

Waste not, want not: Better utilisation of fish waste in the Pacific

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Globally, fisheries and aquaculture industries produce 130 million tonnes of fish waste per annum. This consists of by-catch, onboard waste, home waste and industrial waste. The waste is often disposed in landfills or dumped at sea; however, there are alternative uses that add economic value.

In June 2012, the Secretariat of the Pacific Community (SPC) and the French Research Institute for Exploration of the Sea (Ifremer) co-hosted a seminar that focused on the problem of under-utilisation of fish waste and the potential uses of the waste in the region. This article gives a summary of the seminar report written by Catherine Mariojouis (AgroParisTech) and Michael Sharp (SPC).

How is value added to fish waste?

Generally, value can be added to fish waste via two methods: mass transformation and sorting.

Mass transformation of fish waste involves the conversion of all waste into a single product. Some examples of products that are produced by mass transformation of fish waste include fish meal, fish oil, fertiliser and hydrolysates (e.g. protein hydrolysate).

As the name indicates, sorting involves the separation of different waste products (e.g. bones, guts, fins), which enables each component to be used individually for the production of specialised products. Some examples of products produced from processed sorted waste include liver oil, gelatine, omega 3, protein sports food/drinks, calcium, cosmetics, biotechnical applications and pharmaceuticals.

Why do we need to better utilise fish waste?

The potential producers of fish waste include canneries, industrial fishing vessels, small-scale fishers and processors, fish markets and commercial processing companies. The situation regarding fish waste varies according to country; although there are numerous examples in the region where fish waste is being put to some use, there are also examples of countries where fish waste is not utilised or is under-utilised.

The problem with under-utilisation of fish waste is two-fold. Firstly, there is a direct financial cost associated with the dumping of fish waste, it does not maximise the use of fisheries resources and it can damage the environment. Secondly, the opportunity cost, in terms of missed opportunity to add value to the fish waste, can be significant — there are numerous examples of successful companies that are based on utilisation of waste.



Figure 1. Fillets generally only make up around 50% of a tuna (image: Catherine Mariojouis, AgroParisTech).

What should be done?

When considering how to manage fish waste, the following framework can be adopted:

- i. identify the availability (or production) of fish waste in a given locality;
- ii. assess the current uses of the waste;
- iii. identify potential applications for the waste; and
- iv. develop a strategy for exploiting the waste for environmental and/or economic gain.

Generally, the production of fish waste in the Pacific is not well documented; however, it is recognised that there is a need to find ways to better utilise fish waste for environmental and economic reasons. A first step to achieving this was to organise the SPC/Ifremer seminar.

The SPC/Ifremer Seminar on Fish Waste Utilisation in brief

The one-day seminar, held on 11 June 2012, was organised immediately following a week of meetings of Heads of Fisheries in Noumea, New Caledonia. This gave an opportunity to have an international audience of around 50 people representing the public and private sectors in numerous countries. The attendees included: Heads of Fisheries; regional stakeholders; experts in fish waste utilisation; and representatives of fishing associations, the private sector, governmental and non-governmental organisations. The contribution by all attendees to the output of the seminar is gratefully acknowledged.

The seminar provided opportunities for dissemination of information on fish waste utilisation through a series of presentations (accessible at: http://www.spc.int/DigitalLibrary/Events/Fish_Waste_2012).

Session 1 focused on the problem of under-utilisation of fish waste and the potential uses of waste, and it introduced a general framework when considering how to better utilise waste. A summary of fish waste production in the Pacific was provided, which introduced a typology for categorising producers of fish waste. The typology adopts the following definitions:

Category A:

remote countries or areas that do not produce waste;

Category B:

countries and areas that interact with industrial fishing and processing sectors that produce a lot of waste, but generally utilise it (at least some of it); and

Category C:

countries and areas that interact with industrial fishing and processing sectors that produce a lot of waste, but generally do not utilise it.

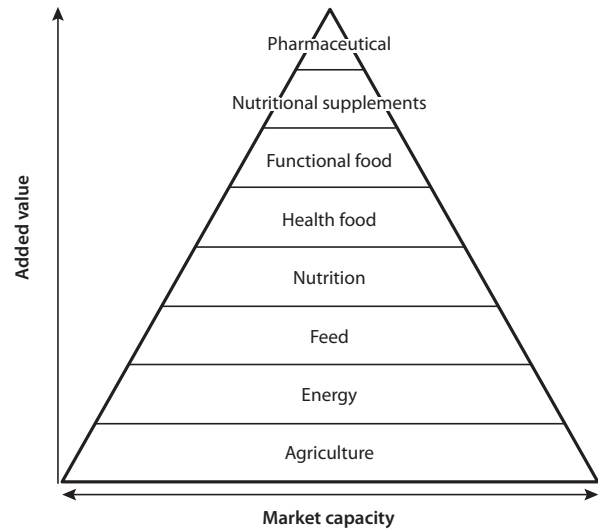


Figure 2. Market pyramid for different value adding applications for fish waste. Source: J.P. Berge (2012), Ifremer.



Figure 3. Fish waste from a Pacific-based processing company (image: BioAgri-NC).



Figure 4. Grinding tuna waste for the production of fish silage (fertiliser) (image: BioAgri-NC).

These categories were adopted in reporting on the seminar and, as an output from the seminar, Figure 5 classifies each participating country accordingly.

Session 2 focused on private sector exploitation of fish waste utilisation. Examples of small-scale and large-scale utilisers of fish waste were presented along with market opportunities for fish waste, including feed for aquaculture and food for human consumption.

Sessions 3 and 4 provided opportunity for exchange of ideas and brainstorming among participants. Working groups discussed and documented the present situation and possible future for fish waste utilisation in their countries, while considering the constraints on utilisation of fish waste.

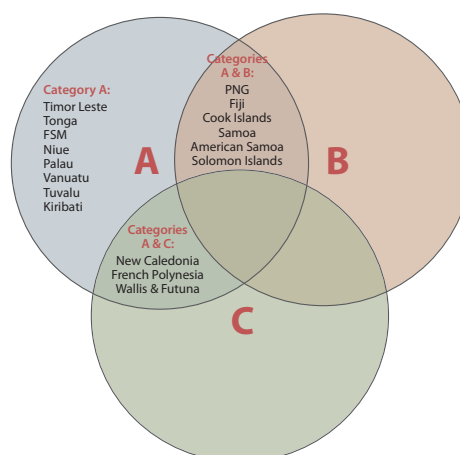


Figure 5. Categorisation of participating countries according to the adopted typology (FSM = Federated States of Micronesia; PNG = Papua New Guinea).

Seminar output and discussion

In working groups, the participants discussed and documented three general areas in relation to fish waste in the Pacific. This aimed to gather a “snapshot” of fish waste availability and current and potential use, and to identify constraints and strategy for utilising waste more effectively in the Pacific region.

The results were presented to the plenary with open discussion on the future actions that are needed to improve fish waste utilisation in the Pacific.

A summary of the working group outputs is provided below; however, it must be acknowledged that the outputs from the working groups are the views of the seminar participants and they do not necessarily represent the actual situation. Although the data cannot be fully relied upon, the seminar gave an opportunity to collate information from industry experts and present a first snapshot of the current status of waste and its utilisation in the Pacific.

Snapshot 1: Availability and present uses of fish waste in the Pacific

Context A – all used (insignificant waste or almost fully utilised)

Description	Small communities with artisanal fisheries, where all fish waste is used Generally little or no waste
Geography	Atolls, small islands, remote coastlines of larger islands
Production	Limited and scattered production of waste
Uses	Human food, animal feed (pigs or pets), or fertilisers
Opportunity	Limited commercial value-adding potential

Context B – better, but not perfect (moderate waste being used, but not everything)

Description	Low-income urban centres and islands that interact with industrial fisheries Intermediate situation with both artisanal and industrial fisheries Generally already having a specialised plant for processing waste into fish meal and fish oil Some use of waste, but not full use
Geography	Urban centres and islands that interact with industrial fisheries (onshore processing, transshipments)
Production	Medium-to-high volumes of waste, geographically concentrated
Uses	Industrial use when economy of scale allows (e.g. fish meal) Some types of waste being used as human food for food security (e.g. heads, tail trunks, belly flaps) Some waste not utilised
Opportunity	Moderate value-adding potential

Context C – completely wasted (no use of waste)

Description	High-income urban centres and islands that interact with industrial fisheries Disposal of waste at sea or landfill at cost (financial and opportunity cost)
Geography	Urban centres and islands that interact with industrial fisheries (onshore processing, transshipments)
Production	Medium-to-high volumes of waste, geographically concentrated
Uses	Entirely wasted – no use
Opportunity	Increasing awareness on waste issue, driving policy for better use High cost of discards providing economic incentive for value adding

Snapshot 2: Potential uses of fish waste in the Pacific

Application	Potential uses of fish waste
Agricultural	Produce fertiliser, fish silage or compost (organic potential) Produce pesticide (for use against insects)
Animal feed	Produce fish meal and oil for agricultural and aquaculture feeds Use of “stickwater” from fish meal process, which can be added to fish meal or in the production of hydrolysates
Food (human)	Utilise at-sea discards from tuna transshipment for human consumption (food security) Produce gelatine with fish waste Produce tuna stock from fish dust — similar to beef and vegetable stocks; it is commonly used in Japanese cuisine
Pharmaceutical	Produce collagen for micro-encapsulated medicines in aquaculture (improves palatability)
Other	Utilise pearl and crustacean shells (e.g. jewelry, calcium) Bycatch is being used for low-value add activities and should be allocated to areas that derive higher economic value (e.g. fish cakes, jerky) Potential to explore the use of fish waste for bait

Snapshot 3: Constraining factors preventing full utilisation of fish waste

Application	Constraints
Economics	Upfront investment for efficient use of waste is generally large Large scale is needed to be competitive Costs for producing a low-value product are high, again requiring scale There is uncertainty around production costs and market for waste products
Extension and development	Technical expertise for high-technology waste utilisation is lacking Support and awareness around the potential uses for waste is also lacking
Commercial	People are generally unaware of the potential applications for fish waste Few market data are available
Supply chain organisation	Collaboration and cooperation is required to get sufficient supplies to warrant fish waste utilisation – this is especially the case for small-scale processors, wide geographic distribution of waste Efficient collection mechanisms are not available
Fisheries sector	Policy required to encourage landing of by-catch and incentive to land guts (for fish silage)
Facilities	Infrastructure for large scale value adding is lacking
Administrative organisation	Separate regional administrations, resulting in a lack of global strategy
Public policies	Public policy and legislation hinder use of fish waste (e.g. Hazard Analysis and Critical Control Points (HACCP) food safety system, policies that restrict landing of fish guts)

Strategy for future developments

The following key ideas for elaborating a strategy for future developments were expressed and presented to the plenary:

- i. most PICTs are small-scale waste producers and geographic disparity and/or low production of waste may not warrant development of waste utilisation initiatives;
- ii. technical organisations (e.g. SPC and Ifremer) can facilitate the development of this sector via introducing network contacts and gathering, reviewing and disseminating information;
- iii. economic analysis is required to determine the products best suited to the scale of each location;
- iv. a summary of the main regional producers, user groups and opportunities for fish waste utilisation is required; and
- v. pilot public-private partnerships (public science, private expertise) should be developed and implemented to test ideas.

Follow-up actions proposed in the final discussion

The following follow-up actions embody the priorities identified by the participants:

1. Improve information about the potential applications for fish waste

SPC and Ifremer will prepare a brief about possible uses, technologies, application sectors, and the main conditions to consider when choosing a waste utilisation route.

2. Conduct a regional survey about fish waste

Beyond the first round of information gathering, it is considered a priority to paint a picture of the fish waste situation in the Pacific.

3. Develop a mobile pilot processing plant for testing and demonstrating different technologies

A mobile technological platform should be developed at pilot scale, with a series of machines allowing the testing and demonstration of different technologies producing different products.

4. Trial aquaculture feed production projects from fish waste

Aquaculture development in the region offers market opportunities for the utilisation of fish waste in feed applications and experimental studies are needed to develop adequate aquafeed.

Conclusion of the seminar

The role of public policy was underlined as an important factor to achieving better utilisation of waste (or reduced waste) in the region. There is a need for research and extension programmes that target private sector development for sustained fish waste utilisation.

Several representatives declared that the seminar was welcome as there are growing opportunities to lower the spoilage of valuable resources, especially in an environment of increased fish catch and processing in the Pacific.

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