

Enhancing fish-based livelihoods and safe aquatic food distribution in island food systems

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Introduction

Fish and other aquatic foods are the backbone of island economies in Southeast Asia and the Pacific (e.g. Gillett 2016). Almost everyone in the Pacific eats fish regularly (Farmery et al. 2020), but most people are not fishers. Fish are caught, distributed and acquired by consumers through purchase, gifting or bartering. This system of producing and distributing aquatic foods connects remote sources of supply with urban and inland demand, and generates indispensable value, both in the form of fish-based livelihoods for the many people involved, and for food and nutrition security in island populations (Gillett and Cartwright 2010). During periods of hardship and disruption, such as the ongoing COVID-19 pandemic or natural disasters, fish and fish-based livelihoods play an important role in the resilience of community economies (Eriksson et al. 2017, 2020). Regional and national development policies and strategies identify that improving the livelihoods of people who catch, process or trade fish, is a critical pathway to improved food and nutrition security (e.g. SPC 2015; DRTL 2011, 2017; World Bank 2017; MFMR 2019). Maintaining the contribution of aquatic foods to food and nutrition security for growing urban populations depends on the sustainability of supply, in addition to improved access to safe aquatic foods from rural origins and reducing waste and loss. In response to these broad objectives, we identify four key opportunities for enhancing fish-based livelihoods and the safe distribution of aquatic foods, and outline a programme that will be undertaken to meet these opportunities.

Inadequate understanding of fish distribution practices and opportunities for livelihood innovation

In many island food systems, perishable goods are stored and transported using relatively simple and short supply

chains, which greatly limits the effective distribution of food that is safe to eat and constrains opportunities to enhance rural fish-based livelihoods (Steenbergen et al. 2019; Tilley et al. 2020). Broad observations about the structural challenges with fish-distribution have highlighted a range of issues along fish value chains, including a lack of hygienic fish handling and processing, limited transport opportunities, limitations in processing and storage options, and barriers to market access (e.g. Kruijssen et al. 2013; Lopez-Angarita et al. 2019). But not enough is currently known about **how** fish and fish products circulate in local economies, and the key factors underlying **why** fish distribution has developed the way it has. As a result, there is also a knowledge gap around opportunities for women's and men's innovation to address production and distribution challenges leading to waste and loss, as well as around gender barriers, education needs and effective policy implementation (World Bank 2017; Tua et al. 2020). Fisheries development programmes seeking to address these challenges need to identify promising areas and activities for innovation, and consider how the benefits can be distributed equitably.

Learning from existing initiatives in rural fish-based livelihoods

Coastal fisheries have long been the focus of development investments in the Pacific (Preston and Vincent 1986; Boape 1999; Bailey and Jentoft 1990; Chapman 2004). Many initiatives have struggled to achieve intended livelihood benefits broadly because they are out of tune with the way people live their lives (O'Garra et al. 2007). Evaluating and learning from past and ongoing activities is critical to improving fisheries development programmes, with a balance between externally supported and locally led innovation processes (e.g. Cox 2017; Eriksson et al. 2020, Roche et al. 2020; Suti et al. 2020). This includes also considering the many traditional practices used to preserve and produce delicious and

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Figure 1: Pictures representing a gradient of externally supported and locally led initiatives. There is much to learn from the many examples of innovation and investments to enhance livelihoods in the coastal fisheries sector. Infrastructure development in the form of “fisheries centres” is a common modality in the Pacific.



1 The Constituency Fisheries Centre at Hauhui in Solomon Islands is one example. These centres often focus on cold storage and ice making for preserving fish during transportation for sale in urban areas, or even export. 2 The ice machine at the Provincial Fisheries Centre at Gizo in Solomon Islands is supplying fishers with flaked ice. Such types of developments are usually very costly, but new technologies are now available that are opportunities for less costly and lighter touches, such as compact solar powered freezers. 3 In Malaita, women’s groups rent out freezer space to people in the village for storing fish and other foods. But novel technologies are not the only way enhancement of fish-based livelihoods can occur.



Social innovation in the form of cooperation is also a way of thinking and planning. These movements can incorporate group training. For example, 4 training in cooking for value adding in microenterprise-style initiatives in Timor-Leste, or 5 peer-to-peer demonstration activities to spread the recipe and practice of nutritious fish-powder with other groups for their sale or consumption. Often, people have developed local solutions or recipes to local challenges or preferences. For example, 6 Ipu is made from tiny fish caught with nets in the Laclo (Manatuto) River in Timor-Leste, mixed with locally produced salt and poured into small bottles that keep for up to a year and can be sold on the roadside.



These traditional practices are made more efficient through continuous innovation. For example, 7 even though drying fish is a traditional practice at Atauro Island in Timor-Leste, making upgrades to such practices using local materials can be a way of enhancing livelihoods using intermediate technologies. 8 Smoking is a practice used to preserve reef fish taken to Gizo and Honiara for markets and family consumption from Vella La Vella in Western Province, Solomon Islands.

Images: 1, 2, 3, 5, 6: Hampus Eriksson; 4: Joctan Dos Reis Lopes; 7: Holly Holmes; 8: Chelcia Gomese

convenient aquatic food products (e.g. Duarte et al. 2020). Despite widespread investments and planning, rural women still feel their fish-based livelihood practices are ignored in many interventions (Ride et al. 2020). Inadequate attention has also been given to the gendered dimension of fish distribution networks and the social and cultural dynamics of fish-based livelihoods. As a result, much of the development programming around coastal fisheries fails to properly engage or benefit the full complement of stakeholders, or to consider the gendered impacts of interventions (e.g. Lawless et al. 2017; Labouinao 2020). There is much to be learned from the many examples of existing innovation in production, storage, processing and packaging (Fig. 1).

Recognised need for upskilling to enable improvements in livelihoods and access to safe aquatic foods

Food loss before consumption is a feature of inefficient food systems, with implications for sustainable resource use, as well as for livelihoods, and food and nutrition security (Chen et al. 2020). Perishable foods, such as fresh fish, are typically at much greater risk of contamination by food-borne pathogens and spoilage by complex biochemical and microbiological processes than more shelf-stable products, such as processed foods. Product degradation from inefficient supply chains and poor handling practices can affect quality, leading to products being sold or exchanged at gradually lower prices, as well as resulting in both reduced nutritional value and increased food safety issues (HLPE 2014). Food spoilage can affect nutrition through nutrient depletion in products, or reduced availability of nutrients through waste; it is estimated that 18–41% of vitamins and minerals, including 23–33% of vitamin A, folate, calcium, iron and zinc are lost from food globally (Global Panel 2020). This nutrient loss, which can occur at different stages of the supply chain, including during fishing, processing and cooking, is poorly understood in seafood, which has highly varied nutrient composition across species, and is often an important source of vitamin A, calcium, zinc and iron (Farmery et al. 2020). The loss of fish quality can limit peoples' financial benefits, in particular for women (Kaminski et al. 2020). For example, post-harvest loss accounted for up to 10% of all food products in the Honiara municipal market and up to 7% in roadside markets, including fishing village markets, in Solomon Islands (Underhill et al. 2019). The provision of training and awareness on alternative processing options has the potential to improve financial benefits through better preservation practices and reduce wastage, which can increase shelf-life and extend the distribution of good quality aquatic foods (Kruijssen et al. 2013; Diedi-Oadi and Mgawe 2011). Novel technologies and social innovation for hygienic handling, processing and sales are key areas of opportunity to enhance livelihoods and access to safe and nutritious aquatic foods.

Readiness of national agencies for community-led development pathways

Partners in Timor-Leste and Solomon Islands recognise the need to shape fisheries development investments towards building local capacity. Policy to support community-led development in rural fish-based livelihoods is already in place in both countries, however, putting policy into practice remains a recognised challenge for national programmes. For example, the reach of agricultural extension services in Solomon Islands is very limited. In the 2019 agricultural census, 4% of agricultural households stated that they had received extension services from a government agency or non-governmental organisation, while 68% gained information from peers (SIG 2019). There is more agricultural extension capacity than fisheries extension capacity, so the information gap is likely to be even greater for the fisheries sector. In the absence of broad-reaching services, alternative models of community-led development and peer-to-peer sharing are needed, with associated targeted support from fisheries agencies.

Our response

We are a consortium of colleagues and projects from the Ministry of Fisheries and Marine Resources in Solomon Islands, the Directorate General of Fisheries in Timor-Leste, the University of the South Pacific in Fiji, and the Centre for Sustainable Communities at the University of Canberra in Australia, all coordinated by WorldFish and the Australian National Centre for Ocean Resources and Security (AN-CORS) at the University of Wollongong in Australia. We will seek to address aquatic food distribution opportunities in island food systems through place-based action research in Solomon Islands, Timor-Leste and Fiji over the next four years. Our programme is organised according to four inter-related work packages seeking to achieve outcomes framed around the justifications described above (Fig. 2).

Reducing food loss and waste, through upgrading supply systems, has the potential to significantly improve benefits related to diet quality, food safety and income generated from higher-quality fish products (HLPE 2014; Rosales et al. 2017). Enhancing storage, processing and distribution of local food commodities is vital in mitigating food and nutrition security impacts from changing food production patterns, and has become especially important during the current COVID-19 crisis (Farrell et al. 2020). A strong link exists between the supply of education, training and skills and the increased demand for, and supply of, practical and organisational innovation (Toner 2011). However, no technical training or sharing of practices suited to rural areas currently exist, and there is very limited understanding on how best to enable rural innovation, based on newly gained skills. Therefore, a central and important part of our programme is to develop accessible information and training.

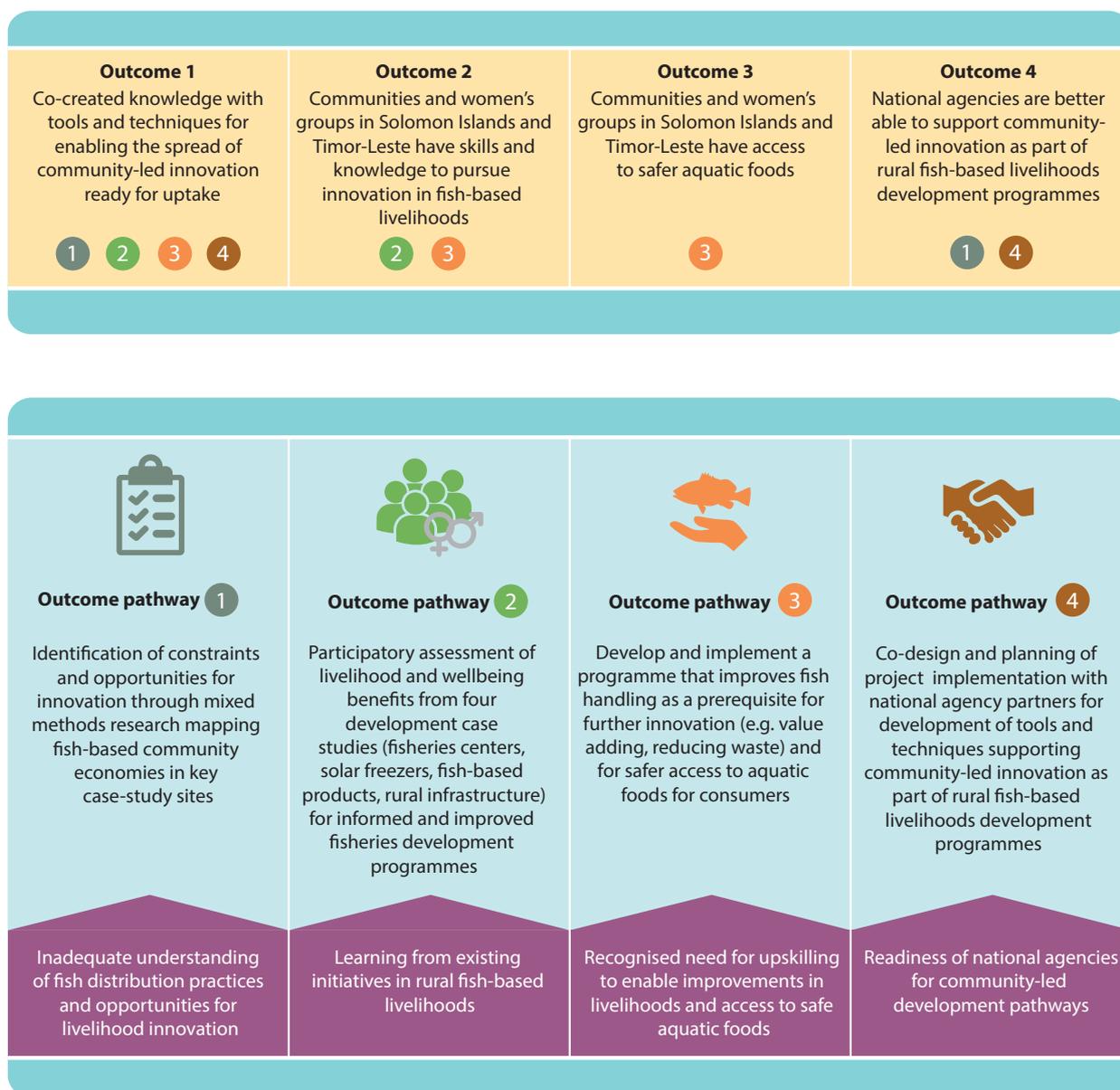


Figure 2. A logic for our work programme focusing on reducing aquatic food waste and loss, upgrading marketing practices through upskilling, and assessing fish-based livelihoods to guide fisheries development programming.

Improving the accessibility of training, and ensuring that training is suited to local needs and context, is an area of work that has been recognised for many years as being important in the Pacific (e.g. Chamberlain et al. 2001), but rarely addressed in a systematic way. We know that external support activities, when shaped to the priorities and concerns of local stakeholders, can have an impact. For example, responding to observed poor handling practices leading to spoiled and unsafe fish, we piloted activities for raising basic handling skills, identification and prioritisation of action plans to share with authorities and market managers in Malaita, Solomon Islands (Fig. 3). Vendors at the workshop prioritised upgrading to market infrastructure, which was recently done (Solomon Star 2021), showing that work-

shops where priorities are identified and mobilised can generate upgrades. As part of these activities, we developed fish-handling information materials, focusing on basic facts and illustrations (Li et al. 2018). These materials are freely available from SPC⁹ and now translated to Bislama (Vanuatu), Tuvaluan (Tuvalu) and Tetun (Timor-Leste).

There is growing recognition of the need for more community-based approaches to coastal livelihood development, and this is an opportunity to shift costly development blueprints towards community-based resource management (CBRM)-like practices (FFA and SPC 2016; SPC 2020). Countries have programmes seeking to support rural economic activities around fish distribution, so there is a clear opportunity



Figure 3. ① Fish marketed at Auki, Solomon Islands, both on the ground and in the sun, leading to rapid spoilage. ② Diagnosis of ways to address the structural problems with the market. ③ Practical upskilling with market vendors. Images: Jan van der Ploeg

for integration (e.g. Alonso et al. 2012; Tua et al. 2020). The focus of these programmes in the past has been capital-intensive investments (e.g. fleet mechanisation programmes, infrastructure, deep-sea fishing methods and export mariculture) that local women and men have often been unable to benefit from. Significant advancements in the recognition and use of participatory community approaches in the sector (van der Ploeg et al. 2016) provide opportunities for more sustainable development of coastal fisheries that are better integrated with local fisher communities. The increasing profile of the CBRM policy and practice in the Pacific over the past decades demonstrates the potential for participatory community approaches to better serve the needs and strengths of local communities (SPC 2015; Schwarz et al. 2020), and that the policy platforms are already in place to use community-based approaches for enhancing rural livelihoods and addressing challenges such as fish waste and loss.

Summary

We will assess fish distribution practices and identify women's and men's livelihood benefits from development initiatives in the coastal fisheries sector, to aid planning with national partners and prioritise innovations that show evidence of equitable benefits. Activities will support rural women and men to develop and share innovative solutions for sustainable fish-based livelihoods, reduce waste and loss of aquatic foods, and increase the capacity of national agencies to support community-based initiatives and ensure equitable rural fisheries development investments.

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