessment, design of workable strategic and logistical interventions to improve fish handling, preservation, processing for value adding, marketing, distribution and other similar interventions directed at improving returns and market potentials for fresh and processed fish in the 12 municipalities covered by RFLP Philippines (RFLP PHI). Such interventions should be able to link and mutually reinforce other Outputs of the Programme, especially alternative livelihoods development and fisheries co-management.

The work of the International Consultant shall culminate to the formulation of the following key outputs:

Formulation of strategies that will reinforce a multi-year RFLP Fisheries Post-Harvest Improvement Work Plan. Strategies should be drawn from:

- A review of current initiatives and data generated by the National Consultant on fisheries post-harvest and the baseline assessment;
- Assessments of current post-harvest and value adding practices, deficiencies and potentials for improvement;
- Evaluation of infrastructure support needs and the feasibility of small investments for post-harvest and fish processing;
- Linkages to micro-financing.

Specifically, the IC will:

Travel to the RFLP project sites in the Philippines in order to conduct assessments, rapid appraisals, and/or primary data gathering and needs evaluation;

Review other existing baseline data and assessment tools currently in place to collect and analyze information relating to Output 3 and provide appropriate recommendations as necessary to improve the database and the monitoring and evaluation system for outcomes under the component;

Identify deficiencies, constraints and issues relating to poor fish handling, preservation and value-adding and identify effective interventions by which these can be addressed within the capacity of RFLP during the Project life;

Following items 2, 3 and 4 above, and factoring in all contemporary aspects of effective post-harvest techniques and value-adding, including but not limited to technical feasibility, product desirability and consumer demand, social acceptability, profitability and simplicity for adoption, the IC shall formulate a post-harvest and marketing strategic recommendation that will be integrated into current and future work plans of RFLP PHI, to include the feasibility of providing small post-harvest infrastructure needs and the mechanisms by which these can be achieved, including identification of donor-funding windows;

Provide a PowerPoint presentation of the main elements of the strategic recommendations to RFLP PHI staff and consultants and partner livelihood focal persons of the 10 municipalities and 2 cities covered by RFLP PHI;

Identify capacity building needs and logistical requirements of fisher groups, women in fisheries, processors and interest groups and prepare and deliver a post-harvest training course for such groups with the participation of RFLP staff;

Provide technical assistance and advice to RFLP staff working on livelihoods development on enabling active participation of livelihood groups, fish processors and women's groups to fisheries produce value-adding and enhance uptake of the IC's technical recommendations;

Provide technical assistance to enable specific fish processing organizations and enterprise groups to achieve Hazards Analysis and Critical Control Point (HACCP) certification and similar accreditation for quality fish products such as bottled sardines;

Design and conduct an exit strategy capacity building activities for the RLFP team and a core group of Bureau of Fisheries and Aquatic Resources (BFAR) staff and key staff of local government units to enable sustained post-harvest interventions;

Submit the required Mission Report and provide reports of consolidated information, findings and recommendations for future action, in line with FAO reporting requirements; and,

Perform other related duties as may be required by the FAO Representative.

Annex 2. Training Needs Assessment Questionnaire

Questionnaire

Purpose

This survey is an attempt to a) profile the various sectors (women's group, fishers, government personnel etc.) currently involved in the RFLP Project b) find out their problem areas regarding post harvest fisheries and marketing and c) find out the way they learn best and which training methods would suit them most, in order to help us design training matched to their needs.

Instructions

Please supply the requested information to the best of your ability. Some of the answers to the questions are in the form of multiple choice. Select the answer which you feel corresponds best to your opinion and check box opposite to that answer or encircle the appropriate number. Some are open-ended questions. Other questions have specific instructions for your guidance. Please spell-out all acronyms. Read carefully each question before you answer it. Do not consult anybody. We want your opinion which we will keep confidential. You may use additional sheet if necessary.

Personal Data

1. Name: _____

2. Age: _____ 3. Sex: _____

4. Agency/Sector: _____

5. Address: _____

6. Contact no. _____

7. Position: _____

8. Educational Background:

Degree (Primary/Sec/Voc/College)	School	Year of Graduation
_____	_____	_____
_____	_____	_____
_____	_____	_____

9. In your present job, with whom do you interact (e.i. Non-Government Organizations, Local Government Units, National Government Agencies, Academe, Private Sector, People's Organizations, Fisherfolk's Associations etc.) and for what purposes?

10. Training courses attended (only post-harvest and marketing related training):

Course Title	Place/Dates	Sponsor/Organizing Institution

11. Career/Livelihood goals:

12. Problem Identification

Constraint/problems encountered in job execution:

13. The following topics may be covered in a course on post harvest and marketing. In the space provided (Others), you may write additional topics not mentioned, if any. Answer column A first, then proceed similarly with the other columns. Please be guided by the following instructions for each column.

Column A: Assess proficiency (expertise) for each topic listed. Please encircle 1 for completely proficient, 2 for somewhat proficient, or 3 for not proficient.

Column B: Can the problem be addressed by training? If so check box opposite the problem area.

Topics	A Proficiency Rating			B Check box if problem can be addressed by training or if interested to participate in future training
	1	2	3	
1. Fish Handling (chilling & freezing) and processing (salting, drying, marinating, canning/bottling, new technology)	1	2	3	_____
2. Selected Traditional and Value Added Fish and Fishery Products	1	2	3	_____
3. Processing Matured Sardines into Fish Paste and Sauce	1	2	3	_____
4. Bangus deboning	1	2	3	_____
5. Smoking (Bangus & Pelagics)	1	2	3	_____
6. Product development	1	2	3	_____
7. cGMP*, SSOP/PRP**, HACCP***	1	2	3	_____
8. HACCP certification	1	2	3	_____
9. Participatory Value Chain	1	2	3	_____
10. Others (pls. specify)	1	2	3	_____

* Current Good Manufacturing Practice

***Hazard Analysis and Critical Control Points

**Sanitation Standard Operating Procedures; Pre-Requisite Programme

14. Recent Training

How many training courses have you attended in the last three years? _____ If your answer is “none” go to the Self Study Attitude (letter D) portion.

15. Attitudes towards Training

A. What is your opinion of the usefulness of the training you recently received?

- All of it was needed to enable me to do the job
- A minor part of my training was irrelevant but most of it useful
- Most of my training didn't help me to do the job
- All the training was a waste

B. Did you learn how to execute your present work/tasks in any of the training courses you have attended?

- Yes, I knew what and how to do my job when I started upon completion of training
- Yes, some of them
- No, because the course (s) didn't cover my specialization
- No, because the course (s) were too theoretical

C. How much time on the job did you need to learn to perform all your tasks adequately?

- less than a week
- 1 week-1 month
- 1-3 months
- 3-6 months
- more than 6 months

D. What did you like least in your training (s)?

E. What did you like most in your past training (s)?

F. Would you like to attend a training course in _____?

- Yes, I really need it
- Yes, it would be useful but I don't need it
- No

16. Self Study Attitude

A. Besides training, do you read by yourself any technical literature?

- Regularly
- Sometimes
- Seldom
- Never

B. Can you learn by reading the handout/literature alone?

- With a little difficulty
- With some difficulty
- Find it very difficult
- Usually prefer somebody to explain it

C. When you are studying from books or notes, you usually

- make notes and write down important points
- underline the important portions
- do both a) and b) above
- neither do a) nor b)

17. The following is a list of instructional methods. In column A, please encircle the number opposite each method to indicate how much you have been exposed to that method (0 for no exposure, 1 for some exposure, 2 for frequent exposure). In column B, rank the methods in the order of effectiveness. The most effective will be 1, next 2, then 3 and so on.
I have had experience of the method:

	A Exposure	B Effectiveness Rank	
Lecture	0	1	2
Educational film	0	1	2
Slides with audio tape	0	1	2
Educational TV	0	1	2

Demonstration & practical exercises	0	1	2	___
Computer-assisted learning	0	1	2	___

18. Computer Literacy

Are you using computers in your job? Yes _____ No_____

Comments

Thank you very much for your cooperation!!

Annex 3. Assessment Questionnaires (Small Scale Fishers/Boats, Ice Plants, Landing Places, FPEs, Wet and Dry Markets)

A. SMALL SCALE FISHERS/BOATS

(Based on Directives 91/493/EC, 98/83/EC, 93/43/EC, Reg. 852-853/2004)

Municipality: _____ **Date:** _____

Name of Fisher: _____ **Sex** _____

Elements to Inspect	Yes	No	Comments
On-board Protection of products (from sun & other) Fish boxes adapted (insulated, easy to clean) clean, in good condition with drainage 1.3 Space for the ice sufficient/separated 1.4 Separated box for bait (if applicable)			
2. Fishing gear 2.1 Fishing gear easy to clean 2.2 Well maintained			
3. Fish landing 3.1 Rapid and hygienic 3.2 Allowing drainage of melted water			
4. Hygiene maintenance 4.1 Boat cleaning after landing 4.2 Fish boxes cleaned after each use 4.3 Fish boxes used for landing clean			
5. Oil and fuel kept separated			
6. Crew health and hygiene monitored 6.1 Medical checks practiced 6.2 Adequate personal hygiene			
7. Ice Hygiene 7.1 Ice originated in an approved establishment 7.2 The quantity utilized sufficient for the journey 7.3 Ice handled hygienically			

Source: Manual for the Execution of Sanitary Inspection of Fish -Strengthening Fishery Product Health Conditions in ACP/OCT Countries - October 2005 – A modified version

B. ICE PLANTS

(Based on Directives 91/493/EC, 98/83/EC, 93/43/EC, Reg. 852-853/2004)

Municipality: _____ **Date:** _____

Name of IP: _____

Elements to Inspect	Yes	No	Comments
1. Silo/s for the ice storage: 1.1 Floors: - Impervious, resistant, easy to clean / disinfect - Surface to avoid water accumulation (drainage/slope) 1.2 Walls: - Smooth surfaces, easy to clean / disinfect - Surfaces resistant and impervious 1.3 Ceiling easy to clean, made to avoid condensation 1.4 Doors: - Resistant finishing - Easy to clean - Well closing 1.5 Reception area / delivering of ice and stored products: - Impervious easy to clean and disinfect surfaces - Easy /effective water drainage. - Good insulation from external temperature			
2. Protection against pest and animals (birds ; insects ; rodents ; cats, dogs etc) :			
3. Potable water supply (Code of Practice-FAO 228, s.2008;DOH AO 2007-002; Directives 98/83/CE) or Clean sea water (CSW) (directives 98/83/CE (PW), or 79/923 (CSW): - Potable water (PW) or Clean Sea Water available. - Pressure and volume adapted/ sufficient. - Distinction between pipelines transporting PW or CSW, by using different colours.			
4. Dressing rooms and toilets: - Dressing rooms sufficient in number/size. - Dressing rooms finished in easy to clean/disinfect, materials - Adequate number of hand washing devices. - Hand washing basins provided with: o Non hand-operated taps. o Disposable towels o Soap and disinfectant - Adequate number of toilets (WC) - Toilets not communicating directly with working places			
5. Hygiene of working areas and equipment: - Facilities showing proper hygiene/ maintenance conditions. - Pest control and other animals deterrence system o Rodenticide, insecticides, disinfectants and other toxic chemicals stored in a lockable room or cabinet. o Cross contamination with chemical and poisons under control. - Facilities used only for the ice production and storage - Only potable water or clean seawater used except if specifically authorized and documented. - Only approved detergents and disinfectants used			

- Working areas and equipment washed and disinfected at least once a day			
6. Personnel hygiene: - All workers handling products having a medical certificate. - Personnel handling fish products under medical follow-up. - Any person susceptible to contaminate the product, not allowed to work in contact with. - Adapted uniform, clean and in good condition. - Hair enclosed by adapted, clean head-gear, - Hands washed each time the work resumes. - Hand wounds protected with adapted impervious bandage. - Prohibition of drinking, smoking, spitting or eating in the working areas announced and respected by the personnel			
7. Ice production and use: - Ice made only from potable water or clean sea water - Ice properly stored in rooms/containers used only for the purpose. - Containers or rooms to store ice clean and well maintained - Delivery deck protected			
8. Designation of responsibilities for hygiene surveillance: - Personnel responsible for the ice quality. - Records containing the values obtained and observations on: o Building cleaning and disinfection. o Personnel hygiene o Personnel health condition follow-up o Pests control follow-up o Water quality monitoring			

Source: Manual for the Execution of Sanitary Inspection of Fish -Strengthening Fishery Product Health Conditions in ACP/OCT Countries - October 2005 – A modified version

C. LANDING PLACES

(Based on Directives 91/493/EC, 98/83/EC, 93/43/EC, Reg. 852-853/2004)

Municipality: _____ **Date:** _____

Elements to Inspect	Yes	No	Comments
1. Products protection against: 1.1 Weather conditions (sun) 1.2 Dust and engine exhaust gases 1.3 Rodents and other pests 1.4 Place fenced with lockable system			
2. Building construction and finishing 2.1 Easy to clean, impervious materials 2.2 Smooth surfaces 2.3 Maintained in good condition			
3. Supply of potable water and/or CSW 3.1 Water available at any time 3.2 Water treated on the spot- (note system)			
4. Ice available 4.1 Produced on the spot 4.2 Storage condition/containers 4.3 Quality controlled (manuals)			
5. Sufficient lighting whenever necessary			
6. Waste disposal 6.1 Adequate drainage system 6.2 Containers for solid waste available			
7. Toilets and wash basins available 7.1 Toilets in sufficient number 7.2 Hand wash basins w/soap and disinfectant			
8. Requirements for hygienic operations 8.1 Handling done properly 8.2. Products standing on specific platforms 8.3 Adequate general washing and disinfection 8.4 Landing operation quick and hygienically done 8.5. Ice origin controlled 8.6 Adequate hygiene of ice taken on board by the boat/s 8.7. Ice quantities taken by boats sufficient 8.8 Ice handling adequate 8.9. Presence of non authorized personnel 8.10. Presence of animals inside the fenced area			

Source: Manual for the Execution of Sanitary Inspection of Fish -Strengthening Fishery Product Health Conditions in ACP/OCT Countries - October 2005 – A modified version

D. FISH PROCESSING ESTABLISHMENTS-Hygiene and GMP Control

(Based on EU Directive 91/493-93/43 and EC/178/2002, 852 & 853/2004)

Municipality _____ **Date** _____

Name of FPE _____

Elements to Evaluate	Yes	No	Comments
1. Facilities and equipment Hygiene - Are they kept in a satisfactory state of cleanliness? - Is vermin systematically exterminated? o Are rodenticides, insecticides, disinfectants and any other toxic substance stored in premises or cupboards which can be locked? o Can these toxic products contaminate the fish products? - Are the working premises used only for fish products? - If not, was the company authorized? - Is potable water used for the designated purposes? - Are the detergents and the disinfecting agents approved? - Are the facilities and equipment cleaned and disinfected at least once per day?	.	.	.
2. Personnel hygiene - Has every worker undergone a medical examination? - Is medical examination periodically carried out on workers handling fish? - Is any person that can contaminate the products excluded from handling them? - Do all the workers wear suitable and clean working clothes? - Do they wear a headgear, which covers completely the hair? - Do they wash and disinfect their hands each time before commencing work? - Are the wounds covered with waterproof bandages? - Does the staff respect the instructions of not smoking, spitting, eating and drinking in the working and storage premises?	.	.	.
3. Production and utilization of ice - Is ice produced from potable water? - Is ice stored in containers designated for this purpose? - Are the ice containers clean and well maintained?	.	.	.
4. Containers for fresh fish - Do they protect fish from contamination? - Do they preserve fish in a hygienic manner? - Do they allow for easy drainage of water? - Does filleting or cutting lead to contamination of fillets?	.	.	.
5. Evacuation of waste - Is waste evacuated at least once a day? - Are the waste containers and the waste storage premises cleaned and disinfected after each use? - Can the stored waste be a source of contamination for the establishment?	.	.	.
6. Fresh products - Are products that are not immediately processed, iced or refrigerated? - Are iced products re-iced regularly? - Are pre-packed products iced or refrigerated? - Is gutting and heading done hygienically? - Are gutted or headed fish immediately washed with potable water? - Is filleting and cutting carried in a place different from the place where fish is gutted and headed? - Are there delays in processing fillets or steaks? - Are fillets and steaks rapidly refrigerated? - Are the viscera and other undesirable parts of the fish quickly separated from the product?	.	.	.

7. Storage of frozen fishery products			
- Is temperature recorded on the recorder? - Is the recording kept for a duration equivalent to the shelf			
8. Thawed products - Is thawing carried out hygienically? - Is there a risk of contamination during thawing? - Is melting water drained properly? - Is the temperature of the frozen products appropriate? - Are thawed products destined to be sold well labeled			
9. Other treatments - Pathogens control by authorized treatments (for cooked shrimp or bivalves). Effective control of critical parameters. - Approved Thermal treatments, documented/validated - Critical parameters controlled (pH, aw, ...) - Records available for at least the product validity			
10. Canned products - Retorting parameters validated and under control - Cans or pouches cooled under controlled conditions - Incubation tests (35°C- 37°C) for each lot - Regular microbiological verification tests- Double seam verifications - Can or pouch integrity controls - Adapted lots unification (equivalent conditions)-Dir. 89/396			
11. Salted fish production - Controlled salt quality, properly stored - Salt non recycled, only used once - Salting bins or tanks washed and disinfected before use			
12. Conditions concerning parasites - Are fish checked visually for parasites? - Are the fish or fish parts that are heavily infested removed from distribution? - Is the control of parasites carried out according to decision 93/140/EEC? - Is fish to be consumed raw or cold smoked ($T < 60^{\circ}\text{C}$) subject to a freezing treatment ($T < -20^{\circ}\text{C}$ for at least 24 hours)? Does the processor verify that this freezing treatment is applied? -Is there a declaration that identifies products that were frozen because of parasites or from which the parasites were removed?			

Source: Manual for the Execution of Sanitary Inspection of Fish -Strengthening Fishery Product Health Conditions in ACP/OCT Countries - October 2005 – A modified version

E. Fresh and Processed Fish and Fishery Products Survey Form**Municipality:** _____**Date** _____

Name of Vendor (F/M)	Fresh Fish/Processed	Place of Origin/Source	Price/ kg

Annex 4. Key Informants/Persons Interviewed

Municipality/City	Key Informants/Person Interviewed
1. Liloy	Mrs. Rosemarie Dinglasa, President, Women's Association Mr. Joy Pancho- Agriculture Officer, LGU
2. Salug	Mr. Rodrigo Kabustante, Agriculturist Mr. Rogelio Aquino, Agriculturist
3. L. Postigo	Mr. Ricardo Mahinay- Fisheries Technician Mr. Rolando V. Tablezo, L. Postigo Mayor
4. Sindangan	Mrs. Caridad Belocura, Agriculture Technician , DA Mrs. Lisa Espinas, Chair of Sindangan's Local Council of Women Mr. Lorraine C. Rodrigo- Revenue Collector – Municipal Economic enterprise Development Office (MEEDO)
5. Manukan	Stephanie P. Sudaria and Saima V. Gimeno- Linay Women's Accociation Mrs. Eva Gamallo, fermented fish processor Mrs. Christina D. Diano, Agriculture Designate Mr. Virgilio T. Usad, Barangay Captain, Don Jose Aguirre
6. Roxas	Mrs. Anita Ganub, Agriculture Technician Mrs. Daisy Medija, Tita Rosa Food Products
7. Rizal	Mr. Peter Egay, Agriculture Officer
8. Sibutad	Mrs. Miraflor M. Obnimaga, Agricultural Technologist/Municipal Fisheries Coordinator Mr. Sabino Limbago Jr. Barangay Captain, Sinipay Island
9. Dapitan City	Ms. Hilda Jimena, Fisheries Officer Mr. Felix Tuballa, Barangay Captain, Selinog Island Mrs. Jocelyn Gaso- Ice plant owner; Gaso bottled Sardine and Dried Fish processor
10. Katipunan	Miss Lovely May Tuiza, Fisheries Technician Mr. Candelario Dano, Kagawad/Agriculture & Fisheries Mr. Aureo R. Copag, Alenter Foods Inc. Mrs. Lourdes T. Canoy, Municipal Agriculturist-Municipal Agriculture Office Mr. Crisostomo T. Eguia Jr., Katipunan Mayor
11. Dipolog City	Mrs. Teresa Sañado- Fisheries Technician Mrs. Mila Dharmdas- Dipolog City Fish Port –in-Charge Mr. Stephen Montaño- Proprietor, Montaño Foods Corporation Mr. Alberto Mendoza, Proprietor, Mendoza Bottled Sardines Mr. and Mrs. Michael Cases , ISDA

Annex 5. Personal Data - TNA Respondents

Name of Respondents	Gender	Age	Sector	Educational background	Municipality
1. Gener Gadia	M	46	Bantay Dagat/MFARMC/Fisherfolk	4th yr	Lilog
2. Fernando Naeng	M	52	-	High School	Liloy
3. Rosemarie W. Dinglasa	F	43	Women's Assoc./President	College level	Punta, Liloy
4. Charita Dipacaro	F	71	Barangay Council/Women's Assoc	College graduate	Liloy
5. Julieta Montimor.	F	48	Pantawid Pamilyang Pilipino Program	High School graduate	Kayok, Liloy
6. Gina Dagninotas	F	33	-	HS graduate	Kayok, Liloy
7. Junie Dagninotas	M	32	Barangay Fisherfolk Assoc., Sec.	College Level	Kayok, Liloy
8. Elias Pudador	M	38	Board of Director	HS graduate	Kayok, Liloy
9. Joy Pancho	M	28	Agriculture's office/Fisheries Technician	B.Sc.Fisheries	Liloy
10. Alfredo Baliwit	M	46	-	-	Salug
11. Reynaldo Oro Jr.	M	22	-	-	Salug
12. Nelson Bucoy	M	36	Fishers' Assoc-Bantay Dagat	HS level	Poblacion, Salug
13. Lydia Maribohjoc	F	51	Women's Assoc.	College level	Poblacion, Salug
14. Rogelio A. Tamala	M	51	Fish Warden	BS Ag. Ed. (ZWAC)	Salug
15. Rebecca Pantosa	F	55	Kagawad	-	Poblacion East, Salug
16. Emelinda A. Tamala	F	47	Women's Assoc.- President	-	Salug
17. Elsa Y. Manlupig	F	38	Business Manager	High School Graduate	Poblacion, Salug
18. Honey Fhe R. Rellon	F	25	Women's Assoc. (member)	3rd grad. College	Poblacion, Salug
19. Luzviminda Oro	F	51	Women's Assoc.	2nd yr. HS	Poblacion, Salug
20. Susana B. Ducoy	F	34	Women's Assoc.	HS grad	Poblacion, Salug
21. Ramonita Ebalar	F	47	Fish Processor (dried fish)	HS grad	Balik-Balik, L. Postigo
22. Juanita D. Talledo	F	39	Women's Assoc. (Pro)	Elementary grad	Melamid, L. Postigo
23. Ricardo J. Mahinay	M	52	LGU, Municipal Agriculture	College grad	L. Postigo
24. Anastacio V. Yosores	M	48	Fisher	HS grad.	L. Postigo
25. Elizabeth T. Yosores	F	-	Fisherwoman	HS grad	L. Postigo
26. Gregory Talledo	M	25	Fisher	HS grad	Melamid, L. Postigo
27. Lorna A. Talledo	F	52	Women's Assoc. (auditor)/Dried Fish Processor	HS grad	Melamid, L. Postigo
28. Victoria Omilig	M	68	LGU- Women's Assoc	Elem level	Melamid, Talenga, L. Postigo
29. Charita D. Omilig	F	41	Women's Assoc	College level	Melamid, Talenga, L. Postigo
30. Bernardita Jueno	F	41	Fish Processor		L. Postigo
31. Consuelo Timtim	F	71	Fish Processor		L. Postigo
32. Susina Timtim	F	43	Fish Processor		L. Postigo
33. Diosdada Alforque	F	58	La Concepcion Women's Assoc/LACWA	Grade 6 graduate	Palid, La Concepcion, Sindangan
34. Corazon Dubina	F	50	La Concepcion Women's Assoc	2 nd yr. High School	Palid, La Concepcion, Sindangan
35. Teodora Mirabeles	F	52	La Concepcion Women's Assoc	H.S. graduate	Palid, La Concepcion, Sindangan
36. Russel Anajo			La Concepcion Women's Assoc	H.S. Graduate	Palid, La Concepcion, Sindangan
37. Verlita T. de Guzman	F	43	La Concepcion Women's Assoc	H.S. Graduate	Palid, La Concepcion, Sindangan
38. Aurora May Alforque	F	24	La Concepcion Women's Assoc/LACWA	H.S. Graduate	Palid, La Concepcion, Sindangan
39. Caridad C. Belocura	F	54	DA/LGU	B. Sc. Agriculture	Gampus, Sindangan
40. Susana R. Alforque	F	44	Agriculture technician/LACWA	H.S. graduate	Palid, La Concepcion, Sindangan
41. Liza Fara D. Espinas	F	57	Local Council Women-Sindangan Chapter	B.Sc. Food and Nutrition/HRM	R. Magsaysay, Sindangan
42. Beverly Forrosuelo	F	60	Sindangan Spanish Sardines	HS graduate	Sindangan

			Savers Assoc.		
43. Anita Allejo	F	57			
44. Joseph Marata	M	44			
45. Catalina Perez	F	63	Barangay Hall Employee/Barangay Women's Assoc	H.S. graduate	East Poblacion, Manukan
46. Cristina D. Luano	F	63	Rural improvement Club/LGU govt. employee	College graduate	Poblacion, Manukan
47. Perlita B. Sundes	F	45	Barangay Hall Employee/East Poblacion Women's Assoc	College level	Manukan
48. Mitzi M. Ordinaria	F	34	Women's Assoc of Punta Blanca	College	Punta Blanca, Manukan
49. Saima V. Jimeno	F	35	Linay Women's Assoc, Manukan Saver Assoc	High School	Linay, Manukan
50. Stephanie P. Sudaria	F	55	Manukan Saver's Assoc.	B. Sc. graduate	Linay, Manukan
51. Eva Gamallo	F	65	Guinamos Processor		Manukan
52. Alicia A. Culancula	F	59	Manukan Women's Assoc.	3 rd year H.S.	Disakan, Manukan
53. Juana Itok	F	46	Langatian Women's Assoc	1 st grade Elementary	Langatian, Roxas
54. Mary Joy Hamoc	F	26	Langatian Women's Assoc	Elementary level	Langatian, Roxas
55. Edna Cabilin	F	48	Langatian Women's Assoc	College graduate (Midwifery)	Langatian, Roxas
56. Raquel Teofilo	F	48	Pasil Women's Assoc	Grade 3	Pasil, Roxas
57. Savanillo Palanas	F	40	Women's Assoc	Midwifery graduate	Langatian, Roxas
58. Rubirosa Elumbarino	F	43	Women's Assoc	College level	Langatian, Roxas
59. Rosalita Torresbuli	F	52	Fish Vendor		
60. Conchita Palaenete	F	51	Fish Vendor		
61. Luzminda Bicoro	F	38	Fish Vendor		
62. Gina Cerleno	F	50	Mabunao Women's Assoc/Fish processor (dried and guinamos)	H.S. graduate	Mabunao, Rizal
63. Necasia Mangubat	F	59	Farmer Mabunao Women's Assoc/Fish processor (dried and guinamos)	H.S. graduate	Mabunao, Rizal
64. Rosanna arboiz	F	41	Farmer Mabunao Women's Assoc/Fish processor (dried and guinamos)	H.S. graduate	Mabunao, Rizal
65. Fe Mangubat	F	29	Farmer Mabunao Women's Assoc/Fish processor (dried and guinamos)	H.S. graduate	Mabunao, Rizal
66. Mary Jane Jaunso	F	35	Women's Assoc/fish processor	H.S. graduate	Mabunao, Rizal
67. Melina Omandan	F	31	Women's Assoc/fish processor	H.S. graduate	Mabunao, Rizal
68. Sarah Bellena	F	42	Women's Assoc/fish processor	H.S. graduate	Mabunao, Rizal
69. Virgie Balbaquera	F	33	Women's Assoc/fish processor	H.S. graduate	Mabunao, Rizal
70. Ma. Estela Bajonsera	F	28	Women's Assoc/fish processor	H.S. graduate	Mabunao, Rizal
71. Roselyn Rombango	F	42	Women's Assoc/fish processor	H.S. graduate	Mabunao, Rizal
72. Lovely May Tueza	F	22	LGU-Fishery Technician	B.SC. Marine Biology	Katipunan
73. Helen Bayer	F	42	Women's Assoc/fish processor (dried fish)	Undergraduate	Katipunan
74. Mylyn Silim	F	19	Women's Assoc/fish processor	H igh School level	San Antonio, Katipunan
75. Betty Bantilan	F	45	"	HS graduate	San Antonio, Katipunan
76. Jovelyn Siarot	F	41	"	1 st year HS	San Antonio, Katipunan
77. Flora Arrayera	F	51	"	HS graduate	San Antonio, Katipunan
78. Adelina Javier	F	45	"	HS graduate	San Antonio, Katipunan
79. Janelyn Cuay	F	20	"	HS graduate	San Antonio, Katipunan
80. Perla Elumbaring	F	39	"	HS graduate	San Antonio, Katipunan
81. Roberta Sumipat	F	28	"	HS graduate	San Antonio, Katipunan
82. Ma. Merlyn Alaton	F	42	"	3 rd year HS	San Antonio, Katipunan
83. Lenie Laure	F	47	"	Elementary graduate	San Antonio, Katipunan
84. Victoria Arcamo	F	50	"	HS graduate	San Antonio, Katipunan
85. Marline Daboda	F	41	Women's Assoc/fish vendor	HS graduate	Sinipay, Sibutad
86. Rosie Jauguin	F	29	Women's Assoc./fish vendor	HS graduate	Sinipay, Sibutad
87. Jocelyn Gunida	F	36	Fisher/Farfish Assoc	HS graduate	Sinipay, Sibutad
88. Josephine Limbago	F	37	Women's Assoc/ Guinamos processor	College, Radio Operator	Sinipay, Sibutad

89.Pacita Baroro	F	47	Women's Assoc/fish vendor	-	Sinipay, Sibutad
90.Marie Rusiana	F	32	Women's Assoc/fish vendor	HS graduate	Sinipay, Sibutad
91.Euginia Arcino	F	21	Women's Assoc/fish vendor	HS graduate	Purok 2, Libay, Sibutad
92.Vilma Prospero	F	39	Women's Assoc/Farfish Assoc	Elementary graduate	Libay, Sibutad
93.Miraflor Obnimaga	F	42	LGU- Sibutad	B. Sc. Fisheries	Sibutad
94.Judith Quiñones	F	30	Women's Assoc	-	Sibutad
95.Merrycriis Balucan	F	26	Women's Assoc	H.S. graduate	Selinog, Dapitan City
96.Aida Laraujo	F	46	Women's Assoc	Elementary graduate	Selinog, Dapitan city
97.Carmelita Bellon	F	48	Women's Assoc/dried fish processor	B. Sc. Commerce	Selinog, Dapitan City
98.Ma. Lanie Baroy	F	38	Women's Assoc	Elementary	Selinog, Dapitan City
99.Melona Senit	F	30	Women's Assoc	H. S . graduate	Selinog, Dapitan city
100. Nenita Tuballa	F	52	Women's Assoc/dried fish processor	HS graduate	Selinog, Dapitan City
101. Merlin Mendez	F	48	Women's Assoc/dried fish processor	3 rd year HS	Selinog, Dapitan City
102. Norma Balucan	F	58	Women's Assoc (President)	Elementary graduate	Selinog, Dapitan City
103. Estrellita Flores	F	47	Women's Assoc (Auditor)	2 nd year HS	Selinog, Dapitan City
104. Dolores Canita	F	53	Women's Assoc/ fresh fish dealer or 'comprador'	Elementary graduate	Selinog, Dapitan City
105. Ime Gador	F	30	Local Council Women (LCW)	Elementary	Purok Everlasting, Olingan, Dipolog City
106. Teresa Sañado	F	48	LGU-Dipolog/Agri. Technician/Fish Warden	B. Sc. Fisheries	Bucana, Sicayab,
107. Cora Ballon	F	51	LCW	College level	Purok Opisco
108.Dominga Dumapig	F	52	LCW	College level	Purok Papagayo
109. Lea Refugio	F	37	NCWP	college	Purok Papagayo
110. Mary Jane Macajelos	F	51	Women's Assoc	Diploma in Fisheries	Purok Papagayo
111. Jolly Atad	F	29	LCW	Diploma in Fisheries	Tamboboy, Olingan, Dipolog City
112.Magelinda Balea	F	44	LCW/DSP	High School graduate	Purok Ofesco, Olingan Dipolog City
113. Evelyn Madura	F	58	NCWD	College	Purok Parpagayo, Olingan, Dipolog City
114. Elena Alina	F	60	LCW	High School	Purok Riverside, Olingan, Dipolog City

Annex 6. Respondents - Small Scale Fishers

Name of Fisher	Age	Gender	Municipality
1. Gener Gadia		M	Baybay, Liloy
2. Fernando Maong		M	Liloy
3. Mario Eyas		M	Liloy
4. Hiracleo Gabas	36	M	Liloy
5. Junie Dagninotas		M	Liloy
6. Melecio Estebat		M	Salug
7. Nelson Duqoy		M	Salug
8. Reynold Oro		M	Salug
9. Ronald Oro		M	Salug
10. Ronnie Ambus		M	Salug
11. Juan Castillo	59	M	Salug
12. Anastacio Yosores	48	M	Melanid, Talinga, L. Postigo
13. Wilfredo Eballyer		M	Balik-Balik, Poblacion, L. Postigo
14. Alex Colina		M	Balik-Balik, Poblacion, L. Postigo
15. Ludivino Gotera		M	Balik-Balik, Poblacion, L. Postigo
16. Joaqin Puyusan		M	Balik-Balik, Poblacion, L. Postigo
17. Jun Ray Gomez	30	M	Balik-Balik, Poblacion, L. Postigo
18. Rolito Cabalan		M	Poblacion, Sindangan
19. Luis Sael	48	M	Sindangan
20. Rizalino Sael	57	M	Sindangan
21. Teodoro Sael	60	M	Sindangan
22. Bryan Sael		M	Sindangan
23. Jeffrey Piag	31	M	Linay, Manukan
24. Edgar Alanalo	45	M	Linay, Manukan
25. Carlito Bantican	45	M	Linay, East Poblacion, Manukan
26. Randy Angot		M	Disakan, Manukan
27. Loremik Pabucar		M	Linay, Manukan
28. Renato Arbuz	35	M	Rizal
29. Alexander Juanzo	42	M	Rizal
30. Celo Jaranuiz	42	M	Rizal
31. Wenceslao Barbahera	35	M	Rizal
32. Marionito Munding	36	M	Rizal
33. Renato Alam	36	M	Roxas
34. Samuel Sartorio	50	M	Roxas
35. Antonio Narzabal	52	M	Roxas
36. Julie Boy Bicoy	40	M	Roxas
37. Lary Bulagot	23	M	Roxas
38. Domingo Dulamas	41	M	San Antonio, Katipunan
39. Arnulfo Partoza		M	San Antonio, Katipunan
40. Ronaldo Silin	40	M	Katipunan
41. Rudy Alpeche	60	M	Katipunan
42. Jose Panama	34	M	Katipunan
43. Nestor Alpeche	29	M	Katipunan
44. Felecio Prospero	40	M	Libay, Sibutad
45. Alejandro Quinones	55	M	Libay, Sibutad
46. Elmer Cutad	46	M	Libay, Sibutad
47. Laureano Gonida	59	M	Libay, Sibutad
48. Conrado Gonida	38	M	Libay, Sibutad
49. Allen Gonzales	42	M	Selinog, Dapitan City
50. Angel Aldion	57	M	Selinog, Dapitan City
51. Rudy Flores	57	M	Selinog, Dapitan City
52. Modesto Dabudabu	47	M	Selinog, Dapitan City
53. Eli Serio Abelon	49	M	Selinog, Dapitan City

54. Tarsela Bantelate		M	Selinog, Dapitan City
55. Andi Taruk	27	M	Selinog, Dapitan City
56. Felicito Anghang	45	M	Dipolog City
57. Alexander Oliveros	40	M	Dipolog City
58. Roseller Posco	51	M	Dipolog City
59. Carlos Motango	35	M	Dipolog City
60. Gerry Ibay	42	M	Dipolog City
61. Rowen Undog	49	M	Dipolog City
62. Nestor Tagapun	29	M	Dipolog City

Annex 7. Training on Fish Handling and Processing - Practical Exercises



REGIONAL FISHERIES LIVELIHOODS PROGRAMME
FOR SOUTH AND SOUTHEAST ASIA
PHILIPPINES (GCP/RAS/237/SPA)

Chilling*

Materials

skipjack/yellowfin (approx. 5 kg), 1 pc
sardines (“tuloy”), 25 kg
coarse salt, 1 kg

roundscad, 12.5 kg
mixed species, 12.5 kg
insulated box (5 pcs)

Procedure

A. Group 1- Chilled seawater (CSW) + sardines

1. Prepare CSW, the volume is equal to 1/3 of the insulated box capacity. The ratio of 3.5% brine to crushed ice is 1:1.
2. Wash fish (12.5 kg) in potable water.
3. Put fish in the ice slurry and read the temperature every 30 minutes until the core temperature of the fish reached 0°C.
4. Plot the temperature against time.

B. Group 2- CSW + skipjack. Follow procedure in A.

C. Group 3- Wet icing + sardines

1. Wash fish with potable water.
2. Pack fish (12.5 kg) in crushed ice (1part fish: 1 part ice)
3. Put crushed ice at the bottom of the insulated box (30 mm). Pack fish alternately with ice. Fish should be surrounded with ice (30 mm) on all sides.
4. Cover the last layer of fish with sufficient ice (60 mm).
5. Read the temperature of fish every 30 minutes until the core temperature of the fish reached 0°C.
6. Plot the temperature against time.

D. Group 4- Wet icing + roundscad - Follow procedure in C.

E. Group 5- Wet icing + mixed species

1. Wash fish with potable water.
2. Put ice (30 mm) at the bottom of the container.
3. Arrange large fish with scales at the bottom, and then fish without scales, followed by small sized species with scales. Last, will be the small-sized fish without scales. Pack fish alternately with ice. Fish should be surrounded with ice (30 mm) on all sides.
4. Cover fish with sufficient ice (60 mm).
5. Read the temperature of fish every 30 minutes until the core temperature of the fish reached 0°C.
6. Plot the temperature against time.

*Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Freezing*

Materials

freezing pans (2.5kg cap.), 5pcs.	sardines, 5 kg
prawns, 2 kg	squid, 2 kg
skipjack or yellowfin (whole, 5 kg)	crushed ice
water, potable	insulated box
basins	kitchen scissors
chilled water (0-4°C)	fine mesh net- nylon

Procedure

1. For Group 1 (sardines), 2 kg; Group 2 (squid)

Wash raw materials, weigh and arrange in the freezing pans.

2. For Group 3 (prawns)

Wash raw materials, then cut antennae and rostrum. Weigh and arrange in freezing pan.

3. Fill pan with chilled water and put the lid on. Make sure that the lid is kept tight by using plastic sheet.

4. Place pan in a basket and immerse in the liquid quick freezer*. Freeze. Take note of the freezing time.

Note: In the absence of a contact plate freezer, this method of freezing will be used during the exercise.

Groups 4 (sardines), 3 kg; Group 5 (skipjack or yellowfin)

1. Wash fish. Weigh the raw materials

2. Arrange fish in a basket and submerge in the liquid quick freezer.
3. Freeze. Take note of the freezing time.
4. Glaze in chilled water. Pack in polyethylene bags then in cartoon. Seal and store in cold store.

Thawing

1. Groups 1-3, remove frozen blocks from cold store and thaw as follows:

Group 1- Thaw frozen sardine block in a vat/basin using chilled water (20°C). Take note of the thawing time.

Group 2- Thaw frozen squid inside the refrigerator. Observe duration of thawing.

Group 3- Leave frozen shrimp block on a tray and let it thaw at ambient temperature. Take note of the thawing time.

Group 4 (sardines) & 5 (skipjack or yellowfish). Thaw in running water. Take note of the thawing time.

2. Weigh the thawed product. Compute weight loss due to drip as follows:

Original weight - final weight

$$\% \text{ weight loss} = \frac{\text{Original weight} - \text{final weight}}{\text{Original weight}} \times 100$$

Original weight

* Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Fermentation*

Materials

sardines (“tuloy”), 4 kg cap)	8 pcs. bottles/glass jars with plastic caps (500-g)
coarse salt, 1 kg	meat grinder

mixing bowls	spatula/ spoons
colander	masking tape, pentel pen
knives	chopping boards

Procedure

1. Wash fish thoroughly. Drain using a colander.
2. Divide the fish into two lots. One lot will be cut into small pieces and the other lot will be ground using a meat grinder.
3. Weigh the cut/ground fish. For the 1st lot, use fish: salt ratio of 3:1; for the 2nd lot, use 3.5: 1 fish : salt ratio.
4. Weigh out the required salt and add to the fish. Mix well.
5. Pack in bottles. Do not overfill.
6. Expose fish: salt mixture to sunlight for 3-4 weeks. Stir contents with wooden or plastic spatula before putting outside.
7. After 3-4 weeks, store bottles in warm dark place until considerable amount of sauce is produced.
8. Filter and put in plastic bottles.

*Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Smoking*

Material

sardines (“tuloy”), 2kg	
gemfish or snake mackerels, <i>Gempylus serpens</i> (“barla”), 2kg	
salt, 2 kg	crushed ice
cooking pot	smokehouse
coconut husks, coconut shells	smoking trays
basins, bowls	colander
knife	chopping board
insulated box	water
muslin cloth	chilled water (20°C)

Procedure (Each Group will assign a member to perform this activity)

1. Prepare saturated brine. Dissolve approx. 700 g salt (depending on the salt quality) in 2 liters potable water. Strain brine using a muslin cloth. Make sure that the prepared brine is sufficient to immerse the fish. If not adjust the volume of brine.
2. Clean the fish to remove adhering dirt. Drain properly.

For sardines, whole or gutted

For barla, cut whole fish into steaks, (3-4 cm thick) then split.

3. Soak fish in the prepared brine for 30-40 minutes or more depending on the size of the raw material.
4. Remove from brine then rinse in chilled water (20°C) to remove excess salt. Drain.
5. Arrange on the smoking tray and dry for 30 minutes under the sun or until dry to the touch.
6. Smoke fish until it attains a golden brown color. Turn fish every 30 minutes to obtain a uniform color.
7. Cool the smoked fish and pack in clean Manila paper/wax paper.
8. Store in cool place or refrigerate.

Note: The smoked fish can be dried to reduce the moisture content. Drying can be accomplished inside the smokehouse without the smoke. The finished product can keep longer if the moisture content is reduced.

*Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Marinating/Pickling*

Materials

sardines (“tuloy”), 4 kg	barla, 2 kg
lizard fish, 2kg	roundscad, 2kg
vinegar (4-4.5% acetic acid), 5 liters	carrots, 300g
iodized fine salt, 2 kg	allspice, 1 pack
ginger, 300g	bell pepper, 300 g
black pepper (whole), 25 g	white sugar, 1kg
onions, (red,1 kg; white, 1kg)	white pepper (ground), 10g
cornstarch, 1 kg	flour (all purpose), 1 kg
lemon grass, 10 stalks	garlic, ¼ kg
bottles/jars, 20 pcs	cooking oil, 3 liter
casserole	

Procedure

A. Fish balls (sardines (2kg), roundscad, lizard fish and barla)**

Separate flesh from bones. Mince and mix with salt, onions, ground pepper, cornstarch and flour. Form into balls. Deep fry fish balls and drain.

Note: for every 100 g minced fish, add $\frac{1}{2}$ tsp salt, $\frac{1}{2}$ tsp minced onions, $\frac{1}{4}$ tsp ground pepper, 1 tbsp cornstarch and 1 tbsp flour.

Sardines (2kg) **

Wash fish thoroughly. Scale, remove the head, fins, internal organs and blood. Cut the fish crosswise to fit the size of the bottle/jar and scrape off blood vessels. Soak in saturated brine for 15 minutes or more depending on the size of the fish. Drain and roll in flour. Deep-fry fish. Drain.

**Group 1- sardines fish balls + 2 packing media; Group 2- lizard fish balls + 2 packing media; Group 3, barla balls + 2 packing media; Group 4, roundscad balls + 2 packing media; Group 5- fried sardines + 2 packing media

B. Preparation of packing medium (pickling/marinating solution):

1. Philippine style

vinegar , 500 ml liter (4-4.5% acidity)	salt, 30g
sugar (refined), 200 g	water, 300 ml
red onion, (rings) 50 g	ginger (slivers), 50 g
carrots (slices), 50g	bell pepper (red, slivers), 50g

2. European style

vinegar, 1 liter (4-4.5% acidity)	allspice, 2-5g
salt, 10 g	sugar, 100g
pepper corn (black), 5 g	white onion (rings), 50 g

Preparation of the pickling solution

Mix sugar, salt, water and vinegar. Heat. Take 300 ml of the pickling solution. Put in the solution the other ingredients for the respective packing medium. Simmer for 5 minutes. Remove garnishing from the pickle solution.

C. Bottling

1. Prepare bottles/glass jars and caps

Wash well and sterilize in boiling water.

2. Packing in bottles/glass jars

a. Pack the fried fish balls and fried sardines into the prepared bottles. Arrange garnishing (carrots, onion rings, ginger, bell pepper, and peppercorns) in the bottles.

b. Weigh bottles individually to get a standard fill. Take care that no particle is on the lip of the bottle. Pour hot pickle solution into the filled bottles leaving 1 cm headspace.

- c. Run a spatula along the inner surface of the bottle to occlude all bubbles. Check the internal temperature before capping. Temperature should be 85°C. If the temperature is lower, place in water bath until the temperature is reached then cap tightly.
- d. Process the sealed bottles in a water bath at 100°C for 10 minutes.
- e. Air cool for 30 minutes then water cool to 40°C.
- f. Wash bottled products then dry. Seal and label and store in a cool dry place.

*Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Fish Floss/Flakes*

Materials

sardines, 2kg	barla, 2 kg
lizard fish, 2kg	bullet tuna, 2 kg
milkfish, 2kg	white sugar, ½ kg
coconut milk (thick cream), 4 cups	lemon grass, 10 pc. stalks
onions, 1 kg	garlic, 4 heads
salt, 1/4 kg	stainless scoop wire
roundscad, 2 kg	

Procedure

1. For sardines, lizard fish and milkfish only: Scale and eviscerate. For bullet tuna and barla, eviscerate, cut to fit the cooking vessel. Wash then poach in water until cooked. Cool.
 2. Separate flesh from bones. Flake.
 3. Heat up a wok and proceed as follows:
- a. For lizard fish and barla (Groups 1 and 2)

Put fish flakes (300-350 g flakes for every kg fresh fish) in a wok and add 2 medium sized minced onions, 2 tbsp minced garlic, 1 tbsp sugar, 1 tsp salt, 1 tbsp lemon grass juice and 100 ml coconut milk. Mix thoroughly. Cook slowly under low to medium heat. Stir frequently to prevent burning and for the floss to brown uniformly. Cook until dry. Cool, pack floss in an airtight container and refrigerate.

The floss can be eaten with cooked rice or can be used as topping for fried rice, noodles, soups and stir-fried vegetables.

b. For Group 3 (sardines), Group 4 (bullet tuna), and Group 5 (milkfish & roundscad)

Put flakes (300-350 g) in a wok together with salt (1 tsp), ground white pepper (1 tsp.) and sugar (1 tbsp). Roast slowly under low to medium heat. Stir frequently until it becomes dry and crispy. Cool and pack in airtight containers (bottles or plastic). Store the product in a dark and cool place.

The product can keep for several months. Fish flakes can be used in soups and in any vegetable recipes.

* Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Fish “Sinaing”

Materials

sardines, 2 kg	bullet tuna, 2 kg
coarse salt, 1 kg	cooking pots
roundscad, 2 kg	

Procedure (Each group will assign a member to perform this activity)

1. Eviscerate fish and wash.
2. Prepare salt (10% of the fish weight).
3. Sprinkle some salt at the bottom of the pot and arrange fish in a pot adding salt in every layer.
4. Simmer in low fire until the liquid dries up.
5. Cool, pack in plastic bags and then refrigerate.

Alternatively, “sinaing” can be air dried before packing in plastic bags. “Sinaing” can keep at room temperature for up to 3 days, if unrefrigerated. The product can be added in any vegetable recipes or can be grilled or fried.

* Note: for more details, please contact RFLP Philippines office local lines at (065) 212-1026 and (065) 213-0232

Annex 8. Training Program

Course Background and Purpose



The training course will feature practical exercises on improved handling practices through the use of appropriate fish containers and promoting the application of proper chilling, freezing, and thawing of fish. The participants shall likewise learn from various fish processing technologies particularly using the frozen fish for bottling; for *tinapa* (smoking); for *patis* (fish sauce); and to explore for its other uses (fish *sinaing*, fish floss and marinated/pickled fish).

For more information, please contact us:



REGIONAL FISHERIES LIVELIHOODS PROGRAMME FOR SOUTH AND SOUTHEAST ASIA- PHILIPPINES

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Post-Harvest and Marketing Specialist

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REGIONAL FISHERIES LIVELIHOODS PROGRAMME FOR SOUTH AND SOUTHEAST ASIA - PHILIPPINES (GCP/RAS/237/SPA)



Training Course on “Fish Handling and Processing”

Livelihoods Skills Development and Enhancement Center (LSDEC),

Brgy. Galas, Dipolog City, Zamboanga del Norte

27-29 September 2011

This serves as invitation

Time	Activity	Responsible Party
27 September 2011		

7:00-9:00 a.m.	Registration and Billeting	Secretariat
9:01-9:30 a.m.	Opening Program National Anthem Opening prayer Introduction of participants	Jonelo T. Sobreguel Post Harvest & Marketing Specialist FAO RFLP
	Welcome Message	Hon. Evelyn T. Uy City Mayor Dipolog City, Zamboanga del Norte
	Opening Message	Benjamin S. Francisco National Project Coordinator FAO RFLP
	Course Elements and Expectation Settings	Jonelo T. Sobreguel Post Harvest & Marketing Specialist FAO RFLP
Day 1: 27 September 2011		
9:31-11:00 a.m.	Lecture- Introduction, fish handling, chilling, freezing and thawing of frozen fishery products	Jasmin Espejo-Hermes FAO Consultant
11:01 a.m.-12:00 noon	Practical exercises- Chilling (Use of wet icing and chilled seawater)	Jasmin Espejo-Hermes FAO Consultant
12:01 p.m.	L U N C H	
1:00-2:00 p.m..	Practical exercises- Preparation of raw materials for freezing	Jasmin Espejo-Hermes FAO Consultant
2:01-2:30 p.m.	Travel to 300-MT BFAR-ZANORTE Cold Storage Facility, Brgy. San Pedro, Dapitan City, Zamboanga del Norte	Secretariat
2:31-5:00 p.m.	Practical exercises- Freezing (Use of liquid quick freezer)	Jasmin Espejo-Hermes FAO Consultant
5:01-5:15 p.m.	Travel back to LSDEC compound	Secretariat

5:16-6:00 p.m.	Reminders for Day 2 Practical exercises- Methods of thawing	Jasmin Espejo-Hermes FAO Consultant
Day 2: 28 September 2011		
7:00-8:30 a.m.	Practical exercises- Methods of thawing	Jasmin Espejo-Hermes FAO Consultant
8:31-10:00 a.m.	Lecture- Processing methods (Fermentation, smoking and marinating), packaging and waste management	Jasmin Espejo-Hermes FAO Consultant
10:01 a.m.-12:00 noon	Practical exercises- Fermentation (Hastened fish sauce processing)	Jasmin Espejo-Hermes FAO Consultant
12:01 p.m.	L U N C H	
1:00-5:00 p.m.	Practical exercises- Smoking (Use of pelagic and “new” species e.g. barla and sardines) and other value-added (“Sinaing” e.g. bullet tuna and sardines) Practical exercises: Marinating or pickling	Jasmin Espejo-Hermes FAO Consultant
5:01-5:30 p.m.	Reminders for Day 3	Jasmin Espejo-Hermes FAO Consultant
Day 3: 29 September 2011		
7:00-11:30 a.m.	Practical exercises- Other value-added products (Fish floss e.g. sardines flakes, bullet tuna flakes and bangus flakes; barla <i>abon</i> and kalaso <i>abon</i>)	Jasmin Espejo-Hermes FAO Consultant
11:31 a.m.-12:00 noon	Group reports Sensory evaluation of manufactured products Training evaluation	Jasmin Espejo-Hermes FAO Consultant
12:01 p.m.	L U N C H	
1:01-3:00 p.m.	Closing Program	Jonelo T. Sobreguel Post Harvest & Marketing Specialist FAO RFLP

1:11-2:11 p.m.	Product presentation Product taste test	Participants
2:12-3:00 p.m.	Awarding of certificates	
	Message	Dir. Ahadulla Sajili, Al HadjRegional Director BFAR IX
	Closing message	Ms. Angelita S. Collyer Livelihood Center Operations Manager LSDEC, Dipolog City, Zamboanga del Norte
3:01 p.m.	DEPARTURE	

Annex 9. Training Participants

NAME	SEX (M/F)	AGENCY	DESIGNATION	ADDRESS
1. Sobreguel, Jonelo T.	M	FAO RFLP	Post-Harvest & Marketing National Consultant	Dipolog City, Zamboanga del Norte
2.Diano, Cristina D.	F	LGU	MAO-Agriculture Technician	Manukan, Zamboanga del Norte
3.Tamala, Rogelio A.	M	LGU		Salug, Zamboanga del Norte
4.Omilig, Charita D.	F	Women's	President	Leon Postigo, Zamboanga del Norte
5.Dinglasa, Rosemarie N.	F	Women's	President	Liloy, Zamboanga del Norte
6.Fernandez, Milagros G.	F	Women's	Member	Leon Postigo, Zamboanga del Norte
7.Talledo, Teresita Y.	F	Women's	Member	Leon Postigo, Zamboanga del Norte
8.Templado, Rufina Z.	F	Women's	President	Liloy, Zamboanga del Norte
9.Obnimaga, Miraflor M.	F	LGU	MAO- Fishery Technician	Sibutad, Zamboanga del Norte
10.Cadag, Jose Jr. C.	M	LSDEC		Dipolog City, Zamboanga del Norte
11.Mangubat, Hermil A.	M	Fisher's	Member	Rizal, Zamboanga del Norte
12.Cabaniog, Dolorita J.	F	Women's	President	Katipunan, Zamboanga del Norte
13.Arroco, Abner	M	Fisher's	Member	Katipunan, Zamboanga del Norte
14.De Guzman, Tiburcio	M	BFAR IX	Provincial Fishery Office Staff	Sindangan, Zamboanga del Norte
15.Cordova, Basilidisa	F	Women's	Member	Leon Postigo, Zamboanga del Norte
16.Landos, Jennifer G.	F	Women's	Member	Leon Postigo, Zamboanga del Norte
17.Laput, Mercedita D.	F	Women's	President	Katipunan, Zamboanga del Norte
18.Villaruz, Roselyn D.	F	ISDA	President (NamNamm Bottled Spanish Sardines)	Dipolog City, Zamboanga del Norte
19.Aguhab, Alma B.	F	BFAR IX	Provincial Fishery Office Staff	Dipolog City, Zamboanga del Norte
20.Sañ do, Teresa Z.	F	LGU	CAO-Agriculture Technician	Dipolog City, Zamboanga del Norte
21. Alingal, Joseph ne B.	F	BFAR IX	Provincial Fishery Office Staff	Dipolog City, Zamboanga del Norte
22.Agpasa, Fortunato P.	M	Fisher's	CFARMC- Chairman	Dipolog City, Zamboanga del Norte
23.Marata, Rolly M.	M	ISDA	Production Worker (Montaño Bottled Sardines)	Dipolog City, Zamboanga del Norte
24.Aleta, Allan Dann	M	LSDEC	Administrative Aide	Dipolog City, Zamboanga del Norte
25.Lorenzo, Adoracion S.	F	BFAR IX	Regional Office Training Section	Zamboanga City

26.Bastasa, Myrna B.	F	BFAR IX	Provincial Fishery Office Staff	Dipolog City, Zamboanga del Norte
27.Sun, Ildefonsa G.	F	LGU	CAO- Agriculture Technician	Dapitan City, Zamboanga del Norte
28.Reyes, Dario V.	M	Fisher's	CFARMC- Vice Chairman	Dipolog City, Zamboanga del Norte
29.Belocura, Caridad C.	F	LGU	MAO- Agriculture Technician	Sindangan, Zamboanga del Norte
30. Panunciar, Revelyn B.	F	BFAR IX	Provincial Fishery Office Staff	Dipolog City, Zamboanga del Norte
31.Cases, Michael	M	ISDA	President	Dipolog City, Zamboanga del Norte
32.Enguito, Tirso Jr.	M	Fisher's	President	Dipolog City, Zamboanga del Norte

Legend: ISDA- In-glass Sardines in Dipolog Association; LSDEC- Livelihood Skills Enhancement and Development Center; CAO- City Agriculture's Office; MAO- Municipal Agriculture's Office; CFARMC- City Fisheries and Aquatic Resources Management Council

Annex 10. List of Equipment and Utensils required for the Cold Storage

1. Working tables (stainless steel)
 2. Freezing pans (3 kg. capacity)
 3. Weighing scale (floor and table top scales)
 4. Insulated Boxes (HDPE)
 5. Crates, baskets, pallets and bins (plastic or metals)
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