

EXCHANGE OF EXPERIENCE TO ADD VALUE TO ORGANIC WASTE FROM SMALL-SCALE

Fisheries and Aquaculture through its Reuse
and Conversion into Innovative Products,
which Contribute to Enhance Food Security
OFWG 03 2017



WORDS OF THE ORGANIZING TEAM OF THE MEETING

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Organic waste associated with small scale fisheries and aquaculture is currently a significant problem for coastal communities as they contaminate water and soils, attract pests (rodants), act as vectors for diseases and have a negative impact on food security, health and tourism, resulting in an economic disadvantage for the sector. Globally, fisheries and aquaculture activities generate millions of tons of organic waste each year, which despite having a high nutritional value, are discarded due to lack of knowledge about how to reuse and recycle them. Nevertheless, APEC Economies are conducting research, experiments and evaluating pilot projects to minimize this problem.

Several innovation actions and methods are presently available to help communities in their efforts to reutilize and recycle marine organic residues. Adding value to residues can create many benefits for small fishing and aquaculture communities, such as providing a source of additional income, creating new jobs (particularly for women), improve livelihoods, reduce organic pollution, recover areas for tourism, reduce and control pests, among others. Some of the challenges that have been observed in attempts to reuse and recycle organic waste are related to the lack of innovative knowledge, difficulties accessing technology and economic resources. These difficulties are repeated in each of Asia Pacific Economies that have a strong vocation for small-scale fishing and aquaculture activities. As a result, every day there are large amounts of waste on beaches and landing areas, instead of being reutilized by the fishers and farmers that generate them.

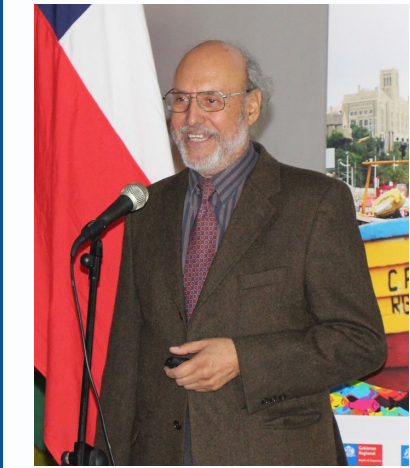
It is important to note the need to support and encourage initiatives to reduce fish waste and discards across the entire value chain of seafood products with a view to contribute to Food Safety.

As a result of the above, in 2017 the Working Group on Oceans and Fisheries of APEC Chile, submitted the project entitled "Exchange of Experiences to Add Value to Organic Waste from Small-Scale Fisheries and Aquaculture through its Reuse and Conversion into Innovative Products, which Contribute to Enhance Food Security", which was approved and financed by APEC. One of the expected products was a workshop held in October of 2018 in Chile, the results of which are presented here.





SPEAKERS



DR. MANUEL YOUNG

Project: "Technological model for a comprehensive use of organic waste from artisanal fisheries".

Position or Institution: Professor and Director of "Daniel Alkalay Lowitt" Biotechnology Center, Universidad Técnica Federico Santa María, Valparaíso, Chile (UTFSM).

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Economy: Chile

INTRODUCTION

Caleta Portales is one of the largest fishing coves in the Region of Valparaíso, generating close to 1.5 tons of organic residues on a daily basis, mainly comprised by fish heads and skeletons. "All of this organic waste contains proteins, fat and carbohydrates, nutrients which are most welcome by the salmon farming and petfood industries as nutritional supplement in view of the intensity of its flavor and odor", according to the researcher from UTFSM.

The aim of the project was to reutilize the organic waste produced in this fishing cove by installing a demonstration plant to produce intermediate products for the animal food industry (cats, dogs) or aquaculture sector, and also involve the women working in the cove, who received training in waste management.

1. RESULTS

- 40% reduction of pollution as a result of fish organic waste.
- Production of added value products on the basis of organic waste from the cove.
- Creation of jobs and involvement of women in production processes.

CONCLUSIONS

- The fishing cove community, especially the women, agreed to develop the project in order to make the cove more attractive for visitors, and generate new income for the fishers involved in the initiative.
- The lack of a constant production volume as a result of relying on a single client, led to loss of interest and motivation on behalf of the participants, who abandoned the project.
- The continuity of the business unit shall depend on the capacity to monitor the production development, associated to training, financial capital, technological innovation and identifying new markets or clients. These factors will impact the sustainability of the project.



DR. XU CHANGAN

Project: "Turning fish waste into value added products, approach and practices in China".

Position and Institution:

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Economy: China

INTRODUCTION

China is a major fishing and aquaculture economy, among other industries, contributing with 62% of global fishing and aquaculture products worldwide, and therefore produces a significant amount of fish waste each year.

These problems arise as a result of poor management of fish residues, leading to environmental pollution, insufficient space available to dispose of residues (landfills), and the loss of high value reusable material. The efficient management of this material, at local and global levels, is essential to ensure the protection of the environment and the health of the population.

Considering the above, the government has implemented a system to integrate biological residues to the value chains, and promote a model based on the 3 "Rs"; Reduce, Reutilize and Recycle.

1. RESULTS

- Fish residues as now considered useful resources instead of waste in order to continue developing production lines as adding value initiatives leading to new business options.
- The implementation of this new 3R method has allowed the economy to save resources by obtaining a wide array of added value products using the same resource.

CONCLUSIONS

- Environmental pollution was the main cause that triggered innovative solutions related to the use of organic residues, such as policies and regulations to minimize the impacts of this waste, the obligation of processing plants to report their use and disposal in legal facilities.
- Plants that recycle are rewarded and those that fail to implement recycling initiatives are sanctioned.
- These policies are implemented locally in fishing areas.
- Dr. Changan indicates that this type of forums is key to exchange experiences, generating ideas, proposals and partnerships that help bridge the gaps that may exist in each project.



MRS. MARITZA BARRIGA SANCHEZ BARRIGA

Project: "Exchange of experiences to add value to organic residues from small scale fisheries and aquaculture through reuse and transformation into innovative products, contributing to food safety"

Position and Institution: Researcher, Technological Production Institute, ITP.

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Economy: Peru

INTRODUCTION

The purpose of the Technological Production Institute, ITP, is to contribute to improve the productivity of businesses by providing services such as research, development, innovation, adaptation, transformation and technology exchange.

The institute carried out an assessment of the production of waste from the trout and shrimp fisheries, considering their inappropriate treatment and absence of added value. Shrimp is particularly rich in a component called Chitin, that is not being utilized but rather discharged into the environment.

1. RESULTS

- The current situation related to environmental pollution has motivated research on the development and application of new production technology used to reutilize and add value to fish waste, such as the production of animal feed.
- There is an urgent need to find alternative food that can be used for animal nutrition, reducing the demand for cereals and other food that is most useful for human nutrition.
- Adding value to fish residues will help protect the environment, contributing to the economy's search for sustainable solutions.

CONCLUSIONS

- The research conducted by the Technological Production Institute indicates the importance of taking into account the significant volumes of organic waste generated by artisanal fisheries, and therefore the need to implement government actions to promote artisanal fishing activities as strategic to the economic development of the economy and raise the economic level of fishers and fishing communities.
- The results of this research indicate that fish waste from large scale fishing activities are being reutilized with various treatment methods, mainly producing fish meal, silage and fertilizers.

DR. GLEYN BLEDSOE



Project: "Maximizing value by increasing total use of small scale fisheries and aquaculture"

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Economy: United States

INTRODUCTION

In the United States it is considered that small scale fisheries can provide more profitable products with increased marketing potential. Nevertheless, smaller volumes can limit economically practical technology. "Small scale economies and "marginal rate of return" may not have a good outcome, thus increased involvement of businesses must be considered to obtain product with a higher economic profit.

All efforts made to add value to a product must be aimed at making profits and not only to add value, and it is therefore essential to conduct a market study to ensure the success of the project.

1. RESULTS

- To achieve success as an entrepreneur in the fishing it is necessary to maximize the return on the investment in small scale fisheries and aquaculture.
- Based on the results of the various investments made under a perspective of waste reutilization, the following can be said:
 - The optimal returns were obtained from living resources since they produce a larger amount of raw material.
 - Research associated to the study showed that net return on investment by product unit can reduce as the product moves through the value chain.
 - Conducting a market study prior to manufacturing the product led to a more profitable production without the risk of economic loss.

CONCLUSIONS

- Running a business related to the reuse of fish waste organic residue is not only about accumulating sufficient volumes of organic residue, it also requires making a profit. Reutilization must also have a financial value, it must generate profits and not only minimize costs.
- It is important to conduct market studies, assess the costs and benefits, identify and develop the market.



DR. ADRIÁN RODRIGUEZ GARCÍA

Project: Assessment of technical-financial feasibility to produce biofuels and by-products from fisheries and aquaculture residual biomass in Mexico.

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Economy: Mexico

INTRODUCTION

The principle of the circular economy model is to “Close the life cycle” of the product, producing new goods and services by reutilizing fish waste. The aim of this system is to implement innovative processes, utilize the residues from initial processes as raw material to produce other products, reduce waste generation, reduce the extraction of new raw material, water and energy consumption.

The project seeks to establish and demonstrate the feasibility of the circular system in the fisheries sector, which was possible as a result of the participation of a multidisciplinary team comprised by representatives from the leading businesses in the sector (Mazinsa, Ricamar, Pinza), research centers (Instituto Mexicano del Petróleo, Hecyfro Innovacion SC) and research and technological development centers (Ciatej, Cideteq, Ciad, TECNM).

1. RESULTS

- Use of methodologies to separate solids, fat and oil obtained from fish waste in order to obtain sub-products with commercial value, such as biofuels.
- The research revealed that residual biomass from fisheries and aquaculture has great potential to generate bioenergy that can be used as source of carbom (energy): Biogas, Biofuel and Biofertilizers.

CONCLUSIONS

- The development of the project establishes the advantages and benefits obtained by implementing a circular economy system, where the residues re-enter the productive cycle as raw material that is part of a new process. This model can be used to reduce the amount of waste disposed of in landfills or in the ocean, minimizing the damage to the environment, creating productive units, leading to employment and optimizing the resources needed to manufacture a commodity and create sustainable and lasting industries.
- Ensuring that production of biofuel is competitive requires an assessment and quantification of the temporary availability of fish waste. It is therefore necessary to identify and encourage those facilities that have the potential to generate waste.



MRS. JANITA PATTARIVIVAT

Project: Utilization of residues from small scale fisheries and aquaculture in Thailand

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Economy: Thailand

INTRODUCTION

Thailand is currently in the process of implementing a fisheries residue management policy, based on a 20 year strategic plan (2017-2036). Population growth and development focuses on the utilization of natural resources based on conservation principles and management of zero residues.

Fisheries activities in the economy focuses on aquaculture and ocean fishing activities; where total captures of small scale fisheries accounts for 10% of the total amount of operations. Considering the dramatic growth of aquaculture and fisheries activities, the government has undertaken research related to the use of fish waste in marine and fresh water fisheries, leading to satisfactory results in the development of subproducts.

1. RESULTS

- Higher reutilization of fish waste, decreasing environmental pollution.
- Increase in the number of fish meal companies that use fish waste.
- Implementation of regulatory guidelines such as GMP / HACCP certificates.

CONCLUSIONS

- As a result of this research, it is possible to conclude that Thailand implements new management policies oriented to the reutilization of fish waste from artisanal fisheries and fish farms in order to obtain new value added products.
- Initiatives are created to encourage the reuse of residues to produce fish meal, animal feed, fertilizers, cosmetics, snacks, and others.
- At the industrial level, fish waste is used to develop biogas and pharmaceutical products.
- The government envisages changes in small scale commercial fisheries in order to increase awareness among the community and businesses with regards to the use of organic residues.



DR. NANCY CHANDÍA

Project: "Algal Biotechnology, development of a product made of algal waste as part of a water strategy for sustainable agriculture in the Region of Coquimbo"

Position and Institution: Professor, Faculty of Marine Sciences, Laboratory of Bioactive Molecules, Universidad Católica del Norte.

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Economy: Chile

INTRODUCTION

In 2012, the Region of Coquimbo suffered from a 60.3% precipitation shortfall that resulted in 15 communes declared catastrophe zones. This situation encouraged experts and authorities to look for solutions. Water shortage was not the only issue, but also the need for additional alternatives to increase soil water retention.

Under this context, the Faculty of Ocean Sciences at Universidad Católica del Norte developed the project entitled "Algal Biotechnology: development of a product made of algal waste as a water strategy for sustainable agriculture in the Region of Coquimbo". The aim of this initiative was to increase soil productivity with the use of marine origin organic matter (marine algae and their by-products).

1. RESULTS

- Hydrogels obtained from brown and green algae used in a dosage of 500 g/m³ increased the soil water retention of clay-like soil and sandy soil in 13% and 33%, respectively, generating usable water pores.
- Brown algae hydrogels decreased soil drainage in 26%, leading to soil moisture and water optimization and reducing water loss.

CONCLUSIONS

- Water retention in soils on which the product was used ensures better conditions for the existence of agricultural crops, such as arid or semi arid areas in the economy
- Algal products included in the study showed improvements of agricultural soils, resulting in more productive areas within the assessment areas
- Hydrogel and/or biofertilizers provide added value to algal waste or non-commercial by-products



MR. FLAVIO ARAYA MOURGUES

Project: Squid and Scallop waste, potential marine bioproducts

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Economy: Chile

INTRODUCTION

In April of 2018, within the context of the need to value marine waste, Fundación Chile launched the project entitled "Opportunities and potential of squid and scallop waste in the Region of Coquimbo", aimed at creating economic value from waste deriving from the production processes of squid and scallop, which can reach 40% of the harvested biomass. Presently, the waste from such production (guts, heads, shells, etc.) is disposed of in landfills, giving rise to higher costs to businesses and environmental damage to the local community.

1. RESULTS

- Considering the significant volumes of waste that exists at the regional level (124,276 tons of fish residue in period 2012-2017), there is an opportunity to create new businesses that could focus on waste reuse. A circular economy model could therefore be applied where the waste from one company could turn into the raw material used by others.
- Bioproducts with higher production potential are as follows, in order of priority: algae extracts, proteine hydrolysates from algae and shellfish, and shellfish collagen.

CONCLUSIONS

- The results obtained contribute key background information for the design, development and implementation of commercial units interested in adding value to fish waste by processing the by-products described above. Changes in life styles at the global level have set a trend towards healthy diets and weight control methods, promoting an increase of foodstuffs containing hydrolysed proteins. The success of hydrolysed protein developments in the economy requires the
- commitment, support and joint work on behalf of the key stakeholders, both in the public and private sectors.



MRS. GRACIELA PEREIRA

Project: Utilizing fish waste, both a challenge and a great nutritional and business opportunity.

Position and Institution: Director of Internal Markets, Panamerican Fisheries Products Inspection, Quality Control and Technology Network

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Economy: Uruguay

INTRODUCTION

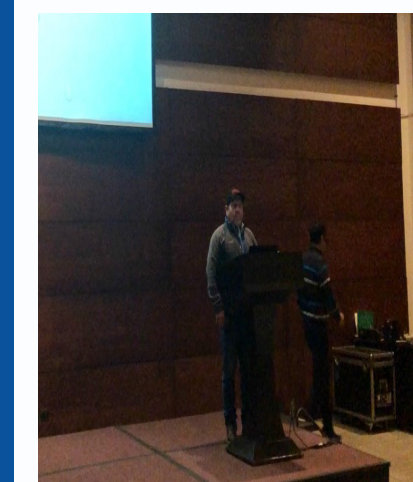
In accordance with the scope of the organization, present research focuses on the absence of essential micronutrients in healthy diets and its impact on 2,000 million people globally, particularly women and children. Communities in developing economies are the most affected by the unavailability of nutritious diets. In general, food habits in rural areas are not very diverse, leading to a deficit in essential micronutrients. As a result, the organization's current programs and strategies are aimed at encouraging the consumption of fish and shellfish, and the use of these resources in a more complete manner.

1. RESULTS

- In Latin America, the Caribbean and Africa, there is a strong demand for food products with nutritional value, considering that these areas display high levels of diseases and physical impairments resulting from poor diets.
- This situation creates the opportunity to develop food supplements based on fish waste considering that they are an excellent source of high quality animal protein, offering omega -3 fatty acids, a rich source of vitamins and minerals.

CONCLUSIONS

- The development of by-products for human consumption, either in the form of finished products or food supplements is of key importance. This industry is at an early stage, and large part of fish waste reutilization are aimed at producing animal feed or for agricultural, cosmetic, pharmaceutical or medical purposes, rather than products for human consumption.



MR. JORGE RIVAS

Project: Diversification of marine algae production.

Position and Institution: Artisanal fishers, members of the Independent Indigenous Artisanal Fishers Syndicate of Palo Muerto- Los

Rios Region
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Economy: Chile

INTRODUCTION

The Independent Indigenous Artisanal Fishers Syndicate of Palo Muerto in the Los Ríos Region is comprised by 18 members. The Organization is mainly dedicated to collecting seaweed on the beach and harvesting benthic species, shellfish and pelagic fish, which are sold to final consumers through middlemen.

1. RESULTS

- Liquid compost is recommended for agricultural use, considering its high levels of phosphorous and nitrogen, key nutrients that stimulate the growth of plants and improve the quality of fruit.
- The performance of liquid compost will depend on the specific requirements and type of crops.
- Mixing solid compost with soil combines essential minerals to achieve water retention capacity, optimizing the use of water.
- Productive periods are in December and in March/April.

CONCLUSIONS

- Creating compost from seaweed improves the quality of crops, recovers over-exploited soils, avoids extreme temperature in soils that damage root formation and also acts as a herbicide, suppressing the growth of weed.
- The use of seaweed to create compost for agricultural purposes at different scales, is an activity that must be promoted in view of current market trends related to producing organic crops using low levels of fertilizers or chemical products.
- The product development stage is currently underway, and marketing and promoting strategies to attract potential clients in the agricultural industry in the Region will be designed.
- Adding value to seaweed will offer new employment opportunities for the community and will contribute as an additional source of income.



MR. HERNÁN VICENCIO; MR. TEODORO LEAL

Project: Producing artificial bait with fish waste from processing plants in Lebu, Province of Arauco, Biobío Region

Position and Institution: President and Secretary, Association of Artisanal Fishers Organizations in the Province of Arauco - FEPARAUCO

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Economy: Chile

INTRODUCTION

The wide array of fisheries activities developed in Lebu generate an average of 30 tons of organic waste on a monthly basis. This waste comes from processing plants, cleaning procedures in coves and discarded natural bait, which is disposed of into the ocean or in communal landfills.

Landfills do not have sufficient capacity to handle this type of waste appropriately, resulting in the accumulation of organic matter and serious environmental issues in the area, such as bad odors, pests and the risk of disease.

1. RESULTS

- Does not require cold storage
- Has a shelf life of 6 months
- Free from bad odors
- Biodegradable, pollution free
- As efficient as natural bait, maintaining its shape during 3 hours in the water, for successful trapping
- Allows for automatic baiting

CONCLUSIONS

- The Federation is working on improving the quality and characteristics of artificial bait by adding odor, color and shapes similar to natural bait (sardine), in order to increase fishing yields of the target species (Pomfret).
The full operation of the artificial bait processing plant will bring the following benefits:
 - Permanent income for the Federation
 - Reduction of fishing operation costs, as a result of a permanent availability of bait and stable prices
 - Improves the environment and quality of life of the community by reducing bad odors and keeping neighborhoods clean

MR. GUILLERMO MOLINA PALAVECINO

Project: "Toward the comprehensive use of fisheries and aquaculture resources"

Position and Institution: Manager Regional Strategic Program, MasMar

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Economy: Chile



INTRODUCTION

The increase of marine bioproducts is principally due to innovations in science and technology. These bioproducts improve the quality of life of people given their potential as inputs in the food, agriculture and environmental industries. This is the reason why the aim of MásMar is to turn the Region of Coquimbo into a source of bio-products and added value fishery products that can reach more complex markets by introducing improved procedures and technology to ensure the use of sustainable environmental methods.

1. RESULTS

- Multidisciplinary work and the application of innovated technology have succeeded in identifying and developing value added products and by-products for human, animal consumption, and agricultural use, such as paté, seasonings, marinated foods, snacks, pickled products, hydrogel and fertilizers.
- Introducing circular economy concepts in processing procedures increases the production yield of aquatic resources. In the case of shrimp and prawns, a 15% to 80% productive increase is foreseen.
- Studies to describe and assess the composition of fishery and aquaculture residues makes it possible to establish potential uses.

CONCLUSIONS

- The development of value added products or by-products requires the interest of fishing companies since they possess the raw material and produce fish waste.
- Fisheries and aquaculture industries have a great business opportunity given that they generate residues with high nutritional value that are not be reused, creating a niche that could be captured by new companies that can fulfill this role.
- Comprehensive market studies must be undertaken to identify real production opportunities based on fishery and aquaculture waste reutilization.

2. APEC ECONOMIES WORKING GROUP

In order to comply with the objectives of the project, a working group was set up to give the members a chance to discuss and exchange opinions regarding the various courses of action implemented by their economies to minimize the impact of biological waste from small scale artisanal fisheries and aquaculture activities.

In view of the above, the following Members shared various initiatives:



I. THI BANG TAM NGUYEN, ECONOMY: VIET NAM

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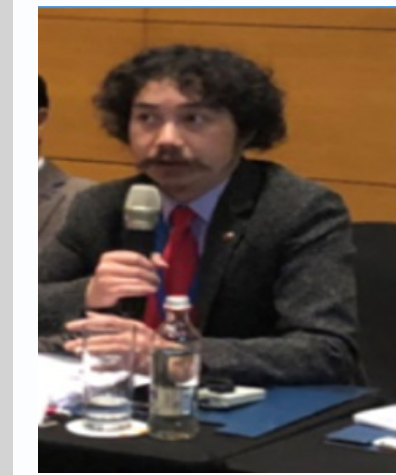
c) Background:

Vietnam is an economy that is dedicated to artisanal fisheries, principally aquaculture. The main farmed species are catfish and prawn, exporting 60% of the total production. Biological residues from productive activities have created significant problems. Therefore, the Ministry of Agriculture and Rural Development of Vietnam (MARD), and specifically the Fisheries Division, have increased their efforts to deal with these issues by implementing several projects.

The aim of the project entitled "Treatment of organic residues present in Aquaculture" is to gather information related to the present situation of biological waste generated by companies in Vietnam, and their utilization. The Government has developed decrees and regulations to classify residues and determine the treatments that companies and the main producers of waste must implement. In this context, two types of waste are identified and classified based on their origin: household residues that are reutilized as biofertilizers, using basic technology such as burying them in the soil, and residues from food processing plants that produce ready to eat food for human consumption.

d) Gaps:

- The economy lacks the programs or funds to finance new production lines or technological equipment for artisanal fishers.
- Private companies must fully fund reutilization initiatives.
- There is a need to address gender inequalities considering that profitable activities are mainly led by men, limiting the possibility of economic and sustainable development of women.



II. WU BIN, ECONOMY: CHINA

a) Position: Professor, University of Zhejiang

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c) Background:

China is an economy with an extensive coastal region that has developed small scale capture fisheries and aquaculture industries. Since the end of the fifties, China has been particularly concerned with recycling procedures, creating programs and laws to regulate these practices. A strict system has been implemented to encourage small companies that recycle an average of 7.5 billion tons each year. As a result of a high population growth, there is significant pressure to manufacture food products, and the Government has promoted and invested in the development of new products. Proportionally, biological waste has also increased, causing environmental damage due to poor management or inappropriate methods of disposal.

The Government, jointly with companies and/or research institutes, have identified the demand for food as a result of population growth, various problems related to the large concentration of aquatic species waste and the most impacted provinces. As a result, the Government of China has promoted projects to solve the identified problems, such as the reutilization of fish bones. Through cofinancing programs, the Government and companies have requested research centers to develop methods, techniques, tools and equipments to answer to these problems.

Once these tools and methods become available, the fisheries industry (small, medium or large companies) will be encouraged to become involved in Government programs that will orient their production procedures and increase their profits. These initiatives will benefit the environment and satisfy the needs of the population.

d) Gaps:

- China has high rates of population growth, leading to a constant demand for food.
- The production of high volumes of food for human consumption results in significant amounts of industrial residue.
- The Chinese population prefers fresh/live products, curbing the development of processed products, increasing captures and residues.
- The Government is promoting programs to change consumption habits among the population, to turn to processed products and by-products (residues).



III. MARGARITA TORRES ARANIBAR, ECONOMY: PERU

a) Position: Engineer, Ministry of Production, General Directorate of Environmental and Aquaculture Affairs, Vice-Minister of Fisheries and Aquaculture.

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c) Background:

Peru is well known for its tremendous biodiversity of marine resources, and as an economy with extensive fishing activities. Fishing and aquaculture companies carry out primary and secondary processing creating solid fish waste (exoskeletons, guts, valves, soft parts, among others) have a negative impact on the environment. This waste is disposed of in collapsed landfills, causing environmental damage, bad odors, pests (flies and rodents) and health risks. Since the year 2000, the Government has implemented environmental policies and regulations of local scope related to residue management.

The Technological Institute of Peru "ITP" conducts research jointly with Universities, Institutions and technical innovation companies related to the reutilization of fisheries and aquaculture residues. As a result of this partnership, technologies such as silage, fertilizers, construction, tanning, handcrafts, hydrolyates have been developed.

To develop and recommend prevention and environmental improvement plans in specific areas of Peru, Multisectorial Commissions were created, such as in Sechura in 2014, in order to reduce the number of shells removed from shellfish through reutilization or recycling methods.

d) Gaps:

- Lack of interest on behalf of artisanal fishers organization to participate in training and capacity building activities since they coincide with fishing operations.
- Based on experience, to ensure the development of added value products, in addition to training programs, tools and infrastructure, continued monitoring and advisory support is required. When organizations lack technical advice, the members loose interest, resulting in the failure of the proposed solution.
- The volumes of squid residue exceed the capacity of processing plants. Thus, it is not possible to fully comply with standing legislation related to the reutilization of residues.



IV. TERESA GÓMEZ – DAVID ARRUÉ, ECONOMY: CHILE

a) Position: Artisanal Fisher of Caleta Portales, operator of organic residue facility.

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c) Background:

Caleta Portales is located in the Region of Valparaíso, fish cleaning and processing tasks performed in this cove generate close to 1.5 tons of residues each day.

Residues are mainly comprised by fish heads, skeletons, tails and guts. The inadequate management and disposal of these residues causes bad odors, and attracts the presence of rodents, flies, cats, dogs and other marine animals (seagulls, sealions and pelicans), in addition to missing the opportunity to take advantage or reusable organic matter that is very rich in protein, fat and carbohydrates that are useful for the animal feed industry. As a result of the implementation of the Project entitled "Technological and logistic model for a comprehensive use of residues from artisanal fisheries", artisanal fishers identified the following advantages:

- Creation of job, including women labour, Produce products using simple procedures with low complexity technology,
- Low production costs,
- Products subject to low regulatory requirements,
- Validation of operational models (frozen and hydrolysis),
- Reduces environmental impact caused by poor management and disposal of residues,
- Takes advantage of the nutritional value of fish waste to produce products or by-products for animal feed,
- Increases competitiveness by giving way to new businesses.

d) Gaps:

- Lack of interest on behalf of women to continue participating, despite having positive expectations with regard to job creations and salaries during the early stages of the project. In practice, financial returns were not constant, and the women became demotivated, gradually withdrawing from the initiative, and only one of the 48 women stayed during the final period.
- Absence of funds to purchase new equipment required for the correct operation and/or productive escalation.
- Absence of a constant demand for the product due to the lack of a demanding market,
- Low level of support in technological aspects and professional assistance to continue the project.
- Constant oversight and advice is required.



V. LEONARDO LLANOS , ECONOMY: CHILE

a) Position: Executive Secretary, Artisanal Fisheries Development Fund

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c) Background:

The Artisanal Fisheries Development Fund FFPA is a public agency that has the mission to promote the sustainable development of artisanal fisheries by supporting the efforts and initiatives of artisanal fishers organizations that are legally constituted at the domestic level, in order to improve the living and working conditions of their members, preserve marine resources and the environment.

This Fund offers two financing arrangements for artisanal organizations: local contests and regional agreements. The available funds can provide total or partial coverage of the submitted proposals, depending the the arrangement that is selected.

Investment areas include:

- Infrastructure development for artisanal fishing activities,
- Training and technical assistance to artisanal fishers,
- Fish repopulation and farming,
- Marketing and management of production facilities.

Food safety is among the contents of the cove improvement program. The aim is to improve the sanitary standards related to fish processing, distribution and trade. The scope of the program includes a design stage to improve handling practices, direct sales in the cove, technical assistance and implementation of filleting carts for sales of fresh product and processing containers to produce and sell fresh-frozen products, among other products with added value.

d) Gaps:

- The FFPA does not have experience in developing strategies and programs to promote reutilization of fish waste from artisanal fisheries. These programs are based on the results from a survey and similar proposals implemented in other regions or economies.
- Lack of knowledge regarding the demands or existing markets for products produced from fish waste.
- Lack of knowledge regarding the volumes of fish waste resulting from artisanal activities, and the physical and chemical characteristics of such residues. There is a need to identify, quantify and describe organic waste generated in fishing coves and operations, in order to determine the actual opportunities for recycling production units.



VI. LEA MYR S. CADAPAN-REYNULFO JUAN CESO, ECONOMY: THE PHILIPPINES

a) Position: R. Juan, Regional Executive Director, Department of the Environment and Natural Resources, Regional Office 1, San Fernando, La Unión. Head of Fisheries and Aquatic Resources Diliman, Quezon City Filipinas. L. Myr, Executive Assistant-Director’s Office Aquaculturist II Aquaculture Division.

b) Contact: reynulfojuan@yahoo.com
leamy@gmail.com

c) Background:

The Government of the Phillipines has implemented several domestic regulations to contribute to marine species sustainability. The Department of the Environment and Natural Resources and the Fisheries and Coastal Aquatic Resources, work jointly to ensure the conservation of biodiversity and climate resilience to achieve food security, ecological integration, reduction of poverty and sustainable development. The areas of work are divided in conservation measures to reduce marine waste and aquatic pollution, improving livelihoods through a program entitled “biodiversity friendly companies BDFE”. The aim of this program is to encourage innovative procedures to manage fish waste by recycling or reutilization methods, thus promoting the sustainable use of biological resources, adding value and creating market opportunities and mutual benefits among micro, small and medium enterprises.

The Government strategy is focused on encouraging small enterprises to develop added value products based on waste reutilization. To ensure the success of this initiative, the organization promotes partnerships among companies located in the same community by providing technical and financial assistance.

Partnerships between similar companies contributes toward optimizing available financial resources. Training and technical assistance activities are performed regularly in coastal areas with the aim of strengthening procedures related to harvesting, productive, waste management and added value.

d) Gaps:

- Lack of financing to implement waste processing plants, therefore partnerships are essential.
- The Government has not implemented programs focusing on adding value to biological waste, although it has developed programs aimed at strengthening technical capacities of artisanal fishers.
- There is a need to develop and/or improve policies to promote resource reutilization, although some activities are emerging.



VII. SIMANJUNTAK FERNANDO JONGGURAN, ECONOMY: INDONESIA

a) Position: Official, Aquaculture Development Center of Tatelu. General Directorate of Aquaculture, Ministry of Maritime and Fisheries Affairs of Indonesia.

b) Contact: fernando_bbl@yahoo.com
bbattatelu@gmail.com

c) Background:

Artisanal fisheries in Indonesia mainly harvest catfish, the volumes of which have increased in recent years until becoming the second largest exporter after Vietnam.

The increasing production of farmed areas have deteriorated the quality of water in farming areas due to the increase of the microbiologic load, resulting from the high levels of ammonia, composting wastes, feed scraps, faeces and urine introduced to the environment. In order to find solutions to these challenges, the Government of Indonesia, through the General Directorate of Aquaculture, has created and implemented strategies to introduce new technologies. One of the most successful and sustainable solutions applied to aquaculture systems has been Biofloc.

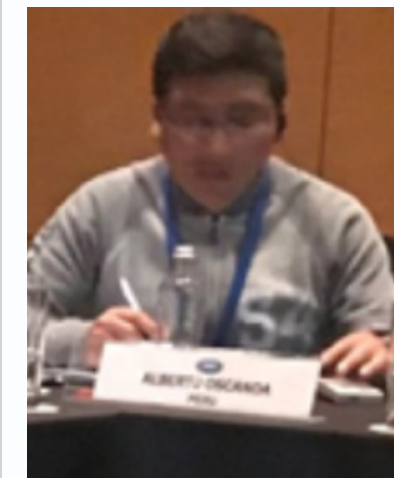
Biofloc consists in recirculation systems, where inflowing water is treated in a reservoir before being pumped to rearing basins, and effluents from the reservoirs are taken to sedimentation tanks to be treated before being discharged into the environment or used for the following reutilization stage. The basic principle of the biofloc technology is waste retention and the transformation into natural food within the farming system.

The Government, specifically through the General Directorate of Aquaculture of Indonesia, are continuously monitoring production processes and their social, economic and environmental impacts at local and domestic levels. If the results turn out to be significant, the Government is willing to develop efficient and sustainable improvement plans.

Government officials identify and encourage fish farms and other fisheries to engage in the working plans.

d) Gaps:

Although a significant number of farms have been benefitted (300), the program still has not covered 100% of catfish farms as well as other important farmed species (Tilapia). The appropriate technology and equipment is required for this purpose.



VIII. ALBERTO OSCANOVA, ECONOMY: PERU

a) Position: Marine Biologist, Instituto del Mar del Perú.

b) Contact: aoscanoaa@imarpe.gob.pe

c) Background:

Peru is one of the main suppliers of fish in the world, producing almost 10% of global fish captures. The main reason behind this enormous productivity is related to the physical and chemical characteristics of its coastal upwelling, resulting in the efficient growth of primary producers, high survival rates of larvae and trophic transfer, favouring foraging sites for fish and main predators.

Peru has established regulations to improve the efficiency of production processes, such as Law D.S N° 017-2011-PRODUCE setting forth the following management provisions:

- Biological residues and discards must be utilized in plants authorized to produce fishmeal, silage, ictiocompost and other processes with fish waste, to allow the total reuse of aquatic resources.
- Artisanal landing sites, ports and docks must implement a registry of landing volumes, discards and residues generated during pre-processing procedures.
- Maximize reuse of fish residues through a fermentation process, and in addition mitigate environmental issues related to waste management and reduce the use of chemical fertilizers.

d) Gaps:

- Absence of active involvement of women in fisheries and aquaculture activities. Therefore, part of the project is aimed at encouraging them to join considering the possibility of increasing their economic income.
- Although regulations regarding waste quantification and disposal exist, they are not fully complied, and residues continue to be disposed in unauthorized sites or processed inappropriately. Enforcement mechanisms are required to ensure the compliance of such rules and policies.

IX. RECOMMENDATIONS OF THE WORKING GROUP

- Increase training for artisanal fishers, in accordance with the financial approach required to add value to the waste resulting from their operations,
- Encourage government funding to provide alternatives to artisanal fishers organization that are unable to finance the required technology.
- On the basis of empirical studies and the experience of other economies, it is time to consider a change in the approach towards the development of the Labour Code from “protecting women” to “promoting gender equality” for people of both sexes.
- Create an enabling environment for women in the work place, in the case of Vietnam it is a priority.
- Encourage companies to invest in new reutilization projects in order to reduce contamination at the global level and make use of waste as a resource.
- For Peru, it is important to continue promoting co-financing of innovation and business programs (Innóvate Perú, maternal innovation program for fisheries and aquaculture).
- Foster research related to the reutilization of fish residue conducted by Universities,
- It is important for those Economies that have implemented training and awareness programs, to ensure the continuity of these activities.
- Projects based on waste use must maintain a permanent production in order to generate demand for the product.
- Perform market studies in order to identify the requirements, demands and potential clients.
- Projects must include technical assistance related to production and trade.
- Carry out market studies to identify feasible opportunities to reutilize waste from artisanal fisheries.
- Arrange appropriate technical and technological advice to design and implement programs that encourage the development of productive units used to recycle and reuse fish waste.
- Request scientific or technology transfer centers to characterise waste generated in fishers coves, by type, origin and process involved in order to determine its best use.
- Government agencies must provide better funding alternatives to fishers communities.
- Governments must encourage the use the “milkfish” boning method, which is undoubtedly the most successful value added product.
- Any future project must be technically viable, and also economically feasible.
- Promote the signature of inter-agency cooperation agreements to strengthen research.
- Create and carry out training programs related to organic waste management and control public policies.

3. FIELD VISIT TO CALETA TONGOY, COQUIMBO REGION”

The aim of the field visit was to reach a common understanding among the participating APEC Economies about small scale fisheries and aquaculture, in order to have a first-hand knowledge about what is meant by an artisanal fishing cove, a vessel, various existing business units, among others.



Caleta Tongoy, is an urban cove dedicated to scallop farming and harvesting other aquatic resources such as chilean abalone, pink clam, razor clams and algae. The administration is in the hands of a Directory that is elected democratically by over 573 partners grouped in several organizations. The fishers in the area have been shellfish divers since the beginning of the fishery, but they began farming scallops in 1983 to gradually improve the status of this species that was heavily exploited in previous years.



The group visited a northern scallop farming facility (*Argopecten purpuratus*) to observe the farming systems, management activities, among other operations, to learn about small scale aquaculture. The visit also included a tour of the fishers cove to learn about the artisanal fisheries operations, and the types of vessels and infrastructure used.



4. WORKSHOP CONCLUSIONS

OBJECTIVE 1. INCREASE AWARENESS ABOUT THE POSSIBILITY TO ADD VALUE TO ORGANIC WASTE IN ORDER TO REDUCE SANITARY AND ENVIRONMENTAL PROBLEMS.

The workshop was a chance to increase awareness among the scientific community, the public and private sectors, artisanal fisheries and aquaculture sectors surrounding the importance of maximizing the use of biological waste. During 3 days discussions were held and several presentations were made regarding biological waste management to mitigate related sanitary and environmental issues. Dr. Manuel Young presented a “Technological Model for the Comprehensive Utilization of Artisanal Fisheries Waste” explaining how the presence of marine birds and sealions declined as a result the implementation of this initiative. From the Chinese delegation, Dr. XU and Dr. Wu Bin highlighted a fisheries residue Management Plan and Reporting Mechanisms as part of the policies developed to promote recycling in manufacturing processes and sanctions in cases of illegal dumping of fish waste. Technical specialist, Maritza Barriga, Engineer Margarita Torres and Researcher Alberto Oscanoa discussed various rules implemented in Peru, such as a solid residue comprehensive management law implemented in Peru, and a fish residue and discards regulation program that includes training aimed at fishers in the area of residues management. Technologist Jasnista Pattaravivat from Thailand presented the existence of a 20 year strategic plan based on conservation and 0 waste. Director Reynulfo Juan and executive Lea Sobrepeña from The Phillipines revealed that their economy promotes recycling and reuse of fish waste through a domestic plan developed by the fisheries industry aimed at reducing losses after captures in at least 10% across a 5 year period. Dr. Gleynd Bledsoe from the United States of America presented a federal program to encourage added value to artisanal fisheries. Engineer Adrián Rodríguez from Mexico explained how to contribute to the environment by adding value to fisheries and aquaculture residual biomass, generating biogas, biofuel or O3 oils and biofertilizers. Government official Thi Bang Tam from Vietnam shared the Government’s experience related to implementing policies to classify aquatic resources in three categories, toxic residues, residues from daily activities and residues from farms and processing plants. Another rule requires disposing fish residues in plastic to be used as fertilizers. Engineer Graciela Pereira from INFOPESCA explained how by-products from fish and food processing are used in LatinAmerica and the Carribbean as food, or indirectly as ingredients as a way to produce added value products, to ensure food safety and minimize sanitary and environmental impacts.

The fishers delegation explained how they have increased their awareness about environmental issues and were able to envisage a business unit with the use of fish waste, as demonstrated by the waste reuse experiences in Caleta Portales with white fish, the fishers organization of Palo Muerto with algae and in Arauco with the creation of artificial bait.

OBJECTIVE 2. CAPACITY BUILDING AND REPLICATE SMALL SCALE FISHERIES AND AQUACULTURE WASTE REUTILIZATION EXPERIENCES IN EACH ECONOMY.

To comply with the above objective, a wide array of experiences and projects developed by APEC Economies were exchanged, such as:

- White fish waste used to produce animal feed,
- Waste from crustaceans to produce gauze, biofilm to keep fruit fresh, medicine for artrosis and a bioabsorbant to absorb heavy metals,
- Scallop Shell residues for textile applications to produce film to improve agriculture soil, raw material to produce paper and food additives with calcium,
- Guts to produce taurine and enzymes for the food industry,
- Trout waste to produce silage,
- Scallop shells as raw material to produce green bricks and to structure roads,
- Crustaceans (such as crabs) used as dyes, food supplements, among others,
- Hydroponics to reutilize fish waste in water as fertilizers for plants,
- Use of fisheries and aquaculture waste for biofuels,
- Shrimp waste to produce food for animals and fertilizers,
- Tuna residues to produce sauces, soups, and other products,
- Algae waste to produce hydrogel,
- Catfish residues used to produce fertilizers,
- Shrimp waste (heads and shells) to produce seasoning,
- Fish, algae, crustacean waste to produce protein hydrolysates.

OBJECTIVE 3. DEVELOP AND STRENGTHEN INNOVATION CAPACITY AND COMPETITIVENESS OF SMALL SCALE FISHERS AND FARMERS

To achieve the above objective, during the workshop the use of waste from small scale fisheries and aquaculture activities was discussed from a financial perspective, with a view to generate new business units in this sector. As highlighted in several presentations, there is a need to focus on a higher profitability, instead of simply adding value, the goal must always be total cost effective utilization. The delegates also mentioned that innovation, competitiveness and benefits for the artisanal sector can be achieved on the basis of collaborative work between the public and private sector, representatives from the academic sector, Governments, stakeholders, experts, technicians, welfare professionals, among others, who must work to increase awareness, provide training and oversee the development of related projects with a view to having positive effects in the sector.

During the workshop, the relevance of women was underlined, acknowledging their fundamental role in fisheries and aquaculture, and the importance of achieving food security and generating income throughout the value chain.

Gaps:

- a) Establish or improve policies to enforce and sanction illegal dumping of fisheries residues.
- b) Support and encourage zero residues throughout the value chain.

- c) Access to funding mechanisms to develop products from fisheries and aquaculture residues, introduce new technology and education; highlight the need to foresee reutilization initiatives and continued funding.
- d) Constant training aimed at handlers and fishers;
- e) Provide technical, operational, and marketing advise to organizations or companies in order to provide tools and build knowledge to secure sustainable reutilization procedures.
- f) Assess and build soft skills, such as attitudes, knowledge, commitment and responsibilities among the actors involved in production processes by integrating welfare professionals in the early stages.
- g) Active commitment or public and private organizations involved in product development, especially those in charge of gathering residues from indsutries or clients that will use the manufactured product as raw material;
- h) Conduct market studies in those cases where reutilization has commercial value, generate profits and not only minimize costs or environmental impacts, to maintain the incentive of organizations or companies that will be dedicated to reutilization. It is important that these initiatives also consider economic feasibility studies.
- i) Partnerships between manufacturers and raw material processing plants in the research process.
- j) Support and encourage a circular economy approach.

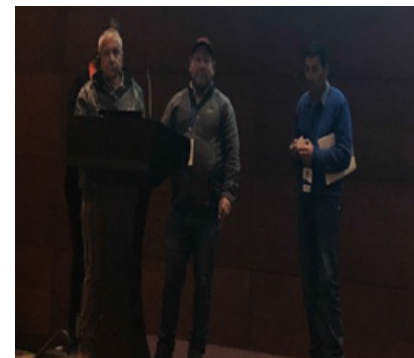
5. CLOSING WORDS BY PARTICIPATING ECONOMIES



JANISTA PATTARAVIVAT "This workshop was very important for all participants. We obtained knowledge regarding the technology used to treat organic waste. Moreover, participants had the chance to exchange the experience together. I think that the information from this workshop can be applied in my area of work or in other Member Economies."



MARGARITA TORRES "I consider that the international workshop has been very well received by the attending participants, the organizers duly provided the various Economies, with the guidelines and orientation to ensure their successful participation. The Economies had a chance to share experiences rearding the existing methods to take advange of fish waste, and I had a chance to increase my knowledge and apply these initiatives in my work related to fish waste management in Peru. The material and a link to access the presentations were provided in a timely manner. I think that it would be very convenient to create a network related to fish waste management. The event was very successful and I hope that APEC can host a similar workshop in the near future".



HERNAN VIVENCIO "We are very grateful because we consider that it was beneficial to learn from and communicate with other local and international leaders to Exchange experiences that can contribute to our Federation and we are counting on your support"

JORGE RIVAS "Excellent, we learned so much on maximizing the use of fish residues, ideas and innovation since fish waste contaminates our environment but at the same time provides a work opportunity for our partners. Thank you very much for the invitation, and to those who made this a reality"



MARITZA BARRIGA "The workshop had many achievements, in addition to exchanging experiences between the participants, it also helped increase awareness about the importance and urgent need to work together with artisanal fishers in the reutilization of fisheries and aquaculture residues, the researchers also showed a lot of interest in supporting and/or conducting joint studies."



Analysis of results

APEC Project Evaluation Survey: Seminar, Symposium, Workshop

The objective of the workshop was aimed at exchanging of experiences to add value to organic waste from small-scale fisheries and aquaculture through its reuse and conversion into innovative products which contribute to enhance food security.

For the assessment of the workshop, the Appendix H was applied in two sections. The former includes closed-ended questions with alternatives, seeking the evaluation of the workshop. The latter included open-ended questions to identify the objectives reached and improvement initiatives.

In general terms, the results of the survey made were positive. Also, comments made by the 48 people that took part in it suggest improvement opportunities for future APEC activities. This number of people corresponded to 40% female and 60% male.

The results of the first section showed that in global terms, the activity was positively assessed by both genders. It is important to mention that people taking the survey did not answer all the questions. However, the average response rate for this section was 98%. The assessment of the first section is as follows:

- The statement, *the objectives of the training were clearly defined*, 77% of the people indicated that they “strongly agree” and 23% “agree”. Regarding gender, the assessment was similar (Figure 1).
- In relation to if *the project achieved its intended objectives*, 77% of the people indicated to “strongly agree” and 23% “agree”. Although the assessment was similar regarding gender, women showed a better assessment than men (Figure 2).
- The statement, *the agenda items and topics covered were relevant*, 85% of the people indicated that they “strongly agree” and 15% said “agree”. In this indicator men did a better evaluation than women. (Figure 3).
- Regarding if *the content was well organized and easy to follow*, 71% stated that they “strongly agree” and 29% “agree”. In this indicator, the best evaluation was made by men (Figure 4).
- Regarding the statement, *gender issues were sufficiently addressed during implementation*, 49% indicated that they “strongly agree”, 49% “agree”, and 2% “disagree”. Although this indicator was assessed positively, it showed the lowest response rate when compared with the other indicators, Figure 5).
- The statement, *trainers/experts/facilitators were well prepared and knowledgeable about the topic*, 79% indicated that they “strongly agree” and 21% “agree”. This evaluation was equal in both genders (Figure 6).
- Regarding if *the materials distributed were useful*, 75% indicated that they “strongly agree” and 25% “agree”. This evaluation was equal in both genders (Figure 7).
- In relation to *the time allotted for the training was sufficient*, 60% stated that they “strongly agree” and 40% “agree”. This evaluation was similar in both genders (Figure 8).

In summary, women did a better evaluation regarding topics related to the project objectives. However, in relation to topics addressed during the workshop, women showed a slightly lower difference than men regarding the assessment.

Figure 1: The objectives of the training were clearly defined

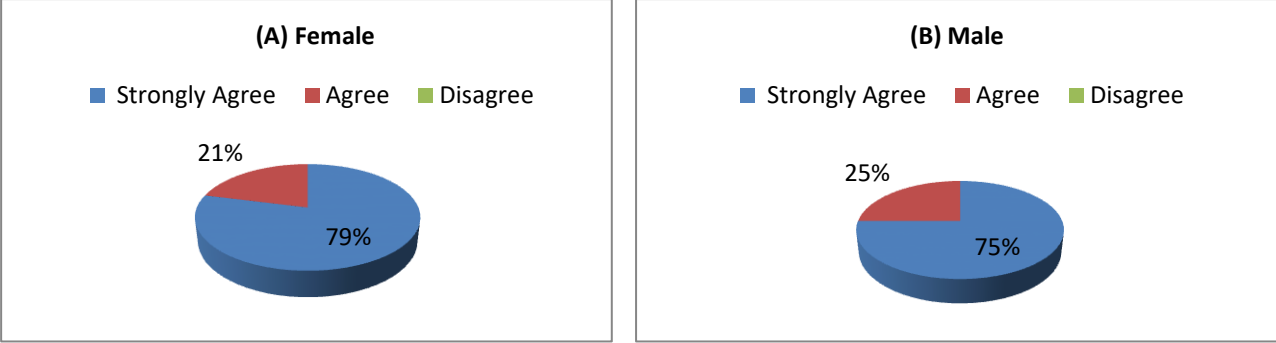


Figure 2: The project achieved its intended objectives

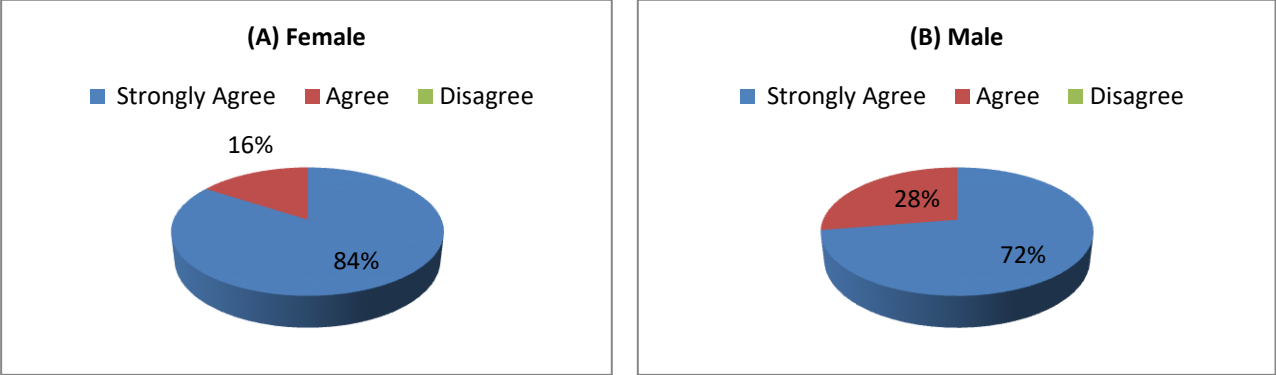


Figure 3: The agenda items and topics covered were relevant

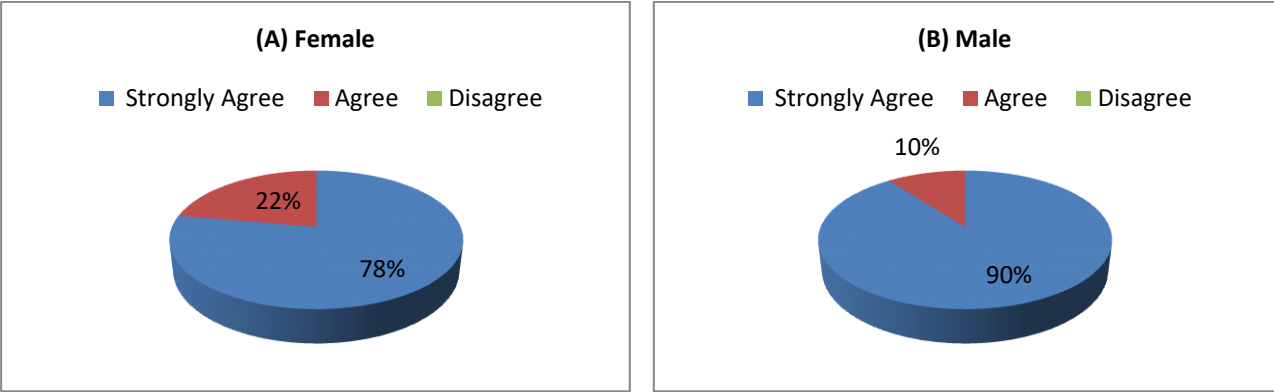


Figure 4: The content was well organized an easy to follow

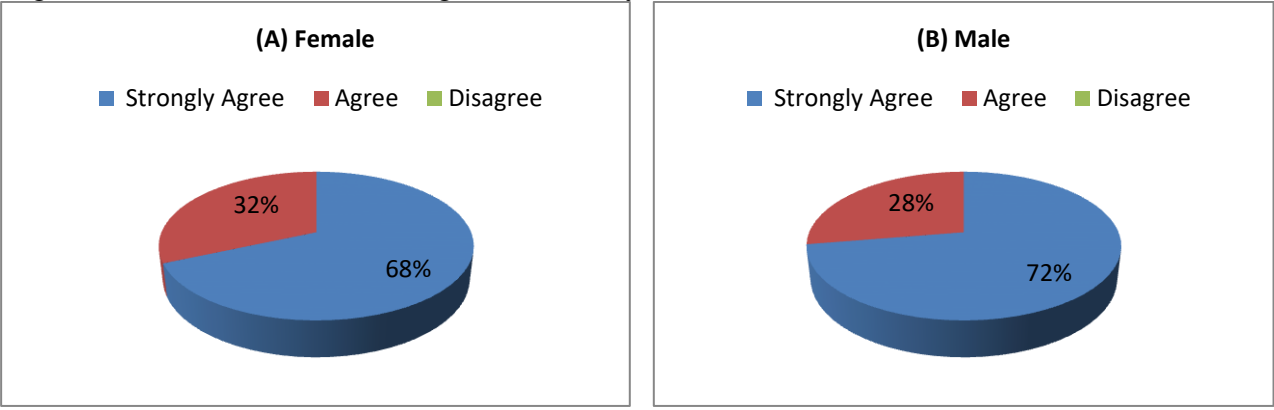


Figure 5: Gender issues were sufficiently addressed during implementation

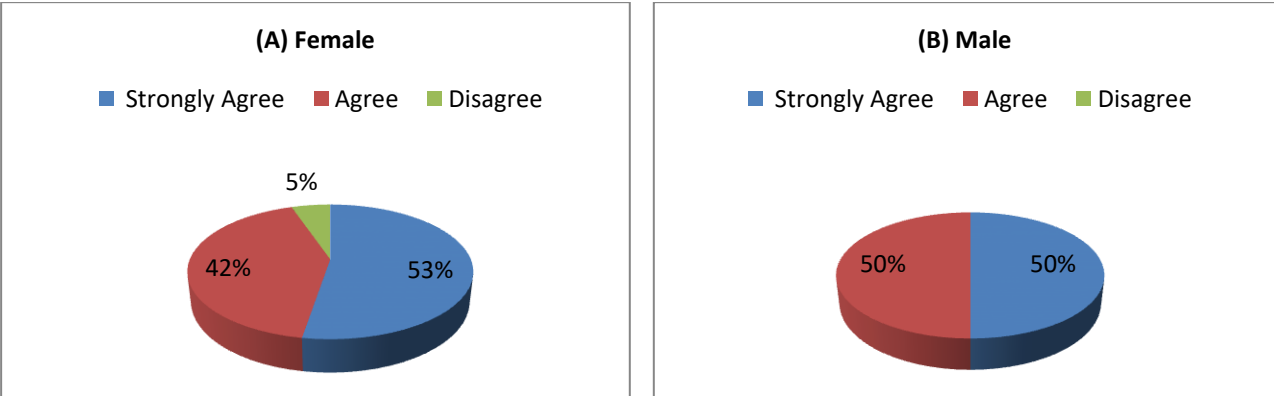


Figure 6: The trainers/ experts/Facilitators were well prepared and knowledgeable about the topic

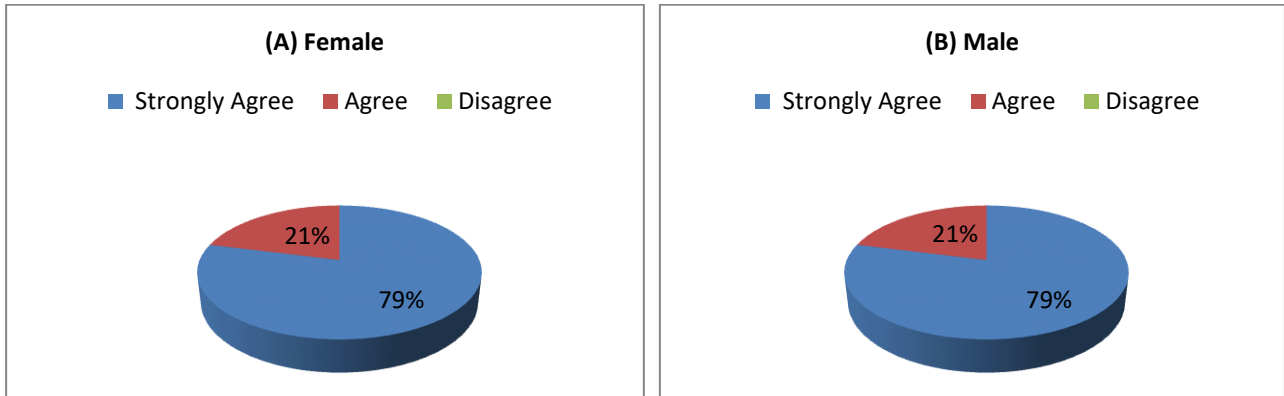


Figure 7: The materials distributed were useful

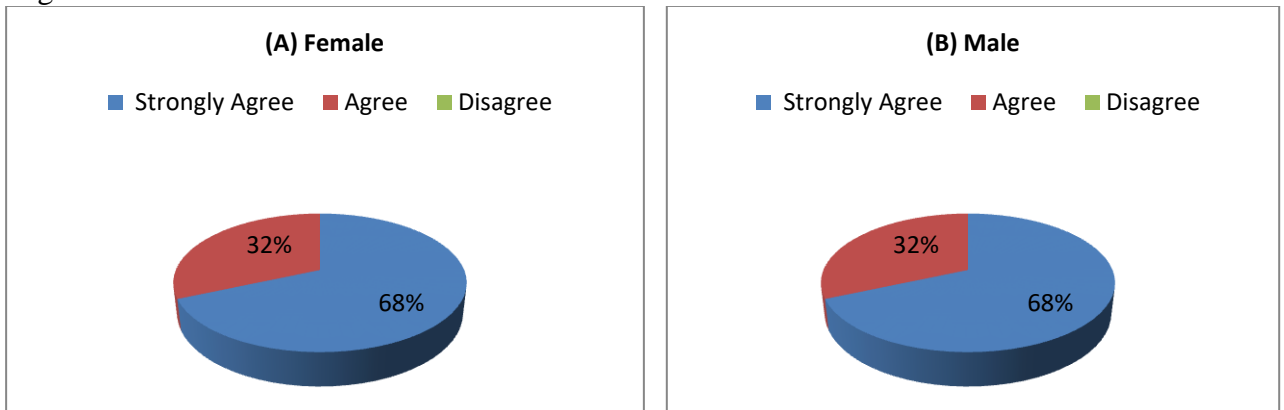
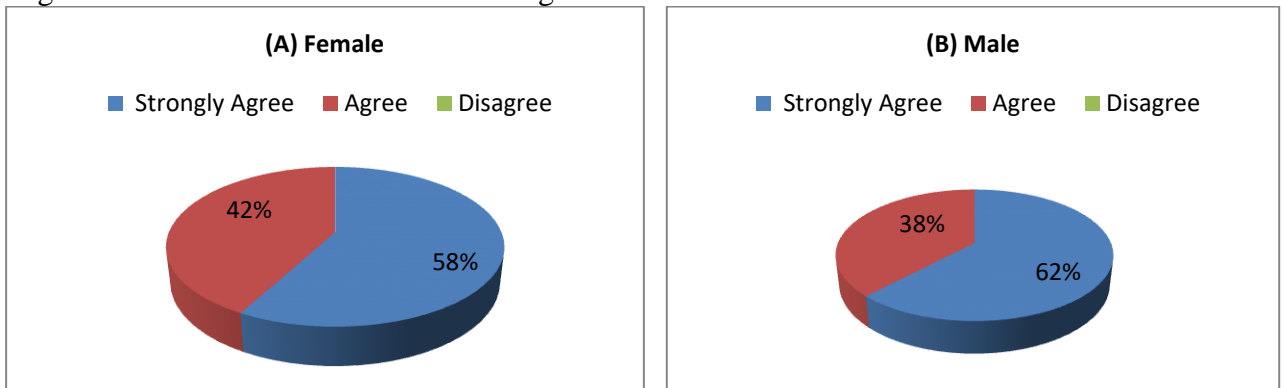


Figure 8: The time allotted for the training was sufficient

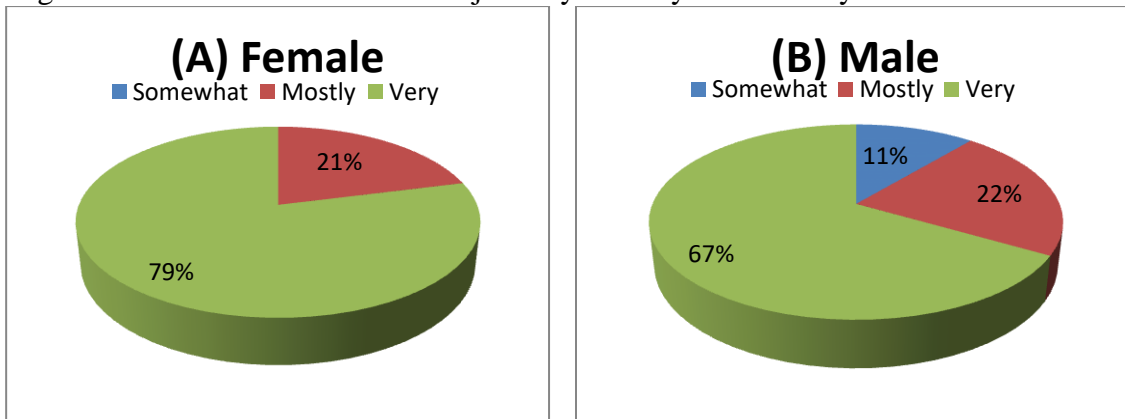


Regarding the comments of this section, it showed a response rate of 12.5%. Suggestions made included language, (it was technical and specific and some materials should have been in English), duration of working time (reduced and there were many speakers), gender (it should not be something to talk about), subjects addressed (relevant in terms of added value and regional governments should fund these projects), and organization (well organized thanks to the team).

The second section included mostly open-ended questions. Answers were grouped by subject and differed by gender. It is important to note that the response rate was lower than the previous section. The summary of the answers is as follows:

- Regarding the question *how relevant was this project to you and your economy?*, 68.7% stated that it was “very relevant”, 20.8% was “mostly relevant”, and 6.3% somewhat relevant. In relation to gender, presented some differences since “somewhat” category only appeared in the masculine gender (11% of men) unlike the female gender that only selected categories “very” and “mostly” (Figure 9.A and B.).

Figure 9: How relevant was this Project to you and your economy?

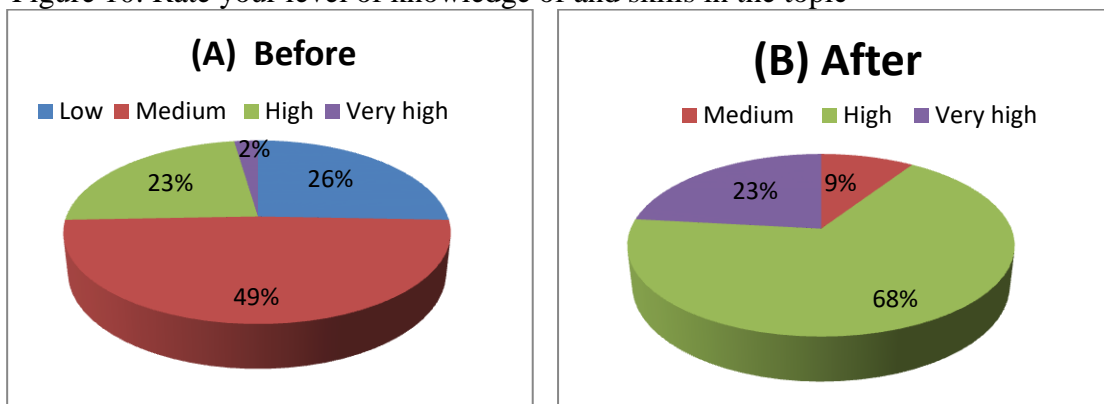


92% of the women indicated that the project was very relevant because they gained knowledge and experience. Also, this knowledge will allow them to replicate experiences learned and to promote technology transfer. 84.6% of men mentioned the same topics than women. Also, 11% of men that stated that the project was somewhat relevant for their economies because they did not gain more knowledge than they already had.

- Regarding the question *what were the project's results/achievements*, only considering the group that responded, 44% of women and 24% of men indicated that the higher results are the possibilities of adding value to artisanal fishing products. Additionally, 19% of women and 21% of men indicated that they increased their knowledge and generated contacts. Also, 38% of women and 55% of men stated that one of the results was the possibility of exchanging ideas and technological transfer.
- In relation to the question *how was your capacity built by this project? what new skills and knowledge did you gain?*, 100% of the people stated that the project did generated capacities and regarding new capacities gained, 100% of men and 85% of women indicated that the new capacities and knowledge gained were around the new knowledge about the alternatives for the use of residues, which will allow them to develop new products, future work and circular economy. Also, 15% of women mentioned additional subjects such as protection of the environment and integration of fishers in aquaculture.

- Regarding the questions on rating the level of knowledge of and skills prior and after participating in the event, 37% of women and 10% of men indicated not increasing their knowledge, 47% of women and 66% of men increased their knowledge in one level and 16% of women and 24% of men increase their knowledge in two levels. Those who did not increase their knowledge level indicated that was because they were experts in the subject. Both men (52%) and women (58%) that increased their knowledge indicated that it was because those were new subjects for them and that it can be used to replicate the experiences. Also, 17% of women and 22% of men indicated that although the subjects were related to their experiences, the knowledge gained will be useful to deepen their knowledge. It is important to mention that 25% of women and 26% of men did not comment with regards to an increase of their knowledge level.

Figure 10: Rate your level of knowledge of and skills in the topic



- In relation to the question, how will you use the skills and knowledge gained from this project to build capacity in your home economy?, comments made by women (31.6%) and men (31.0%) indicated that they will use the knowledge to develop clean technologies in order to add value; 31.6% of women and 41.4% of men will use it to establish a baseline and develop work plans, projects, programs and policies to promote waste recycling and management. Also, 10.5% of women and 13.8% of men stated that they will use the knowledge in the development of new business units considering the exporting market. Additionally, it is important to say that the response rate was 73.7% for women and 86.2% for men.
- Regarding the question, what needs to be done next by APEC? Are there plans to link the project's outcomes to subsequent collective actions by fora or individual actions by economies?, 44.4% of women and 44.8% of men indicated that APEC should replicate workshops in regions and promote international participation since it allows the generation of education and commercial contacts. They also mentioned that APEC should develop documents aimed to the dissemination and manuals for technological transfer. Additionally, 22.2% of women and 27.6% of men indicated that the interinstitutional and international work should continue as well as the promotion of regulation changes and environmentally friendly policies. It is also important to mention that the response rate was 66.7% for women and 72.4% for men.

- With regards to the question *how could this project have been improved? Please provide comments on how to improve the project, if relevant*, the response rate was 47.1% for women and 58.6% for men. They stated that the participation of local actors should be increased in this kind of international experiences. They also indicated that there should be an improvement in logistic aspects, a greater dissemination of the activities and an improvement in communication regarding language both oral and written.

Per Diem Form & Project Overseer's Certification

Project No. : OFWG 03 2017
 Name of Meeting/Workshop/Seminar : APEC Workshop Exchange of Experience to Add Value to Organic Waste from Small-Scale Fisheries
 Date (excluding arrival & departure day) : 08 - 10 October 2018
 Venue city & Economy : Coquimbo, Chile

Name of Experts/Participants	Economy	Arrival Date	ATTENDANCE		
			(Experts/Speakers/Participants are to sign-in on each day of event)		
			Day 1	Day 2	Day 3
			08 Oct	09 Oct	10 Oct

Expert						
1.	Marila Barriga Sanchez	PE	6 Oct			
2.	Gleyn Bledsoe	US	7 Oct			
3.	Xu Changan	PRC	7 Oct			
4.	Adrian Rodriguez	MEX	7 Oct			
5.	Manuel Young	CHL	7 Oct			
Participants						
1.	Wu Bin	PRC	7 Oct			
2.	Margarita Rossa Torres Aranibar	PE	6 Oct			
3.	Reynulfo Juan	RP	6 Oct			
4.	Janista Pattaravivat	THA	6 Oct			
5.	Thi Bang Tam Nguyen	VN	7 Oct			
6.	Simanjuntak Fernando Jongguran	INA	7 Oct			

I hereby certify that the above experts/participants attended the above-mentioned event, and have completed the tasks as experts/participants and that they are entitled to receive travel allowances (airfare and per diems) and honorarium (if eligible) for their participation as indicated in their respective travel undertaking.

Signature of Project Overseer :
 Name of Project Overseer : Mir Julio Jorquera
 Date: 08-10 Oct. 2018

Per Diem Form & Project Overseer's Certification

Project No. : OFWG 03 2017

Name of Meeting/Workshop/Seminar : APEC Workshop Exchange of Experience to Add Value to Organic Waste from Small-Scale Fisheries

Date (excluding arrival & departure day) : 08 - 10 October 2018

Venue city & Economy : Coquimbo, Chile

Name of Experts/Participants	Economy	Arrival Date	ATTENDANCE		
			(Experts/Speakers/Participants are to sign-in on each day of event)		
			Day 1 08 Oct	Day 2 09 Oct	Day 3 10 Oct
7. Ms Lea Myr S. Cadapan	RP	2 Oct			

I hereby certify that the above experts/participants attended the above-mentioned event, and have completed the tasks as experts/participants and that they are entitled to receive travel allowances (airfare and per diems) and honorarium (if eligible) for their participation as indicated in their respective travel undertaking.

Signature of Project Overseer

Name of Project Overseer

Mr Julio Jorquera

Date: 08-10 Oct. 2018

Participant Attendance

Project No. : OFWG 03 2017
 Name of Meeting/Workshop/Seminar : APEC Workshop Exchange of Experience to Add Value to Organic Waste from Small-Scale Fisheries
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 Venue city & Economy : Coquimbo, Chile

Name of Participants	Economy	email	ATTENDANCE		
			(Experts/Speakers/Participants are to sign-in on each day of event)		
			Day 1 08 Oct	Day 2 09 Oct	Day 3 10 Oct

<u>Participants</u>						
1.	Julio Jorquera	Chile	jjorquera@salpica.cl			
2.	Juan Covarebians	CHILE	juancovarebians@salpica.cl			
3.	Cristian Quezada	CHILE	COVAREDA@SUBPESCA.CL			
4.	Karen Mundaca	Chile	Kmundaca@subpescadecolchile.cl			
5.	Alberto Osorno	Perú	osornoa@imrpe.gob.pe			
6.	Bastiana Rasco	USA	rasco@usua.edu			
7.	Gleyn Bledsoe	USA	Gleyn@us94.edu			
8.	Jorge Rojas	Chile	jrojas@river68@gmail.com			
9.	Melina Rojas	CHILE				
10.	Marcia Gaudin Ouel	CHILE	marcia.gaudin@asec.cl			
11.	Tom Caplan	Chile				
12.	Polihoytrons Ouel	Chile				

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Signature of Project Overseer :
 Name of Project Overseer : Mr Julio Jorquera
 Date: 08-10 October 2018

Participant Attendance

Project No. : OFWG 03 2017
 Name of Meeting/Workshop/Seminar : APEC Workshop Exchange of Experience to Add Value to Organic Waste from Small-Scale Fisheries
 Date (excluding arrival & departure day) : 08 - 10 October 2018
 Venue city & Economy : Coquimbo, Chile

Name of Participants	Economy	email	ATTENDANCE		
			(Experts/Speakers/Participants are to sign-in on each day of event)		
			Day 1 08 Oct	Day 2 09 Oct	Day 3 10 Oct

13. Franklin Zepeda	Chile	egpascobas58@gmail.com			
14. Fabrice Noire	Chile	francesnoire@protonmail.com			
15. Jacqueline Solari	Chile	jsolari2016@supredsa.cl			
16. Marcelina Ortiz	Chile	casalben@protonmail.com			
17. Yasser Hattab Jorgando	Chile	yhattab@supredsa.cl			
18. Nidia Artaza	Chile	nidiaartaza@protonmail.com			
19. Sigfrido Ramirez	Chile	sigfrido@protonmail.com			
20. Benjamin Uruos	Chile	benuruos@protonmail.com			
21. Luis Andres	Chile	luisandres@protonmail.com			
22. Mishal Lopez Lamy	Chile	clopez@protonmail.com			
23. Pamela Turner Valle	Chile	cooperativa@protonmail.com			
24. Juan Pizarro	Chile	juanpizarro@protonmail.com			
25. Juana Gomez	Chile	juana@protonmail.com			

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Name of Project Overseer

Mr Julio Jorquera

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26. David Jorjue Leon	Egypt	Wziyeld@amsil.com			
27. Rodolfo Leal	Chile	16722@adnet.cl			
28. Luis Felipe Muñoz	Chile	lmuñoz@subpesc.cl			
29. ALEXANDER ESTAYAN	CHILE	alexander@desarroll.cl			
30. GLENNON SHERWOOD S.	CHILE	gleannon@bentmail.com			
31. Carolina Ellis	CHILE	carolina@elval.com.ar			
32. Luis CAHOY	ARGENTINA				
33. Luis Duran + Susana	ARGENTINA	AS. Duran + Susana			
34. Deyano Lopez	CHILE	deyano@subpesc.cl			
35. Daniel Andrade Flores	CHILE	mandrade@subpesc.cl			
36. Yuri Swift Gmelch	CHILE	Yuri Swift = susperes.cl			
37. Rodrigo Barber	Chile	rodrigo@barbervaler.cl			
38. Juan Cesar Ferr	CHILE	juan@subpesc.cl			

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39. PASCALA BEGIN	Chile	plepno@mmmpunibol			
40. ARGENT BRYN	Chile	argp@mmmpunibol			
41. PABLO VELAZQUEZ	PERU				
42. CRISTIAN FELIZEL	CHILE	FELIZEL@MMA.SOB.CL			
43. ROBERTO CONROYAL	Chile				
44. PEPPE BRYAN G.	CHILE				
45. MARIBEL ORTIZ H	CHILE	marth@prochile.job.cl			
46. NOLANIE MARTINEZ	Chile	nmartinez@economia.cl			
47. FRUIN YEA DONATE	Chile	peya@abpces.cl			
48. OSCAR AVILA Z	CHILE	osavila@stavi.coquimbo.cl			
49. TRACY JOSÉ CATOR SAUND	CHILE	tracere@chuvaco.cl			
50. GABRIELA DELA PIZCADA	Chile	gabridela@abpmmmpunibol			
51. SARA TRONCOSO	Chile	STRONCOSO@MMA.SOB.CL			

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				Day 1 08 Oct	Day 2 09 Oct	Day 3 10 Oct
52.	Carlos A. Aguilar Mont		carla@rondona.com	✓	✓	✓
53.	Rodrigo Garcia S		Rodrigogarcia@natural.com	✓	✓	✓
54.	Silvia Pastore		S.M.Pastore@gmail.com	✓	✓	✓
55.	MARCELA IVA NOBVA		MARCELA.NOVA@TIAO.COM	✓	✓	✓
56.	Roberto Fagundes	CHILE	Rfagundes@scs.org	✓	✓	✓
57.	Nancy Chavala	EDUCATION RESEARCH CHILE	Nchavala@ocu.cl	✓	✓	✓
58.	Valdo Silva	CHILE	valdo@cevincia.com	✓	✓	✓
59.	Hector Talloz	CHILE	h.talloz@epuail.com	✓	✓	✓
60.	William Marin	CHILE	williammarin@natural.com	✓	✓	✓
61.	Luis Cabello Viced	Chile	luis.cabello@natural.com	✓	✓	✓
62.	Ana Maria Lopez	Chile	am.lopez@live.cl	✓	✓	✓
63.	Marta Calderon	CHILE	MartaCalderon@total.com	✓	✓	✓
64.	Suave Chaves P.	Chile	s.chaves@scs.org	✓	✓	✓

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65.	Samuel Morley, body Ximene Alayaga	Chile	sepeleba@almarsp.cl xalayaga@almarsp.cl	X		
67.	Claudia Parro Flavio Araya M.	Chile	claudia.parro@chil.cl flavio.araya@chil.cl			X
69.	Judith Felli	Chile	cfelli@dot.cl			X
70.	Caroline Cepeda E.	"	cepeda@sumpasa.cl			X
71.	William Parro A	Chile	william@dot.cl			X
72.	Glaciela Pereira	Uruguay	gpereira@sumpasa.cl			X
73.	Luis Cordero	Chile	luis.cordero@dot.cl			X
74.	María José Martínez	Chile				X
75.	Juanita Wicksler Lopez	Chile	juanita.wicksler@sumpasa.cl			X
76.	Ricardo Gaján H.	Chile	ricardo.gaján@sumpasa.cl			X
77.	José Rojas M.	Chile	jrojas@sumpasa.cl			X

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