Australian Government
Australian Centre for International Agricultural Research

Final report

project

Improving community-based fisheries management in Pacific island countries

project number	FIS/2012/074
date published	11 May 2018
prepared by	Neil Andrew, Joelle Albert, Moses Amos, Karibanang Aram, Rolenas Tavue Baereleo, Ian Bertram, Michel Blanc, Delvene Boso, Jessica Blythe, Brooke Campbell, Lindsay Chapman, Philippa Cohen, Aurelie Delisle, Hampus Eriksson, Quentin Hanich, Connie Donato Hunt, David Mills, Ben Namakin, Pita Neihapi, Jason Raubani, Alessandro Romeo, Anne-Maree Schwarz, Michael Sharp, Faye Siota, Andrew Song, Meshach Sukulu, Dirk Steenbergen, Tooreka Teemari, Temarewe Tekatau, Kautoa Tonganibeia, Tarateiti Uriam, Jan van der Ploeg, and Lisa Wraith
co-authors/ contributors/ collaborators	See authorship lists of outputs listed in Section 8.4 – 50+ people.
approved by	Dr Ann Fleming
final report number	FR2019-51
ISBN	978-1-925747-27-0
published by	ACIAR GPO Box 1571 Canberra ACT 2601 Australia

Contents

List of Acronyms

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
ANCORS	Australian National Centre for Ocean Resources and Security
AusAID	Australian Agency for International Development (to November 2013)
CAPF	Comprehensive Aid Policy Framework
CBFM	community-based fisheries management
CGIAR	Consultative Group on International Agricultural Research
CLCP	Community Life Competence Process
CPUE	catch per unit effort
CROP	Council of Regional Organisations in the Pacific
CRP AAS	CGIAR Research Program on Aquatic Agricultural Systems
CSO	civil society organisation
CTI-CFF	Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
DFAT	Australian Government Department of Foreign Affairs and Trade
FAC	Fisheries Advisory Council (Solomon Islands)
FAD	fish aggregating device
FAO	Food and Agriculture Organization of the United Nations
GIZ	(Deutsche) Gesellschaft für Internationale Zusammenarbeit
ha	hectares
HIES	Household Income and Expenditure Surveys
IYCF	infant and young child feeding
JICA	Japan International Cooperation Agency
KIR	Three character ISO code for Kiribati
LMMA	Locally Managed Marine Area (network)
M&E	monitoring and evaluation
MDD-W	minimum dietary diversity for women of reproductive age
MFMR	Ministry of Fisheries and Marine Resources (Solomon Islands)
MHMS	Ministry of Health and Medical Services (Solomon Islands)
MFMRD	Ministry of Fisheries and Marine Resources Development (Kiribati)
MIA	Ministry of Internal Affairs (Kiribati)
MPPD	Malaita Partnership for Development
MSSIF	Mekem Strong Solomon Islands Fisheries Programme
New Song	*A new song for coastal fisheries—pathways to change: the Noumea strategy*
NGO	non-government organisation
NPOA	National Plan of Action (Solomon Islands)
NRM	natural resource management
PAR	participatory action research
PDAM	participatory diagnosis and adaptive management (framework)
PICs	Pacific island countries
R&D	research and development
RinD	research in development

SES	social-ecological systems
SLB	Three character ISO code for Solomon Islands
SPC	Pacific Community (previously Secretariat of the Pacific Community)
SSF Guidelines	FAO Guidelines on Securing Small-scale Fisheries
TC	tropical cyclone
ToC	theory of change
VFD	Vanuatu Fisheries Department
VUT	Three character ISO code for Vanuatu

1 Acknowledgments

The project partners, WorldFish, Kiribati Ministry of Fisheries and Marine Resource Development, Solomon Islands Ministry of Fisheries and Marine Resources, Vanuatu Fisheries Department, University of Wollongong (ANCORS), James Cook University, and The Pacific Community (SPC) would like to thank the many people who have contributed to this work.

We acknowledge and thank the communities we worked with in Kiribati, Solomon Islands and Vanuatu. The project would not have happened without their expertise, generosity in sharing knowledge and willingness to engage in the search for better ways of doing things.

We are grateful to other national partner agencies for their guidance and engagement during fieldwork: In Solomon Islands; the Ministry of Health and Medical Services, Ministry of Environment, Climate Change, Disaster Management and Meteorology, and the Provincial Governments of Western Province and Malaita. In Kiribati; the Ministry of Internal Affairs, Ministry of Environment, Lands, and Agricultural Development and the Attorney General's Office. In Vanuatu; the Ministry of Environment, Vanuatu Cultural Centre, Ministry of Trade, Tourism, Commerce and Industry, Department Land Survey and Registry, and the Provincial Secretariats of Sanma, Malamba and Tafea.

Moses Amos, Lindsay Chapman, Ian Bertram, Kalo Pakoa and Stuart Kaye played enabling roles that made things happen and smoothed the path. Delvene Boso, Shabeen Ikbal, Thavamaler Ramanathan, and Myree Mitchell provided crucial support. Further acknowledgement of individual contributions to outputs and activities is provided in the respective outputs.

We gratefully acknowledge funding from the Australian government through the Department of Foreign Affairs and Trade and the Australian Centre for International Agricultural Research. Staff from the High Commissions in Honiara, Tarawa and Port Vila were generous in their support.

Activities were integrated with other projects as appropriate to accelerate progress and co-funded by a range of projects/donors and agencies. In addition to our own institutions, these included: ACIAR project FIS/2015/031 (food systems and FADs), Asian Development Bank (FADs in Vanuatu and CBFM in Malaita) and Conservation International (FADs in Vanuatu) and SwedBio (livelihoods in Solomon Islands). Further acknowledgement of institutions and funding may be found in each output. Elements of the project will be continued and see full expression in ACIAR project FIS/2016/300.

This work contributed to the CGIAR Research Programs Aquatic Agricultural Systems (AAS) and Fish Agrifood Systems (FISH).

Finally, we thank Cherie Lambert, Thomas Roth, Anh Thu Nguyen and Liz Brierley (DFAT) for guidance and Dr Chris Barlow (ACIAR) for his enduring commitment to the 'long game' of building better fisheries and stronger livelihoods in the Pacific region.

2 Executive summary

Inshore fisheries are central to the rural economies and food supply of Pacific Island Countries (PICs), supplying food and serving as one of the few sources of cash for rural people. These fisheries are crucial elements in filling the shortfall in fish supply predicted to confront many PICs in the coming decades. No other production sector can fill the shortfall in supply in the medium term so securing a sustainable supply of fish from coastal fisheries is crucial.

Project FIS/2012/074 implemented a broad programme of research in development that sought to develop and nurture the structures, processes and capacity to implement and sustain national programmes of CBFM in Kiribati, Solomon Islands and Vanuatu. Work in communities was augmented by national and regional engagement and published analyses of issues around inshore fisheries.

In 2015, the project contributed to, and re-aligned itself to serve the SPC-led regional CBFM initiative known as the *New Song for Coastal Fisheries – Pathways for Change*. The New Song has catalysed a significant increase in political momentum for improved coastal fisheries, largely through the vehicle of CBFM.

The project highlighted the need for critical perspectives to examine, not only the potential, but also shortcomings of CBFM. The Pacific region is rapidly changing through population growth, the impacts of climate change, urbanisation and increased market integration; change that is often operating beyond the local scale, but nonetheless presents challenges to local governability of small-scale fisheries. In these regards, individual PICs are on different trajectories and can not be considered similar. Sustaining local advances in fisheries governance in the absence of external input and scaling up the footprint of CBFM in the region remain significant challenges.

In order for CBFM to realize its potential in contributing to increased food security, it must be placed in the broader context of rural lives and their social institutions, income generating activities and markets. A systematic review of the literature indicates there is limited evidence that livelihood diversification necessarily leads to positive outcomes and CBFM is not the most appropriate fisheries governance arrangement in many instances. An example of such a case and developing solution is the OKRONOS initiative in Langalanga lagoon.

There have been substantial advances in nearshore FAD programs in the Pacific region in recent years, particularly in design and deployment. Advances in technology have enabled safer and easier deployments in remote locations, even when using small vessels. The project contributed to a growing regional alignment on FAD development and implementation. FAD monitoring and evaluation efforts are still limited in the region, which limits the ability to provide generalized advice on the impact of FADs on fish production to communities and their impacts on communities and reef-based fish stocks.

Beche-de-mer fisheries remain an enduring challenge to fisheries agencies. Analysis of national trade statistics indicate fisheries in the region peaked more than 20 years ago and continue to decline. PICs must tailor management based on the intrinsic productivity of shallow inshore habitats—harvests from atoll nations will need to be smaller per unit area than from the high islands. Countries with low productivity fisheries must consider the crucial economic ‘safety nets’ that export small-scale fisheries represent for dispersed island populations and incorporate them into broader development and island resilience strategies.

The project was the first concerted CBFM initiative in Kiribati. Five communities from the Gilbert group of islands, comprising a total of 630 households engaged the novel process of establishing community visions, goals and action plans, codified in management plans. The significant interest in CBFM generated in Kiribati outside the communities the project with will be built upon in FIS/2016/300. Building national capacity for CBFM, through sustained

engagement with *Unimwane* Associations, Island Councils and national MFMRD staff and policies proved to be an important dimension of the project.

In Solomon Islands, which has a long history of engagement with CBFM, substantial progress has been made over the lifetime of the project at the provincial level in Malaita and Western Province. Engagements with communities to establish new sites of CBFM are intense, time-consuming and require substantial investments of resources. While this investment is important for in-depth and, in some cases, long-time-series research, it is simultaneously critical to recognise the limits and costs of such an approach. Investments made by CRP AAS in building partnerships and coalitions allowed project activities and fisheries objectives to be addressed in more integrated ways, accounting better for local context and validated by local experts. Much speculation and evidence-based models for the potential of spread have been provided by Pacific and Solomon Islands experts over the years. This project has been the first (through the efforts of an early career researcher) to test, in a very applied and critical way, the costs and value of an approach designed to promote spread through a 'lite-touch' approach. Capacity limitations in coastal fisheries or CBFM-focused management in provincial and national agencies are substantial constraints.

In Vanuatu, the project implemented CBFM in partnership with eight communities in Santo, Maskelyne and Aniwa Islands. Project implementation was disrupted by Tropical Cyclone Pam in March 2015; activities and resources were re-allocated to VFD-led recovery activities for 2015-2016. While national capacity for CBFM was stronger in Vanuatu, integration with other national and NGO-led CBFM activities emerged as a greater issue than in Kiribati or Solomon Islands. National integration under a common coastal fisheries strategy will be a priority for FIS/2016/300.

As elsewhere, the role of women in fisheries, fish value chains and coastal livelihoods more broadly is poorly understood and accounted for in the Pacific region. The project completed policy analyses to determine structural barriers and opportunities for gender equity in fisheries and developed practitioner guidelines. We also implemented grounded research-in-development with communities. Ongoing efforts to build capacity of researchers, partners and all practitioners were critical and an important area for real impact.

There was evidence of a double burden of malnutrition in rural Solomon Islands communities, with a prevalence of overweight or obese women and stunted children. Malnutrition was evident in children under the age of five in all study communities. The most prevalent form of child malnutrition was stunting, with 24.3% of children between 6 months and 5 years of age measured having stunted growth. The project implemented interventions within the first 1,000 days of life; (ii) interventions to improve the productions of household gardens; and (iii) education to improve communities' knowledge of nutritional issues.

Fish play an integral role in nutritional security, but need to be better integrated into a broader food systems approach with feedback loops between trade, supply and demand, and the choices people make about their diets. Across the region fish is differently acquired and consumed. The project provided the first estimates of acquisition (gifting, purchase or subsistence), apparent consumption, and calorific contribution of fish in eight PICs.

Significant resources were invested in building capacities of project staff, partner organisations and communities. Training workshops, mentoring and on-the-job-training enhanced capacity in community facilitation, project evaluation, gender and PAR. Building the capacity of community leaders, provincial government staff, partner organisations and national staff is arguably the best way to foster social change and sustainable development, although results are often indirect and difficult to measure.

3 Background

Key issues addressed

Inshore fisheries and marine resources are central to the rural economies and food supply of Pacific island countries (PICs), supplying daily protein and serving as one of the few sources of cash for villagers and coastal people. These fisheries will be crucial elements in filling the shortfall in fish supply predicted to confront many PICs in the coming decades. The broad threats facing PICs, such as climate change and rapid population growth, are particularly relevant to the future of inshore fisheries. It is improbable that inshore catches will increase significantly, and their continued degradation will have severe consequences for food security and social stability. No other production sector can substitute in the medium term, so securing a sustainable supply of fish from inshore fisheries is crucial. To address these challenges, this project was a key component of a broad program of research in development that sought to initiate a transformation of the coastal fisheries of PICs. This project sought to improve rural lives through the vehicle of community-based fisheries management (CBFM) and, in that, address several key issues as outlined below.

CBFM and food security: All small island states of the Pacific region are heavily reliant on coastal fish for food and income. As a consequence, sustaining the production of coastal fisheries is recognised as a major food security issue and priority for national agencies. In a widely cited publication, Bell et al. (2009) predicted that in 75% of Pacific island nations, coastal fisheries will not meet food security needs by 2030, implicating profound consequences for policy and development assistance. Their analysis was driven largely by assumptions about trends in population growth, fish consumption and the effectiveness of fisheries management under classical yield assumptions. By hypothesising that improved natural resource management through CBFM would effect significant poverty reductions in coastal communities and Pacific nations, we sought to achieve outcomes and impacts on three dimensions of poverty: (i) income and asset building; (ii) improved social and economic rights; and (iii) more resilient and adaptive communities.

The fundamental rights associated with customary marine tenure, in combination with the challenge of centralised management in countries consisting of many widespread, remote islands, has strained classical approaches to management and governance of inshore fisheries. A re-imagining of such centralised approaches is necessary, particularly through improved local-scale management supported by higher scales of governance. Although implementation of a CBFM program does not necessarily equate with sustainable fisheries, a mix of customary and national law provides the enabling environments needed to begin the journey toward securing fisheries resources for the future.

The project drew together initiatives in CBFM into a broad program of work to provide models for transforming coastal fisheries management in PICs. To enable governments to achieve their ambition of sustainable inshore fisheries, such transformation, through improved local management and linked local- and national-scale governance, is imperative.

Integrating 'the New Song': In 2015, the Pacific Community (SPC) launched an initiative to boost the contribution of coastal fisheries to food security in the Pacific region—*A new song for coastal fisheries—pathways to change: the Noumea strategy*' (hereafter 'the New Song'). This initiative was developed by participants at a March 2015 workshop on the future of coastal fisheries. The workshop had over 100 participants from all 22 SPC member PICs and territories (PICTs). including community members from 10 PICTs, 4 agencies of the Council of Regional Organisations in the Pacific (CROP), donors, non-government organisations (NGOs) and regional partner academic institutions.

Given CBFM's long history of evolution and implementation in many PICs, the New Song entered an already complex landscape of national strategies, stakeholders and experiences

that focused on community-based fisheries management (CBFM) design and delivery. The New Song's integration with national policy frameworks and delivery would be critical to avoid it becoming a largely rhetorical and CROP agency–led initiative. This project provided an opportunity to understand and refine the role that the New Song and CROP agencies could play in supporting and strengthening existing CBFM efforts in Solomon Islands, Kiribati and Vanuatu. To do this, we took a multi-pronged approach: firstly, to understand and facilitate the fit of the New Song into the existing policy landscape; secondly, to guide monitoring requirements of the New Song so that they mesh with, and add value to, national government monitoring and evaluation (M&E) and reporting; and thirdly, to start to track how changes and capacity catalysed by the New Song might influence CBFM quality and spread in practice.

Gender: Decades of development activity have recognised the critical role of women's participation and empowerment in increasing the productivity of agricultural systems. Women play central roles in ensuring livelihoods, food security and nutritional needs of household members, all of which contribute to poverty reduction. Much of the development community recognises that achieving gender equity (fairness) in agricultural research and development (R&D) is not only a social justice issue affecting women but is critical to achieving development outcomes for society as a whole. CBFM is an area where women play a critical role as they are typically involved in inshore fishing activities, such as reef gleaning, invertebrate collection and the preparation and sale of the products of fishing activities.

Gender and social inequality can limit certain people's access to information, decision-making power, economic assets, educational opportunities, social capital and other health and development resources. While gender was already a dominant theme in regional (the New Song) and global (the Food and Agriculture Organization of the United Nations (FAO) International Guidelines on Securing Sustainable Small-scale Fisheries, known as the 'SSF Guidelines') policy intentions at the time of project development, grounded capacity and understandings of gender and social differentiation were yet to be translated and mainstreamed into CBFM practice in the region. We applied a gender lens and gender-sensitive approaches to CBFM engagement processes and research. In building the capacity of Pacific CBFM and fisheries practitioners and managers to understand how engagement processes can work with existing local governance structures, it is imperative to avoid inadvertently reinforcing inequitable gender norms and power imbalances. Integrating such perspectives ultimately increases the equitability of decision-making and control of productive resources.

Monitoring and evaluation: In order to measure progress, identify challenges and respond adequately during the implementation of the New Song, the development of the M&E framework needed to reflect the regional approach utilised to develop the strategy itself. As such, it was key to develop a regionally agreed-upon set of indicators for coastal fisheries. In light of this, SPC and WorldFish collaborated to undertake an audit and review of existing indicators for coastal fisheries outcomes used in the region. The process focused on a mapping exercise where existing indicator frameworks relevant to coastal fisheries were organised and condensed into a joint library of Pacific island coastal fisheries indicators under the New Song.

The Pacific food system: During the development of the project we concluded that a central problem for the Pacific food system would be its evolution under a range of ecological and social drivers of change. Nutrition security is challenged by rapid population growth and urbanisation, shortages of arable land and cheap, low-quality food imports from burgeoning global trade. Many PICs are affected by the double burden of malnutrition (undernutrition and overweight/obesity). Our project addressed the food systems issue in the Pacific activities integrated with the WorldFish-led ACIAR project FIS/2015/031 (*Fish in national development: contrasting case studies in the Indo-Pacific region*). This project, also led by Neil Andrew, was implemented in partnership with SPC and the Solomon Islands

Ministry of Health and Medical Services. Activities: (i) trialled participatory interventions to improve the dietary diversity of women and children in rural communities through a nutrition-sensitive approach in Malaita Province; and (ii) extended analyses of regional trade statistics and national Household Income and Expenditure Surveys (HIES) to inform regional and national policy.

Project justification

The project supported the Australian Agency for International Development (AusAID—integrated in November 2013 into the Department of Foreign Affairs and Trade; DFAT) strategic goals and research priorities identified in the Comprehensive Aid Policy Framework to 2015–16 (CAPF) and the AusAID Research Strategy 2012–16, respectively. The CAPF identified Solomon Islands and Vanuatu as priorities for bilateral programs, while Kiribati was prioritised under the new micro-states initiative in the AusAID Budget 2012–13. In particular, two of the five goals/priorities of the CAPF/AusAID Research Strategy were directly aligned: sustainable economic development; and effective governance. These were supported through the R&D of community fisheries management structures that improved food security, incomes, employment and enterprise opportunities, while strengthening the resilience of local communities and ecosystems against climate change impacts. The project's research into forms of effective governance that straddle formal and informal institutions strengthened governance at local and national levels, thus improving delivery of vital services and further contributing to sustainable economic development.

The project's research outcomes were similarly closely in line with the four strategic outcomes identified in the AusAID Research Strategy: (i) providing evidence that informed and improved partner-country decision-making in the sustainable economic development of coastal fisheries; (ii) building Australian leadership in finding solutions to global development problems in coastal fisheries and food security; (iii) creating new knowledge that predicted and responded to related development challenges and opportunities; and (iv) strengthening the capacity of partner countries to undertake research in their own right through mentoring and capacity building.

The project also contributed to ACIAR's four corporate goals: (i) food and nutrition security—improved management and governance of coastal fisheries are proving determinant in filling the predicted shortfall in fish supply; (ii) productivity and resilience of crop, livestock, forestry and fisheries systems—resource management institutions enhanced the capacity of rural communities to self-organise and respond to shocks; (iii) smallholder and community livelihoods—durable improvements to fisheries improved diverse livelihood portfolios of coastal people; and (iv) individual and institutional R&D capacity—the capacity enhancement of researchers in national agencies, national NGOs, and national staff who all worked on the project complemented institutional strengthening programs in Solomon Islands (New Zealand funded) and Kiribati (AusAID funded).

The project built on or aligned with several ACIAR-funded projects. For example, the methods and management plans established in clusters of more than 30 villages in 3 provinces in Solomon Islands as part of project FIS/2010/056 (*Scaling-out community-based marine resource governance in Solomon Islands, Kiribati and Vanuatu*) were applied in our project. Furthermore, companion project FIS/2012/076 (*Improving community-based aquaculture in Fiji, Kiribati, Samoa and Vanuatu*) provided another critical piece of the jigsaw in securing the future supply of fish and providing alternatives to continued increases in exploitation of reef fisheries. That project identified sea cucumbers as the strongest candidate through which to integrate activities with our project. ACIAR's ongoing investments in sea cucumber culture and ranching in partnership with WorldFish and James Cook University provided a strong basis for this link. Another companion project, FIS/2015/031 (fish in national development), involved a baseline assessment of dietary diversity and nutritional status in focal communities in North Malaita, Solomon Islands. It tested the application of a new proposed global indicator of women's minimum dietary

diversity (MDD-W) for application in national surveys in the Pacific region. Our project built on these baseline data and provided a more comprehensive analysis of seasonal changes in dietary diversity. By utilising a cost of the diet approach, the project developed trials of improved practice interventions on dietary diversity for women and young children. This analysis contributed to a shared output with FIS/2015/031 on the lessons learned on the possible application of MDD-W as a new indicator for national-level surveys in the Pacific region.

4 Objectives

The overall aim was to improve food and nutrition security, productivity and resilience of fisheries systems and community livelihoods in the Pacific region, with a focus on enhancing the structures, processes and capacity to implement and sustain national programs of CBFM in Kiribati, Solomon Islands and Vanuatu. The outcomes of the project were delivered through eight objectives, which are outlined below, along with the activities undertaken to meet them.

Project objectives and activities contracted in July 2013 were revised in response to: (i) the mid-term review, (ii) the advent of the New Song, (iii) Tropical Cyclone Pam in Vanuatu, (iv) integration with unforeseen bilateral projects working on the same topics in the same countries, and (v) additional funding received in 2016. All changes to objectives and activities were approved by ACIAR; the work summarized in this report reflects the final, approved, set.

Objective 1. Critically analyse CBFM and related interventions as used in the Pacific region

- Critically analyse lessons learned in the application of CBFM in the Pacific region and its contribution to development outcomes in the region
- Critically analyse the concept of livelihood diversification and its practical relevance to improved CBFM (in collaboration with project FIS/2012/076)
- Conduct a review of past and potential future roles of aquaculture in CBFM in Pacific islands (in collaboration with project FIS/2012/076)
- Critically analyse the potential and actual contribution of FADs as a CBFM tool and the role of tuna in meeting the food security needs of the region
- Analyse the governance of marine resources in cities and other contexts where CBFM is insufficient (e.g. Tarawa and Langalanga lagoons, transboundary fisheries and national commodity fisheries)

Objective 2. Design and implement CBFM in Kiribati communities in collaboration with Island Councils and national agencies

- Conduct participatory diagnosis of the most appropriate entry points for management and governance responses
- Convene a stakeholder meeting to agree on a model for CBFM implementation in Kiribati
- Work with at least three communities to develop management plans and implement adaptive management of their resources
- Design and implement questionnaires on the gendered dimensions of CBFM in the wider livelihood context of communities
- Aligned with existing national policy and structures, design and implement a provincial-level support network for communities undertaking CBFM.

- Extend support to communities in management plan implementation to ensure continuity to start of project Phase 2

Objective 3. Strengthen and enhance CBFM in Solomon Islands in collaboration with provincial government and national agencies

[The project initially focussed on Western Province in Solomon Islands but, following ACIAR approval was broadened to include community engagement in Malaita and greater emphasis on national processes].

- Conduct participatory planning with the provincial government to build capacity for provincial support to CBFM implementation
- Work with at least three communities to develop management plans and implement adaptive management of their resources
- Design and implement questionnaires on fisheries outcomes and economic benefits of CBFM
- Design and implement questionnaires on the gendered dimensions of CBFM in wider livelihood context
- Aligned with existing national policy and structures (NPOA [National Plan of Action], SILMMA [Solomon Islands Locally Managed Marine Areas Network]), convene stakeholders to design and implement a provincial-level support network for communities undertaking CBFM.
- Extend support to communities in management plan implementation to ensure continuity to start of project Phase 2

Objective 4. Design and implement CBFM in Vanuatu coastal communities in collaboration with provincial government and national agencies

- Conduct participatory diagnosis of the most appropriate entry points for management and governance responses
- Convene a stakeholder meeting to agree a model for CBFM implementation in Vanuatu
- Design and implement questionnaires on the gendered dimensions of CBFM in the wider livelihood context
- Work with at least three communities to develop management plans and implement adaptive management of their resources
- Align community work with existing national and provincial policy and structures to support scaling network
- Extend support to communities in management plan implementation to ensure continuity to start of project Phase 2

Objective 5. Enhance understanding and mechanisms to accelerate scaling-out of CBFM in the Pacific region

- Conduct social network research in CBFM networks to better inform spread models
- Use the national theories of change (Objective 6) as a basis to develop a regional model for scaling out CBFM
- Identify and use a range of communication channels, such as websites and theatre, to facilitate information exchange
- Linking regional, national and local action – policy coherence and grounding the New Song

Objective 6. Design and implement an impact assessment program to evaluate progress in implementation of the New Song

- Hold participatory impact pathway analysis workshops in Tarawa [Kiribati], Gizo [Solomon Islands] and Port Vila [Vanuatu] to guide project design and impact assessment
- Establish economic, social and ecological baselines at local, regional and national scales based on CBFM site
- Design a participatory impact assessment program incorporating indicators of change at local, provincial and national scales and work with responsible agencies to incorporate these into their national monitoring and evaluation programs

Objective 7. Greater gender equity in decision-making and control of assets

- Hold a workshop on gender in fisheries in the Pacific and collectively design elements of a regional research and development agenda
- Design research tools and assess gender empowerment in fisheries collected from national agencies and SPC
- Develop an understanding of structural issues in gender in fisheries—including recommendations for CROP and national fisheries agencies
- Build an understanding of policy commitments related to fisheries and gender (i.e. via the New Song and SSF Guidelines) and national capacity gaps and investment required to support countries to meet these commitments
- Develop understandings and share practical recommendations related to gender considerations in community development and natural resource management; using a Solomon Islands case study

Objective 8. Improved utilisation of fish in the Pacific region

- Assess seasonal variation in women's dietary diversity and IYCF [infant and young child feeding] practices
- Implement interventions to improve nutrition of women and young children
- Develop an understanding of how market supply and demand influence the diets of rural Solomon Islanders
- Improve understanding and promote the use of fish for nutritional security in the Pacific Food System

5 Methodology

5.1 Research strategy

A recurrent criticism of agricultural research for development is that it is too often supply driven and dissociated from a real understanding of the integrated nature of poor people's lives and the difficult choices they make. In considering this, our central hypothesis was that we would have greater impact through a participatory action research (PAR) and partnership-driven approach to development and learning. This PAR approach aimed to place the capacity for generating and using knowledge in the hands of people who are trying to improve their lives. Learning from rural development practice shows that community empowerment plays a central role in the success of development interventions. We therefore engaged as co-researchers those who would otherwise be subjects of research, including fishing communities and households, officials, NGOs and others.

To ensure that the project's PAR was useful at a broader scale, we took a structured approach to identifying the localities where we worked and the issues we addressed. This included a scoping phase and a diagnostic phase where opportunities for scaling up were identified.

While our approach focused on people and place, we also recognised that external drivers, such as economic, environmental and political processes, often determine the fate of these systems. Our scoping and subsequent research therefore analysed this broader vulnerability. Particular emphasis was put on understanding how to reduce the vulnerability of aquatic agricultural systems to any adverse impacts of these external factors, and build resilience of people most exposed to them.

We worked directly with communities to address challenges in achieving sustainable and secure inshore fisheries and aquatic resources. In each of the localities, we also worked with stakeholders to identify networks that could be strengthened or extended to facilitate partnerships among fishers, farmers, traders, women's groups, private firms, local governments and other agents of change.

Decades of development activity and research have underscored the critical role of women's participation and empowerment in poverty reduction through improving agricultural productivity, livelihoods and nutrition. As part of the CGIAR Research Program on Aquatic Agricultural Systems (CRP AAS), we worked to understand gender roles and norms in the target countries and how development interventions could be more effective within these. We also identified where and how these norms presented obstacles to stakeholders transforming their fisheries. We then worked with stakeholders and engaged with partners to develop and test approaches that could help change these norms.

The project sought to answer seven important research questions:

1. In each country, what are the critical success factors in implementing CBFM?
2. In each country, how does CBFM interact with the broader livelihood choices made by men and women?
3. What contribution does CBFM make to broader development outcomes outside the fisheries sector and what are the constraints and opportunities to improve that contribution? (e.g. How can that be integrated into the national development agenda?)
4. What constraints are there to gender equity in decision-making around CBFM and related livelihood choices and what innovations and interventions are most effective in addressing these constraints to reduce gender inequality and enhance the productivity and diversity of women's livelihoods?

5. How can the successes from work done in communities and with national agencies in the three partner countries be spread through the region?
6. What are appropriate indicators of success for national CBFM programs and what does an impact assessment program 'look like'?
7. What is the role of fish in the diets of women and young children in rural coastal communities (through a case study in North Malaita, Solomon Islands) and how can nutrition-sensitive interventions improve dietary diversity?

Consistent with the PAR approach taken in the CRP AAS, the research involved two embedded layers of processes: (i) those designed to generate action outcomes (what the group does); and (ii) those designed to generate understanding from the actions (generating answers to research questions). The two are inextricably linked through iterations of action, reflection and learning cycles undertaken collectively.

The eight project objectives, which collectively addressed the above questions, were clustered into five groups:

- **Objective 1** focused on analysis of existing and new information at regional and national scales to deepen understanding of the efficacy of different models of CBFM within the broader development context. This work, which was critical to learning lessons from the often disjointed and sporadic history of CBFM in the Pacific region, primarily addressed Research Question 1 and was used to inform the rest of the project.
- **Objectives 2–4** implemented and strengthened CBFM at the community level by (i) adopting a small number of relatively intensive action research engagements with some communities to enable quantification of fisheries outcomes and economic benefits and (ii) implementing a 'lite-touch' approach in other communities. This latter approach was based on our improved understanding of how information spreads and the minimum level of external input required for communities with certain characteristics to adopt CBFM. To address Research Questions 2–4, we conducted and collectively learned how to improve structured questionnaires, value-chain analyses and social network analyses with the communities and their networks. Although the intent of work was similar in all countries, their unique political contexts demanded different modalities and phasing through the project—hence, we had a separate objective for each country. Approaches were designed in a participatory manner through workshops and consultations with provincial- and national-level governments.
- **Objectives 5 and 6** primarily addressed Research Questions 5 and 6 and focused on the integrative and scale-out aspects of the project, in order to extend reach beyond the communities and countries where we worked and to evaluate progress during and beyond the life of the project.
- **Objective 7** focused on the gender dimensions of improving coastal fisheries, and concentrated mainly on Research Questions 1 and 3. This work used lessons learned in the CRP AAS to guide community engagement and capacity development in national and regional partners.
- **Objective 8**, which addressed Research Question 7, focused on improving the utilisation of fish in the Pacific region by developing a comprehensive understanding of seasonal changes in women's dietary diversity and infant and young child feeding (IYCF) practices and then implementing and assessing the outcomes from participatory interventions for improved dietary diversity.

This work contributed to the structures, processes and capacity to implement and sustain national programs of CBFM in Kiribati, Solomon Islands and Vanuatu. Selection of these countries was guided by (then) AusAID and ACIAR priorities and confirmed during the scoping phase by expressed demand from national agencies. Ongoing ACIAR-funded CBFM work in Solomon Islands provided a unique opportunity to learn more about the sustainability of CBFM programs and constraints to scaling out. This project initiated CBFM

in new communities and critically analysed progress in those where CBFM had been previously implemented.

Co-funding for this project came from SPC and the CRP AAS. National agencies and communities made substantial in-kind contributions. While not a formal partner in the project, the Australian Research Council Centre of Excellence for Coral Reef Studies (http://www.coralcoe.org.au/) jointly funded a research position within this project.

5.2 Methods and locations per objective

Methods for published work are detailed in the respective outputs. Below we summarize methods for unpublished research – reference is made to the corresponding section where results are presented and discussed.

Livelihood Diversification (Section 7.1.2)

The analyses of livelihoods diversification and the specific role of aquaculture in spreading risk and diversifying income was completed in collaboration with the companion project (FIS/2012/076). Although their implementation was not an activity of this project, development interventions that link CBFM, aquaculture and inshore fish aggregating devices (FADs) were designed based on the outcomes of Objective 1. Reports and policy briefs summarising these analyses informed implementation and scaling of the CRP AAS in the Pacific as well as being available as a technical resource for other stakeholders in the region. We used the Technical Advisory Group established for this project to guide the details of these collaborative initiatives.

Our review of livelihood diversification in fisheries (activity 1.2.1) followed systematic review (SR) methods. SRs have been primarily used to assess the impact of interventions in health and education (e.g., the Cochrane Collaboration http://www.cochrane.org/ and the Campbell Collaboration http://www.campbellcollaboration.org/), but are increasingly used in arenas where the nature of evidence is more diverse (e.g. Dixon-Woods et al 2005, Pawson et al. 2005, Stewart et al. 2005, Gough et al. 2012).

Although the approach employed may broadly be categorized as an 'aggregative systematic review' (Gough et al. 2013), in which empirical data were collected to describe and test pre-defined concepts, we kept the review open to iteration and adaptation of methods and so used elements of what are described as 'configurative' reviews (op cit.). The review included both quantitative and qualitative research output (Pawson et al 2005, Thomas and Harden 2008). We explored theories of change (Taplin et al. 2013), that were either explicit or implicit in the literature, and gathered and assessed the validity of the evidence.

The search strategy for peer-reviewed papers focused on the major databases accessed in the scoping stage, and was complemented by search of reference list and citations to key papers. We included all papers citing Allison and Ellis (2001) and Barret et al (2001) in the search results. The latter is one of the most highly cited papers on rural diversification, and was particularly useful in broadening the scope of our search. The following string was used in the Web of Science search: (livelihood* NEAR (diversi* OR alternat*)).

Scoring: To synthesise the outcomes from the selected studies, our analysis was structured using pathways to impact conceived around a theory of change (figure 5.2.1) developed from Ellis and Allison (2004). This conceptual framework is based on the premise that livelihood diversification may improve livelihoods primarily by increasing financial and human capital (arrows flowing from top to bottom in Fig. 5.2.1). Diversification that is either autonomous or induced by an intervention was considered in the review. The feedback arrows (in red) represent the potential for changes in assets to affect diversification (e.g. increase in labour availability might lead to the expansion of activities in the portfolio). The enhanced assets may in turn affect livelihood outcomes by reducing income poverty, marginalisation and vulnerability. The changes in these three general domains might be

observed through several specific processes (examples in the orange ellipses). Such specific processes are not exclusive to a particular general domain, and interaction is likely to exist both within and between specific processes – these features are important but not shown in the diagram for the sake of clarity.

Based on this framework, each retained paper was assessed for conceptual structuring and implementation approach using an extensive, standardised coding process based on *general pathways*, *specific pathways* and *outcomes*. *General pathways* define the broad research focus of a study or intervention in addressing poverty, and definitions are based on concepts of multi-dimensional poverty as elaborated by Allison et al. (2006, 2011). Studies were assigned to *specific pathway* categories according to specific processes reported in their findings as evidence of change in livelihoods. Finally, the *outcome of* studies was classified according to whether the evidence of change reportedly supported claims that livelihoods had improved, not improved, or had showed mixed impacts in connection with different levels of diversification. The latter were grouped according to three types of reporting on portfolios: diversified livelihood strategies, comparatively reduced diversification, and apparent lack diversification.

Initial scoring was conducted by members of the research team (D. Hellebrandt, M. Rochester). However, given a degree of subjectivity in the scoring process, two independent scorers were contracted to repeat the process. At the time of reporting, this independent scoring had been completed, but results are yet to be analysed.

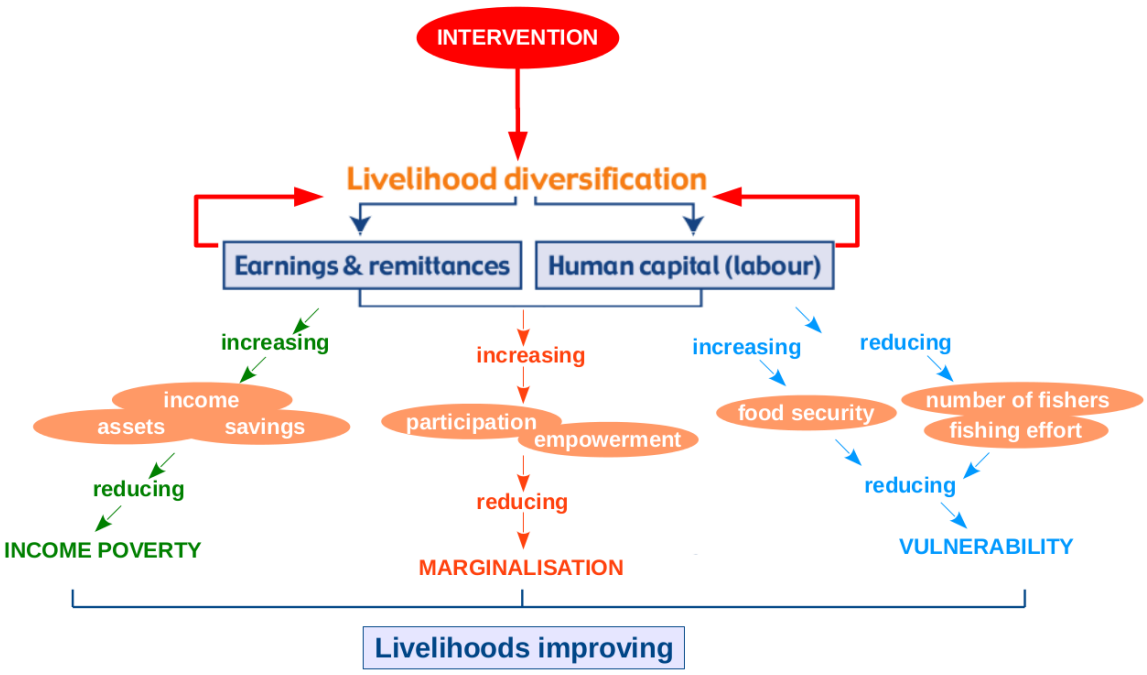


Figure 5.2.1. Impact pathways of livelihood diversification in fisheries and aquaculture. Based on Ellis and Allison (2004).

CBFM in Kiribati, Solomon Islands and Vanuatu (Sections 7.2, 7.3 and 7.4)

The methods used in **Objectives 2–4** were similar to each other and can be summarised as a group. The approach to CBFM developed, tested and modified in FIS/2007/116 (*Improving resilience and adaptive capacity of fisheries-dependent communities in Solomon Islands*) and FIS/2010/056 (Andrew et al. 2007; Boso et al. 2010; Cohen et al. 2012) had proven to be a good fit to the Solomon Islands context (Alexander et al. 2011). An intensive

participatory community engagement approach to CBFM implementation in a limited number of communities is a rich ground for action research partnerships and learning on the part of communities and partners. However, reflecting on the learning from intensive engagement in Solomon Islands, that approach was adapted for communities where such intensive engagement was not possible, or not warranted. The methods for the 'lite-touch' approach reflect that learning.

We used case studies from Vanuatu, Kiribati and Solomon Islands where case studies are those communities with which we facilitated CBFM through this project. Co-authors are locally engaged researchers/practitioners. Qualitative data were collected from the time of first contact with communities, throughout the process of community engagement, and during the implementation of management. All data were collected in the local, common, language; Pijin in Solomon Islands, Bislama in Vanuatu and Kiribati in Kiribati, and translated into English. Data included records of field notes taken during visits, which includes participant observations and records of partner-led activities, records of community and committee consultations, formal agreements such as collaborative agreements signed between communities, community development actions plans and marine resource management plans (that ultimately emerged from engagements). These non-structured forms of data collection were supplemented with more formal data collection methods. In all sites, semi-structured interviews were conducted with male and female fishers separately. This interview covered the following themes: management conception, boundaries, management design and operational rules, historical operational rules, compliance and (data presented elsewhere) impacts of management on fishing patterns. Some sites were the subject of other participatory or non-participatory research, and, where appropriate, these data were drawn upon here.

Intensive PAR engagements involved a community contact step during which roles, responsibilities and agreements were established. This was followed by a participatory scoping and diagnosis phase which adopted a community empowerment approach to CBFM planning. PAR involves working in partnership with communities to develop, monitor, review and refine community-developed management plans where they request external input. In PAR communities, project researchers also commit resources to collecting additional social and biological information that the communities would not otherwise collect; in this case, to enable quantification of fisheries outcomes and economic benefits, including the impact of CBFM on broader livelihood choices (contributing to Objective 1 and Research Questions 2 and 3). To address Research Question 4, we undertook a desk-based literature review, and carried out qualitative and quantitative surveys (using questionnaires, focus group discussions, key informant interviews and case histories) with sample households to provide an understanding of:

- the state of women's access to and control over the assets, resources, knowledge, skills and services
- women's role in decision-making, particularly in CBFM initiatives
- social norms, roles and relations that influence women's livelihood choices, participation in value chains and role in decision-making processes, including men's attitudes and practices, and women's opinions and reports of men's practices.

Meetings with participating communities and households were organised to share information and to engage in a dialogue to identify innovations and interventions to inform Objective 1 outputs and PAR by the communities themselves.

In parallel with intensive engagement, we facilitated the implementation of a 'lite-touch' touch approach in other communities. Focusing strongly on the dissemination of information, the project concentrated on building relationships with provincial governments that facilitated the sharing of lessons and promoted the involvement of provincial officers in community implementation activities.

Scale-out models for CBFM had been developed among stakeholders in Solomon Islands (e.g. Govan et al. 2011) to account for the devolution of fisheries management responsibility to provincial governments and for the increasing number of 'core or intensive engagement communities' that neighbouring communities could draw upon for experience and advice. Training modules developed for provincial fisheries officers in FIS/2010/056 became part of the toolbox that the Solomon Islands Ministry of Fisheries and Marine Resources (MFMR) had to strengthen capacity at the provincial level. As this project was embedded within WorldFish's CRP AAS, there was a valuable opportunity to leverage wider initiatives of stakeholders and partners operating in Solomon Islands. For example, within the CRP AAS, WorldFish had contributed to the drafting of the provincial fisheries ordinances for Central Islands, Western and Malaita Provinces that explicitly supported CBFM. Meanwhile, partner initiatives had assessed the minimum needs for provincial governments to support and implement CBFM (Govan 2013). It was within this context that this project contributed.

In Solomon Islands, the focus was firstly on refining intensive participatory community approaches, explicitly linking communities through a provincial ordinance to their provincial government, and secondly on working with national and local governments to provide capacity building once they had staff in place to support CBFM. The mechanisms for capacity building of provincial government staff was agreed upon and modified as required, in regular consultation with the provincial governments and national policymakers and budget holders.

Both the intensive and 'lite-touch' approaches were implemented in Kiribati and Vanuatu. Methods and lessons learned in other initiatives in the Pacific region, and through the analysis in Objective 1, were incorporated as appropriate.

In Kiribati, we worked with communities in North Tarawa and Butaritari. In Solomon Islands, community-based work was done with the provincial government in Malaita and Western Province, in Shortland Islands and Vella Levalla. In Vanuatu, we worked in Santo, Maskelynes and Aniwa. These choices of locations were guided by demand from national agencies in order to balance often conflicting criteria, including the presence of existing interventions, strategic priorities and accessibility. Islands and community selection was finalised with national agencies and other stakeholders as part of the participatory design process.

Objective 5 sought to enhance understanding and strengthen mechanisms to accelerate scaling-out of CBFM in the Pacific region. An important part of this component was to track and understand social and ecological changes that occur as a result of CBFM implementation, and to use that understanding to accelerate learning and uptake of management. The diversity of institutional arrangements offered many pathways to change and an opportunity to better understand the role of different models of management institutions. Quantitative gender-differentiated social network research methods and analysis (Carrington et al. 2005; Bodin and Crona 2009) were used to investigate patterns of knowledge transfer within and among countries in the region.

Key aspects of these analyses were: (i) the role of leadership in uptake and the durability of management; (ii) attributes of villages that predisposed success or failure; (iii) enabling attributes and constraints in village, provincial and national nodes in networks; (iv) the evolution of networks at local, provincial and national scales; and (v) the contributions of external agents as bridging organisations and brokers of new innovations. Activities, processes and sources of information that had influenced and motivated community managers to participate in or change marine resource management were determined via focus group discussions, informal interviews and semi-structured questioning.

Research outputs were integrated into protocols, training and communication materials for practitioners and into the long-term implementation of the spread model. Utilising existing government committees and structures (and national NGO initiatives, such as Won Smol

Bag in Vanuatu), we implemented effective communication mechanisms about CBFM between different levels of governance and among sectors.

In Kiribati, initial work in CBFM communities highlighted that village choirs were often used to disseminate information. Working closely with the CBFM committee of each village, we evaluated if choirs could be used to disseminate information about CBFM in CBFM villages and non-CBFM villages. To assist with the scaling out and support of CBFM initiatives from CBFM villages to non-CBFM villages in Kiribati, we used focus group discussions and participant observation of official village, Island Council and Council of Elders' meetings to understand if a network of CBFM committees at an island level (equivalent to provincial level) could assist with scaling out CBFM actions from CBFM villages to non-CBFM villages. At the national level, a workshop was held to discuss the roles and functions of a CBFM steering committee.

Analyses of the roles of networks in spreading CBFM (to be published as Blythe et al. in prep) employs a qualitative case study approach. Data for this paper include in-depth interviews, document analysis and participant observation. All interviews were recorded with written consent, transcribed and entered into qualitative data analysis software (NVivo 11). To facilitate coding, we produced a coding manual that included a code name, definition, guidelines for using the code, and an example for each dimension of the governance capacity framework (individual, relational, organisational and institutional) (MacQueen et al. 2008). Next, we assigned scores on a three-point scale (from 1–low to 3–high) for the contribution of the network to each of the four dimensions of governance capacity. While subjective, this scoring system is designed to add comparative value to our analysis (Foster-Fishman et al. 2001). To complement the interview data, we gathered and analysed all available documents related to the MPPD [Malaita Partnership for Development]. These included the network's terms of reference, meeting minutes from quarterly meetings (n = 6), and workshop reports (n = 2). Content analysis was conducted using a combination of inductive and deductive techniques designed to uncover meaningful concepts and variables, to look for similarities and differences in statements, and to verify relationships among them (Creswell 2003). In addition, we regularly attended quarterly meetings and workshops engaging in formal participant observation.

Impact Assessment (Section 7.6)

To address **Objective 6**, we designed and implemented an impact assessment program to evaluate progress in support of national and New Song objectives. Based on Table 1 of the AusAID/ACIAR Concept Note, the following indicators were identified at the project development and inception phase:

1. Increased and sustainable supply of fisheries products available for domestic consumption
2. Sustainable nearshore marine fisheries systems
3. Communities actively engaged in management of their fisheries resources
4. More secure livelihoods for target communities
5. Improved nutrition in target communities
6. Capacity of provincial institutions to support CBFM
7. Capacity of coastal communities to manage their fisheries
8. Increased number of fisheries communities that have effective governance mechanisms
9. Value of fisheries products captured/traded from sustainable coastal fisheries in formal and informal economies.

During its life-time the project results framework evolved and paired with the New Song strategy. The ambitions remained the same but the choice and vocabulary around indicators developed (see Table 7.6.1). The project designed an assessment program through: (i) establishing monitoring plans to track changes in economic, social and ecological indicators;

and (ii) developing and implementing a Participatory Impact Assessment Program (PIAP) that incorporated indicators of change at local, national and regional scales. PIAP workshops were held in Tarawa (Kiribati), Gizo (Solomon Islands) and Port Vila (Vanuatu). The workshops identified and mapped out plausible project outcomes and impact pathways and identified key assumptions. The implementing team then 'stress tested' the pathways through partner analysis, questioning of underlying assumptions and estimation of potential impact. The more probable pathways were quantified in terms of potential size and spread of anticipated impact.

Impact Assessment of NRM and policy research was an active frontier of research. At the time of project development, WorldFish was pursuing new methods for ex-ante and ex-post impact assessment in collaboration with AAS and ACIAR. This project formed part of that research agenda.

As part of this process we held a workshop with monitoring and evaluation practitioners working at the regional level for coastal fisheries. This was focused on obtaining feedback, validation and input into the indicator audit and review process from others working in the field. This initiative was part of the process to obtain regional feedback of New Song outcome indicators at the 10th Heads of Fisheries meeting. A key objective of this process was to ensure regional monitoring and evaluation for fisheries continues to be coordinated, relevant and not add additional reporting burden to stakeholders.

We used a quantitative panel study to follow a sample of men and women project community members in Solomon Islands, Vanuatu and Kiribati through time. Panel studies remove many of the uncertainties associated with random sampling in longitudinal studies. The panel study consisted of two modules:

1. A *village profile* that collected data on contextual parameters of settings where we worked. These data were not only important to gauge the situation that people live in, but form important data points for tracking larger scale change.
2. A *face-to-face interview protocol* collected personal data associated with project dimensions. Seeking in-depth answers to aid explanatory power takes time and effort, so questions had been sought that could act as rapid indicator metrics. The questionnaire was built on many of SPC's socioeconomic survey questions (Kronen et al. 2008), so as to extend the relevance of these data for historical and geographical comparison.

The interviews were gender differentiated to encompass equal numbers of men and women. This contributed to generating insights around gendered access to, and benefits from, natural resources. We re-sampled the participants of the survey at 3-year intervals—to match ACIAR project generation lifetimes.

Gender (Section 7.7)

In addressing the gender research of **Objective 7**, we employed a qualitative and case study approach. Data collection tools used at the village level were contextually modified versions of those used in the global study designed to examine gendered dimensions of adaptive capacity and capacity to innovate within rural livelihoods (Badstue et al. 2014). These more structured methods were supplemented with participant observations of the CBFM process. CBFM engagement processes, and associated livelihood developments (e.g. use of FADs), were employed with guidance from gender-transformative and gender-sensitive approaches (Kantor et al. 2015). To ensure these lessons translated into built capacity of provincial, national and regional CBFM and fisheries partners, lessons were shared in both written and workshop settings. While we delivered gender-focused materials, rather than presenting gender as a somewhat isolated piece of work that would be only the concern of 'gender focal points', we framed these modules within CBFM and fisheries more broadly to gain more traction.

Dietary Quality (Section 7.8.1)

Dietary diversity is a semi-qualitative measure of food consumption. When measured at the individual level, it can be used to reflect 'nutrient adequacy' or the extent to which that individual is obtaining their required nutrients. It is particularly useful to measure women's dietary diversity (as women's nutritional status is key to breaking the intergenerational cycle of malnutrition) as well as IYCF practices (as the first 1,000 days of a child's life are recognised globally as an important window of opportunity to prevent childhood malnutrition).

To address **Objective 8**, we built on the existing baseline dietary quality surveys that had been undertaken (through FIS/2015/031) in the focal communities in North Malaita, Solomon Islands of the then CGIAR AAS through which preliminary qualitative research on root causes of poor nutrition, and barriers to improved nutrition had been undertaken in June 2015. Through this, we developed a better understanding of the seasonal variation in dietary diversity of women and young children (<5 years). Dietary quality of women was measured using the m*inimum dietary diversity of women* (MDD-W) indicator, which is a validated measure of micronutrient adequacy (Martin-Prével et al. 2015). MDD-W is defined as the proportion of women of reproductive age that consumed five or more of ten key food groups (FAO and FHI 360 2016). For children, the *minimum dietary diversity for children aged 6 to 23 months* (*IYCF MDD)* is a synonymous indicator to MDD-W. IYCF MDD is defined as the proportion of children (aged 6 to 23 months) who consume foods from four or more of seven key food groups (WHO 2008). In the IYCF MDD, food groups 2 and 3; 7 and 8; 9 and 10 are combined.

The diet quality survey module was first implemented in rural communities in North Malaita in May/June 2017 (as part of FIS/2015/031). The dietary quality survey was repeated with a sub-set of women in September 2017 to gain an understanding on how seasonality and food access influences dietary diversity. Daily variation in diet quality was assessed in September over a 6-day period. Ethics Approval to conduct this study was obtained from the Solomon Islands Ministry of Health and Medical Services (Ethics Approval HRE10/16).

Initial analysis of baseline data (collected in May 2016) and subsequent surveys in September, 2017 indicated that existing diets were inadequate in certain food groups. Through participatory approaches, we then implemented interventions to improve dietary diversity. This involved nutritional awareness, agricultural training and cooking demonstrations. Through repeat dietary diversity/IYCF surveys, we will be able to assess the impact of the interventions to improve dietary diversity at the community level.

Patterns in acquisition and apparent consumption of fish (Section 7.8.3)

The analysis of national Household Income and Expenditure Surveys (HIES) data to describe food acquisition and apparent consumption[1] is continued from ACIAR Project FIS/2015/031. These analyses form part of a larger collaboration analysing the acquisition and consumption of food groups in the region; here we concentrate on fish and seafood. Below we reprint abridged and updated methods for this work based on methods reported in the Final Report for FIS/2015/031.

Analyses were completed of national data held by SPC. Modern standardized Household Income and Expenditure Survey (HIES) data were available for Federated States of Micronesia (FSM), Nauru (NRU), Palau (PLW), Solomon Islands (SLB), Tokelau (TKL), Tonga (TON), Vanuatu (VUT) and Samoa (WSM). HIES have recently been completed for

[1] *The term '**acquisition'** is used to signify the availability of fish in the household – got through cash purchase, gifting or subsistence. Fish comes into a household as **whole fish equivalent** (WFE), only part of which is edible. Conversion of WFE to **edible portion** for dietary diversity and nutrition analyses followed FAO guidelines.. The term **apparent consumption** is used because HIES gathers information on household expenditure on fish which is used as a proxy for consumption. Where the unqualified term 'consumption' is used for brevity, this caveat should be borne in mind.*

Cook Islands, Niue and Tuvalu - data are currently being cleaned by SPC and national agencies, and these countries will be included in forthcoming journal articles. Unfortunately, HIES for Kiribati, PNG and Fiji are unlikely to be available in the near future (noting that the latter two countries account for 79% of the region's population). Given our focus on food security, the American, British and French Territories were excluded from the analysis.

Data access was granted through Memoranda of Understanding with each country's national statistics office. All data queries were conducted by SPC staff.

The data included modules on demographic information, household expenditures, individual expenditures and income, and household diary information on food production and activities. In common with most analyses at the country level, we used income and expenditure on specific food groups as proxies for acquisition and consumption.

All data sets containing household food acquisition diary data were imported for analysis into Stata. Common variables and unique household identifiers for each data set were generated and, where necessary, various diary files were appended to create a single diary file per country. All expenditure types (cash purchases, home production and gifts received by the household) and transaction units (both standard and non-standard) were commonly coded.

All countries except Vanuatu classified transactions according to the United Nations Statistics Division's Classification of Individual Consumption According to Purpose (COICOP) codes. For Vanuatu, the national commodity classification was recoded to match that of the Solomon Islands.

Households were coded as being rural or urban except in Nauru and Tokelau. Fish were coded according to the following categories:

1. Bonito and skipjack;
2. Other pelagic finfish, including other types of tuna;
3. Reef finfish – multiple species of reef fish, including snapper;
4. Invertebrates – molluscs, crustaceans and other invertebrates;
5. Canned tuna and mackeral
6. Canned fish – other canned fish not specified by enumerators
7. Fish other - other fresh fish not specified by enumerators

Cross tabulation, graphical and manual data cleaning were used to verify that transactions were correctly classified by fish type and recoded as necessary. In the case of Samoa, a large proportion of fresh fish transactions were coded as "Fish - general". A representative from Samoa's Ministry of Agriculture and Fisheries assisted in recoding Samoan fish names to the relevant fish category and COICOP.

A variable "total quantity" was generated as the product of the variables "number" and "quantity" (e.g., 10 fish of 500 grams each were multiplied to derive a total quantity of 5,000 grams). Outliers in "total quantity" were identified as being more than three standard deviations from the mean, by transaction unit and fish category (henceforth, the "three SD method"). Where outliers were detected, the median "total quantity", for that unit and fish category, was imputed. The variable "total quantity" is critical in the derivation of the median price per gram, which is why identification and imputation of outliers was deemed appropriate. Outliers accounted for 3.1% of the 16,118 records in the dataset.

Where standard units of measurement were reported, these transactions were converted into grams and a price per gram, per transaction, was derived by taking the total value of the acquisition (cash expenditure, or household estimated value of the home produced or gifted item) divided by total quantity (in grams). The null hypothesis that the price per gram was normally distributed was visually (histogram and box plot) and statistically (Shapiro-Wilk-Test) tested and rejected. As such, the price per gram was log normalised and outliers were

detected using the three SD method. Outliers were flagged and the median price per gram, by commodity and excluding the outliers, was derived.

Where non-standard units of measurement were reported, quantities per transaction (in grams) were derived by dividing the transaction value (the expenditure amount in the case of cash acquired goods, or the households estimated value of the home produced or gifted item[2]) by the cleaned median price per gram. We assume that reported expenditure was correct. Whole fish equivalent acquisitions were then estimated for each transaction.

Quantities per transaction and by fish category were again cleaned using the 3 SD method.

Apparent consumption (in grams and calories) were estimated by converting whole fish equivalent acquisition to edible portions (for grams) and by multiplying the edible portion quantity by the energy content for each fish category (for calories). Edible portion conversion factors and calories per 100 grams were derived from the Pacific COICOP-Food Nutrition Database (UoW, SPC and FAO 2017).

HIES collects household acquisition of goods and services, which is used as a proxy to estimate consumption. Whilst HIES is a common vehicle for the per capita apparent consumption estimates, there are multiple challenges in the use of HIES data, especially in the Pacific context where sample sizes are relatively small and there is limited administrative and supporting data to validate the model, especially in terms of spatially disaggregated prices.

Due to the relatively small sample sizes, the analyses assume:

1.
2. Prices for cash purchased and home produced goods are homogenous.
3. Prices within fish categories are relatively homogenous.
4. The household reported expenditure amount for home produced and in-kind receipts is assumed to be accurate.
5. Edible portions (and associated caloric content), especially in the case of shellfish, are assumed to be accurate, however they may differ greatly depending on the commodity and its size.

Capacity development

Capacity development formed a cross-cutting objective and so was not raised as a separate objective. In addition to communities, a primary focus of capacity building in the target countries was provincial-level agency officers and institutions such as Island Councils in Kiribati. The project worked directly with local communities and provincial institutions to strengthen their engagement in fisheries management and their capacity to enact governance over their resources. This included the development of management plans where relevant, capacity building in fisheries management expertise and processes within the communities and Island Councils themselves, and strengthening of the legislative and regulatory environments at the federal and Island Council levels to empower local communities and enforce their decisions. Progress in capacity building was measured as part of Objective 6.

[2] *A range of methods may be used to estimate per capita fish acquisition and apparent consumption; none seem universally applied and accepted as the best approach, but all use the replacement cost method (Turner et al. 1993, Asafu-Adjaye, 2005, Jackson et al. 2014).*

6 Achievements against activities and outputs/ milestones

6.1.1 Objective 1. Critically analyse CBFM and related interventions as used in the Pacific region

activity	outputs/ milestones	completion date	comments
1.1 Critically analyse lessons learned in the application of CBFM in the Pacific region and its contribution to development outcomes in the region	1.1.1 Lessons learned publication and associated regionally relevant policy brief for Solomon Islands	Jun 2014	Completed. See Section 7.1.1 (CBFM in the Pacific) and 7.1.2 (Research in Development). Section 7.1.1 published as: Cohen, et al. (2014a), Is community-based fisheries management realising multiple objectives? Examining evidence from the literature, SPC Traditional Marine Resource Management and Knowledge Information Bulletin, 34: Dec 2014 Jupiter, S.D et al. (2014) Locally-managed marine areas: multiple objectives and diverse strategies. Pacific Conservation Biology 20, 165–179. Section 7.1.2 published as: Douthwaite et al. (2015). More inclusive science for the poor: linking farmers to research using the RinD approach. In, Douthwaite B, Apgar JM, Schwarz A, et al. (eds). Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems. Working Paper: AAS-2015-16. Penang, Malaysia. Schwarz et al. (2016). Collaborating for development impact: learning from research partnership experiences In Douthwaite B, Apgar JM, Schwarz A, et al. (eds). Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems. Working Paper: AAS-2015-16. Penang, Malaysia. van der Ploeg et al. (2016). Learning from the lagoon: Research in development in Solomon Islands. Penang, Malaysia: CGIAR Research Program on Aquatic Agricultural Systems. Program Report: AAS-2016-02. Webster et al. (2017). Detecting fisheries trends in a co-managed area in the Kingdom of Tonga. Fisheries Research 186, 168–176. [with James Cook University]

	1.1.2 Journal publication and associated policy brief: The contribution of CBFM to fisheries and food security – a Solomons case study	Jun 2015	Completed. See Section 7.1.1. Published as: Cohen et al. (2015a). Community-based co-management for governing small-scale fisheries of the Pacific: A Solomon Islands' case study. In S. Jentoft, & R. Chuenpagdee (Eds.), Interactive governance for small-scale fisheries; global reflections: Springer. pp 39-59. Cohen et al. (2014b) Developing a common understanding of taxonomy for fisheries management in north Vella Lavella, Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 33, 3–12. Evans et al. (2018) Reconciling multiple societal objectives in cross-scale marine governance: Solomon Islands' engagement in the Coral Triangle Initiative. Society and Natural Resources 31, 121-135. Apgar et al. (2017). Identifying opportunities to improve governance of aquatic agricultural systems through PAR. Ecology and Society 22, 9. Albert et al. (2015). Keeping Food on the Table: Human Responses and Changing Coastal Fisheries in Solomon Islands. PLoS ONE 10(7), e0130800
	1.1.3 Regional analysis of the contribution of CBFM to increases in economic development and food security	May 2017	Partially completed. Analysis for Solomon Islands completed but it has proven difficult to move estimates of the economic contribution of coastal fisheries and CBFM beyond those provided by Gillett (2016). Updated estimates will be developed in 2018 under FIS/2016/300 The food security analyses are also ongoing. Progress is summarized under Objective 7. See Section 8.3
	1.1.4 Three-country journal paper that critically reviews lessons in, engaging with communities, developing management plans and monitoring implementation	Dec 2016	Ongoing. Summarised as country-specific lessons. See Sections 7.2, 7.3 and 7.4. Country-specific lessons have been captured in Oriana et al. (2016), Baereleo Tavue et al. (2016) and Uriam et al. (2016). The integrating paper will be published as: Cohen et al. (in prep). Local context and engagement processes that influence development, design and implementation of community-based fisheries management.
	1.1.5 Three-country journal article that reviews fisheries outcomes from serial periodic harvesting	Dec 2016	Ongoing Cohen et al. (in prep). The fisheries impacts of community-implemented management measures. This output will be completed with input from and as part of FIS/2016/300.

	1.1.6 Three-country journal article published on gender in fisheries in Kiribati, Solomon Is and Vanuatu	Dec 2015	Ongoing. Progress is summarized under Section 7.7. This specific output will be published as: Delisle et al. (in prep). Applying a gender lens to the interactive governance framework for small-scale fisheries in the Pacific region.
1.2 Critically analyse the concept of livelihood diversification and its practical relevance to improved CBFM	1.2.1 Journal publication and policy brief on lessons in livelihood diversification published through SPC channels	Dec 2016	Ongoing. See Section 7.1.3. Analyses are completed. The paper will be published as: Andrew et al. (in prep). Pathways to livelihood diversification in fisheries and aquaculture in the developing world. Target journal: Fish and Fisheries A policy brief will follow submission of the paper.
	1.2.2 A paper detailing a capitals and assets framework for identifying opportunities and constraints to improve CBFM in PICs	Dec 2015	Completed. See Section 7.1.4. Published as: Blythe et al. (2017a) Strengthening post-hoc analysis of community-based fisheries management through the social-ecological systems framework. Marine Policy 82: 50-58.
1.3 Conduct review of past and potential role of aquaculture in CBFM in Pacific islands	Journal publication and policy brief published through SPC channels	Dec 2016	Ongoing. See Section 7.1.5. Published as: Blythe, et al. (2017b). Social dynamics shaping the diffusion of sustainable aquaculture innovations in the Solomon Islands. *Sustainability* 9, 126. Andrew et al (in prep). Review of the status and impact of aquaculture for food security in Oceania. Target journal: PLoS One Policy Brief to be completed following completion of Andrew et al.
1.4 Critically analyse the potential and actual contribution of FADs as a CBFM tool and the role of tuna in meeting food security needs of the region	1.4.1 Journal publication and policy brief on FADs in Solomon Islands published through SPC channels	Jun 2015	Completed. See section 7.1.6. Published as: Albert et al. (2014). The contribution of nearshore fish aggregating devices (FADs) to food security and livelihoods in Solomon Islands. *PLOS ONE* 9(12): e115386. doi:10.1371/journal.pone.0115386 Albert et al. (2015a). Nearshore fish aggregating devices (FADs) and food security in Solomon Islands. WorldFish AAS report. Available at (http://worldfishcenter.org/content/) Masu and Albert (2015). Nearshore fish aggregating devices for food security in Solomon Islands. SPC Fisheries Newsletter, 146, 25-31. [policy brief]

	1.4.2 Journal article and policy brief published through SPC channels on the future role of FAD-caught tuna in meeting food security needs	Jun 2016	Completed. See section 7.1.7. Published as: Bell et al. (2015a). Optimising the use of nearshore fish aggregating devices for food security in the Pacific Islands. *Marine Policy* 56: 98-105. Bell et al. (2017a). Operationalising access to oceanic fisheries resources by small-scale fishers to improve food security in the Pacific Islands. Marine Policy in press. [with ADB and NOAA]
	1.4.3 Journal article on lessons learned in implementation of national FAD programs and their role in regional food security	Dec 2016	Completed. See section 7.1.6. Published as: Campbell et al. (2016). Not just a passing FAD: Insights from the use of artisanal fish aggregating devices for food security in Kiribati. *Ocean and Coastal Management* 119: 38-44. Regional nearshore FAD expert consultation workshop developed in collaboration with SPC held in Vanuatu 22nd – 28th June 2016. Anon (2017) Sustainable national artisanal FAD programmes: what to aim for. SPC Policy Brief No. 31. Albert, J. and Sokimi, W. (2017a). Sharing Pacific nearshore FAD expertise. SPC Newsletter 150, 37-41.
1.5 Analyse the governance of marine resources in cities and other contexts where CBFM is insufficient (e.g. Tarawa and Langalanga lagoons, transboundary fisheries and for national commodity fisheries)	1.5.1 Journal publication and policy brief published through SPC channels	Jun 2016	Partially completed. See section 7.1.8. Published as: Eriksson et al. (2016). An ecosystem approach to small-scale fisheries through participatory diagnosis in four tropical countries. Global Environmental Change 36: 56-66. Hanich Q., Wabnitz C., Ota Y., Amos M., Donato-Hunt C. and Hunt A. (2017). Small-scale fisheries under climate change in the Pacific Islands region. Marine Policy in press. [with Nereus program]. Sulu et al. (2015). Livelihoods and fisheries governance of fisheries in contemporary Pacific Island settings: A Solomon Islands case study. PLoS ONE 10, e0143516. Sukulu, M., et al. (2016) Management over ownership: Modern community cooperation in Langalanga Lagoon, Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 13-21. Analyses of Tarawa lagoon and transboundary fisheries not done.

	1.5.2 Journal article on the impacts of booms and busts in BdM fisheries on community and household livelihoods	Dec 2016	Completed. See section 7.1.9. Published as: Eriksson, H., Clarke, S. (2015a) Chinese market responses to overexploitation of sharks and sea cucumbers. Biological Conservation 184, 163-173. Eriksson, H. et al. (2015b) Contagious exploitation of marine resources. Frontiers in Ecology and the Environment 13, 435-440. Eriksson, H. et al. (2017a) Geography limits island small-scale fishery production. Fish and Fisheries. DOI: 10.1111/faf.12255 Purcell, S.W. (2017). Distribution of economic returns in small-scale fisheries for international markets: A value-chain analysis. Marine Policy. 86: 9-16. Eriksson, H.et al. (in prep). What happens when the sea cucumber fishery closes? A case study from Melanesia. Journal article. Eriksson et al. (in prep). Reconciling resilience and development at the nexus of food security and livelihood strategies in Langalanga lagoon, Solomon Islands.

6.1.2 Objective 2. Design and implement CBFM in Kiribati communities in collaboration with Island Councils and national agencies

activity	outputs/ milestones	completion date	comments
2.1 Conduct participatory diagnosis of the most appropriate entry points for management and governance responses	Publish situation analysis and CBFM rollout plan produced	Jun 2015	Completed. See section 7.2.2 ‘Site selection and participatory diagnosis’. Published as: Delisle et al. (2016). Participatory diagnosis for North Tarawa and Butaritari island communities in the Republic of Kiribati. WorldFish, Penang, Malaysia. Project Report: 2015.
2.2 Convene a stakeholder meeting to agree a model for CBFM implementation in Kiribati	2.2.1 A stakeholder meeting designs and agrees to a model for CBFM implementation in Kiribati	Dec 2014	Completed See section 7.2.4 ‘Stakeholder meetings and CBFM implementation’: Regular stakeholder meetings organized to share lessons as CBFM progresses in Kiribati were held throughout the project lifetime (see Table 7.2.2).

	2.2.2 Publish a situational analysis of coastal fisheries in Kiribati within the broader development context as a Working Paper and then as a journal article	Dec 2015	Completed. See Section 7.2. Published and/or to be published as: Uriam and Delisle (2014) Community-Based Fisheries Management Project in Kiribati: the first steps. SPC Fisheries Newsletter. Namakin B. and Uriam T. (in prep.) Toolbox for community-based fisheries management in Kiribati. MFMRD Fisheries Newsletter. Campbell and Delisle (in prep). Strengthening coastal fisheries governance: What role for community-based fisheries management in Kiribati? Hanich et al. 2016. Pacific small-scale coastal fisheries: strengthening sustainability, food production and livelihoods. Pp. 28–32 in Asian Development Bank (ADB), Pacific Economic Monitor Series. ADB: Manila, Philippines.
	2.2.3 Publish translated SPC information sheets to fit Kiribati context and community-targeted brochures on CBFM in Kiribati context	Jun 2016	Completed. See Section 7.2. A total of 37 guides have been translated into I-Kiribati and forwarded to SPC for advice on layout and printing. They included translated versions of SPC information sheets for species of importance in Kiribati, safety guidelines, posters around mangrove management and destructive fishing methods and checklists for communities undertaking CBFM. Anon (2016). *Kwain karaoan te ointua*: Poster on '10-step by-law process proper citation. Content developed in collaboration with Kiribati Ministry of Fisheries and Marine Resources Development (MFMRD), Ministry of Internal Affairs (MIA), and Attorney General's Office (AGO) and distributed to MFMRD and community for outreach purposes.
	2.2.4 Workshop to develop structures, define roles and functions for supporting the long term scaling out of CBFM (i.e. National CBFM Steering Committee, NGOs, embedded staff, regional support, etc)	Jun 2017	Completed: Due to the lack of pre-existing in-country capacity and experience in CBFM in Kiribati, the project refocused on building a foundation for CBFM. More advanced stages such as scaling of CBFM will be a focal activity for the follow-up project in FIS-2016-300. A workshop was implemented to reflect on lessons learnt and develop strategies forward for CBFM developing in Kiribati for the future. Uriam T. 2016. Stakeholders of the Kiribati community based fisheries management project gather to discuss lessons learned and a way forward. SPC Fisheries Newsletter 149, 19–21.
2.3 Work with at least three communities to develop management plans and implement adaptive management of their resources	2.3.1 Inshore resource management plans are formally agreed to by three communities and agreed management rules are implemented by the communities	May-Nov 2015	Completed. Plans finalized and implemented as (see section 7.2.5 'CBFM establishment'). 1. Tanimaiaki (Butaritari) agreed May 2015 2. Kuma (Butaritari) agreed Jun 2015 3. Tabonibara (North Tarawa) agreed Aug 2015 4. Buariki (North Tarawa) agreed Oct 2015. 5. Bikati (Butaritari) agreed Nov 2015.

	2.3.2 Community workshops and network meetings held with Provincial stakeholders including other communities to share lessons	Jun 2015 and Jun 2016	Completed by milestone measure but ongoing activities continue engagement with provincial institutions in North Tarawa and Butaritari (see section 7.2.6 'CBFM establishment – national and subnational cap development'). CBFM committee members of Tanimaiaki, Kuma and Bikati presented their CBFM plans during a meeting held with the Unimwane association and the Island Council of Butaritari in November 2015. The CBFM team supported community representatives from Buariki and Tabonibara in presenting their management plans to the Island Council and Unimwane Association of North Tarawa in February 2016. Tarateiti Uriam was invited to present the CBFM approach during a meeting attended by the Mayors of all Gilbert Islands in November 2015. Ben Namakin was invited by the Mayor and Chair of the Unimwane association of Makin Island to talk about the CBFM approach and activities being undertaken in the neighbouring island of Butaritari.
	2.3.5 National policy brief on CBFM produced	May 2017	Completed. Policy brief completed as a cabinet paper to Government of Kiribati: Hanich et al. (submitted). Government of Kiribati Cabinet briefing: community-based approaches to fisheries management. Unpublisihed document.
2.4 Design and conduct questionnaires on the gendered dimensions of CBFM in the wider livelihood context.	2.4.1 Community workshops and meetings held to report back results of gender analyses	Jun 2016	Partially completed and ongoing. Data collection completed. Meetings with MFMRD staff and community representatives were held after the completion of data analysis. Write continues as
2.5 Aligned with existing national policy and structures design and implement a provincial level support network for communities undertaking CBFM	2.5.1 Network established and supported	Jun 2016	Completed and ongoing In-country CBFM team providing regular briefings to supporting organisations including MFMRD, Ministry of Internal Affairs and the Ministry of Environment, Land and Agricultural Development.
	2.5.2 Locally relevant community targeted information is produced and available through MFMRD	Dec 2016	Completed. See Section 7.2.6. Published as: Campbell and Delisle (2016). *Kawain karaoan to ointua*. Guidelines for by-law processes relating to coastal fisheries activities in Kiribati. Report to the Ministry of Fisheries and Marine Resources Development (MFMRD). Australian National Centre for Ocean Resources and Security (ANCORS): Wollongong, Australia. 17pp. Campbell and Delisle 2017. Exploring the use of bylaws as an enabling tool for sustainable community-based fisheries management in Kiribati. SPC Fisheries Newsletter 153, 40–46.

	2.5.3 Kiribati training workshop to develop marine spatial planning and theory of change tools to scale out CBFM and develop hybrid approaches for urbanised communities.	Dec 2016	Completed; See section 7.2.8. Written up as unpublished reports: Hanich et al. (submitted) Ministry of Fisheries and Marine Resources Development (MFMRD) policy briefing: Tarawa Lagoon management, community tenure and spatial planning. Hanich Q. and Dunstan P. (submitted). Ministry of Fisheries and Marine Resources Development (MFMRD) policy briefing: theories of change for fisheries.
	2.5.4 Policy coherence study of Kiribati policy framework against FAO SSF Guidelines and New Song. Published as Policy brief.	Dec 2016	Partially completed. See Section 5.4.1. Regional analysis reported as Song et al. (submitted), Policy brief not done.
2.6 Extend support to communities in management plan implementation to ensure continuity to start of project Phase 2	2.6.1 Contracts of in-country project staff extended to 30 June 2017	Jun 2017	Completed. Contracts for Tarateiti Uriam and Ben Namakin extended with SPC.
	2.6.2 Annual work plans for in-country project staff finalized to ensure continuity of community engagement	Feb 2017	Completed. Community engagement extended.

6.1.3 Objective 3. Strengthen and enhance CBFM in Solomon Islands in collaboration with provincial government and national agencies

activity	outputs/ milestones	completion date	comments
3.1 Conduct participatory planning with Provincial government to build capacity for support to CBFM implementation	3.1.1 Policy brief targeting Provincial government on CBFM	Jun 2014	Completed. See Section 7.3.2. Participatory planning (including community selection) was achieved through scoping activities and consultations (from community visits, to multi-stakeholder provincial consultations; reports cited below) WorldFish (Dr Greg Bennett and Grace Orirana) served on the Provincial Fisheries Advisory Committees and as coordinator or member (respectively) for provincial networks tacking development planning and implementation. Published as: Bennett et al. (2014a). Solomon Islands: Western Hub scoping report. AAS Project Report AAS-2014-14. Bennett et al. (2014b). Solomon Islands: Western Province situation analysis. CGIAR Research Program on Aquatic Agricultural Systems. Penang, Malaysia. Project Report: AAS-2014-15. Cohen et al (2014c). Lessons from implementing, adapting and sustaining community-based adaptive marine resource management. Lessons Learned Brief: AAS-2014-16. CGIAR Research Program on Aquatic Agricultural Systems/WorldFish: Penang, Malaysia. Govan et al. (2013). Solomon Islands: Essential aspects of governance for Aquatic Agricultural Systems in Malaita Hub. CGIAR Research Program on Aquatic Agricultural Systems. Project Report: AAS-2013-19. Penang, Malaysia.
3.2 Work with at least three communities to develop management plans and implement adaptive management of their resources	3.2.1 Written management plans are endorsed by communities	Dec 2015	Completed and ongoing - engagements continue. See Section 7.3.4. Management plans designed and endorsed by communities in Santupaele, and Fumamato'o . Pre-existing management plans in Leona and Paramatta reviewed and revised for communities. Management plan development and associated activities involved numerous site visits, in person communication and trainings; Santupale (24 points of contact), Fumamato'o 35 points of contact, Mararo 22 points of contact (documented in field trip reports).

	3.2.2 Community workshops and network meetings held with Provincial stakeholders including other communities to share lessons	Jun 2015 and Jun 2016	Completed by the milestone measure – activity ongoing. Community workshops conducted (approximately 3 to 5 per community) include visioning workshops, facilitator training, Training workshops also conducted on alternative livelihood (e.g., organic farming, efficient fuel stoves, FAD fishing) and specific resource management (e.g., mangrove, coral replanting). Look and learn exchanges facilitated in Western and Malaita province to share lessons and promote CBFM spread. Synthesis of lessons for and from sharing in networks and other workshops reported in; Schwarz et al. (2017). Critical reflections from fostering adaptive community-based, co-management in Solomon Islands small-scale fisheries. SPC Trad Mar Res Mgt and Know Bull 38:14-25. Orirana et al. 2016. Spreading community based resource management; testing the 'lite-touch' approach in Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 3–12
3.3 Design and conduct questionnaires on fisheries outcomes and economic benefits of CBFM	3.3.1 Data report produced to contribute to Objective 1 publications	Dec 2015	Completed and ongoing. Data collected in three years in Leona and Paramatta to determine the fisheries impacts of CBFM– five year analysis to be complete in 2018. Fisheries data collection commenced for Santupaele and Radefasu in 2016 and 2017 respectively and is ongoing(data to be analysed in subsequent phase of project). Panel study designed and conducted (See Section 7.6.2) in all CBFM communities to determine long term fisheries and economic changes. Baseline only conducted – subsequent data to be collected and analysed under next project phase.
	3.3.2 Community workshops held to communicate results	Jun 2016	Ongoing. Preliminary results from Leona/Paramatta reported back during review of management plan (Dec 2015). An intern (youth member from the community) was employed to work with data (January-April). Data are regularly reported back to communities (milestone complete but ongoing) particularly in annual (or less frequent) reviews of management plans (conducted in two communities).
3.4 Design and conduct questionnaires on the gendered dimensions of CBFM in wider livelihood context.	Results are presented back to the community	Jun 2015	Completed – some write-up pending Gender benchmarking tools adapted for Solomon Islands and implemented in three communities. Reported as Cohen et al. (2016) and Lawless et al. in review (papers reported Section 7.7). Gender benchmarking results presented back to all communities in 2016. Interviews conducted to understand processes of CBFM formation - including gendered aspects. Simultaneously gender sensitive observations made in most site visits. Data to be reported in; Cohen et al. (in prep). Local contexts and engagement processes that influence development, design and implementation of community-based fisheries management

3.5 Aligned with existing national policy and structures (NPOA, SILMMA) convene stakeholders to design and implement a provincial level support network for communities undertaking CBFM	3.5.1 Information presented to support community networks for CBFM	Dec 2015	Completed by milestone but on-going activity. Network engagements for community representation, lessons exchange and policy alignment complete for milestone but ongoing; Western and Malaita multi-stakeholder networks utilised and supported. Funding secured for Western Province network and project staff act as coordinator (ToR and formal recognition progressed with explicit aim of informing Western Province Development Strategy (delayed due to government changes. Malaita network employed as AAS CRP steering committee – sustainability issues encountered. Workshops held to strengthen networks. Two newspaper articles published in Island Sun Newspaper on the Western Province network. WorldFish staff continue to be a part of the dialogue concerning policy and structures (e.g., including regular attendance of SILMMA and NCC meetings). This will ensure our future networking efforts are capitalising on and fitting with existing efforts. Analysis done to determine alignment of existing policies, including with new policies. Data will be reported back and discussed in preliminary ToC stages of the next project phase. Data reported in Cohen et al. 2016, detailed in Objective 7.1).
	3.5.2 A provincial level network is endorsed by the Provincial government	Oct 2016	Completed. Establishment and subsequent regular meetings of an information exchange and coordination network of CBFM practitioners in Western Province (2014). Network formation formalised. Provincial government funding provided in 2017 to maintain network Supported by WorldFish, Malaita Provincial Partnership for Development gained recognition from the government in 2016
	3.5.3 Up to date locally relevant community targeted information is produced and available through Provincial Fisheries and related network offices	Dec 2015	Completed by milestone and ongoing. In dialogue with the communities where WorldFish currently support CBFM, we continue to identify information required by communities to support their management efforts – information reported back to communities regularly. Provincial government staff were included in the multi-stakeholder symposium on community-based resource management in Western Province (2014). As a result of this knowledge and awareness of CBFM within the provincial government was increased (this meeting was the inception of the Western Province network – sustained into 2018).
	3.5.4 CBFM support by Provincial officers in the target Province is costed for the Province for their use in budget negotiations	Dec 2016	Ongoing. Activities to build capacity in the provincial government for planning and CBFM support continue in 2016. While provincial fisheries and environment staff are committed to supporting CBFM, their limited human and financial capacity presents an ongoing challenge. In Malaita Province the staffing situation has substantially improved (and Provincial staff are regular contributors to the CBFM program), in Western Province staff losses and uncertainties have stalled Provincial capacity building and engagement.

3.6 Extend support to communities in management plan implementation to ensure continuity to start of project Phase 2	3.6.1 Contracts of in-country project staff extended to 30 June 2017	Jun 2016	Completed. Contracts for Solomon Islands WorldFish staff extended.
	3.6.2 Annual work plans for in-country project staff finalized to ensure continuity of community engagement	Feb 2017	Completed. Work plan developed and integrated into second phase project proposal and subsequent ToR.

6.1.4 Objective 4. Design and implement CBFM in Vanuatu coastal communities in collaboration with provincial government and national agencies

activity	outputs/ milestones	completion date	comments
4.1 Conduct participatory diagnosis and develop management responses	Situation analysis and CBFM rollout plan produced as a report	Jun 2016	Completed: Diagnosis and review for report completed but report was delayed (see section 7.4.2 'Site selection, scoping and participatory diagnosis'). The content was adjusted to focus on a national level situation analysis to complement output under Activity 4.2.2: Raubani et al. (2017). Past experiences and the refinement of Vanuatu's model for supporting community-based fisheries management. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 38, 3–13. Following TC Pam the project development shifted priority towards post disaster relief. Particularly in Aniwa project focused towards resilience and led to important disaster relieve measures and publication of findings See Section 7.4.5: Eriksson et al. (2017b). The role of fish and fisheries in recovering from natural hazards: lessons learned from Vanuatu. Environmental Science & Policy 76, 50–58.
4.2 Convene a stakeholder meeting to agree a model for CBFM implementation in Vanuatu	4.2.1 A stakeholder meeting designs and agrees to a model for CBFM in Vanuatu	Jun 2016	Completed and ongoing. Regular consultation meetings held throughout the project (see summary text), leading to the formulation of community based management plans in all sites (see section 7.4.4 'Stakeholder meetings and CBFM implementation'). Communities continue to apply the rules and regulations as developed in the plans.

	4.2.2 Model is published as part of a critical review of Vanuatu's long experience in CBFM	Jun 2016	Completed. Output from the stakeholder meetings (as noted above) of the National CBFM policy endorsed in 2016. Reflections on process of CBFM development published: Baereluo Tavue et al. (2016). What influences the form that community-based fisheries management takes in Vanuatu? SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 22–34.
4.3 Design & conduct questionnaires on gendered dimensions of CBFM in the wider livelihood context.	4.3.1 Results are presented back to the community	Dec 2016	Not completed (see section 7.4.7 for work on 'Gender in CBFM processes' in Vanuatu)
4.4 Work with at least three communities to develop management plans and implement adaptive management of their resources	4.4.1 Inshore resource management plans formally agreed to by three communities and rules are implemented by the communities	Dec 2016	Completed. Management plans for six communities (three in the Maskelynes, and three in Santo) have been developed, approved and in final stages of printing consultations (see section 7.4.5 'CBFM establishment community processes'). Planned implementation is during the follow-up project FIS 2016-300: VFD (2017a-f). CBFM plan 2017–2020 for Hog Harbour, Lolathe, Lutes, Pelongk Peskarus and Port Olry
	4.4.2 Community workshops and network meetings held with Provincial stakeholders including other communities	Dec 2016	Completed. See section 7.4.4 'Stakeholder meetings and CBFM implementation' Community workshops and network meetings were held with provincial stakeholders to share lessons from VFD CBFM engagement after the endorsement of the National CBFM Policy. Further lesson learned workshop organized with community subnational and national stakeholders.
	4.4.3 SPC Fact Sheets translated for Vanuatu context	Dec 2016	Completed. SPC Fact Sheets translated and adjusted to fit the Vanuatu context: SPC (2017a). *Gaed long ol toksave blong ol fising komiuniti long Vanuatu* (Guide and information sheets for community fisheries management in Vanuatu). Stredder Print Ltd: Noumea, New Caledonia.
4.5 Align community work with existing national and provincial policy and structures to support scaling network [rephrased as wording in proposal unclear]	4.5.1 Network structure agreed to with Fisheries Department and code of operations (constitution) agreed to by stakeholders	Dec 2016	Completed by milestone and ongoing. Training of VFD Staff by SPC completed by June 2016. VFD to train wardens and wan smol bag team in December 2016. Project sites selected Authorised Officers who also were part of this training to help build their capacity (see section 7.4.5 and 7.4.6).
4.6 Extend support to communities in management plan implementation to	4.6.1 Contracts of in-country project staff extended to 30 June 2017	Jun 2017	Completed. Contract for Pita Neihapi extended.

ensure continuity to start of project Phase 2	4.6.2 Annual work plans for in-country project staff finalized to ensure continuity of community engagement	Feb 2017	Completed and work plan implemented to end project. Work plan developed and integrated into second phase project FIS-300-2016.

6.1.5 Objective 5. Enhance understanding and mechanisms to accelerate scaling-out of CBFM in the Pacific region

activity	outputs/ milestones	completion date	comments
5.1 Conduct social network research in CBFM networks	Journal articles based on social network analyses published for the region	Jun 2015	Completed. See Sections 7.5.1 (social networks) and 7.5.2 (leadership). Published as: Blythe et al. (2017c). Navigating the transformation to community-based resource management. In: Armitage, D.; Charles, A.; Berkes, F. (eds.) Governing the coastal commons: Communities, resilience and transformation. Routledge. pp. 141-156 Blythe et al. (2017d). Five principles for network success in Solomon Islands. Penang, Malaysia: WorldFish. Program Brief: 2017-04. Blythe et al. (in prep). Do networks build collaborative governance capacity? [Malaita province case] Case et al. (2015). Rethinking environmental leadership: the social construction of leaders and leadership in discourses of ecological crisis, development and conservation. *Leadership*. 11(4): 396-423 Cohen and Steenbergen (2015b). Social dimensions of local fisheries co-management in the Coral Triangle. *Environmental Conservation* 42: 278-288. Evans et al. (2015). Understanding leadership in the environmental sciences. *Ecology and Society*, 20: 50. Evans et al. (2017). The landscape of leadership in environmental governance: a case study from Solomon Islands. Human Ecology 45: 357.
5.2 Support SPC to develop regional Theory of Change for scaling out CBFM [National Theories of Change (Obj 6) used as a basis to develop a regional model for scaling out CBFM]	5.2.1 DFAT Noumea CBFM workshop completed and SPC policy brief published with regional Theory of Change	Jun 2017	Completed. Summarized in Section 7.5.3. In addition to SPC and national partners, project staff contributed Noumea workshop (Sulu, Cohen, Schwarz, Delisle, Campbell, and Andrew). The workshop produced a 'New Song' for coastal fisheries in the region which was subsequently endorsed by HoF. The New Song cannot be claimed as a project output but the project made large contributions to it. Section 7.6.3 outlines the work on developing the ensuing New Song results framework where the project made further contributions (e.g. Donato-Hunt and Eriksson 2017; SPC 2017b), and this framework will assist in guiding national implementation.

	5.2.2 Journal article and associated policy brief and presentation to HoF forum on promoting sustainable fisheries through CBFM and progress with SPC 'New Song'	Jun 2017	Partially completed. See Section 7.5.3. Policy brief published as: Hanich et al. (2017), Enabling government - empowering communities. National implementation of the New Song, Working paper, 10th SPC Heads of Fisheries Meeting, Noumea, New Caledonia Presentation made at HoF10 led to DFAT support to SPC for a dedicated CBFM officer in 2018. Journal article not done.
5.3 Identify and use a range of communication channels such as websites and theatre to facilitate information exchange	5.3.1 Alternative communication channels tested and evaluated	Jun 2016	See country-specific sections 7.1, 7.2 and 7.3.
	5.3.2 Assessment of the use of choirs to facilitate the spread of CBFM information in Kiribati as SPC newsletter article and MFMRD newsletter article	May 2017	Partially completed. Trials were done with a choir, but were not documented.
5.4 Linking regional, national and local action – policy coherence and grounding the New Song	5.4.1 Regional paper on national policy coherence with FAO SSF Guidelines and New Song	May 2017	Completed. See Section 7.5.4 (policy coherence) and 7.5.5 (transformation). Published as: Section 7.5.4 published as: Cohen, et al. (2017) Policy coherence across scales of governance in Pacific small-scale fisheries, in: Jentoft, S., Franz, N., Barragan Paladines, M., Chuenpagdee, R. (Eds.) Implementing the SSF Guidelines. Gourlie et al. (2017) Performing "A New Song": Suggested Considerations for Drafting Effective Coastal Fisheries Legislation under Climate Change. Marine Policy (in press). Davis et al (2017). Legislating for A New Song: Ensuring effective and up-to-date coastal fisheries laws in the Pacific Region. SPC Fisheries Newsletter 153, 36–39. Song et al. (submitted). Multi-scale policy diffusion and translation in Pacific Island coastal fisheries. Global Environmental Change Section 7.5.5 published as: Blythe et al. (2018). The dark side of transformation. Antipode, in press.
	5.4.2 Solomons workshop with MFMR, SPC and FAO to align SSF guidelines and New Song commitments with national policy	Dec 2016	Partially completed. Various meetings were held, however alignment with SSF guidelines and New Song were not completed.

	5.4.3 Journal article. Linking regional policy to national action; the entry to the New Song and SSF guidelines into a complex policy landscape	Jun 2017	Completed. Overlap of output description so combined with 5.4.1 above.
	5.4.4 SPC Bulletin article. Is the New Song a regional manifestation of the Small-Scale Fisheries Guidelines?	Jun 2017	Completed. See Section 7.5.4. Published as: Song, et al. (2017b) Policies in harmony? Does the New Song agree with the Small-Scale Fisheries Guidelines? Secretariat of the Pacific Community Traditional Marine Resource Management and Knowledge Bulletin. 38: Jun 2017

6.1.6 Objective 6. To design and implement an impact assessment program to evaluate progress against AusAID and ACIAR indicators

activity	outputs/ milestones	completion date	comments
6.1 Hold PIAP workshops in Tarawa, Gizo and Port Vila to guide project design and impact assessment	Theories of change developed and published as a three-country Working paper	May 2017	Partially completed. Participatory planning events held in Solomon Islands provinces and at national level (inclusive of provinces). Theory of Change workshops (See Section 7.6.1), reported in; Apgar et al. (2016). Getting beneath the surface in program planning, monitoring and evaluation: Learning from use of PAR and theory of change in the CGIAR Research Program on Aquatic Agricultural Systems. Action Research, 15, 15–34. CRP AAS (2014) Malaita Hub – Solomon Islands, Initiatives Theory of Change Workshop. Facilitators' report. Honiara, March 10-12, 2014. Blythe and Harohau (2015). Theory of Change workshop with the Malaita Province Partners for Development (MPPD), Auki, Solomon Islands May 7-8, 2015. Unpublished Workshop Report. Vanuatu deferred as a consequence of Tropical Cyclone Pam and then not completed. Subsequently, as part of FIS/2016/300, a national ToC was developed in November 2017. Schwarz et al. (2014a). AAS Western Hub – Solomon Islands Program Design Workshop, Gizo, Western Province, Solomon Islands, October 9-10 and 15, 2014. CRP AAS Facilitators' Report. Kiribati ToC not done. A training course was completed in 2016, but not taken further.
6.2 Establish an M&E program for this and related CBFM projects within the context of	6.2.1 Development of a panel study to generate quantitative baselines at local	July 2016	Completed. See section 7.6.2 (baselines for monitoring and evaluation) for the entire activity 6.2 The project has developed a longitudinal panel study survey protocol for data collection of metrics at individual (men and women) and community levels ("village profiles") that will complement national

the New Song *[Establish economic, social and ecological baselines at local, regional and national scales based on CBFM sites]*	level		statistics, as part of its M&E.
	6.2.2 Three-country journal paper on lessons from *ex ante* impact assessment programme	Apr 2017	Ongoing. The application of ex ante theory has evolved throughout the project, building on an interdisciplinary analytical framework (See Section 7.6.2). Blythe et al (2017a) was published as a proof of concept of the utilisation of an interdisciplinary analytical framework for assessment of CBFM impacts within Solomon Islands. Blythe J., Cohen P., Eriksson H., Cinner J., Schwarz A., Andrew N.L. 2017a. Community-based fisheries management: strengthening post-hoc analysis through the social-ecological systems framework. *Marine Policy 82: 50-58*
	6.2.3 Panel study implemented in Vanuatu, Solomon Islands, and Kiribati	Jan 2017	Completed See Section 7.6.2 The survey was implemented during 2016-2017, and builds on established monitoring indicators. It was implemented using tablets (Appendix 2). The baseline consists of a total sample of 179 women and 180 men.
	6.2.4 Collate documentation from engagement processes in three countries for construction of report card to final report	Apr 2017	Completed Collation of project activities completed for purpose of this report. Information is outlined in ACIAR report template format rather than report cards. (See activities 6.2.5 and 6.3.5)
	6.2.5 Project report cards with outcomes mapped to indicators developed in activity 6.3.4 included in final report	Dec 2016	Completed The project impacts are summarized following the ACIAR report template format. The report card structure was pursued in relation to the Future of Fisheries Regional Guidelines for Sustainable Fisheries and the integration of the New Song outcomes indicators to produce the Coastal Fisheries Report Card 2017 (see activity 6.3.5)
6.3 In partnership with SPC, design a results framework for Pacific Island coastal fisheries (The New Song)	6.3.1 Complete a technical workshop to map existing regional indicators to a unified results framework under the New Song.	Aug 2016	Completed. See section 7.6.2 (design a results framework). During 19-22 July, WorldFish and ANCORS hosted an M&E workshop with participants from WorldFish, ANCORS, SPC, and PIFS. The workshop developed a visual theory of change diagram for the New Song and focused broadly on obtaining feedback, validation and input into the indicator audit and review process from others working in the field. At the workshop regional policy indicators were mapped and aligned, and the process of developing suitable indicators for the eight New Song policy outcomes initiated.
	6.3.2 Produce a SPC policy document (policy brief or addition to the New Song) that provides an integrated coastal fisheries results framework for the	Dec 2016	Completed. See Section 7.6.2 Donato-Hunt and Eriksson (2017) presents the regional M&E reporting logic and tentative selection of indicators for feedback by regional Heads of Fisheries. Donato-Hunt, C., Eriksson, H. Regional reporting for the New Song for Coastal Fisheries Strategy. Information Paper 5. 10th SPC Heads of Fisheries Meeting Noumea,

	region		New Caledonia, 14–17 March 2017
	6.3.3 Complete a journal article on the synthesizing process of the indicators: overcoming overlap and confusion, harmonization across multiple agencies, theorize around regional uptake and M&E implementation	Apr 2016	Ongoing. See Section 7.6.3 Donato-Hunt et al. synthesizes the process of identifying and selecting the New Song outcome indicators. This article positions the coastal fisheries strategy in the global context of analogous initiatives and explores their application in practice. This helps understand harmonization across multiple agencies, theorize around regional uptake and M&E implementation. Donato-Hunt, C., Eriksson H., Andrew, N. Synthesizing the process of regional coastal fisheries indicators: overcoming overlap and confusion, harmonization across multiple agencies. Target journal *Marine Policy*
	6.3.4 Responsible agencies have incorporated indicators into their national M and E Programs *[was 6.3.1]*	Jun 2017	Completed. See Section 7.6.3 SPC (2017) summarizes the New Song results framework and presents the analysed regional state of coastal fisheries by New Song outcome. The New Song M&E have indicators that have been developed and selected in consultation with national agencies during the 10th HoF in Noumea (See 6.3.2). The New Song outcome indicators align national agencies with reporting commitments for the New Song outcomes. SPC (2017b). The Coastal Fisheries Report Card. Annual Ministerial Forum Fisheries Committee Fourteenth Meeting - Working Paper 10. Mooloolaba, Australia, 5-6 July 2017.
	6.3.5 National report cards on CBFM for Solomon Islands and Kiribati	Jun 2017	Deferred. The New Song reporting alignment with The Coastal Fisheries Report Card 2017 (for the Future of Fisheries Regional Roadmap for Sustainable Fisheries) presented to the Forum Fisheries Committee replaced this milestone. The Coastal Fisheries report card draws on the endorsed indicators and summarizes regional progress against New Song outcomes for the project countries

6.1.7 Objective 7. Greater gender equity in decision-making and control of assets

activity	outputs/ milestones	completion date	comments

7.1 Workshop and publications to increase the profile of gender issues in fisheries in the region	*7.1.1 Journal articles published on gender in fisheries in Kiribati and Solomon Is*	*Jun 2017*	Complete see Section 7.7.1 Three 3 day workshop conducted for WorldFish Solomon Islands team and representatives from the Ministries of Fisheries; Environment; Agriculture; Women and Youth; as well as non-government organisations see; WorldFish/Promundo (2015) Integrating Gender Transformative Approaches into Aquatic and Agricultural Systems 11-13th August 2015, Honiara, Three workshops conducted by WorldFish staff for partners (SPC and SICCP) including staff, community coordinators and, a representative from SPC/GIZ Fisheries office (total 50 people trained). Alternative/supplementary livelihood activity workshop (reported elsewhere) included a substantial gender component with lessons drawn from previous trainings and data collection. Newspaper article; Solomon Star "Women in Fisheries" SPC Regional meeting on Inshore and Coastal Fisheries presented WorldFish Gender Transformative Approach as best practice in the region. Blog; Linking gender and global environmental change research" http://blog.worldfishcenter.org/2016/11/linking-gender-and-global-environmental-change-research/ Blog; Leveraging change: How gender norms matter for development http://blog.worldfishcenter.org/2015/11/leveraging-change-how-gender-norms-matter-for-development/ Blog; Integrating gender in development investments: insights from Solomon Islands and Timor-Leste http://swed.bio/news/integrating-gender-in-development/ Papers published as; Cohen et al. (2016). Understanding adaptive capacity and capacity to innovate in social-ecological systems; applying a gender lens. Ambio 45, 309-321. Locke et al. (2017). Innovation and gendered negotiations: Insights from six small-scale fishing communities. Fish and Fisheries 18: 943–957. Kruijssen et al. (2013). Livelihoods, markets, and gender roles in Solomon Islands: case studies from Western and Isabel Provinces. CGIAR Research Program on Aquatic Agricultural Systems. Penang, Malaysia. Project Report: AAS-2013-22
	7.1.2 Workshop completed in collaboration with SPC on gender in fisheries in the Pacific to agree on regional research and development agenda	Oct 2016	Completed. Workshops conducted in Sydney (design workshop) and Fiji (write-shop) in collaboration between SPC, FAO, WorldFish and project partners. Output in preparation; Barclay et al. (In prep). Toolkit for Pacific Gender and Social Inclusion in Coastal Resource Management and Development. Research agenda developed in consultation with SPC, national government partners, FAO, WorldFish gender experts and in response to data gaps – research agenda reflected in the design of the subsequent phase of this project.

	7.1.3 Data on gender empowerment in fisheries collected from national agencies and SPC	Dec 2016	Milestone completed but adjusted Due to data deficit in national government, data were collected through benchmarking study (see methods described in 7.7.1), reported in Cohen et al 2016 and; Lawless and Teioli (2015) Aquatic Agricultural Systems Benchmarking Malaita and Western Provinces; Key Findings 50 pp. WorldFish, Honiara, Solomon Islands. [unpublished report]
	7.1.4 Journal article and SPC publication on structural issues in gender in fisheries submitted	May 2017	Not completed but ongoing. See Section 7.7 and country section 7.2, 7.3, 7.4. Will be published as; Barclay et al. (in prep) Structural issues in gender in fisheries in the Pacific region. Research that contributes substantially to this activity examines cultural and social norms and policy constructs as structural barriers. Published as policy analyses Cohen et al. 2017, Song et al. 2017 and; Lawless (2014) Literature Review of Gender and Social Norms in Malaita Hub, Solomon Islands. 28 pp. WorldFish, Honiara, Solomon Islands [unpublished report]
	7.1.5 Journal article introducing a Women's' Empowerment Index in Fisheries submitted	May 2017	Revised. After analysis of the survey instrument used to calculate the index, it was concluded that it was too onerous to be initiated in communities that have already been much-surveyed. Instead, elements of the survey were included in the panel survey instrument and reported through that process. See Appendix 1.1 for panel survey. McDougall et al. (2015) Implementing a gender transformative research approach: early lessons. In Douthwaite B, Apgar JM, Schwarz A, et al. (eds.) Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems. Working Paper: AAS-2015-16. Penang, Malaysia.
	7.1.6 Journal article on gender, livelihoods and shell money in Langalanga lagoon submitted	May 2017	Completed, submitted as; Barclay et al. (submitted). Lagoon livelihoods; the shifting role of shell money in Langalanga, Solomon Islands. Maritime Studies.

	7.1.7 Journal article on gender considerations in community development and natural resource management; a Solomon Islands case study	Dec 2016	Completed. Published as; Lawless et al (submitted). Gender norms and relations: implications for agency in rural livelihoods in Solomon Islands (in review – World Development) Lawless et al. (2017). Considering gender: Practical guidance for rural development initiatives in Solomon Islands. Penang, Malaysia: WorldFish. Program Brief: 2017-22. Schwarz et al. (2014b) Engaging men and women in community-based resource management processes in Solomon Islands. Case study Brief: AAS-2013-33. CGIAR Research Program on Aquatic Agricultural Systems, WorldFish, Penang, Malaysia, 12pp. Iniesta-Arandia et al. (2016). A synthesis of convergent reflections, tensions and silences in linking gender and global environmental change research. Ambio 45: 383-393. Promundo-US and the CGIAR Research Program on Aquatic Agricultural Systems. (2016). Promoting Gender-Transformative Change with Men and Boys: A Manual to Spark Critical Reflection on Harmful Gender Norms with Men and Boys in Aquatic Agricultural Systems. Washington DC: Promundo-US and Penang: CGIAR Research Program on Aquatic Agricultural Systems. Bareleo Tavue et al. (2016) [reported in Objective 3] details some of the strategies employed in Vanuatu that were found to be successful in promoting sensitivity towards and engagement of women in natural resource management – some of which were built on lessons from Solomon Islands. WorldFish and Promundo-US (2015) Integrating gender transformative approaches into Aquatic and Agricultural Systems. WorldFish: Honiara, Solomon Islands. [unpublished]

6.1.8 Objective 8. Improved utilization of fish in the Pacific region

activity	outputs/ milestones	completion date	comments
8.1 Women's dietary diversity and infant and young child feeding surveys	8.1.1 Complete dietary surveys in July 2016, November 2016 and February 2017	Q1 2017	Partially completed.Two surveys completed, Final survey not undertaken due to community survey fatigue – ongoing as part of FIS/2016/300. See Section 7.8.1. Reported as: Albert et al. (2017). Abstract submitted and presented at the WorldFish Small-Scale fisheries symposium, Penang. WorldFish (2017a). Fish: food for good health, poster prepared for community develop activities in Solomon Islands, Honiara. WorldFish (2017b.) The first 1000 days, poster prepared for community development activities in Solomon Islands, Honiara.

	8.1.2 Journal article on nutrition and dietary diversity case study in Malaita, Solomon Islands (with project FIS/2015/031)	Q1 2017	Completed as report to Ministry of Health (Albert et al. 2017c) and as a draft journal article (in prep). See Section 7.8.1. Albert et al. (2017c) An analysis of dietary diversity and anthropometry of women, infants and young children from rural communities in Malaita and Western Provinces, Solomon Islands, report prepared for the Solomon Islands Ministry of Health and Medical Services. Albert et al. (in prep). Poor nutrition and diets in rural Solomon Islands communities: a mixed methods approach to framing the problem and its drivers. Target journal Maternal and Child Nutrition.
8.2 Analysis of the cost of alternative diets and the market mechanisms that influence it	8.2.1 Journal article on the role of fish, local and imported foods in the diets of rural Solomon Islanders and the influence of seasonality and market supply.	Q3 2017	Incomplete but ongoing. See Section 7.8.1. Partial data collection but not complete due to community survey fatigue. Nutrition interventions implemented focused on community identified immediate nutrition issues. To be further refined and evaluated in FIS/2016/300 Albert et al. (in prep). The role of fish, local and imported foods in the diets of rural Solomon Island women. Target Journal Food Policy.
8.3 Understanding and promoting the use of fish for nutritional security in the Pacific Food System	8.3.1 Complete an analysis of regional and national trends in fish consumption and nutritional status published as a SPC report and journal article (in conjunction with FIS/2015/031)	Nov 2017	Completed. See Sections 7.8.2 and 7.8.3. Albert, J., Bogard, J. (2015b) Planning a nutrition-sensitive approach to aquatic agricultural systems research in Solomon Islands, Program Brief: AAS-2015-15. CGIAR Research Program on Aquatic Agricultural Systems, WorldFish, Penang, Malaysia, 20pp. Bell et al. (2015b). Diversifying the use of tuna to improve food security and public health in Pacific Island countries and territories. Marine Policy 51: 584-591. Bell et al. (2017b) Adaptations to maintain the contributions of small-scale fisheries to food security in the Pacific Islands. Marine Policy in press. Sharp et al. (in prep). Patterns in acquisition and apparent consumption of fish in eight Pacific Island Countries. Target journal: Fish and Fisheries Andrew et al. (in prep). Fish in the Pacific Food System. Target journal: Global Environmental Change

7 Key results and discussion

The project took a programmatic approach to implementing activities and producing outputs and outcomes. Wherever appropriate, we integrated our work with other initiatives to produce synergies and efficiencies. From the outset, we planned integration with CRP AAS and ACIAR projects FIS/2012/076 (community aquaculture) and FIS/2010/057 (*Developing inland aquaculture in Solomon Islands*). Additional synergies came during the course of the project, notably with FIS/2015/031 (Indo-Pacific fish in development), SwedBio and projects funded by the Asian Development Bank (ADB) in Malaita and Vanuatu. Some publications cited here as 'in prep' will be further developed and published as part of ACIAR project FIS/2016/300. Such collaboration/co-funding is noted below and in the listing of outputs (Section 8.2). The web of shared attribution so created is an unavoidable and desirable dimension of research for development.

The project produced or contributed to more than 100 significant outputs (including more than 45 peer-reviewed papers). For brevity, below we cluster activities, outputs and outcomes into discrete topics. Published or 'in press' outputs are summarised and the reader is referred to those articles for more complete description of methods, results and discussion. Unpublished outputs are provided in more detail.

References cited in the text below are listed in Section 8.1. Outputs produced or contributed to by the project are listed in 8.2. To avoid a perception of double counting, in the sections below outputs are listed once only, but we note there is considerable overlap among objectives and activities.

7.1 Objective 1: Critically analyse CBFM and related interventions in the Pacific region

7.1.1 Lessons in the application of CBFM in the Pacific Region and its contribution to development outcomes

This section summarises activities 1.1.1 and 1.1.2, published in outputs detailed below.

Published outputs

Albert S., Aswani S., Fisher P.L. and Albert J. (2015). Keeping Food on the Table: Human Responses and Changing Coastal Fisheries in Solomon Islands. PLoS ONE 10(7), e0130800.

Cohen P.J., Evans L. and Govan H. (2015a). Community-based co-management for governing small-scale fisheries of the Pacific: a Solomon Islands' case study. Pp. 39–59 in 'Interactive governance for small-scale fisheries; global reflections' ed. by S. Jentoft and R. Chuenpagdee. MARE Publication Series, v. 13. Springer: Cham, Switzerland.

Cohen P.J., Jupiter S.D., Weeks R., Tawake A. and Govan H. (2014a). Is community-based fisheries management realising multiple objectives? Examining evidence from the literature. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 34, 3–12.

Evans L.S., Cohen P.J., Vave-Karamui A., Masu R., Boso D. and Mauli S. (2018). Reconciling multiple societal objectives in cross-scale marine governance: Solomon Islands' engagement in the Coral Triangle Initiative. Society and Natural Resources 31, 121–135.

Jupiter S.D., Cohen P.J., Weeks R., Tawake A. and Govan H. (2014). Locally-managed marine areas: multiple objectives and diverse strategies. Pacific Conservation Biology 20, 165–179.

Webster F.J., Cohen P.J., Tauati M., Vidler K., Mailau S., Vaipunam L. (2017). Detecting fisheries trends in a co-managed area in the Kingdom of Tonga. Fisheries Research 186, 168–176. [with James Cook University]

The reliance of PICs on coastal, nearshore, small-scale fisheries is well recognised in the region and beyond. Concerns about sustainability of these fisheries and the benefits they provide are also widespread amongst Pacific island governments and intergovernmental organisations, development and conservation organisations, researchers and donors. Discussions on solutions to address inshore, coastal, small-scale fisheries concerns in the Pacific tend to focus heavily on CBFM. The Pacific's customary foundations and community structures that can potentially help to address contemporary resource pressures, improve management and enhance development outcomes were brought to global attention in the early 1980s (e.g. Johannes 1982a, b). A series of development investments in the 1990s and early 2000s promoted the development and spread of CBFM—for example, building on customary foundations such as through Australian development assistance to Samoa (e.g. King and Faasili 1998) and developing new legal instruments and processes where customary foundations were absent in Tonga (Webster et al. 2017). Considering the long-held theory of change (ToC) around CBFM and subsequent histories of investments in CBFM implementation meant that a review of objectives, outcomes and state of knowledge was timely; this was addressed as an early and formative project activity.

We interviewed 50 key informants (CBFM researchers and practitioners) from the tropical Pacific region and through these interviews identified 8 overarching objectives for CBFM (referred to also as Locally Managed Marine Areas "LMMAs"): (1) enhancing long-term sustainability of resource use; (2) increasing short-term harvesting efficiency; (3) restoring biodiversity and ecosystems; (4) maintaining or restoring breeding biomass of fish or invertebrates; (5) enhancing the economy and livelihoods; (6) reinforcing customs; (7) asserting access and tenure rights; and (8) empowering communities (Jupiter et al. 2014). Interviews and literature showed that the management actions or 'tools' implemented for particular objectives broadly included: permanent closures; periodically harvested closures; restrictions on gear, access or species; livelihood diversification strategies; and participatory and engagement processes.

Using both reviewed literature and the key informant interviews, we examined outcomes for single or multiple objectives and the contribution that each of the different actions or tools was reported to make (Cohen et al. 2014a; Jupiter et al. 2014). Multiplicity of objectives in one site means that 'success' can have multiple meanings and trade-offs; for example, where success towards one objective (e.g. short-term increases in catch efficiency) may come at the expense of achieving others (e.g. enhancing long-term sustainability of resource use or maintaining breeding biomass). The management actions or 'tools' implemented broadly included (Figure 7.1.1): permanent closures; periodically harvested closures; restrictions on gear, access or species; livelihood diversification strategies; and participatory and engagement processes. We found that the selection and application of management tools is adapted to different contexts and adjusted through time to account for social and ecological changes or as new knowledge emerges. In fact, the acceptance and proliferation of CBFM in the region is substantially attributable to the non-prescriptive nature of the approach (i.e. adaptable to a range of conditions and contexts and adjusted through time) and its ability to be adjusted to diverse, complex and dynamic small-scale fisheries' social and ecological systems (Cohen et al. 2015a).

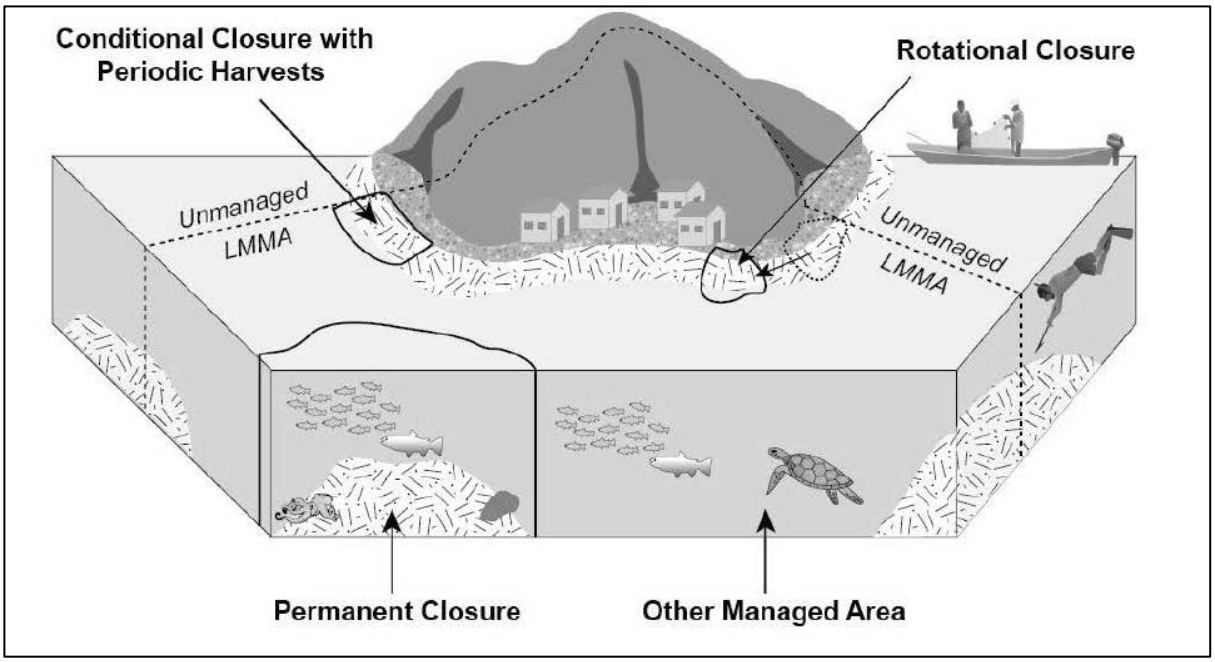


Figure 7.1.1. Schematic of management actions that may be employed within a LMMA on a Pacific Island, showing the boundary of the LMMA, adjacent land tenure area and management actions implemented (from Jupiter et al. 2014).

Although CBFM is a commonly supported and proliferating strategy (with hundreds to thousands of sites reported across the Pacific; Govan et al. 2009), we found relatively few cases that (1) described how objectives and management tools were negotiated; (2) reported the tools implemented; (3) empirically tested outcomes; and (4) presented a national or regional perspective (i.e. most were only very localised cases). These knowledge gaps hinder our collective ability to glean generalisable lessons and to understand the potential and shortcomings of CBFM for achieving a range of different ecological and social objectives. This project therefore made contributions to addressing these gaps, using empirical cases of CBFM (detailed in subsequent sections).

We used an empirical case study to examine how regional initiatives (in this case, the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security) were translated into action in Solomon Islands. We found that CBFM plays a critical role in the national interpretation of the more conservation-orientated initiative and this demonstrates, in part, the traction that CBFM has as a key strategy employed for multiple objectives, including food security, sustainable economic development, biodiversity conservation and adaptation to emerging threats (Evans et al. 2018). The model was referred to as ‘CBFM+’ to depict ‘a need to scale-up and in recognition that additional objectives above and beyond conventional natural resource management were now included’ (Evans et al. 2018). However, no work to date has critically evaluated the difference in investment, approach and outcomes in applying CBFM versus CBFM+.

Our reviews and engagements through the course of this project highlighted the need for critical perspectives to examine, not only the potential, but also shortcomings of CBFM. The Pacific region is rapidly changing through population growth (rates among the highest globally), the impacts of climate change, urbanisation and increased market integration; change that is often operating beyond the local scale, but nonetheless presents challenges to local governability of small-scale fisheries (Cohen et al. 2015a). Research in the follow-on project FIS/2016/300 will address in greater depth the role of government in addressing fisheries concerns and community development aspirations and the necessary strategies

that must be employed alongside, in addition to and instead of, CBFM (Cohen, in prep; an update of Govan et al. 2009).

7.1.2 Research in development

This section summarises activities and outputs from Activity 1.1.1. This summary is drawn from the outputs detailed below.

Published outputs

Apgar J.M., Cohen P.J., Ratner B.D., de Silva S., Buisson M.-C., Longley C., Bastakoti R. and Mapedza E. (2017). Identifying opportunities to improve governance of aquatic agricultural systems through participatory action research. Ecology and Society 22, 9.

Douthwaite B., Kabir K., Karim M., Lando L.A., Longley C., Muyaule C., Perez M., Siota F. and Sukulu M. (2015). More inclusive science for the poor: linking farmers to research using the RinD approach. Pp. 57–80 in 'Research in development: learning from the CGIAR Research Program on Aquatic Agricultural Systems', ed. by B. Douthwaite, J.M. Apgar, A. Schwarz, C. McDougall, S. Attwood, S. Senaratna Sellamuttu et al. Working Paper: AAS-2015-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Schwarz A., Cole S.M., Downing B., Perez M.L., Kamp K, Crissman C. et al. 2015. Collaborating for development impact: learning from research partnership experiences. Pp. 25–40 in 'Research in development: learning from the CGIAR Research Program on Aquatic Agricultural Systems', ed. by B. Douthwaite, J.M. Apgar, A. Schwarz, C. McDougall, S. Attwood, S. Senaratna Sellamuttu et al. Working Paper: AAS-2015-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

van der Ploeg J., Albert J., Apgar M., Bennett G., Boso D., Cohen P., Daokalia C., Faiau J., Harohau D. et al. 2016. Learning from the lagoon: research in development in Solomon Islands. Program Report: AAS-2016-02. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Results and discussion

Too often, 'off-the-shelf' agricultural technology does not meet local needs and, consequently, is not adopted by poor farmers and fishers. In Solomon Islands, the CRP AAS explored alternative pathways to make research and innovations more relevant to the needs of the most marginal and vulnerable people. In order to overcome the knowledge–action gap, the CRP AAS developed the research in development (RinD) approach, which builds fundamentally on PAR principles (Douthwaite et al. 2015; Schwarz et al. 2015; Apgar et al. 2017). This approach of long-term and deep engagement with communities influenced the entire project, nuanced by the context of each project country.

RinD in Solomon Islands started in 2012 with a detailed analysis of the socioeconomic, ecological and political context of the country: the national situation analysis (Govan et al. 2013a), followed by more detailed scoping reports on Malaita and Western Provinces (Schwarz et al. 2013; Bennett et al. 2014a). These insights were subsequently used to facilitate the selection of communities and the participatory design of action plans at the community level, and to develop partnerships with stakeholders at the provincial level through the Malaita Partnership for Development (MPPD) and the (later formed) Western Provincial Network for Sustainable Development (WPNSD). The community action plans reflect a set of thematic areas of work related to prioritised actions as agreed upon by the community.

Using the outcome-evidencing methodology, we identified several emergent outcomes of the RinD approach that foster social change and innovation (as reported in van der Ploeg et al.

2016). By facilitating community dialogue on problems people face, enabling communities to address these problems themselves, and acting as a broker to bring in relevant stakeholders and expertise, the RinD approach aimed to build the community's capacity to adapt and to innovate. Through this process, leaders in the focal communities came to recognise the benefits of broad participation in decision-making processes, and consequently are in a better position to liaise with other NGOs and national government agencies to mobilise resources to further their community development agenda.

In comparing Solomon Islands work with other cases from the CRP AAS, we found that using the PAR principles (a key part of the RinD approach) of ownership, equity, shared analysis and feedback built trust and confidence. While initial engagements were more technically focused (e.g. around tilapia CBFM), PAR helped to identify and act upon opportunities to address more difficult-to-shift dimensions of governance, particularly in terms of stakeholder representation, distribution of authority and accountability (Apgar et al. 2017). Simultaneous to changes in facilitation techniques, researchers adapted research methodologies to privilege local knowledge above western scientific knowledge systems and experienced greater engagement with research (e.g. Cohen et al. 2014b). Our findings suggest that the engaged and embedded approach of researcher-facilitators can help move from identifying opportunities for governance change to supporting stakeholders as they build more equitable governance arrangements.

A parallel engagement process at the provincial (rather than community) level has forged new partnerships between WorldFish, other R&D organisations and government agencies. In particular, relationships with the provincial governments in Malaita and Western Province, the Ministry of Women, Youths, Children and Family Affairs, the Ministry of Health and Medical Services and the World Vegetable Center have provided an opportunity to draw in broader expertise, share lessons and influence policy. Through CRP AAS, our project staff, community leaders and partner staff received training in novel facilitation techniques. The improved skills and greater understanding of the role of facilitator prompted a notable shift in CBFM engagements (described in Schwarz et al. 2017). The newly developed expertise of WorldFish on community engagement processes and gender transformative approaches (detailed elsewhere) has been increasingly recognised and taken up in the region, and has the potential to significantly strengthen marine resource management.

Conclusions and recommendations

- The benefits of increasing the level of investment in partnerships with provincial governments, ministries and NGOs are increasingly becoming clear: it grounds research better, improves its quality, ensures it is more relevant, and facilitates learning and uptake. Substantial progress has been made over the lifetime of the project at the provincial level in Malaita and Western Province. The challenge is to continue working with partners, even with limited resources.
- The realisation that the main barriers for agricultural innovation are not technical but social has led to the continued integration of social science in the research program. In particular, the gender transformative approach (see Section 7.7) has the potential to significantly improve small-scale fisheries management.
- Significant resources were invested in building capacities of project staff, partner organisations and communities. Training workshops, mentoring and on-the-job-training enhanced capacity in community facilitation, project evaluation, gender transformative approaches and PAR. Building the capacity of community leaders, provincial government staff, partner organisations and national staff is arguably the best way to foster social change and sustainable development, although results are often indirect and difficult to measure.
- The ongoing efforts to actively engage communities in research for development have redefined the WorldFish program in Solomon Islands, and has guided the project delivery as a whole. The approach fostered several innovations in how the project

operates on the ground (e.g. the signing of community research agreements and the focus on working with community champions). There is clearly a need to strengthen the link between community action plans and the research initiatives. One way to do this is to make the research questions much more specific and aligned with the problems identified by communities.

- It is becoming clear that participatory approaches at the community and provincial level are particularly useful to set the research agenda and prioritise activities. However, sustaining research activities, like community monitoring activities and PAR, remain a challenge beyond the project's life.

7.1.3 Livelihood diversification

This section summarises Activity 1.2.1. The work is in progress and will be published as:

Andrew N.L., Mills D., Hellebrandt D., Rochester M. and Allison E. (in prep). Pathways to livelihood diversification in fisheries and aquaculture in the developing world. (Target journal: Fish and Fisheries)

Background

A livelihood is defined as 'comprising the capabilities, assets (including both material and social resources) and activities required for a means of living' (Ellis 2000). People with diverse livelihoods are considered to be less vulnerable than those with greater reliance on fewer sources of food and income (Ellis 2000; Finkbeiner 2015). Many development interventions, particularly in the lives of rural people, seek to diversify livelihoods in the belief that in so doing people will become more food secure and less poor.

In the developing world, fisheries are commonly part of diversified livelihoods that respond to different threats and opportunities for people to build resilience (e.g. Mills et al. 2017). Sometimes sources of livelihood span different sectors of the economy; for example, agriculture, fishing and off-farm activities, such as trading and remittances (e.g. Sulu et al 2015). People also diversify the ways in which they catch fish, but these livelihood options are covariants in the sense they may be vulnerable to many of the same threats (Ellis 2000; and see example in Morand et al. 2010).

Livelihood diversification is defined as 'the process by which rural families construct diverse portfolios of activities and social support capabilities in their struggle for survival and in order to improve their standard of living' (Ellis 1998). Livelihood diversification is differentiated from the narrower concept of income diversification by having a wider focus on social processes and outcomes as they evolve over time (Ellis 1998). Livelihood diversity is the outcome of both planned interventions and autonomous adaptation. Diversity per se is also prominent in theoretical framings of sustainable development that focus on resilience and wellbeing (Gunderson and Holling 2002).

The proposition that more diverse livelihoods reduce vulnerability and food insecurity, and enable people to construct routes out of poverty, has become central to much policy advice and investments in rural development, including fisheries (Allison and Ellis 2001; Smith et al. 2005). In a fisheries context, diversification is promoted as a way to reduce vulnerability, increase income and reduce pressure on resources while fisheries management measures take effect.

Given this prominence, it is important to more critically engage with the concept of livelihood diversification and to challenge the evidence base that legitimises its promotion (Brugere et al. 2008). We examined the peer-reviewed literature for evidence of poverty reduction and ecological sustainability outcomes along commonly articulated pathways for diversifying the livelihoods of people dependent of fisheries and aquaculture. We asked the following overarching question: What is the evidence that livelihood diversification initiatives in

fisheries and aquaculture systems have improved the lives of people? Within this question we explored both the evidence of impact through defined impact pathways and the quality of evidence.

Livelihood diversification initiatives typically seek to improve lives through three pathways, which may be framed as propositions or hypotheses:

1. **Livelihood diversification leads to improved fisheries outcomes**. Exploitation pressure is reduced by people leaving the fishery partially or completely. Those remaining in the fishery part-time can consider conservation measures that restrict fishing, as they have other sources of income. They can also reduce their fishing effort when stocks are low, allowing recovery.
2. **Livelihood diversification reduces people's vulnerability to shocks and adverse trends**. If households mix marine and land-based natural resource activities, and have income sources that are not natural resource based, then this portfolio of activities confers a greater capacity to adapt to shocks; for example, extreme climate events, economic shocks, fishery collapses, political disruptions and idiosyncratic threats, such as loss of a fishing net, damage to a boat or illness in the household.
3. **Livelihood diversification provides a means to rise out of poverty.** The addition of more income-generating activities helps to increase income and assets. It may also indirectly assist the inclusion of fishers in land-based society and the wider economy.

We tested these (often implicit) theories of change by evaluating evidence of improved fisheries, reduced vulnerability or decreased poverty. These outcomes may come about autonomously by the actions of households and communities or driven by deliberate interventions by external agents, such as governments, aid organisations or NGOs. We recognise these pathways may be interdependent in complex ways because, for example, risks taken in order to accumulate assets by engaging in the broader economy may increase vulnerability.

Results and discussion

The 1,477 articles initially identified from the search were screened for relevance, firstly by title and abstract then by a full analysis of the text (see PRISMA diagram, Figure 7.1.2). A total of 1,328 articles were excluded because they were not relevant to the topic. The remaining articles were read in depth against the same inclusion criteria and a further 60 excluded. The full-text articles remaining after the final screening made up the dataset to be assessed. Each file was named in a standard format with first author, year of publication, keywords and journal.

We found 89 studies of livelihoods diversification in populations dependent on fisheries or aquaculture. One-quarter of those studies focused on measures of diversity of income sources, with limited or no relation to specific context, and offered limited or no evidence on outcomes of diversification. The majority of studies (n=67) presented contextualised reports on the diversity of livelihoods strategies and offered evidence that allowed for an assessment of claims regarding the impact of diversification.

Results of scoring were summarised in a Sankey diagram (Figure 7.1.3). This diagram traces each study (1 grey line = 1 study) from the general conceptual pathway, through the specific pathway, to the outcome. Clearly, conceptualisation of diversity/diversification-focused projects is most frequently around addressing vulnerability.

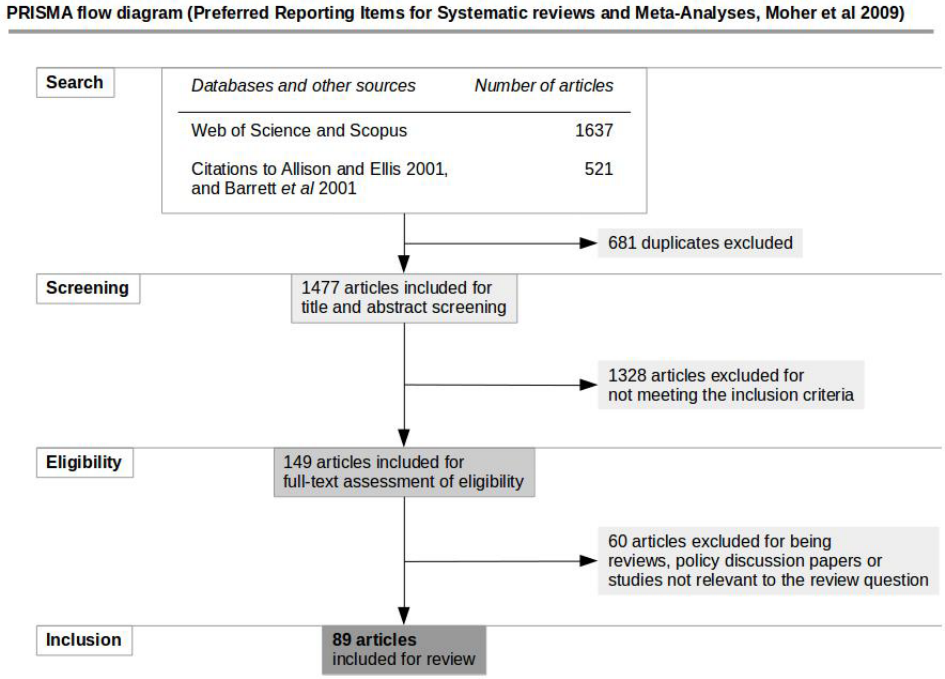


Figure 7.1.2. PRISMA diagram representing review stages and respective number of articles retained and excluded

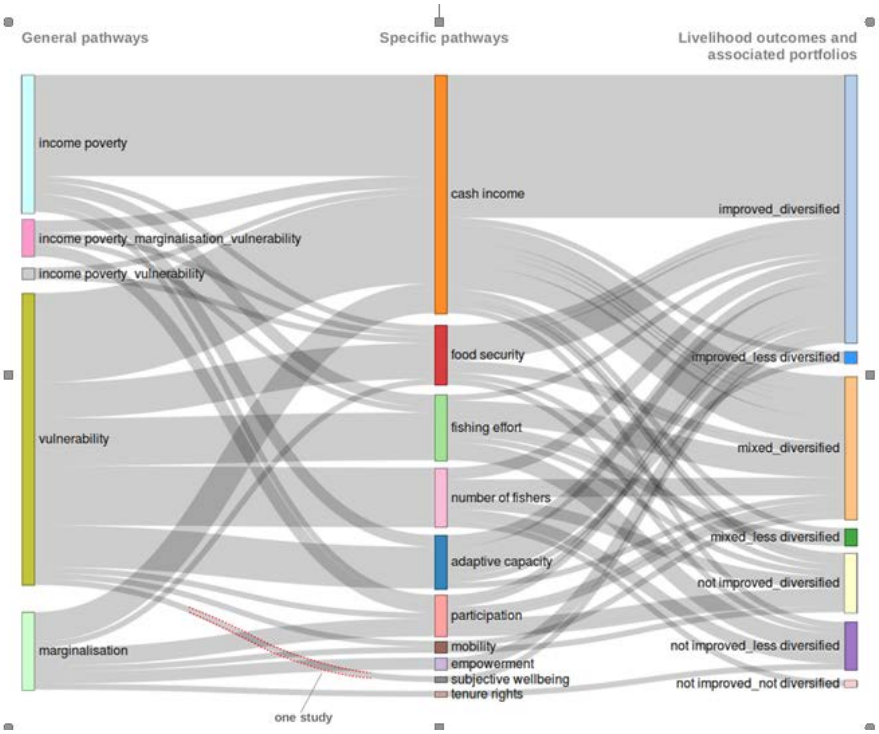


Figure 7.1.3. Preliminary pathway diagram showing general and specific pathways, and outcomes. Note: this will be updated to include papers published in 2016 and 2017 and coding by independent scorers.

Several consistencies and patterns were seen through the scoring of the studies, and a summary of these is given in Figure 7.1. Those with clear reporting on livelihood outcomes

tended to investigate the improvement to livelihoods in terms of reduced vulnerability and reduced income poverty, and, to a lesser extent, reduced marginalisation. The evidence on specific processes assumed to explain the impacts of diversification on livelihoods was varied, but changes in cash income were clearly predominant. Increases in participation in natural resource management, adaptive capacity and food security, and reduction in fishing effort or number of fishers, were also prominent.

The evidence was less conclusive regarding outcomes and potentially beneficial impact pathways. Despite a small majority of studies reporting positive outcomes (47 (51%) of a total 93 reports), the remaining evidence indicated either mixed outcomes (29%) or no verifiable improvement to livelihoods (20%).

We explored in further detail 13 studies from the retained publication set that reported on cases of development interventions aimed specifically at improving livelihoods through diversification (as distinct from studies that investigate the consequences of existing or unassisted diversification). Only six studies applied clear measures to minimise bias in their respective assessments and/or consider the effects of confounding factors in producing the livelihood outcomes analysed. Due to the small number of cases, inference is limited. The overall picture from this subset corroborates the findings from the larger set of studies outlined above. Specific findings from project evaluations suggest that diversification tends to lead to improved livelihoods through combined increases in cash income, participation and food security—although these project evaluations also offer evidence that positive impact might not follow from effective diversification.

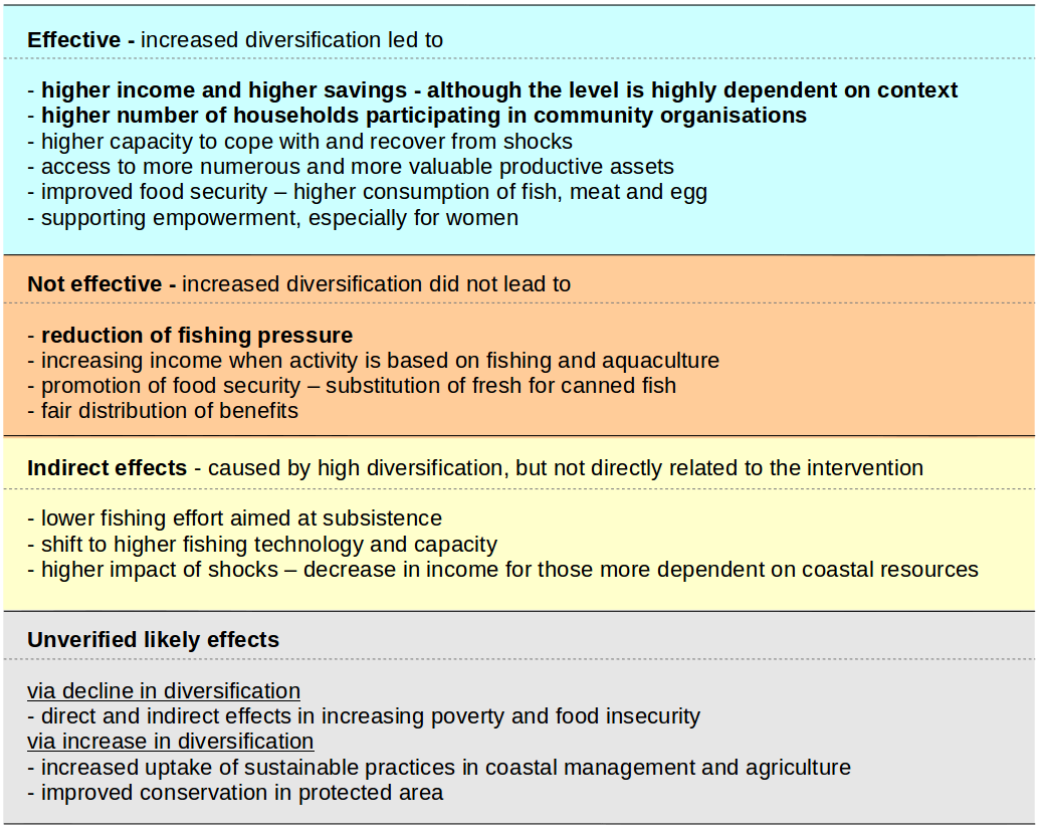


Figure 7.1.4. Summary of patterns seen among included papers in terms of approaches and outcomes

Conclusions

Our findings indicate that the evidence available in the peer-reviewed literature does not support the proposition that livelihood diversification necessarily leads to positive livelihood outcomes. Although the evidence presented a significant number of studies that confirmed the possibility of beneficial outcomes, our findings advise against generalisation either in the direction of change (as seen by the several instances of mixed or lack of positive impact) or of the processes that might lead to change (as seen by the range of processes and lack of trends in the association between specific processes and outcomes).

We also observed a conspicuously low number of studies focused on geographical mobility, migration and remittances: processes that are essential to a better understanding of diversification and its outcomes. Likewise, considerations on gender-specific impacts or the role of gender in determining outcomes of diversification were virtually absent in the evidence body gathered in this review—with exception of the studies in the subset aimed at assessing interventions.

7.1.4 Capitals and assets framework

This section summarises Activity 1.2.2. The work is published as:

Blythe J., Cohen P.J., Eriksson H., Cinner J., Boso D., Schwarz A.-M. and Andrew N.L. (2017a). Strengthening post-hoc analysis of community-based fisheries management through the social-ecological systems framework. Marine Policy 82, 50–58.

CBFM is held up as one of the most promising approaches for securing sustainable small-scale fisheries. Yet, the complex features that shape CBFM outcomes remain inadequately understood. In part, this stems from the fact that few community-based projects meet the data requirements for formal impact evaluations. Given this context, diagnostic approaches are increasingly seen as a frontier for strengthening CBFM analysis and securing the sustainability of these fisheries. By diagnostic approaches, we are referring to frameworks that can help identify a range of biophysical, socio-political and institutional variables that contribute to the failure or success of resource management outcomes. In particular, this paper sought to provide a theoretical grounding for our impact assessments.

We explored the capacity of Ostrom's (2009) social-ecological systems (SES, Figure 7.1.5) framework to strengthen post-hoc diagnosis of CBFM and the project's impact assessments in the Pacific and beyond. We drew on data from published and grey literature (including field notes, meeting minutes and project reports) generated throughout an 8-year CBFM project in five Solomon Island villages.

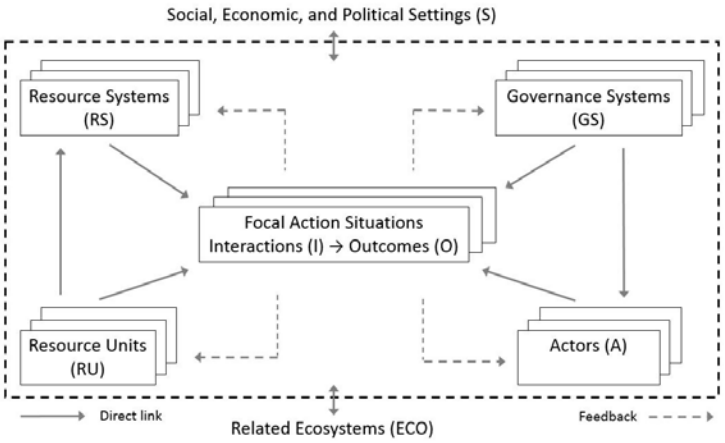


Figure 7.1.5. The social-ecological systems framework (Ostrom 2009)

7.1.5 Aquaculture

This section summarises Activity 1.3. The work is in progress and will be published as:

Andrew N.L., B. Campbell, J. Sammut, R. Jimmy, T. Pickering, S. Gereva, N. Paul, C. Wabnitz (in prep). Review of the status and impact of aquaculture for food security in Oceania. Target journal: PLoS One

It also draws on an output published in parallel with ACIAR project FIS/2010/057:

Blythe J., Sulu R., Harohau D., Weeks R., Schwarz A.-M., Mills D. and Phillips, M. (2017b). Social dynamics shaping the diffusion of sustainable aquaculture innovations in the Solomon Islands. Sustainability 9, 126.

Background

In the face of the alarming possibility that some PICs may experience shortfalls in the quantities of fish required to keep growing and urbanising local populations adequately fed by 2030 (e.g. Bell et al. 2009), several solutions have been put forward. One commonly proposed solution is to increase the quantity of fish available to people through the practice of aquaculture. Aquaculture is championed worldwide for its food security benefits; the Pacific region is no exception. Indeed, a key focus of recent regional development assistance efforts has once more turned towards increasing aquaculture development support across a number of PICs.

This section reviews the contribution of aquaculture to food security and income generation in the region. The analysis builds on Amos et al. (2014), Ponia (2010), SPC (2011) and Gillett (2016), among others. The evidence used draws from a range of sources, reflecting both the scattered and incomplete nature of available data and the different dimensions of the issue. We combine: (1) a review of the published literature; (2) updated national production estimates; and (3) HIES data.

Literature review

The review used a systematic scoping survey of the primary and secondary literature to explore evidence pathways (Gough et al. 2012; Pham et al. 2014). Two main phases of data screening have been completed: (1) screening based on article title and abstract; and (2) full-text screening to remove articles based on the eligibility criteria described below (Table 7.1.1).

Scientific databases consulted for the primary literature search were Scopus and Web of Science. Secondary literature searches were conducted using the search functions of the publication repositories of ACIAR, ADB, European Commission, FAO, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), New Zealand Ministry of Foreign Affairs and Trade, SPC, World Bank and WorldFish. Assessed document types included peer-reviewed journal articles, reports, briefs, information papers, symposium proceedings, newsletter articles, manuals, plans, yearbooks and books.

The second screening phase of this review process was completed in mid-2017. Out of 917 documents screened for inclusion based on title and abstract, all but 38 were excluded due to subject, geography, duplication or inaccessibility. An analysis of these remaining documents for their metrics of food security impact is in progress.

Table 7.1.1. Search terms used to identify articles for inclusion in the scoping review

Search term operators	Topic or 'Title/Abstract/Keyword'
	'aquaculture' OR 'mariculture'
OR	'fish farm'
OR	'fish' OR 'shrimp' OR 'prawn' OR 'seaweed' OR 'cucumber' OR 'tilapia'
AND	'American Samoa' OR 'Cook Islands' OR 'Federated States of Micronesia' OR Fiji OR 'French Polynesia' OR 'Guam' OR 'Kiribati' OR 'Marshall Islands' OR 'Nauru' OR 'New Caledonia' OR 'Niue' OR 'Northern Mariana Islands' OR 'Palau' OR 'Papua New Guinea' OR 'Pitcairn Islands' OR 'Samoa' OR 'Solomon Islands' OR 'Tokelau' OR 'Tonga' OR 'Tuvalu' OR 'Vanuatu' OR 'Wallis and 'Futuna'
OR	'Pacific Ocean' OR 'Pacific'
OR	'Food security'
Proximity searching	OR fish NEAR/5 farm
Filters	English language

National production

A total of 53 species or species groupings, including aquatic plants, have been cultured for food and non-food purposes from 18 PICs since 1950. Of these, 30 species or species groupings were reported in 2015 (Table 7.1.2).

Statistical reporting for aquaculture production in PICs is patchy; the most up-to-date reporting typically varies between 2014 and 2015, but may be earlier. Estimates of national production by taxa come from a range of sources, including official statistics reported by FAO and SPC (1986–2006), and what Ponia (2010) calls 'provisional estimates'.

The FAO statistics are relatively poor—for the period 1980–2015, nearly 50% were 'estimates' of unknown provenance. Estimation is notably prevalent in PNG and Fiji, the two largest producers. Ponia (2010) used an extensive expert elicitation method to refine statistics for 1998–2007. Total regional production by PICs for the period estimated by Ponia considerably less than FAO estimates and contained both large underestimates in national production and overestimates (e.g. Kiribati) and under-estimates (eg. Cook Islands). Ponia (2010) and Gillett (2016) estimates do not integrate production classified as pieces rather than in standard units. It is unclear whether the FAO estimates of production have used conversion ratios to combine these measurements. Total regional estimates from the three sources are summarised in Figure 7.1.6.

Draft figures of reported statistics from all three sources are included below in Figure 7.1.7. These figures will be further refined as the analysis progresses.

Table 7.1.2. List of species or species groupings cultured for food and non-food purposes in PICs at some point since 1950. **Bold** indicates reported production in 2015; nei = not elsewhere included (Source: FAO 2017).

Anadara clams nei (*Anadara* spp.)	Mangrove cupped oyster (*Crassostrea rhizophorae*)
Banana prawn (*Fenneropenaeus merguiensis* and/or *F. indicus*	Marine fishes nei
Barramundi (= giant seaperch) (*Lates calcarifer*)	Milkfish (*Chanos chanos*)
Bear paw clam (*Hippopus hippopus*)	Monkey river prawn (*Macrobrachium lar*)
Bighead carp (*Hypophthalmichthys nobilis*)	Mozambique tilapia (*Oreochromis mossambicus*)
Blacklip pearl oyster (*Pinctada margaritifera*)	Mozuku (*Cladosiphon okamuranus*)
Blue shrimp (*Litopenaeus stylirostris*)	Mullets nei (Mugilidae)
Blue tilapia (*Oreochromis aureus*)	Nile tilapia (*Oreochromis niloticus*)
Clams etc. nei	Orbicular batfish (*Platax orbicularis*)
Coarse seagrape (*Caulerpa racemosa*)	Pacific asaphis (*Asaphis violascens*)
Common carp (*Cyprinus carpio*)	Pacific cupped oyster (*Crassostrea gigas*)
Crocus giant clam (*Tridacna crocea*)	Pearl oyster shells nei
Elkhorn sea moss (*Kappaphycus alvarezii*)	Penaeus shrimps nei (*Penaeus* spp.)
Elongate giant clam (*Tridacna maxima*)	Philippine catfish (*Clarias batrachus*)
Emperor red snapper (*Lutjanus sebae*)	Rainbow trout (*Onchorynchus mykiss*)
Eucheuma seaweeds nei (*Eucheuma* spp.)	Red claw crayfish (*Cherax quadricarinatus*)
Flathead grey mullet (*Mugil cephalus*)	Rough turban (*Nerita atramentosa*)
Fluted giant clam (*Tridacna squamosa*)	Sea mussels nei (Mytilidae)
Freshwater fishes nei	Silver carp (*Hypophthalmichthys molitrix*)
Gastropods nei (Gastropoda)	Sixfinger threadfin (*Polydactylus sexfilis*)
Giant clam (*Tridacna gigas*)	Smooth giant clam (*Tridacna derasa*)
Giant clams nei (*Tridacna* spp.)	Spinefeet (= Rabbitfishes) nei (Siganidae)
Giant river prawn (*Macrobrachium rosenbergii*)	Striped catfish (*Plotosus lineatus*) (??)
Giant tiger prawn (*Penaeus monodon*)	Tilapia nei (*Oreochromis* spp.)
Grass carp(= white amur) (*Ctenopharyngodon idella*)	Whiteleg shrimp (*Litopenaeus vannamei*)
Green mussel (*Perna viridis*)	Yabby crayfish (*Cherax destructor*)
Indo-Pacific swamp crab (*Scylla serrata*)	

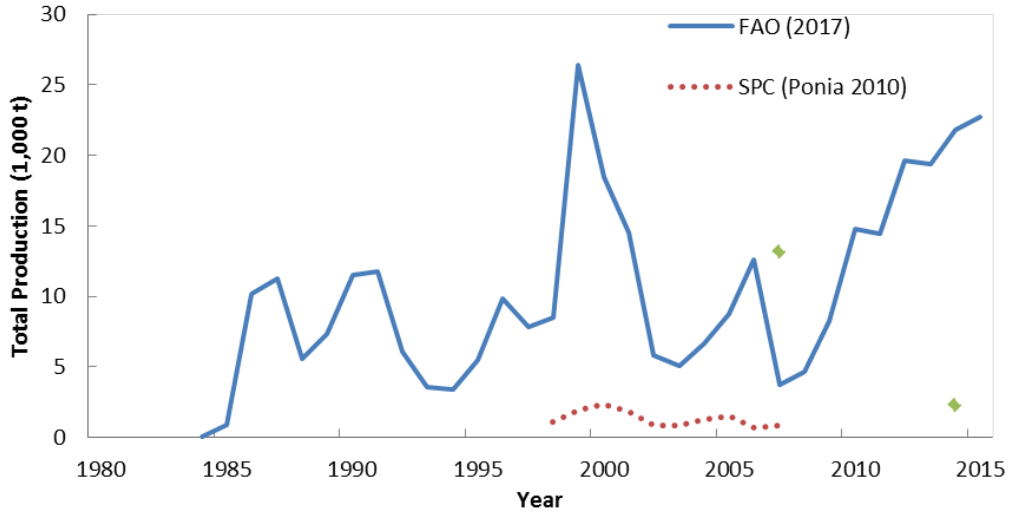


Figure 7.1.6. Aquaculture production in PICs from 1980 to 2015, all species, including aquatic plants, in all environments. Data excludes territories, i.e. New Caledonia, French Polynesia, Wallis and Futuna, Amer. Samoa, Guam, Northern Marianas, Pitcairn. Data sources as indicated plus Green diamonds indicate data reported in Gillett (2009 and 2016).

Household acquisition of fish produced by aquaculture

Estimates of income derived from aquaculture were obtained from national HIES. This source of information provides an independent estimate of aquaculture activity in the region (Smith and Subandoro 2007; Fiedler et al. 2012). HIES do not ask questions about the source of fish acquired by a household.

HIES have been completed in seven PICs: Federated States of Micronesia (FSM), Palau, Nauru, Samoa, Solomon Islands, Tokelau and Tonga. Aquaculture was not included as a category in household surveys in, Samoa and Solomon Islands because the National Statistics Offices and their SPC advisors concluded that aquaculture production was zero or negligible. Unfortunately, HIES data are not available for Papua New Guinea or Fiji, which are the largest producers in the region.

The HIES analyses indicate that aquaculture made no or negligible contribution to household income in Nauru, Tokelau and Tonga. A measurable contribution was recorded in rural households in Palau and FSM. One per cent of rural households report participation in aquaculture (no urban households do so). Similarly, 1% of Nauruan households report some participation. The greatest participation of households was in rural, but not urban, Palau where 6% of households reported aquaculture activities and selling the fish produced.

Next to the technological innovation of aquaculture, an equally important aspect in addressing widespread food security through aquaculture is ensuring its adoption over space and time. Although there exists a considerable body of work that theorises spread of sustainable aquaculture innovations through farmer-to-farmer transfer of knowledge, few studies have traced the adoption of aquaculture by small-scale farmers empirically to validate the grounds of this proposition, particularly in the Pacific context. In a study that investigated the factors shaping the spread of small-scale tilapia aquaculture through rural Solomon Islands, Blythe et al. 2017b used diffusion of innovation theory to show the influence of: (1) socioeconomic characteristics of adopters; (2) the role of opinion leaders; and (3) the characteristics of the innovations. The review yielded the following important results: (1) adopters were typically older, wealthier and had more diverse livelihoods than non-adopters; (2) opinion leaders were able to facilitate adoption, but lacked capacity to provide the fundamental knowledge needed for a successful outcome; and (3) aquaculture

innovations were most likely to be successful when they engaged with broader social and institutional contexts.

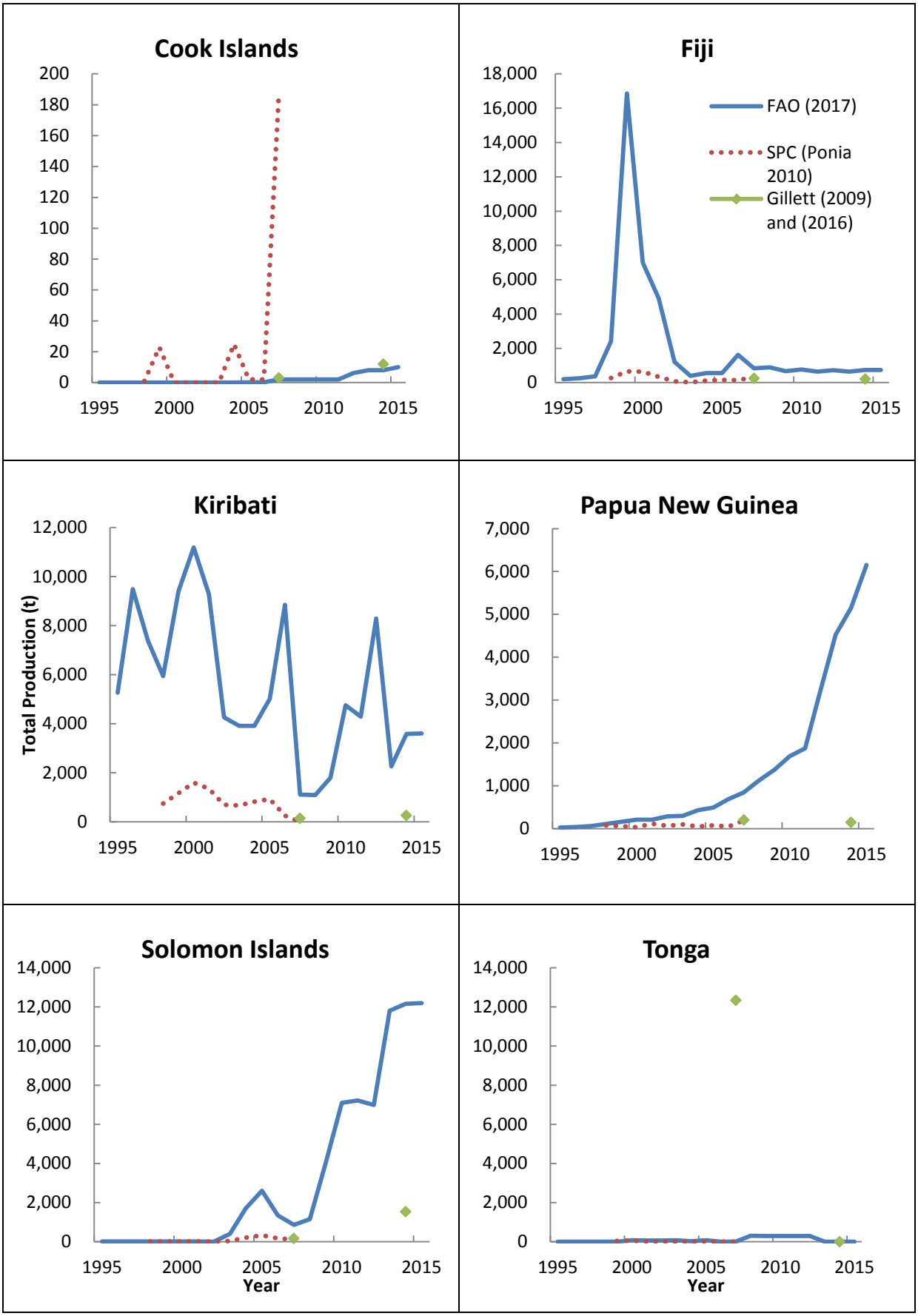


Figure 7.1.7. Aquaculture production by data source in the top six producing countries 1995–2015 (data sources as indicated)

Discussion and conclusions

Although our study is ongoing, it is evident that understanding of aquaculture production and its contribution to national food security is confusing and problematic. National statistics reported to FAO are not sufficiently reliable to describe aquaculture production in the region. There is little congruence between available estimates for many commodities and for overall production. Targeted studies (particularly Ponia 2010) to improve data quality are now out of date.

Preliminary analyses suggest the great majority of papers focus on the technical aspects of aquaculture production and that there is little strong evidence of food security impacts of aquaculture in the published literature. If confirmed, this conclusion would align with those from SPC (2011), Gillett (2016) and others. SPC (2011, p. vii) pithily concluded that 'we need to get away from the idea that mariculture is good and should be promoted. It is an option to be considered'.

An important dimension our analysis will be to reconcile different data sources and conclusions: does aquaculture contribute meaningfully to food security or not? And, if so, are its contributions hidden by poor data and reporting of the evidence?

In discussions on how to achieve effective adoption of aquaculture across larger scales, the poorest quartile of households warrant more explicit attention, given that these households often do not feature as 'adopters' or 'opinion leaders' but are most in need of the innovation. In addition, a deeper engagement is needed with the broader social and institutional contexts that shape the adoption process. Aquaculture interventions that account for these social dynamics are critical for translating production innovations into sustainable benefits to rural communities (drawn from Blythe et al. 2017b).

7.1.6 Fish aggregating devices (FADs) in Solomon Islands

This section summarises activities and outputs from Activity 1.4.1. This summary is drawn from the outputs detailed below.

Published outputs

Albert J.A., Albert S., Andrew. N, Blanc M., Carlos A., Luda L., Tofuakalo F., Masu R., Oengpepa C., Oeta J., Posala R., Schwarz A.-M., Sibiti S., Siota F., Sokimi W., Tan S., Tawaki A., Teri J. and Warren, R. (2015). Nearshore fish aggregating devices (FADs) for food security in Solomon Islands. Program Brief: AAS-2015-05. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Albert J., Beare D., Schwarz A.-M., Albert S., Warren R., Teri J., Siota F. and Andrew N.L. (2014). The contribution of nearshore fish aggregating devices (FADs) to food security and livelihoods in Solomon Islands. PLoS ONE 9, e115386.

Masu R. and Albert J. (2015). Nearshore fish aggregating devices for food security in Solomon Islands. SPC Fisheries Newsletter 146, 25–31.

Results and discussion

Activities under Activity 1.4 in Solomon Islands have built on research established under the New Zealand Aid–funded Mekem Strong Solomon Islands Fisheries project 'Developing a national inshore FAD programme'. Under this initial project, various nearshore FAD designs (e.g. Figure 7.1.7) were deployed to enable an assessment of the designs along with the collection of fish catch and socioeconomic data to evaluate the contribution of FADs to food security and livelihoods in rural communities.

The datasets were analysed in detail in this project, leading to the compilation of a scientific paper (Albert et al. 2014), a program brief (Albert et al. 2015) and a paper led by MFMR on the attributes of a sustainable national FAD program for Solomon Islands (Masu and Albert 2015).

In summary, this research has demonstrated that nearshore FADs in Solomon Islands were able to increase the annual supply of fish to rural communities, with FADs contributing up to 45% of estimated annual fish catches at the study sites. While it was clear that FADs increase the supply of fish, catch rates in FAD locations were not consistently higher than other fishing grounds (Figure 7.1.8). Despite this, results indicated that villages experiencing low catch rates due to a limited diversity of fishers or degraded reef fisheries have a greater likelihood of using FADs to better effect.

Results show that FADs were overwhelmingly perceived by villagers to have benefits for families (as a source of income and by improving nutrition through increased fish consumption) and communities (as a means of providing fish for fundraising and feasts). Yet, the study also highlighted that nearshore FADs can also have negative impacts on village life, including a reduction in the time that male fishers spend on other household (mostly gardening) and community activities. This has the potential for long-term impacts, if not acknowledged and addressed.

Figure 7.1.7.A nearshore bamboo FAD design being towed out to sea for deployment (Photo: Grace Orirana)

Nearshore FADs have a finite lifetime and all FADs will eventually break and be lost. Key outcomes from this study show that technical aspects of deployments that maximise FAD longevity, such as site selection and FAD design, are critical to the development of a national FAD program in Solomon Islands. Results from the assessment were used to recommend nearshore FAD designs based on three important site characteristics (sea conditions, cost and boat traffic) (Figure 7.1.9).

Other critical attributes of a sustainable FAD program for Solomon Islands detailed in Masu and Albert (2015) include:

- using local fisher knowledge to optimise FAD deployment locations
- participatory planning and awareness with communities to promote effective use of FADs and minimise losses
- improving catch rates through fishing method training
- improving safety through safety-at-sea training
- implementing FADs as part of broader development planning
- including M&E to build an information base for informed policymaking
- securing recurring funds to maintain FAD programs.

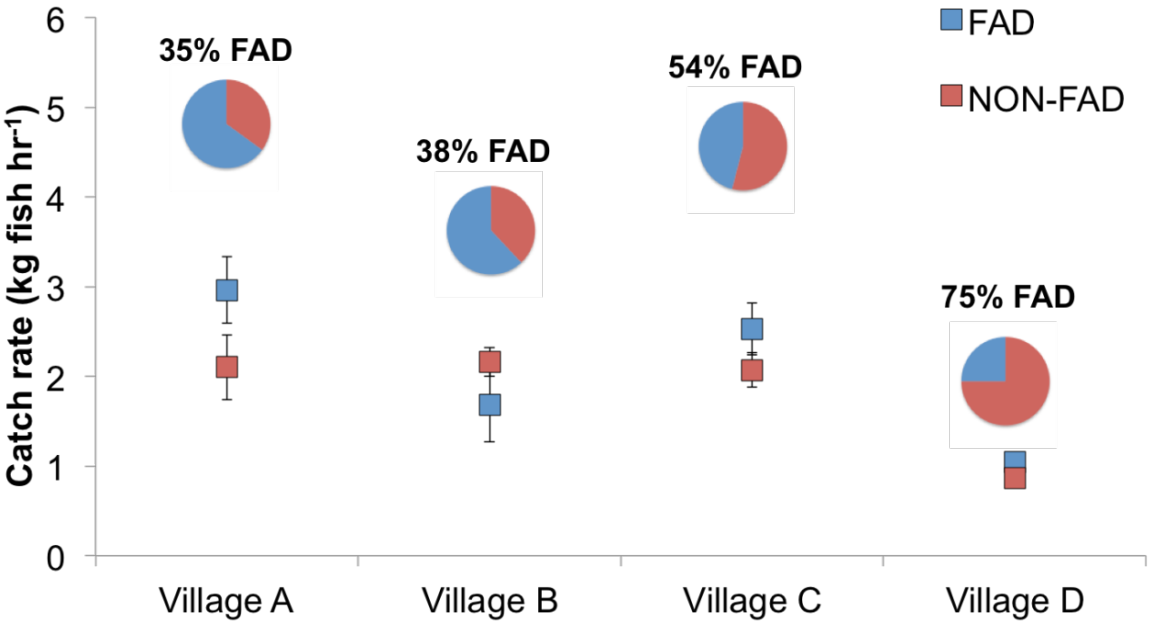


Figure 7.1.8. Fish catch rates and proportion of fishers that fished at FAD and non-FAD fishing locations at the four study sites.

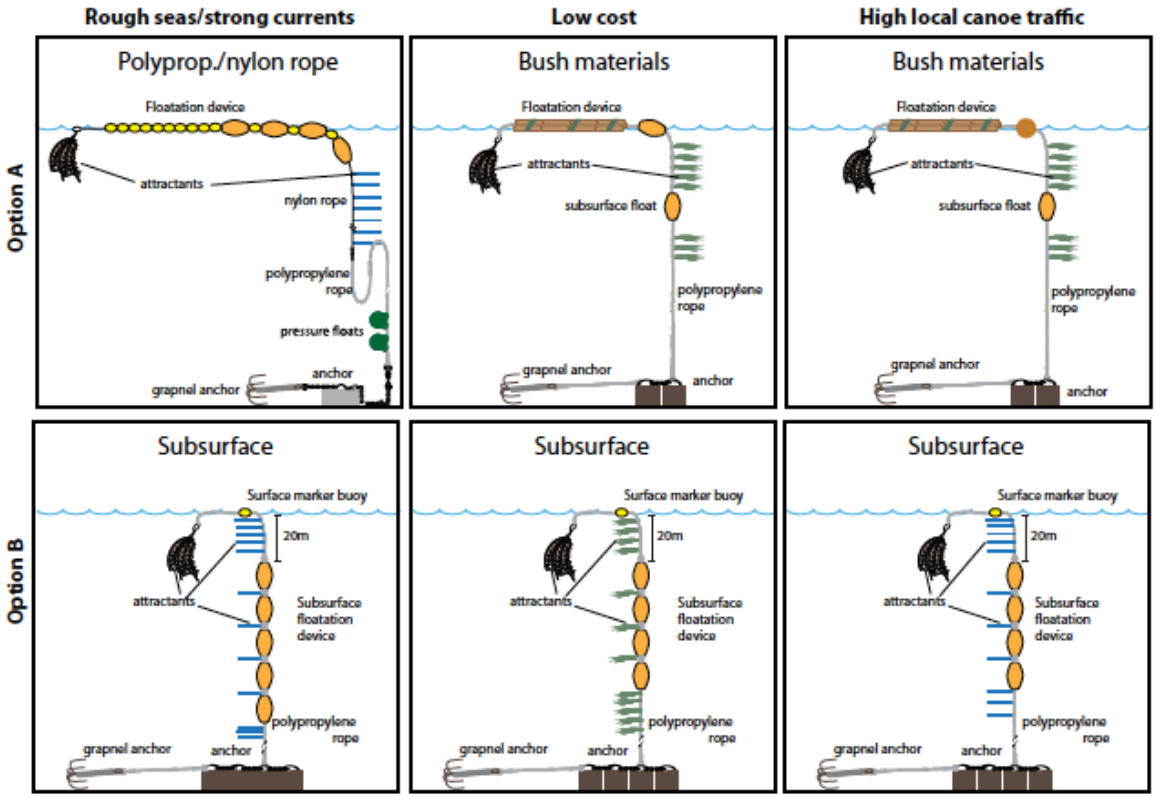


Figure 7.1.9. Visual representation of recommended nearshore FAD designs for Solomon Islands dependent on three key site characteristics.

Conclusions and recommendations

Drawing on the findings of this study, and building on insights from earlier research, a range of evidence-based conclusions begin to emerge about the implementation of nearshore FADs:

- Technical aspects of deployment to maximise FAD longevity, such as site selection and the design of the FAD, are critical. The experience of villagers will continue to augment expertise from SPC and bring innovations in design, maintenance and redeployment.
- Nearshore FADs need to be embedded in the wider development planning of communities and national agencies in order to recognise benefits and trade-offs, including those which disproportionately affect some members of society, and to be able to adjust for these accordingly.
- At national scales, effort should focus on more food 'insecure' communities that have a high reliance on fish and limited access to diverse or productive fishing areas.
- Finally, nearshore FADs have been widely promoted as having a role as a fisheries management tool (through the transfer of fishing effort from the reef to pelagic and oceanic resources) and as a climate change adaptation measure. While this study clearly shows that nearshore FADs can increase the supply of fish, it was not possible from this analysis to determine whether their presence reduced pressure on existing reef fisheries. Targeted data are needed if FADs are to evolve beyond their current potential; if not, they will join other 'livelihood diversification' options as much-touted but largely untested contributors to improved coastal fisheries.

7.1.7 Fish aggregating devices (FADs) in the Pacific region

This section summarises activities and outputs from Activities 1.4.2 and 1.4.3. This summary is drawn from the published outputs detailed below

Published outputs

Albert J. and Sokimi W. (2017a). Sharing Pacific nearshore FAD expertise. SPC Newsletter 150, 37–41.

Anon (2017). Sustainable national artisanal FAD programmes: what to aim for. SPC Policy Brief No. 31.

Bell J.D., Albert J., Andréfouët S., Andrew N.L., Blanc M., Bright P., Brogan D., Campbell B., Govan H., Hampton J., Hanich Q., Harley S., Jorari A., Smith M.L., Pontifex S., Sharp M.K., Sokimi W. and Webb A. (2015a). Optimising the use of nearshore fish aggregating devices for food security in the Pacific Islands. Marine Policy 56, 98–105.

Bell J.D., Albert J., Amos G., Arthur C., Blanc M., Bromhead D., Heron S.F., Hobday A.J., Hunt A., Itano D., James P., Lehodey P., Liu G., Nicol S., Potemra J., Reygondeau G., Rubani J., Scutt Phillips J., Senina I. and Sokimi W. (2017a). Operationalising access to oceanic fisheries resources by small-scale fishers to improve food security in the Pacific Islands. Marine Policy in press.

Campbell B., Hanich Q. and Delisle A. (2016). Not just a passing FAD: insights from the use of artisanal fish aggregating devices for food security in Kiribati. Ocean & Coastal Management 119, 38–44.

Results and discussion

Sharing Pacific FAD expertise

Through financial support from this project along with the French Pacific Fund, the first Expert Consultation on nearshore FADs in the Pacific region was held in June 2016 at the Vanuatu Maritime College, Santo, Vanuatu. This was a joint initiative between SPC and

WorldFish. Twelve experts from the Pacific region met to share knowledge and experiences in the design, planning and implementation of nearshore FAD programs. Countries and territories represented were American Samoa, Cook Islands, Fiji, French Polynesia, Kiribati, PNG, Samoa, Solomon Islands, Tuvalu and Vanuatu (Figure 7.1.10). These FAD practitioners were identified based on their experience and complementary knowledge of nearshore FAD technology, implementation and M&E.

Figure 7.1.10. Participants of the Expert Consultation on nearshore FADs in the Pacific region

The purpose of the consultation was to gather lessons learnt and to identify the best practice principles to guide future nearshore FAD programs across the Pacific region. The Expert Consultation covered countries' innovations in FAD design and the full cycle of a nearshore FAD program, including site selection, community engagement, rigging, deployment, fisher training, maintenance and M&E. Overall program management and funding models for sustaining long-term national FAD programs were also discussed.

The regional lessons learnt identified during this consultation have been summarised by Albert and Sokimi (2017a) and are summarised here briefly.

FAD design and innovation

FAD types, designs and components have evolved in the Pacific through research and innovations, resulting in several commonly used nearshore FAD designs; the SPC-modified Indian-Ocean FAD (renamed Indo-Pacific FAD during the consultation), Vanuatu's Vatu-Ika FAD and the SPC subsurface FAD. The two most common problems identified with nearshore FADs were the loss of nearshore FADs due to vandalism and the difficulty in deploying FADs from small vessels. These issues have been largely resolved through technological advances and innovations. Key lessons learned from surface nearshore FAD designs included:

- avoid surface hardware as this is a key structural weakness
- hard plastic 30G floats are recommended for durability, size and floatation
- use buffer rope between surface floats to avoid total loss of FAD if one or two floats become loose
- protect mooring rope with insulating material to avoid chafing by joining seams of buoys
- braided multi-strand rope is the best mooring rope available for structural integrity
- use biodegradable aggregators where possible to reduce environmental impact as a result of FAD losses
- utilise anchorage systems as appropriate for bottom type, topography and remoteness.

Site selection and community engagement

- National-level frameworks should be developed to guide the nearshore FAD site selection process in order to retain transparency and to ensure that FADs are deployed for genuine purposes and for the relevant end users.
- Nearshore FADs are becoming used increasingly as a component of CBFM. Regional CBFM guidelines and principles for site selection and community engagement for CBFM may help FAD practitioners select appropriate FAD sites and develop community engagement frameworks.
- Engagement processes need to be consistent with local customs and traditions and ownership needs to be clearly defined to ensure responsibility for nearshore FADs being successfully transferred to the target groups; for example, involving fishers and fisher associations in site selection.

FAD deployment methods

- Safety should be the number one priority when deploying nearshore FADs. Such FADs can be successfully and safely deployed from small boats; however, deployment procedures need to be in place and trained personnel are required for deployments to ensure safety measures are fully considered and evaluated.

Fisher training

- Fisher training is important, especially for communities without prior FAD experience, as specific fishing methods are required to fish FADs efficiently and FADs are usually located further offshore than usual fishing grounds—this places small-scale fishers out of their comfort zone and requires additional safety considerations.

FAD maintenance

- Nearshore FAD maintenance (including the removal of entangled fishing gear and fouling materials (e.g. coral growth) and replacement of degraded structural materials) can increase the time that FADs remain in the water.
- Maintenance of submerged hardware can be difficult and often requires expensive, well-trained and experienced dive teams, which many countries do not have. As a result, most countries maintain only surface components.

Monitoring and evaluation

- There is a lack of M&E data for nearshore FADs across the Pacific region due to remoteness, the costs involved in implementation and lack of appropriate data-collection methodologies.
- There has been some success in developing community-based monitoring programs through networks of community resource people which allow for data collection in remote locations (e.g. Solomon Islands (see Section 7.3.4) and more recently in Vanuatu (as part of ACIAR FIS/2015/031 and a related ADB funded project) and in Fiji (in Ra through an ADB funded project and in Kadavu funded by SPC).
- A key recommendation was to develop clear objectives at a national or project level to guide the collection of data that are fit for purpose.

Program management and funding

- There have been successes in the region in developing longer term nearshore FAD programs through partnerships with fisher associations, NGOs, government ministries and stakeholders.
- By including FADs as part of the broader community development planning process, they can become more than a fisheries management tool.

- A number of management issues surfaced through the experts' discussions, including limited capacity at the national level, relating to national fisheries administrations being unable to secure recurring funding to support long-term nearshore FAD programs (related to the lack of M&E data to 'prove' the impacts of FADs).

Four key elements were highlighted as necessary to enable the development of long-term, sustainable national nearshore FAD programs; namely, capacity, management, end-user engagement and funding. These elements have been outlined in an SPC policy brief (Anon 2017) to guide senior fisheries officers and policymakers to achieve sustainability for their FAD programs. The policy brief includes a matrix (Table 7.1.3) to enable countries to assess their progress towards achieving a sustainable national FAD program.

Table 7.1.3. Matrix for assessing progress towards a sustainable national FAD program (Anon 2017)

	On the way to sustainability	Sustainable
Capacity		
1.a. Country-based experts are available to manage the FAD programme including the rigging and deployment of FADs	✓	✓
1.b. The national fisheries agency owns or has easy access to the infrastructure and equipment required to deploy FADs. (e.g. suitable boats with echo sounder and GPS)	✓	✓
1.c. Depending on the size of the PICT, one or more recurrent positions at the national fisheries agency are fully or partly dedicated to FAD work and this is reflected in job descriptions		✓
1.d. A succession training plan is in place to ensure that the country does not lose its FAD technical capacity when the existing FAD experts move out or retire		✓
Management		
2.a. Political stakeholders understand the contribution of nearshore FADs to food security and livelihoods	✓	✓
2.b. The national fisheries agency has strategic plans or policies that mention nearshore FADs and the FAD programme	✓	✓
2.c. A registry is used to record FAD deployments and keep track of lost FADs that need to be replaced	✓	✓
2.d. Legislation and regulations are in place and enforced to support the national FAD programme and to clarify the roles and responsibilities of FAD users		✓
2.e. The national fisheries agency has a nearshore FAD management plan or policy to guide its FAD work		✓
2.f. A monitoring framework is in place that captures fishers' use of FADs and/or catches at representative sites		✓
End-user engagement		
3.a. Partnerships are developed with end users (e.g. communities, fishers' associations, sport fishing charters, recreational fishers) for the ownership, co-management and potential cost-sharing of FADs	✓	✓
3.b. An effective feedback mechanism exists between the national fisheries agency and FAD end users	✓	✓
3.c. FAD awareness-raising and training in safe FAD fishing methods are undertaken in communities that are newly exposed to FADs		✓
3.d. Conflict resolution protocols are in place and effective		✓
Funding		
4.a. The government provides the national fisheries agency with a recurrent annual budget for the implementation of its FAD programme	✓	✓
4.b. Donors and/or the government provide occasional funding for FAD projects	(4a or 4b are in place)	✓
4.c. Partnerships with end users are in place, which include FAD cost-sharing		✓

The lessons learned expert consultation outcomes are complemented by three papers (Campbell et al. 2016; Bell et al. 2015a; and Bell et al. 2017a) published as part of this project, which explore insights from the use of FADs in Kiribati, the Pacific region and Vanuatu, respectively.

*Insights from the use of artisanal **FAD**s for food security in **Kiribati***

In Kiribati, barriers to food security benefits optimisation from FADs were explored and a paper published by Campbell et al. (2016; see also Albert and Sokimi 2017a). Key barriers included:

- *Strategic information*—there is a lack of critical information and data in Kiribati to evaluate whether FADs are delivering the benefits that support national food security goals. This lack of key information for decision-making makes it difficult to strategically plan and adapt a national FAD program to continue to meet medium-to-long-term needs for fish for food security.
- *Communication and coordination*—the absence of effective communication across national, subnational and community levels is potentially contributing to community-level conflicts and subsequently the performance and accessibility of FADs.
- *Program capacity*—a deployment-centric focus with limited human and institutional capacity to implement FAD program effectively increases the risk of (1) focusing on deploying FADs in new locations rather than on maximising the benefits of existing FADs; and (2) taking attention and resources away from other activities that might also be able to provide rural livelihood benefits.
- *Funding and other external support*—funding is focused on FAD deployments with minimal consideration given to critical support systems.
- *Development frameworks*—there is a lack of integrating FADs within a broader national 'toolbox' to address development, livelihoods and food security in context.

Investments required to optimising the use of FADs and operationalising access to oceanic fisheries resources

Two papers published by Bell et al. (2015a and 2017a) as part of this project explore the optimisation and operationalisation of nearshore FADs in the Pacific region.

The paper on the optimising the use of nearshore FADs (Bell et al. 2015a) describes the initiatives required to establish and maintain nearshore FADs as part of national infrastructure for food security in the Pacific region. These actions build on existing knowledge in the region and include:

- identify the locations where FADs are likely to make the greatest contribution to food security through the availability of detailed geographical information systems (GIS)
- integrate the use of FADs with other livelihood options available to rural communities and remove any blockages preventing such communities from harnessing the full range of benefits from FADs
- assess whether exclusion zones for industrial fishing provide adequate access to tuna for small-scale fishers
- determine if small-scale fishers are able to catch sufficient tuna to meet the protein needs of rural communities
- evaluate whether FADs add value to coral reef management initiatives
- improve the design and placement of nearshore FADs.

Building on the investments required to optimise the use of FADs, a recently accepted paper by Bell et al. (in press) outlines three additional areas of investment needed to assist small-

scale fishers to operationalise the use of FADs, particularly in cyclone-prone countries. The paper describes the activities needed for these investments using Vanuatu as a case study. The three investments are expected to create opportunities for small-scale fishers to increase their access to tuna and other large oceanic fish species in safe and effective ways. They are also expected to make small-scale fishers more resilient to the devastating effects of cyclones and help them adapt to the impacts of climate change on coastal fisheries.

These investments include:

- training in safe and effective FAD fishing methods
- developing reliable ways for forecasting when tuna, and other large pelagic fish (e.g. mahi mahi and wahoo), are likely to associate with FADs and delivering this information to fishers effectively
- storing spare FAD materials, boats and fishing gear in cyclone-proof containers so that FADs lost during cyclones can be replaced quickly.

Conclusions and recommendations

There have been substantial advances in nearshore FADs programs in the Pacific region in recent years; in particular, around the technological aspects of FAD design and deployment. Advances in technology have enabled safer and easier deployments in remote locations, even when using small vessels.

FAD monitoring and evaluation efforts are still limited in the region. Consequently, there remain a number of knowledge gaps for which sound research and experiments are required. Five priority questions were formulated by during the nearshore FAD Expert Consultation to guide relevant nearshore FAD research:

1. *Do nearshore FADs contribute to food security and income generation?*
This includes a better understanding of catch rates (catch per unit effort; CPUE) and catch utilisation at both FAD and non-FAD fishing locations as well as understanding the end use of fish caught in different locations.

2. *How useful are nearshore FADs in supporting coastal fisheries management?*
This research question relates, in particular, to CBFM. Data are required to determine whether fishers change their practices as a result of the presence of nearshore FADs and shift fishing effort away from lagoons and reefs.

3. *What are the underlying factors that influence the longevity of nearshore FADs?*
These underlying factors include both the structural weaknesses in the FAD itself as well as social components, such as the root causes of vandalism and conflicts between users.

4. *What are the social impacts of nearshore FADs?*
Across the region, we need a greater understanding of the social impacts of nearshore FADs programs on the recipient communities. This will require an understanding of the governance and ownership structures that impede or facilitate success and how the presence of nearshore FADs influence the trade-offs that communities make in terms of livelihoods (e.g. shifting from farming to fishing and the influence of a new income source). Such research will enable the development of mechanisms to mitigate conflicts between different users (e.g. subsistence and artisanal fishers).

5. *How do oceanic and coastal fish interact with nearshore FADs and what is the seasonality in aggregations around nearshore FADs across the region?*
To aid both site selection and fishers' use of nearshore FADs, greater understanding is required on the seasonality and interactions between coastal and oceanic fish. While data will be different across the region, this knowledge will help inform both national and regional tuna fishery management decisions to ensure that coastal communities do share the benefits of their countries' tuna resources.

Without further research and evaluation, the ability to prove the effectiveness and value of FADs in achieving the objectives of a country will be limited. This will severely impact the ability of national fisheries departments to secure recurring budgets and ensure food security and alternative livelihoods. Some of these research questions (e.g. 1, 2 and 4) will be explored in Vanuatu as part of ACIAR project FIS/2016/300.

7.1.8 Livelihoods and governance in a non-CBFM context: the case of Langalanga lagoon

This section summarises activities and outputs from Activity 1.5.1. This summary is drawn from the following published and yet-to-be published outputs

Published outputs

Eriksson H., Adhuri D.S., Adrianto L., Andrew N.L., Apriliani T., Daw T., Evans L., Garces L., Kamanyi E., Mwaipopo R., Purnomo A.H., Sulu R.J. and Beare D.J. (2016). An ecosystem approach to small-scale fisheries through participatory diagnosis in four tropical countries. Global Environmental Change 36, 56–66.

Hanich Q., Wabnitz C., Ota Y., Amos M., Donato-Hunt C. and Hunt A. (2017). Small-scale fisheries under climate change in the Pacific Islands region. Marine Policy in press.

Sukulu M., Orirana G., Oduagalo D., Waleilia B., Sulu R., Schwarz A.-M., van der Ploeg J. and Eriksson H. (2016). Management over ownership: modern community cooperation in Langalanga Lagoon, Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 13–21.

Sulu R.J., Eriksson H., Schwarz A.-M., Andrew N.L., Orirana G., Sukulu M., Oeta J., Harohau D.O., Sibiti S., Toritela A. and Beare D. (2015). Livelihoods and fisheries governance in a contemporary Pacific island setting. PLoS ONE 10, e0143516.

Unpublished output 'in preparation'

Eriksson H., Sulu R., Blythe J., van der Ploeg J., Cohen P. and Andrew N. (in prep). Reconciling resilience and development at the nexus of food security and livelihood strategies in Langalanga lagoon, Solomon Islands.

Results and discussion

The work in Langalanga represents both a body of scholarship on CBFM in settings challenging for this management modality, and an example of capacity building of Solomon Islands project staff. Solomon Islander WorldFish staff led both the collection of data and the production of published outputs under this activity: with mentoring from WorldFish scientists, Dr Reuben Sulu published his first first-authored peer-reviewed paper in PLoS ONE (impact factor 3.2), and research analyst Meshach Sukulu published a systematic evaluation of community processes in an SPC bulletin. Both are noteworthy achievements.

The first paper by Sulu et al. (2015) analysed a substantial household survey dataset (*n* = 235, representing approximately 11% of households in the greater lagoon area) and helped frame re-imaginings of management models in contemporary Pacific island settings. The study illuminates how people live their lives in an environment adjacent to the provincial capital Auki, and how they negotiate livelihoods and resource management. Fishing is clearly an important source of income and nutrition for people in Langalanga, but a range of other income- and food-generating activities contribute to make up the portfolio of livelihoods supporting households in the lagoon. The composition of some household livelihoods was influenced by the environment that people live in or around; for example, artificial island households scored fishing higher than mainland households that have greater access to agriculture, and petty trading was more important to people living in households near Auki where the scale of economy is greater (Figure 7.1.11).

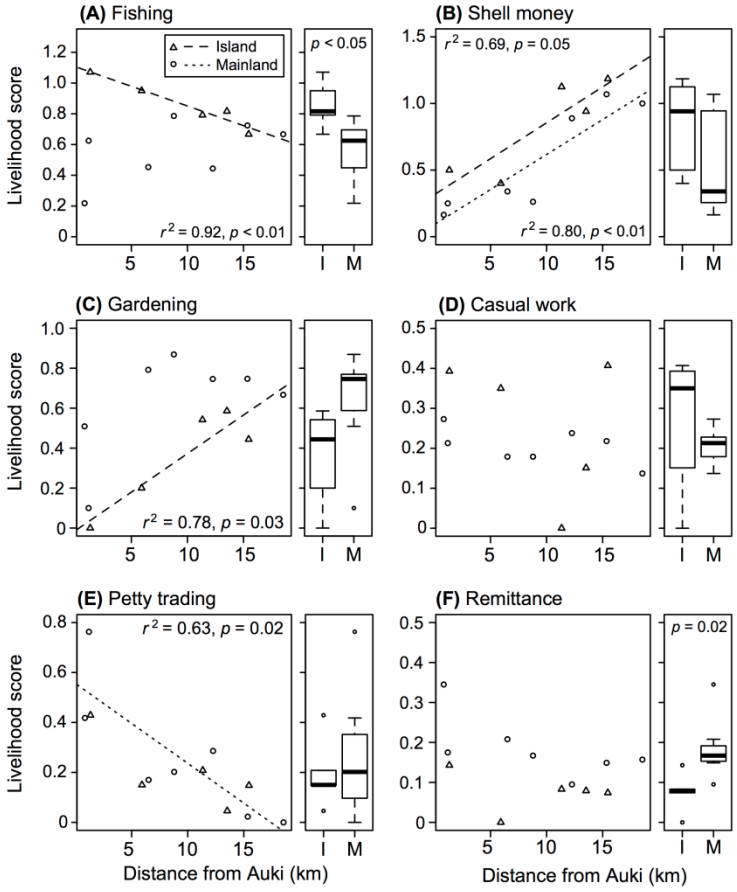


Figure 7.1.11. Significance of distance from Auki on livelihood activities. Relationship between weighted mean livelihood importance score (*Li*) and distance from Auki (km) for the six most common livelihood activities. Differences in slopes were detected for fishing, shell money, gardening and petty trading (panels A, B, C and E). The Tukey's boxplots illustrate the range, median and upper and lower quartiles of *Li* in island (I) and mainland (M) households. Significant differences in *Li* between island and mainland households were found for fishing (panel A) and remittance (panel F).

Overall, fishing was the most common and highest scoring livelihood. This was unsurprising given the 'saltwater people' epithet by which the Langalanga people are known. Overfishing was a widespread concern and livelihood demands were seen as the most common reason for violation of rules. There was understanding of people's needs, so respondents tended to

look the other way if rules were broken. Irrespective of whether traditional social controls were intended to limit fishing effort or manage human relations, they no longer serve as effective fishery management tools in a location such as Langalanga Lagoon.

Places like Langalanga are found across many modern Pacific island settings where human populations increase, migrate, urbanise and compete for declining resources, and boundaries delimiting the extent of community managed areas become increasingly unclear or contested. In situations where growing populations live with high dependence on degraded and contested natural resources, where institutions have eroded, and where modernisation is encroaching, how can livelihoods be maintained, diversified or enhanced and natural resource management (NRM) be most effectively negotiated? The ensuing SPC bulletin article by Sukulu et al. (2016) explores the process of community cooperation within such a complex setting.

Sukulu et al. (2016) outlines several phases of increasing community cooperation over 5 years (Figure 7.1.12). The initiative was driven by community members to reach a level of association that has been formalised as a community-based organisation. A management plan for a Locally Managed Marine Area (LMMA) has been developed, but has not yet been fully implemented. Although community cooperation has been predominantly an internal negotiation, activities by NGOs have facilitated its development. This case study in Langalanga Lagoon demonstrates that, in some situations, the role of a management partner is to support emerging processes that may only be part of a longer journey. Although sustainable fishing has not been achieved in Langalanga Lagoon, the re-invented community cooperation suggests that degrading trajectories can be altered through community-driven processes, even when suitable conditions for CBFM are absent.

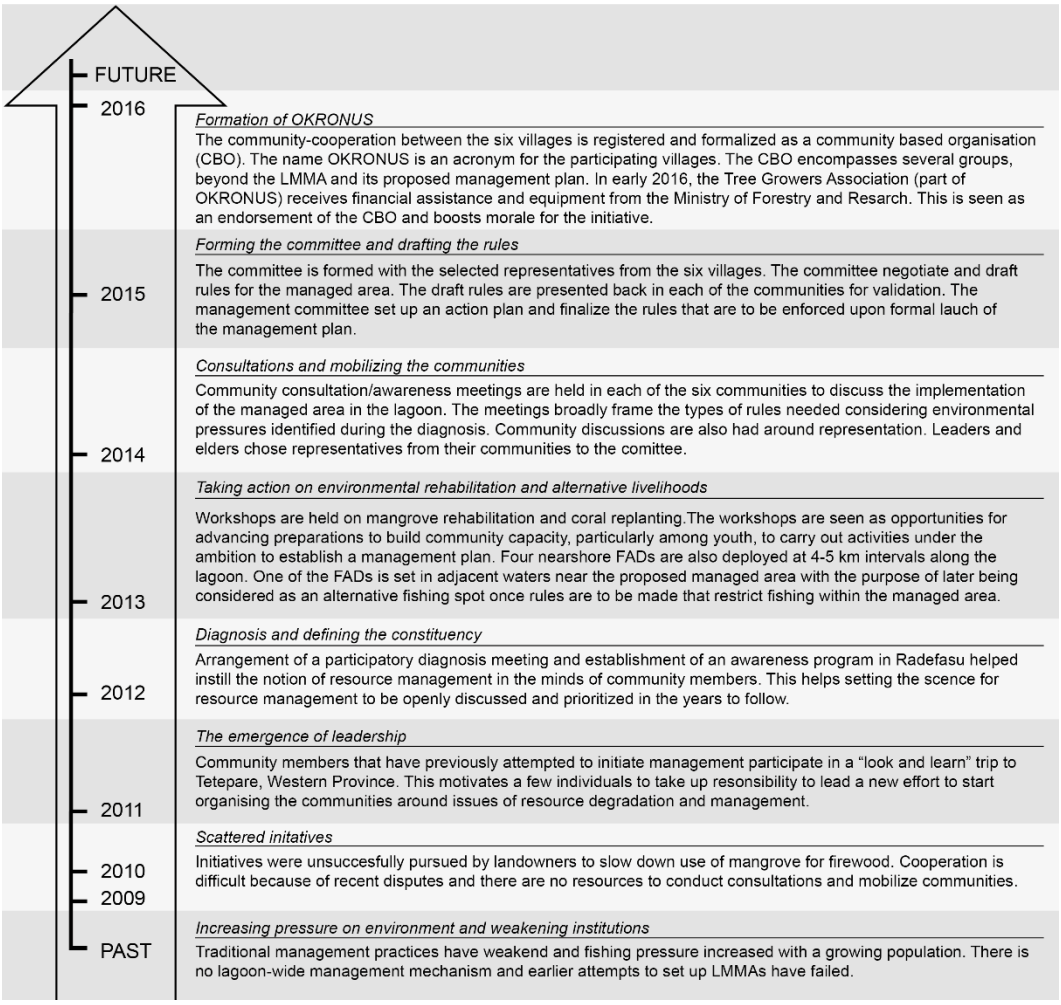


Figure 7.1.12. Timeline illustrating the processes leading to the formalisation of the community-based organisation

Since the publication of Sukulu et al. (2016), the community-based organisation has made substantial progress in creating an LMMA. The original plans were revised in two meetings with WorldFish in 2017. The community-based organisation now aims to manage a much smaller reef area and two specific mangrove forests. A monitoring system was set up in which youth in the community survey the reef and the mangroves. The OKRONUS youth group is now developing a theatre show that will be performed in the six communities to inform people of the proposed LMMA. More details on this part of the project are given in Section 7.3.4.

The yet-to-be-published work by Eriksson et al. (in prep.) further explores the Langalanga data to contribute to the scholarship on livelihood diversity and diversification, and how resilience fits into development programming and its evaluation through food security measures. This is an important frontier to build better development programs and to aid the measurement of impact—an enduring challenge and priority in development practice.

The study critically analyses how the food security levels among households in Langalanga (Figure 7.1.13) can be explained by the composition of household livelihoods. A preliminary finding is that different households derive different value from the same livelihood. Our data indicate that people make a living based on the opportunities they see in front of them and the capacity they have to pursue these opportunities. Even in an area that is known for its ‘saltwater people’ with high reliance on the ocean, 28% of households derive no value from fishing. A key preliminary finding is that we find no significant dissimilarity in livelihood

composition between households belonging to the different Household Food Insecurity Access Score (HFIAS categories), so there is little guidance on what types of livelihoods generate more food security than others.

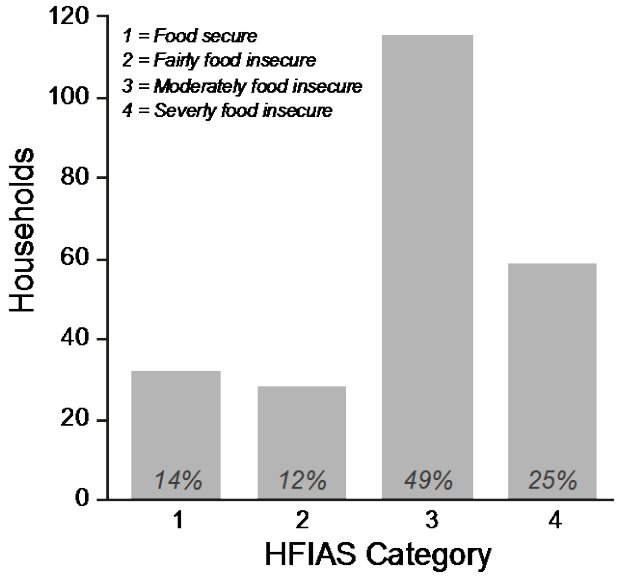


Figure 7.1.13. Frequency distribution of households within the four categories of Household Food Insecurity Access Score (Coates et al. 2007).

Conclusions and recommendations

- Traditional governance/property systems still exist in Langalanga Lagoon and, while degraded, these could be reinvigorated. Such systems, together with contemporary community-based governance structures and the provincial government system, could be the vehicle for convening the initial conversations around governance, livelihoods and resource management.
- To ensure the continuity of project interventions, management partners should aim to support existing or emerging processes of social change—this requires an intimate knowledge of the local context, strong partnerships and a long-term engagement in a locality.
- Community cooperation can alter degrading trajectories, even when suitable conditions for CBFM are absent.
- Targeted livelihood enhancement initiatives that focus on young entrepreneurs may support the next generation of marine stewards.
- Long-term planning, constant dialogue and adaptive management are necessary to ensure the sustainability of a LMMA. This, however, is a challenge for current NGO funding structures and project cycles.

7.1.9 Sea cucumber fisheries and livelihoods

This section summarises activities and outputs from Activity 1.5.2 and draws on published and yet-to-be published outputs (as detailed below).

Published outputs

Eriksson H. and Clarke S. (2015a). Chinese market responses to overexploitation of sharks and sea cucumbers. Biological Conservation 184, 163–173.

Eriksson H., Friedman K., Amos M., Bertram I., Pakoa K., Fisher R. and Andrew N. (2017a) Geography limits island small-scale fishery production. Fish and Fisheries 00, 1–13.

Eriksson H., Österblom H., Crona B., Troell M., Andrew N., Wilen J. and Folke C. (2015b). Contagious exploitation of marine resources. Frontiers in Ecology and the Environment 13, 435–440.

Purcell S.W., Crona B.I., Lalavanua W. and Eriksson H. (2017). Distribution of economic returns in small-scale fisheries for international markets: a value-chain analysis. Marine Policy 86, 9–16.

Unpublished work and outputs 'in preparation'

Eriksson H., van der Ploeg J., Sukulu M., Batalofo M. and Boso, D. (in prep). What happens when the sea cucumber fishery closes? A case study from Melanesia.

Methods for unpublished work

The published global and regional studies of sea cucumber trade relied primarily on FAO, Hong Kong and national trade statistics. In the project's study, interviews were held with fishers in Malaita province, Solomon Islands, to 'ground' some of the findings concerning the global forces at play in the Chinese seafood-sourcing network. The interviews sought to collect information on what happens in communities when sea cucumber fisheries are irregularly opened and closed. Interviews were held with key informants in six communities in Malaita. In addition, in a group exercise, community members distributed allocated stickers onto photos to rank the importance of a long list of marine species for food, economy and culture (Figure 7.1.14). The overall scoring generated by the number of stickers given to a species gave an indication of how important sea cucumbers really are to the incomes of people in these communities.

Figure 7.1.14. Women distribute stickers onto laminated photos of marine species. Commonly known as the 'pebble distribution method', the number of stickers on each photo generates a score of the importance of a species for food, income and culture.

Results and discussion

The project delivered a substantial body of scholarship and practical advice on sea cucumber fishing and sea cucumber trade, including four published papers with an *average* impact factor of 6.0. This scientific collection is augmented with another four products in preparation that focus more on how a national trade ban is perceived and plays out at the local scale, and which deliver strategic policy objectives for national management agencies.

Two papers were developed in partnership with the Stockholm Resilience Centre at Stockholm University in Sweden. The Resilience Centre hosts world-leading expertise on global seafood trade. The partnership was important for moving beyond just sea cucumber as a case study to also update international scientific discourse on attributes of contemporary seafood trade.

First, Eriksson and Clarke (2015a) analysed FAO and Hong Kong trade statistics for shark fins and sea cucumbers. Given the strong cultural tradition embodied in the two products, and the assumption that growth in China drives increasing production, it was expected that the production patterns of both shark fin and sea cucumber would have increased under the prosperous economic conditions in China during the past decade. However, this was not the case. Shark fin production appears to have declined, either due to resource constraints, changing consumer attitudes and/or regulatory curbs on trade. In contrast, global sea cucumber production had not fallen because there are still available supplies, aquaculture production, limited public conservation awareness and an insufficient regulatory environment. The ongoing expansion of sea cucumber sourcing and trade is a reflection of a global sourcing network that has been resilient to changing trade conditions (e.g. stock declines, closed fisheries and regulations).

Eriksson et al. (2015b) then thematically explored contemporary global seafood sourcing networks using sea cucumbers as a case study. This was a deeper analysis of Hong Kong trade statistics than the previous paper. The analyses updated seminal work by Berkes et al. (2006) and Anderson et al. (2010), which showed, using historical data, a lagged spatial expansion with distance to the recipient market. A major finding by Eriksson et al. (2015b) was the speed at which modern sourcing networks had expanded. In just 15 years (1996–2011), the sea cucumber sourcing network expanded from 35 to 83 countries: on average, more than three new countries started exporting sea cucumbers to Hong Kong every year during this period. Moreover, sea cucumber fisheries serving the Chinese market now operate within countries cumulatively spanning over 90% of the world's tropical coastlines (Figure 7.1.15). The historical patterns observed—for example, by Berkes et al. (2006)—that distance is a key factor for expansion no longer apply in modern seafood sourcing: global networks are established to connect distant sources of supply with urban areas of high demand.

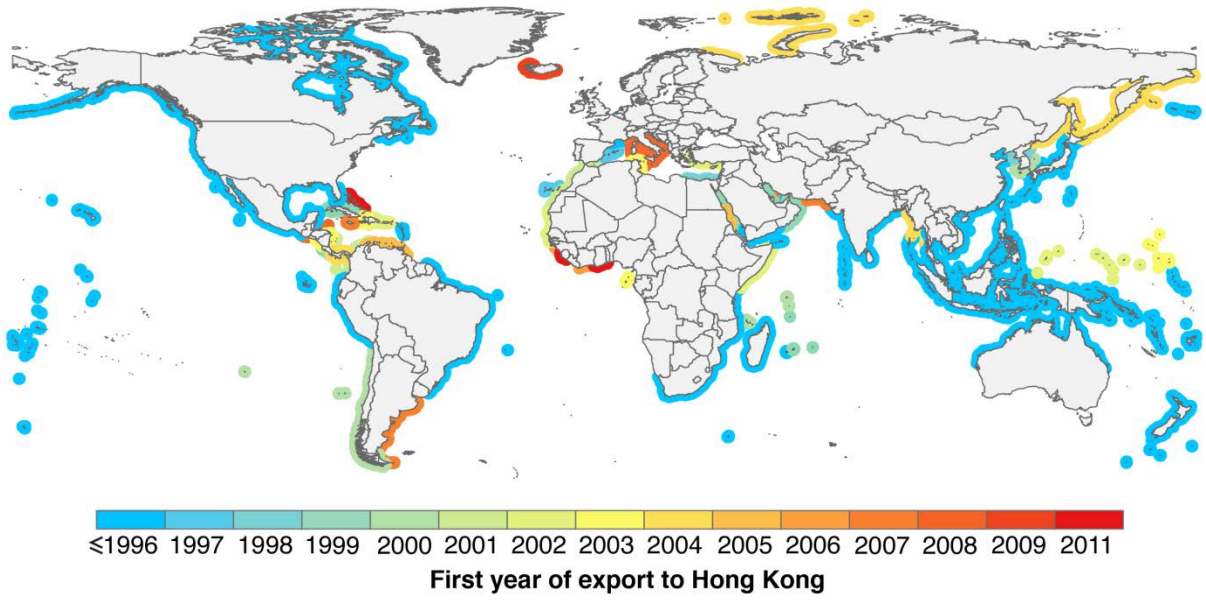


Figure 7.1.15. Colour-coded map depicting the first year that countries exported sea cucumbers to Hong Kong. For large countries, the depicted coastline has been reduced to match fishing areas, or target species distribution, following available information.

Those two papers showcased the global forces at play in sourcing of sea cucumbers for China. In partnership with SPC and FAO, Eriksson et al. (2017a) analysed 40 years of Pacific island sea cucumber trade under these global conditions. Combined production from PICs peaked over 20 years ago (Figure 7.1.16).

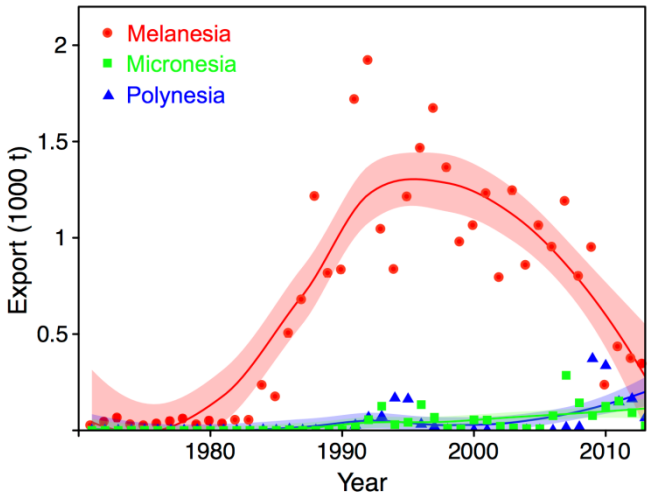


Figure 7.1.16. Melanesia, Micronesia, Polynesia total exports of dried sea cucumbers from Melanesia, Micronesia and Polynesia, 1971–2013. Fitted lines are loess curves with a window of 75% of the data.

The study found that a country's land area had the most influence over fishery production metrics developed from trade statistics (e.g. total export, boom duration, size of peak boom). The analysis demonstrated that 'not all fisheries are equal', thereby balancing the expectations of what islands can produce in the future with respect to their intrinsic natural attributes can help identify limit reference points for island small-scale fisheries. This study delivers a strong message for PICs: harvests from atoll nations will need to be smaller per unit area than from the high islands. In particular, countries with low-productivity fisheries must consider the crucial economic 'safety net' role played by export small-scale fisheries for dispersed island populations and incorporate them into broader development and island resilience strategies. In a parallel ACIAR project (FIS/2015/031), Eriksson et al. (2017b) made a similar recommendation for a management strategy where high-value species placed under protection are seen as a 'safety net' if allowed to be accessed only during periods of special requirement—for example, when coping with natural hazards.

The final published output (Purcell et al., 2017) was part of ACIAR project FIS/2010/096 on postharvest processing and illustrated that despite rigorous data collection and analyses, the complexity of trading processes (e.g. social relations, risk mitigation strategies) inhibits market intelligence and upstream transparency. The opaque trading makes it difficult for managers wanting to obtain a reasonable understanding of current value, and for fishers wanting to secure a 'fair share' of the product. Encouragingly, some fishers did seem to be getting a

Figure 7.1.17. Public text message sent by Solomon Islands MFMR to address false rumours about a fishery opening.

reasonable share of product value, at least sufficient to not be labelled as being taken advantage of.

The outputs that are still in preparation synthesise these insights and 'grounds' them with national fishery agencies and with people in communities. Emerging results suggest that fishers do not object to government bans on sea cucumber fishing and trade. Perhaps this is because protecting and then opening areas or species is an integral mechanism in more traditional management practices. The products in preparation also explore what tools agencies might consider into the future regarding modern communication technology, exemplified by the Solomon Islands MFMR text message sent out to silence rumours about a fishery opening when PNG was opening the fishery (Figure 7.1.17).

In summary, these studies round out complementary ACIAR investments that have incorporated various dimensions of sea cucumber. As a final discussion point, it is relevant to evaluate what lies ahead for Pacific island sea cucumber fishing and trade. The Eriksson et al. (2015b) study connected to the political ecology literature that explores 'lootable' wealth—high-value products that are easy to extract under weak management and that are easily shipped or smuggled—and highlighted that sea cucumbers are lootable resources that can probably not be managed using usual fishery management means. The reflection about special management requirements has particular bearing on the CBFM emphasis of the project: how can supply chains be governed in ways that are advantageous to people in communities under these global trading conditions? This question remains unanswered, but two activities may be considered in the future: (1) the role of state-operated international auctioning of sea cucumber based on lessons from Solomon Islands MFMR in 2013; and (2) the development of transparent institutions and infrastructure to arrange a marketplace to which fishery and customs officers can turn for up-to-date prices on sea cucumber.

The political dimension of sea cucumber in the Pacific has resulted in an enduring agony of mismanagement and distrust. The recent opening of the fishery in Solomon Islands, despite the management plan stating that an assessment should precede an opening, highlights that achieving equitable and sustainable sea cucumber trade is perhaps not a technical issue as much as it is a political one. The current state of affairs in Solomon Islands, where the politics of the sea cucumber trade are playing out to the disadvantage of sustainability institutions, has likely ruined the short-term prospect of building an equitable supply structure for sea cucumber.

Conclusions and recommendations

- The global forces at play in the sea cucumber sourcing network are resilient to changing conditions (e.g. stock declines, closed fisheries, regulations, public opinion on conservation).
- Sea cucumber fisheries serving the Chinese market now operate within countries cumulatively spanning over 90% of the world's tropical coastlines
- Combined sea cucumber production from PICs peaked over 20 years ago
- PICs must tailor management based on the intrinsic productivity of shallow inshore habitats—harvests from atoll nations will need to be smaller per unit area than from the high islands.
- Countries with low productivity fisheries must consider the crucial economic 'safety nets' that export small-scale fisheries represent for dispersed island populations and incorporate them into broader development and island resilience strategies.

7.2 Objective 2: Design and implement CBFM in Kiribati in collaboration with Island Councils and national agencies

7.2.1 Introduction

This section summarises activities and outputs from Activities 2.1 to 2.5—see Section 6 for tabulated activities and milestones—and is drawn from the following published and yet-to-be published outputs:

Published outputs

Campbell B. and Delisle A. (2016). *Kawain karaoan to ointua*. Guidelines for by-law processes relating to coastal fisheries activities in Kiribati. Report to the Ministry of Fisheries and Marine Resources Development (MFMRD). Australian National Centre for Ocean Resources and Security (ANCORS): Wollongong, Australia. 17pp.

Campbell B. and Delisle A. (2017). Exploring the use of bylaws as an enabling tool for sustainable community-based fisheries management in Kiribati. SPC Fisheries Newsletter 153, 40–46.

Delisle A., Namakin B., Uriam T., Campbell B. and Hanich Q. (2016). Participatory diagnosis of coastal fisheries for North Tarawa and Butaritari island communities in the Republic of Kiribati. Program Report: 2016–24. WorldFish: Penang, Malaysia.

Hanich Q., Delisle A. and Campbell B. (2016). Pacific small-scale coastal fisheries: strengthening sustainability, food production and livelihoods. Pp. 28–32 in Asian Development Bank (ADB), Pacific Economic Monitor Series. ADB: Manila, Philippines.

Uriam T. (2016). Stakeholders of the Kiribati community based fisheries management project gather to discuss lessons learned and a way forward. SPC Fisheries Newsletter 149, 19–21.

Uriam T. and Delisle A. (2014). Community-based fisheries management project in Kiribati: first steps. SPC Fisheries Newsletter 144, 22–23.

Unpublished outputs or in preparation

Campbell B, Delisle A, Namakin, B and Uriam T. (2016) *Kwain karaoan te ointua*: The process of making by-laws, Poster produced for MFMRD and community outreach.

Campbell B. and Delisle A. (in prep). Strengthening coastal fisheries governance: What role for community-based fisheries management in Kiribati?

Hanich Q., Eria T., Hayes D. and Dunstan P. (submitted) Ministry of Fisheries and Marine Resources Development (MFMRD) policy briefing: Tarawa Lagoon management, community tenure and spatial planning.

Hanich Q, Uriam T., (submitted). Government of Kiribati Cabinet briefing: community-based approaches to fisheries management.

Hanich Q. and Dunstan P. (submitted). Ministry of Fisheries and Marine Resources Development (MFMRD) policy briefing: theories of change for fisheries.

Namakin B. and Uriam T. (in prep) Toolbox for community-based fisheries management in Kiribati. MFMRD Fisheries Newsletter.

Background

Prior to 2014, few recorded examples of formal community-based or co-management arrangements around coastal fisheries existed in Kiribati. This minimal exposure to CBFM, in comparison to the other project countries, implied that the implementation of CBFM in Kiribati required foundational capacity building rather than advancing CBFM to mature stages of operation. As such, the project activities primarily focused on developing the necessary institutional foundation that is the precursor to any sort of national CBFM development and implementation as we see in the other project countries. This institutional building, within both communities and national fisheries authorities, has provided a valuable set of lessons learned.

The Republic of Kiribati spans over 3.5 million km^2 of ocean and includes 32 low-lying atolls and 1 raised coral island distributed across the Gilbert Islands group[3], Phoenix Islands[4] and Line Islands[5] as well as Banaba (formerly Ocean Island). Of Kiribati's estimated 103,058 inhabitants, 49% live in the capital South Tarawa (KNSO 2012). The long history of limited availability of productive land has rooted the I-Kiribati population in an important cultural and socioeconomic relationship with the marine environment. Oceanic resources, of which oceanic tuna is the most lucrative, bring in over 70% of government revenue in fishing access fees every year, reaching A$141 million in 2014 (NEPO and MFED 2016; MFED and MFMRD 2016). This financial importance partly explains the majority investment of time and resources of the Ministry of Fisheries and Marine Resources Development (MFMRD) in the sustainable management of oceanic resources over increasing capacity in management of coastal (inshore) resources.

While the government revenue generated by the exploitation of oceanic resources indirectly influences the lives of I-Kiribati people, only a small minority directly participates in oceanic fisheries. In fact, an estimated 80% of I-Kiribati directly use coastal resources in their day-to-day lives (KNSO 2006). Valued at approximately A$22 million[6] in the mid-2000s (Gillett 2009), coastal resources are not only economically important, they also provide most of the protein and micronutrient intake of the population. Based on 2005–06 data, Bell et al. (2009) estimated that fish accounted for >80% of Kiribati's annual protein consumption. Because terrestrial food protein and carbohydrate resources are limited, per capita fish consumption in Kiribati is among the highest in the world. In Kiribati, fish provides more than just food protein benefits. FAO estimates that about 300 g of whole fish per capita per day would provide the minimum protein requirements for good health in general. Although carbohydrate intake is increasing in the diet in Kiribati, fish supply much of the daily energy requirements. Fish resources are thus extremely important to the food security of the I-Kiribati people.

Coastal fisheries in Kiribati cover the lagoon, ocean, reef and intertidal zones, usually all within 3 nautical miles of the coast. The fisheries are typically artisanal, involving low-tech, low-capital operations (i.e. small boats/dugouts or gleaning activities), usually carried out at the household level by men, women and youth. Fish resources (e.g. finfish, bivalves, cephalopods, gastropods) are mostly caught for subsistence consumption, although some are traded domestically; either inter-island or through the main market in South Tarawa. With the exception of some areas where customary marine rights (but not tenure) still persist, Kiribati's coastal fisheries remain largely unregulated.

[3] The 16 islands and atolls of the Gilbert group are Abaiang, Abemama, Aranuka, Arorae, Beru, Butaritari, Kuria, Maiana, Marakei, Makin, Nikunau, Nonouti, Onotoa, Tabiteuea, Tamana and Tarawa. The island of Tarawa is divided into South Tarawa and North Tarawa.
[4] The Phoenix Islands include Birnie, Enderbury, Kanton, Manra, McKean, Nikumaroro, Orona and Rawaki.
[5] The Line Islands include Caroline, Flint, Kiritimati (Christmas Island), Malden, Starbuck, Tabuaeran (Fanning Island), Teraina (Washington Island) and Vostok.
[6] Estimate only as the informal nature of coastal fisheries limits ability to accurately determine financial contribution.

7.2.2 Site selection, scoping and participatory diagnosis

To contextualise the fishery system in Kiribati, the Australian National Centre for Ocean Resources and Security (ANCORS) led a participatory diagnosis phase with assistance from project partners between May and December 2014 (Delisle et al. 2016). The diagnosis phase followed an engagement protocol that national partner agencies helped define. The Kiribati CBFM team used the following step-wise approach to evaluate the appropriateness of selecting particular communities to collaborate with in the project (see also Figure 7.2.1):

- National-level government agencies were approached to assess whether communities that had expressed concerns about their coastal fisheries and asked for assistance in terms of management (instead of development assistance). Such community needs would have been forwarded by the relevant Island Council to MFRMD or the Ministry of Internal Affairs (MIA).
- Island Councils (subnational authority) of those identified by national authorities were then approached to find out if members of the council were interested in the project's concept and approach.
- Once interest was expressed by an Island Council, elected councillors, acting as representatives of their home village, were asked to decide which communities would be interested in becoming a pilot site and to explain their reasons behind the choice.
- A village meeting was organised by the CBFM team in the communities suggested by the Island Councils, to confirm and detail the interest in participating in the project and to ensure that the communities understood proposed project objectives as well as the roles and responsibilities associated in being a pilot site.

Figure 7.2.1. Community engagement protocol for the selection of CBFM pilot sites (Delisle et al. 2016)

Pilot villages identified by community leaders were Bikati, Kuma and Tanimaiaki on the island of Butaritari (Figure 7.2.2), and Buariki and Tabonibara on the island of North Tarawa (Figure 7.2.3). As an initial engagement in the five pilot CBFM communities, the CBFM team followed the participatory diagnosis and adaptive management (PDAM) framework (Andrew et al. 2007; Andrew and Evans 2009; Evans and Andrew 2009) to identify and evaluate the

social, economic, environmental and governance contexts and the characteristics of their coastal fisheries (Table 7.2.1). Participatory research techniques used to elicit diagnostic information included village profiles, community mapping to identify the full range of stakeholders in the fishery, resource matrix exercises, gender-based focus group discussions and interviews with key informants. Secondary data were also collected if primary data could not be obtained. This analysis built on earlier scoping work that provided a national stocktake of offshore and coastal fisheries in Kiribati (Campbell and Hanich 2014). In early 2015, the CBFM team presented the preliminary results of the initial diagnosis to each community to validate the information, which was later reported in Delisle et al. (2016).

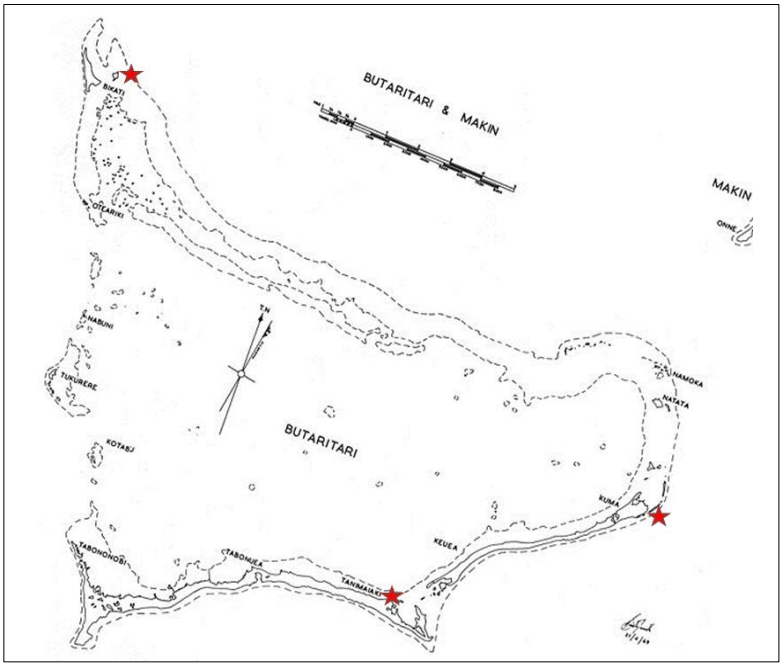


Figure 7.2.2. Map of Butaritari with pilot sites shown in red. (Map source: MFMRD 2015)

The diagnosis revealed the common threads and key differences among the five pilot CBFM communities. In terms of similarities, all five shared a strong dependence on marine resources, and had similar village profiles and local leadership structures. Community members across both islands also shared many of the same resource use issues and concerns, including overall declines in important marine resources, overharvesting and increases in fishing capacity, destructive fishing methods, destruction of marine habitats, pollution, lack of livelihood opportunities and pressure to get food and cash for families. Communities identified these as major factors contributing to the current status of their coastal fisheries. The major differences between the two islands included the number of fishers accessing common coastal resources and the willingness of community members to work with one another towards a common goal. For example, North Tarawa is the second-most densely populated island in Kiribati after South Tarawa and shares the Tarawa Lagoon with South Tarawa, which is heavily urbanised. More than 50,000 I-Kiribati rely upon the coastal fisheries of the Tarawa Lagoon for their livelihoods and food security. Butaritari is the third-most populated island in Kiribati, but because it is geographically distant from Tarawa, the communities living there do not share their marine resources and face different challenges in managing their fisheries. Taking a generally holistic view of the use and management of their local coastal fisheries, diagnosis participants commonly noted that the acceptance and long-term enforcement of community-driven resource management decisions requires strengthened connections and support within and between villages, as well as across levels of government and regulation.

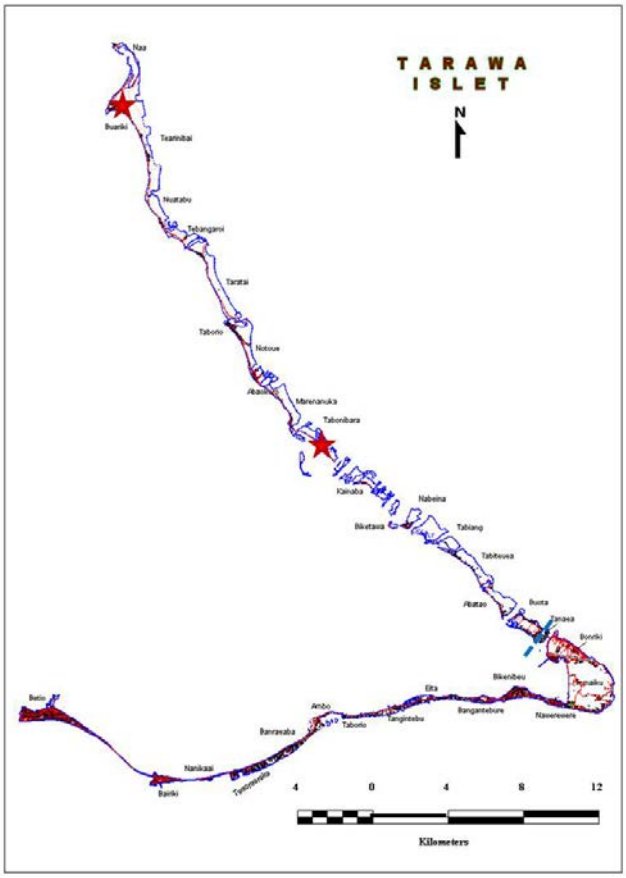


Figure 7.2.3. Map of Tarawa. The blue dashed line indicates the administrative boundary between South and North Tarawa. The red stars indicate the two project sites in North Tarawa. (Map source: MFMRD 2015).

Among the issues also identified by community members were the continued weakening of customary village-based authority around marine resource use, a poor understanding of their own decision-making power, and lack of institutional and legal support for fisheries management. In particular, many community members expressed concern that unless formal legal recognition was created to honour community-led fisheries resource management efforts, any village-level management plan would ultimately not succeed due to a lack of effective compliance and enforcement mechanisms, especially against potential outside transgressors (Campbell and Delisle 2017).

7.2.3 Policy landscape at national and subnational scales

MFMRD functions within a centralised government management model with a mostly top-down, one-way flow of information and projects, and limited consultation with communities. There are four different levels of coastal fisheries management in place:

- National Coastal Fisheries Division, MFMRD (formal)
- Island Councils (jurisdiction within 3 nautical miles of coast; *Local Government Act 1984*)
- village level (informal)
- household/clan level (informal).

Table 7.2.1. Population and household size in study sites and totals in 2010. For the purposes of this table, a 'household' (HH) is defined as per Government of Kiribati Census enumeration protocols to mean people who usually eat together and share in the preparation and costs of providing food (adapted from KNSO 2012 and Delisle et al. 2016).

	Pop	HHs	Marine zone			Important marine species	Main locally perceived CBFM challenges	Land	
			Lagoon km^2	Reef km^2	Reef base km^2			Land km^2	Key market resources
North Tarawa									
Buariki	703	145				- Peanut worm - Goatfish - Strombus & ark shells - Bonefish - Silver biddy	- Increased pop and fishing pressure - Destructive fishing methods; Local compliance - Destruction of seagrass beds - Fish poaching from South Tarawa - Decline in finfish & invertebrates - Income decline - Ciguatera toxin		Coconut palm–related items; pandanus; fish
Tabonibara	363	61				- Peanut worm - Ark shell - Goatfish - Bonefish - Silver biddy	- Increased sedimentation - Decline in availability of bivalves - Local extinction of bivalves - Harder to fish for the family - Decline in sea cucumbers		
Total (North Tarawa)	*6,102*	*1,002*	*533.9*	*129.0*	*375.0*			*31.2*	
Butaritari									
Bikati	225	47				- Giant clams - Peanut worm - Flying fish - Reef fish - Bivalves - Turtle	- Decline in marine resources - longer to catch fish - Decline in peanut worm - Increased clam fishing pressure - Clams unhealthy (mantle bleach) - Decline in bivalves (no. and size) - Unhealthy seagrass & mangroves - Change in fishing gear - Ciguatera and Crown-of-thorns outbreaks increasing		
Tanimaiaki	267	60				- Striped emperor - Red snapper - Goat fish - Silver biddy - Bivalves - Coconut crab - Bonefish	- Decline in finfish species, smaller size fish - Causeway blockage between lagoon and ocean - Blocking of milkfish ponds - HHs leaving to South Tarawa - Increased pollution - Crown-of-thorns starfish		Fruit and vegetables; coconut palm–related items; fish and shellfish
Kuma	323	62				- Striped emperor - Mullet - Bonefish - Goatfish - Red snapper - Eel - Coconut crab - Bivalves	- Decline in marine species - longer time needed to catch fish - Use improved fishing gear - Fish farther away - Less species aggregation - Decline in octopus & coconut crb - Erosion		
Total (Butaritari)	*4,346*	*630*	*295.8*	*82.6*	*11.7*			*13.5*	
Total	103,058	16,043							

The Government of Kiribati recognises the importance of the long-term protection of coastal resources in its newly developed National Fisheries Policy 2013–2025. This policy was developed in consultation with MFMRD staff as an AusAid-funded initiative. In this policy, special mention is made of the importance of involving local communities in efforts directed toward the management of coastal resources. Currently, the system includes national legislation, policies and the authority by Island Councils (subnational level of government) to establish rules within their 3 nautical mile jurisdiction on an island-by-island basis. Although the sustainable management of coastal fisheries resources is a national priority, the Government of Kiribati acknowledges that current management regimes are ineffective. It is unclear as to whether the inclusion of community activities such as CBFM came from a deep recognition by MFMRD staff that change was needed or if it was rather influenced by international discourse from the region or international donors.

As the concept of CBFM was largely not practised prior to the project, the efforts of the CBFM team targeted the different institutions across different levels of governance, i.e. from local to national. There was initial doubt and uncertainty among actors about the concept and rationale behind CBFM. For instance, some staff within MFMRD voiced concern that if communities were given a role in managing coastal fisheries, some staff may no longer be required and would lose their jobs. At the village level, similar apprehension existed among many villagers who initially did not trust that the CBFM team genuinely sought engagement and collaboration as partners. Island Council members and village representatives were supportive of the project but were initially less vocal about their ideas for strong coastal fisheries management when dealing with national agencies.

7.2.4 Stakeholder meetings and CBFM implementation activities

Two domestic stakeholder meetings were held during the course of the project. The first was held on 27–29 October 2014 and included representatives from the pilot communities, relevant ministries and NGOs (43 participants; Figure 7.2.4). The aim of the meeting was to introduce the CBFM project to a wide audience at the national level, allow community members to talk about their involvement in it and define priorities for a model of CBFM in Kiribati. The participation of representatives from Vanuatu, Solomon Islands and SPC in this meeting generated a lot of discussion. Presentations drawing from international case studies provided valuable concrete examples of how CBFM is implemented across the Pacific region. The main outcome of the meeting was that participants came to understand that villagers and the government can collaborate to sustainably manage coastal fisheries. Both community representatives and government staff learned about their roles in a CBFM process and admitted they held misconceptions about the support they could get from one another. The discussion yielded an important outcome for CBFM design in that it highlighted that the management of small-scale coastal fisheries in North Tarawa and Butaritari needs to involve stakeholders across multiple levels of governance—from resource users to fisheries authority.

In April 2016, a second stakeholder meeting was held with 45 participants from national ministries, including: MFMRD, MIA, the Ministry of Environment, Lands and Agricultural Development, the Ministry of Women, Youth and Social Affairs, the Office of the Attorney General, and the Curriculum Development Unit of the Ministry of Education). The meeting was also attended by local government officials (e.g. mayors from Makin, Butaritari, North Tarawa and the Tarawa Urban Council (TUC). Representatives from each pilot community also participated. The meeting aimed to discuss lessons learned, best practices and ways forward to ensure better collaboration between communities and other stakeholders. For example, the mayors of Makim and TUC were invited because of their proximity to both pilot islands, and their shared use of the lagoon marine resources. Director of Coastal Fisheries, Karibanang Tamuera, stressed the shared responsibility of the multiple government ministries, Island Councils and civil society in fulfilling the needs of communities as envisioned in their fisheries management plans.

Figure 7.2.4. First national Kiribati CBFM stakeholder workshop

To break down inter-group barriers and allow community members to speak freely and confidently, the stakeholder meeting was conducted to recreate the '*maneaba* way' following the Kiribati tradition of meeting in a *maneaba* meeting house where everyone is equal and free to express opinions. This was dramatically different to other meetings between government representatives and community members wherein the latter often feel that they are in a position of 'inferiority' and 'invited' to listen to the expertise of government staff:

> I have been to a lot of meetings and this is the first meeting where we discuss freely what we want for our people. (Mayor of TUC)

An important accomplishment of the second stakeholder meeting was the decision to establish a steering committee, made up of staff from the different ministries in attendance and chaired by CBFM project officers. The steering committee would further the work started at the stakeholder meeting in strengthening the collaboration between the various ministries and communities. Community representatives were satisfied with this outcome, knowing that their concerns were being heard by government officers. This national committee is currently in development.

An important impact of the project has been community empowerment in engaging with the government. The CBFM team observed a stark development in the confidence of community representatives between the first and second stakeholder meetings. Community representatives went from being passive listeners during the first meeting to leaders of discussion with government representatives during the second meeting.

A regional stakeholder workshop was also convened early in the project, by SPC in Noumea, New Caledonia, on 3–6 March 2015. A community representative from Tanimaiaki village (Butaritari) participated, and gained valuable insight into CBFM processes and experiences through discussions with other village leaders from across the region. Openly discussing concerns around CBFM with other village leaders proved an important opportunity for this representative, who felt a great sense of responsibility in adopting something as novel as CBFM.

Further community-based stakeholder meetings took place throughout the project, and involved inception, planning and evaluation meetings with local fisheries actors (including fishery authority bodies). An overview of meetings/activities that took place over the life of the project is presented in Table 7.2.2.

Table 7.2.2. Chronology of the significant community engagement activities as part of the CBFM implementation activities at project sites

	Date	Location	Activity	Objective	Part.	Stakeholders present	Outputs
YEAR-1: *Mar-14 – Mar-15*	Mar/ Apr '14	S. Tarawa; N. Tarawa	1) Initial project engagement in-country and at Island Council level; 2) initial contact made with Butaritari; 3) project introduction to North Tarawa Island Council	Initial engagement and socialisation of project with government staff; initial engagement with Island Councils—permission-seeking and endorsement	30+	7 project staff; ~20 mayors, clerks, village councillors, *Unimwane* (male elders), women's rep; at least 3 government reps	Project introduced to MFMRD, MIA, MELAD staff; project endorsed by 1 Island Council with invitation to meet by 1 more
	May/ Jun '14	S. Tarawa; N. Tarawa: Buariki, Tabonibara, Buota; Butaritari: Kuma, Tanimaiaki, Bikati	1) Project introduction to Butaritari Island Council; 2) initial project engagement at community level with village leaders from 6 proposed pilot sites	Engagement and socialisation of project with village executive—permission-seeking and endorsement	~130	4 project staff; ~20 mayors, clerks, village councillors, *Unimwane*, women's rep; at least 3 government reps; ~20 community members per community except Buota (~2 people)	Project endorsed by 1 Island Council; project introduced to 6 villages with endorsement of support in 5
	July/ Aug '14	S. Tarawa; N. Tarawa: Buariki, Tabonibara, Buota; Butaritari: Kuma, Tanimaiaki, Bikati	Project engagement at community level with village leaders from 6 proposed pilot sites	Engagement and socialisation of project with village executive—permission-seeking and endorsement	~106	3 project staff; at least 3 government reps; ~20 community members per village	Project introduced to 5 villages, community endorsement and support for project, initial situation analysis begun
	Oct '14	N. Tarawa: Tabonibara, Buariki; Butaritari: Kuma, Tanimaiaki, Bikaati	5 community consultations	Introduction and socialisation of project to wider community; participatory diagnosis (community)—situation analysis, network mapping, needs analysis	~257	4 project staff (2 rotated); at least 3 government reps; ~40–50 community members per village	Community profiles developed and priority needs identified
	Oct '14	S. Tarawa	1) First stakeholder workshop; 2) Fisheries Awareness Week (FAW)	Development of a general model for implementing community-based approaches to fisheries management in Kiribati; promotion of 'CBFM' project to wider Kiribati community, showcasing early activities (FAW)	~31; ~200 +	1) MFMRD Secretary and senior staff; MIA Secretary and staff representative; High Commissioners of NZ and Australia; ANCORS staff; SPC representative; CBFM officers from Solomon Islands and Vanuatu, and Kiribati; CSIRO; mayors and senior representatives from communities; 2) all MFMRD staff; senior dignitaries; 100s of members of the public, including some pilot community reps; 3 project staff	Model for implementation discussed and established; awareness of project raised
YEAR-2: *Mar-15 – Mar-16*	Mar '15	S. Tarawa, N. Tarawa, Butaritari	Community meetings	Validation of participatory diagnosis information and meeting with community leaders to set up CBFM plan activities	~46+	5 project staff total split on different activities; 1 MFMRD staff; ~20 per community	Community data validated; community relationship building
	May/ Jun '15	S. Tarawa; Butaritari: Kuma, Tanimaiaki	Community meetings	Development of CBFM plan in 2 villages; briefing of Island Council and Elders' association about progress	~105	4 project staff; 1 MFMRD staff; ~50 per community	CBFM plans written
	Aug '15	N. Tarawa: Tabonibara	Community meetings	Development of CBFM plan in 1 village; briefing of island Council and Elders' association about progress	~53	2 project staff; 1 MFMRD staff; ~50 per community	CBFM plans written
	Oct '15	S. Tarawa; Butaritari: Bikati; N. Tarawa: Buariki	Community meetings	Development of CBFM plan in 2 villages	~104	3 project staff; 1 MFMRD; ~50 per community	CBFM plans written
	Dec '15	Butaritari: Bikati	MFMRD assessment	MFMRD-conducted assessment of area Bikati wanted to close for an MPA	at least	No project staff; MFMRD research team; Bikati village leaders; Bikati community members	Biological assessment of proposed MPA undertaken

				under management plan	10		
YEAR-3: *Mar-16 – Mar-17*	Mar '16	S. Tarawa; N. Tarawa: Buariki	1) Data collection training of 6 people; 2) gender and innovation data collection in 1 village as well as implementation support; 3) CBFM governance survey of government staff	MFMRD/project human resource capacity building; data collection for project M&E; opportunity for CBFM plan implementation support follow-up	~53	4 project staff; 3 MFMRD interns;~30 community members; 16 MFMRD staff	Data collected on aspects of community gender and innovation, project governance, stakeholder buy-in; implementation support provided
	Apr '16	S. Tarawa; Butaritari: Bikati	1) Second stakeholder workshop; 2) gender data and innovation data collection in Butaritari; 3) North Tarawa villages (Tabonibara and Buariki) take steps to incorporate as a Society to give stronger legal backing to CBFM plan and Bikati proceeds with seeking to formalise MPA into a by-law	Evaluation and review of CBFM plan implementation; data collection for gender and innovation aspects; legal support for CBFM plan implementation	~30 at wksp, ~57	1) MFMRD Secretary and senior staff; MIA Secretary and staff representatives; 2) 4 project staff (2 rotated); 3 MFMRD interns; ~ 20 community members; 3) ~10 members per community (x3)	CBFM plan implementation evaluated; data collected; legal supports created
	May '16	Butaritari: Kuma, Tanimaiaki, Bikati	1) CBFM governance survey in Butaritari; 2) CBFM plan implementation support	Data collection for project M&E; opportunity for CBFM plan implementation support follow-up	83	2 project staff; 1 MFMRD staff; 80 community members	Data collected on aspects of project governance, stakeholder buy-in
	Oct '16	S. Tarawa	Fisheries Awareness Week	Promotion of 'CBFM' project to wider Kiribati community, showcasing activities and achievements	~200+	All MFMRD staff; senior dignitaries; 100s of members of the public, including some pilot community reps; 3 project staff	Project outreach display; awareness brochures distributed
	Mar '17	S. Tarawa; N. Tarawa: Tabonibara, Buariki; Butaritari: Kuma, Tanimaiaki, Bikati	1) Data collection training and M&E panel study in 5 pilot villages; 2) follow-up consultations with pilot village leaders; 3) distribution of by-law 10-step poster	Training in-country staff and upskilling MFMRD junior staff in electronic data collection; baseline of select socio-economic data to assist with M&E requirements and comparative analyses; project engagement; educational outreach	104+	3 project staff; 1 MFMRD junior staff, 100+ community members, including village leaders	In-country staff trained; MFMRD junior staff upskilled; baseline socio-economic data collected in 5 project villages; awareness/education materials distributed
	May/ Jun '17	Butaritari: Bikati	1) MFMRD conducts biological assessment of Bikati MPA; 2) Bikati celebration; report of first enforcement event in MPA (may have been earlier in 2017)	Biological assessment; celebration of first reported enforcement event	~35	~5 MFMRD staff; ~30 community members	CBFM plan enforced – outcome Biological assessment with MFMRD
Remainder	Jun '17	Abaiang: Tabontebike	1) MFMRD and CBFM team invited to new island to meet community request to establish MPA; 2) CBFM team assists with CBFM plan in 1 non-pilot village	CBFM scaling-out; development of CBFM plan in 1 village	~36	1 project staff; ~5 MFMRD staff; ~30 community members	scaling out—outcome
	Nov '17	S. Tarawa; N. Tarawa: Tabonibara, Buariki	1) Follow-up consultations with pilot villages about CBFM plans; 2) Discussions about M&E activities	CBFM implementation support	~21	1 project staff, ~20 community members (likely CBFM committee and village exec only)	

Note: ANCORS = Australian National Centre for Ocean Resources and Security; CBFM = community=based fisheries management; CSIRO = Commonwealth Scientific and Industrial Research Organisation; FAW = Fisheries Awareness Week; M&E = monitoring and evaluation; MELAD = Ministry of Environment, Lands and Agricultural Development; MFMRD = Ministry of Fisheries and Marine Resource Development; MIA = Ministry of Internal Affairs; MPA = marine protected area; NZ = New Zealand; SPC = Pacific Community.

7.2.5 CBFM establishment I—community-level processes

Two rounds of consultations were held in each community. Firstly, the CBFM team facilitated gender and age disaggregated focus group discussions (e.g. groups for women, youth, elderly men and middle-aged men) to promote participants' confidence in expressing their views. Through a process of participatory mapping (Figure 7.2.5), each group was encouraged to draw maps to outline their village and lagoon, identify fishing grounds, spawning aggregation sites, important marine ecosystems and the direction of currents. Matrices were filled out to capture information about fish catch, participation in fishing (who fishes), use of catch (cash, barter or food), seasonality of catches, and perceived status and conditions of the stock (Uriam and Delisle 2014).

Figure 7.2.5. Participatory resource mapping

As a next phase, a community meeting with the entire village was organised to discuss and draft community-based management plans (with input from each focus group). The outputs of this meeting formed a first step towards developing CBFM plans (e.g. Figure 7.2.6), which represented the first of their kind in Kiribati. A 20-year vision for the community was discussed, as well as threats and concerns. Findings from these discussions were grouped into themes and broken down into objectives and actions that the community was willing and able to undertake. The five resulting community management plans have common elements, such as the banning of destructive fishing gear and practices, including:

- using small-size nets and excessively long gill nets
- splashing water with metal bars to scare fish and drive them towards the nets (*te ororo*)
- encircling corals with gill nets (*borakai*)
- destroying corals to reach fish or octopus
- fishing on spawning aggregations
- catching juvenile fish before they have had a chance to reproduce.

Establishing marine reserves was another action that was recommended in all management plans. Bikati was the first community to establish a community-driven marine protected area and was supported by the Island Council and Elders' association in Butaritari.

The management plans also afforded communities a platform to address other issues that indirectly affect fisheries, such as poor village governance, waste and sanitation, agriculture, education and alternative sources of income (Uriam 2016).

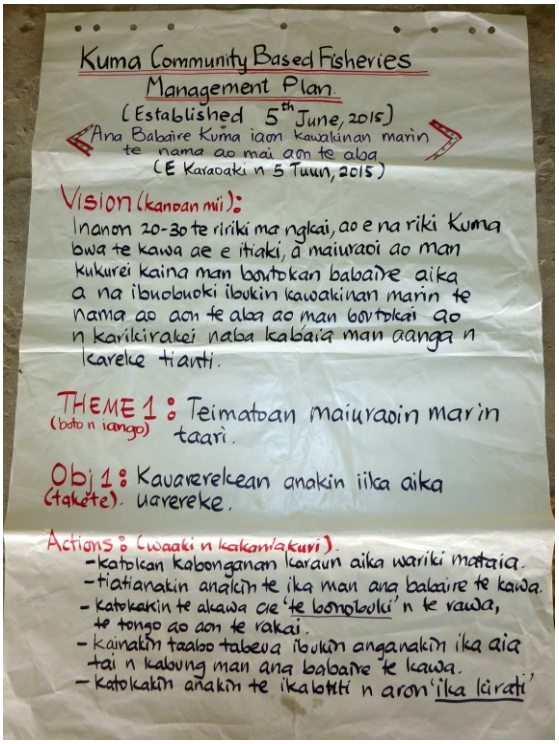


Figure 7.2.6. Kuma CBFM management plan discussion output

Two activities stood out from the others as proving very successful at involving and motivating community members in all the communities visited:

- **Mapping exercises** were successful with every demographic group. These exercises went beyond the collection of spatial data and generated discussion between community members and marked the beginning of a higher level of engagement. The conversations generated during these exercises led initially reluctant community members to offer their input, and even actively seek out other community members whose input was deemed valuable.
- **Involving the youth in data collection** proved an effective avenue to stimulate broader community involvement. Teachers at the local schools saw an opportunity to provide a concrete application of mathematics and environmental science curriculum material. Students collected, and are partly involved in the analysis of, the data as part of their mathematics class. This activity was strongly supported by village leaders who saw it as an opportunity to build the capacity of their youths. It is envisaged that the youths themselves will report the results of this study back to their community.

Each village has set up a CBFM or *Nei Tengarengare* committee to be the voice of the program in villages. The literal meaning of *nei tengarengae* is 'the mermaid', and was first coined by an elder of Tanimaiaki village in Butaritari. *Nei* means calm and also stands for a woman. In Kiribati culture, women are very important, without whom people would go hungry. *Tengarengare* means laugh or happiness. The local naming of their CBFM, which was self-initiated, reflects an internalising of, and ownership claim over, the regulations and plans they developed. In Butaritari, they have also set up an island-wide CBFM committee that involves the Island Council, representatives from each village and *Unimwane* (male elders and traditionally important figures in matters of local governance). These management committees are seen as vital to the legitimacy and long-term sustainability of CBFM, and form a vital point of entry for interaction with external fisheries stakeholders. The committees motivate community members to participate in management activities, resolve conflicts and enforce rules. Progress toward CBFM establishment in the five communities is summarised in Table 7.2.3.

Table 7.2.3. Overview of CBFM outputs per community.

	Governance	Resource management
North Tarawa		
Buariki	- CBFM committee established - CBFM plan incorporated as a society through Ministry of Women, Youth and Social Affairs	- CBFM guidelines set out in community management plan - Regulated ban on destructive fishing gear and practices, including: • using small-sized nets and excessively long gill nets • fish-driving practices into nets (*te ororo*) • encircling corals with gill nets (*borakai*) • prodding coral cavities to reach fish or octopus • fishing on spawning aggregations • catching juvenile fish before they have had a chance to reproduce.
Tabonibara	- CBFM committee established - CBFM plan incorporated as a society through Ministry of Women, Youth and Social Affairs	
Butaritari		
Bikati	- CBFM committee established - Island-wide CBFM committee established, includes *Unimwane*, Island Council, village representatives - Community-led marine protected area in process of being formalised through a by-law	
Tanimaiaki	- CBFM committee established - Island-wide CBFM committee established, includes *Unimwane*, Island Council, village representatives - Support of CBFM plan by neighbouring villages	
Kuma	- CBFM committee established - Island-wide CBFM committee established, includes *Unimwane*, Island Council, village representatives	

Areas of overlap between villages, particularly where boundaries were not clearly defined administratively, are seen as particularly problematic in the CBFM literature. During community consultations, members were quick to identify common-use areas as critical for village leaders to prioritise when applying management rules. Pilot communities identified their own solutions for dealing with these common areas. They primarily depend on their

existing system of networks and interactions between villages at the island level. Such a situation assumes that relations between communities are good. Villagers strongly believe that the success of their management initiatives relies on themselves but also on the support of their neighbouring villages. The system currently favoured by three of the pilot communities which have established a CBFM committee focuses on:

- establishing their management vision, goals and planned actions at the community level through discussion among village members
- clearly informing neighbouring villages of what they are doing and why (with the assistance of the CBFM team if necessary) via communication involving members of the CBFM committee but also through traditional modes of communication involving discussion between village chiefs, *Unimwane* and councillors of concerned villages.

This method proved successful and has even contributed to the organic diffusion of CBFM to neighbouring communities, a notable impact of the project. The North Tarawa Island Council agreed to collectively support CBFM activities across the whole island at a meeting in early 2017. The mayor also championed CBFM activities on multiple occasions. Tanimaiaki village met with neighbouring villages to gain their support of CBFM; two villages have discussed following suit. Tabonibara closed harvest of silver biddy species during its spawning season, and this action was supported by neighbouring villages. Additional communities in Butaritari (two) and North Tarawa (one) have started their own CBFM initiatives and asked for advice from the CBFM project team.

The WorldFish CBFM facilitator's guide (Albert et al. 2013) provided resources that were applied by the project officers in Kiribati. After a year of practice with the guide, the CBFM project officers felt comfortable enough to use it as training material for MFMRD officers and Fisheries Extension Officers during a training session on CBFM concepts in December 2016. The guiding principle of our engagement was to conduct exercises with community members that allow them to reveal their opinions and avoid leading them down preconceived (development) pathways. It was clear through interacting with MFMRD junior staff that community engagement was understood and practised as one-way communication where officers were the providers of knowledge. The facilitation principle practiced during the implementation of the CBFM project (through training but more importantly through collaborative fieldwork with the CBFM team) helped change the standard approach used by MFMRD to two-way communication where listening to community input and guiding communities through active visioning became core elements of work. A combination of existing CBFM resources, training on facilitation skills and applied fieldwork with trained CBFM officers was found to be a very effective method in reaching out to more officers within MFMRD and, through them, helped disseminate the principles of the project to a growing number of staff.

The implementation process highlighted the importance of establishing clear protocols for community engagement with relevant key institutions (national, subnational and village level) to ensure transparency. Relevant institutions should know about project objectives, progress and timing of visits to communities. Clear communication between different institutions is also key to avoid misunderstandings or misconceptions about projects. For instance, the CBFM team originally thought that the key point of contact to organise meetings in Buariki, one of the pilot sites in North Tarawa, should be the village chief. The team assumed that the role of the village chief would be to disseminate the information to all other relevant village leaders, including *Unimwane*, village committee members and elected councillors. However, the village chief acted as a gatekeeper and was not forthcoming in providing our information to other relevant parties. For a few months, the team believed that most of the information about the progress of the project had been delivered. During a trip to Buariki, the team discovered that community members, *Unimwane* and councillors had been under the impression that the project was no longer a community project seeing as no information has been passed on and that all interaction appeared solely with the village chief. The CBFM

team had to spend a week privately meeting with all relevant community stakeholders to rebuild trust and establish a protocol for disseminating information. It was agreed that information about visits and project progress should be sent to the village chief, councillors and one of the *Unimwane*.

Dissemination of information remains a key challenge for CBFM in Kiribati. With no phone coverage in any of the pilot villages, in North Tarawa, letters of information had to be sent by boat and given to the clerk of the Island Council who then disseminated the information locally. In Butaritari, the CBFM team gave letters of information to the pilot of Air Kiribati who flew on a weekly basis to the island, to disseminate them to the relevant people. Although the system worked as a means of informing community members, the time lag in communication inherent to this system challenged an interactive two-way information flow, making it difficult to check if community members had any questions or wanted to amend dates for visits.

7.2.6 CBFM establishment II—national and subnational capacity development

A participatory approach to CBFM design, management and planning was unfamiliar both at the community level and across scales of governance in Kiribati. As such, the CBFM project team regularly reported on the project's progress through information sessions at the national level. A commitment was established at an early stage for MFMRD staff to travel to communities with project staff for each community visit. From the government's perspective, the inclusion of its staff member allowed for a stronger alignment of CBFM activities with its own programs and initiatives, and minimised the perception that the CBFM work was separate from their own. The presence of government officers furthermore appeared to both legitimise activities to community members, as well as motivate them to show authorities that their community was actively making efforts.

At the subnational level, relevant Island Councils (composed of elected officials) and *Unimwane* Associations (composed of male elders) were regularly consulted. Each institution has one–two representatives from each village on an island. At the onset of the project, a meeting was organised with both institutions to gain support for the initiative. Both institutions hold regular monthly meetings and CBFM project staff sought permission to attend to provide periodic project updates. Attendance at these meetings provided the CBFM team with opportunities to answer questions and to get continued support for the project. Representatives from CBFM communities sitting in those institutions welcomed the efforts of the team.

As argued by Cohen et al. (2014c), management at the sub-national level presents both advantages and disadvantages. Because the Island Councils have a legislative mandate over the 3 nautical mile jurisdiction through the *Local Government Act 1984*, they formed a major point of contact for coastal fisheries management (Govan 2014). Continual engagement with Island Councils and *Unimwane* Associations was imperative; however, restricting engagement to these institutions alone could compromise community representation. Through early discussions involving these institutions and broader representation of the communities at our five pilot sites, it was agreed that CBFM should be concentrated at the village level so that management decisions could be made appropriate to the local context. Once decisions were made at the village level, as, for example, with the declaration of zoned resource-use areas, representatives of those villages sitting on the Island Council and *Unimwane* Association would discuss the intervention's appropriateness (e.g. in relation to other resources user groups) and would help determine whether the management decision warranted enactment as a by-law.

The inclusion of institutions other than those directly in charge of fisheries management has served to strengthen institutional links and broaden government support for the CBFM process in the long term. In Kiribati, MIA is responsible for community development and has a mandate to improve service delivery to communities. A dialogue with this institution was a

prerequisite before any attempt to engage with local villages could be made, and helped validate the program. A representative from MIA acted as a cultural broker during community visits, to help negotiate cultural protocols. Further collaborations were established with the Environment and Conservation Division (ECD) of the Ministry of Environment, Lands and Agricultural Development, the national agency responsible for the protection and conservation of the Kiribati environment. The CBFM team met regularly with ECD staff to share information, provide updates on project progress, talk about opportunities to streamline joint activities in villages where each team was working and, finally, to pass on any requests for support expressed by community members during CBFM activities (e.g. requests for information about mangrove planting, waste management).

An important governance capacity development outcome of the project was the formulation of a set of guidelines for local stakeholders to establish fisheries by-laws. By-laws (locally known as bye-laws or *ointua*) are legally enforceable rules that can be applied in one village, across many villages, or island-wide, depending on what the council chooses to specify in their written by-law. They are recognised and supported by the Government of Kiribati, including the *Fisheries Act 2010*, and can further legitimise local authority over fisheries management. The development of the guidelines followed a request by community members for assistance in understanding the mechanisms and processes required to create by-laws at the Island Council level. The absence of formally recognised customary marine tenure in Kiribati means that no national-level support for community-led fisheries initiatives currently exist in law. Island Councils, however, have delegated power over marine resources within their area of authority. Following consultation with MIA and the Attorney General's Office (AGO), the process of how by-laws are created in practice was determined. The consultation process sparked positive discussion across ministries. As a result, the creation and use of by-laws as an enabling tool for community fisheries management was a significant feature of discussion between community leaders and government departments at the second stakeholder workshop in 2016. The project team collaboratively drafted an English-language guidance document, presenting a 9-step process describing in detail the different activities that need to be undertaken and which institutions are responsible at each step (see Campbell and Delisle, 2016). This was subsequently disseminated to MFMRD, MIA and AGO in an effort to help bridge the inter-departmental silos and to clarify the by-law process both on paper and in practice. In explaining the process for communities, a 10-step I-Kiribati/English language poster was created for communities that explained the by-law process and points of contact in the local language (Figure 7.2.7). This poster was distributed to the CBFM committees in each pilot community. By 2017, four villages had taken steps towards drafting a by-law to formalise their CBFM plans.

At the national level, the project has created momentum within the National Coastal Fisheries Division of MFMRD, influenced the development of the Coastal Fisheries Regulation to incorporate CBFM principles and changed the political narrative to include CBFM. Evidence of the last is in the announcement by the Secretary of MFMRD to widely adopt CBFM principles across all MFMRD activities (e.g. facilitation rather than presentations alone when interacting with communities). The Secretary acknowledged that the principles of CBFM could assist MFMRD in the delivery of its outer island programs. A natural diffusion of CBFM participatory techniques has been occurring. For example, a MFMRD senior staff member in the Fisheries Extension Programme participated in community meetings in the CBFM villages and afterwards become very supportive of the approach. She has encouraged the training of new Fisheries Extension Officers in CBFM principles. Following participation in CBFM community activities in North Tarawa, another MFMRD project officer in charge of developing marine protected areas in South Tarawa is now using a longer community-oriented approach to develop tools for the management of marine resources there. He has undertaken community consultations with four village wards in South Tarawa to understand the views and aspirations of different community members and is currently facilitating community visioning with the different wards.

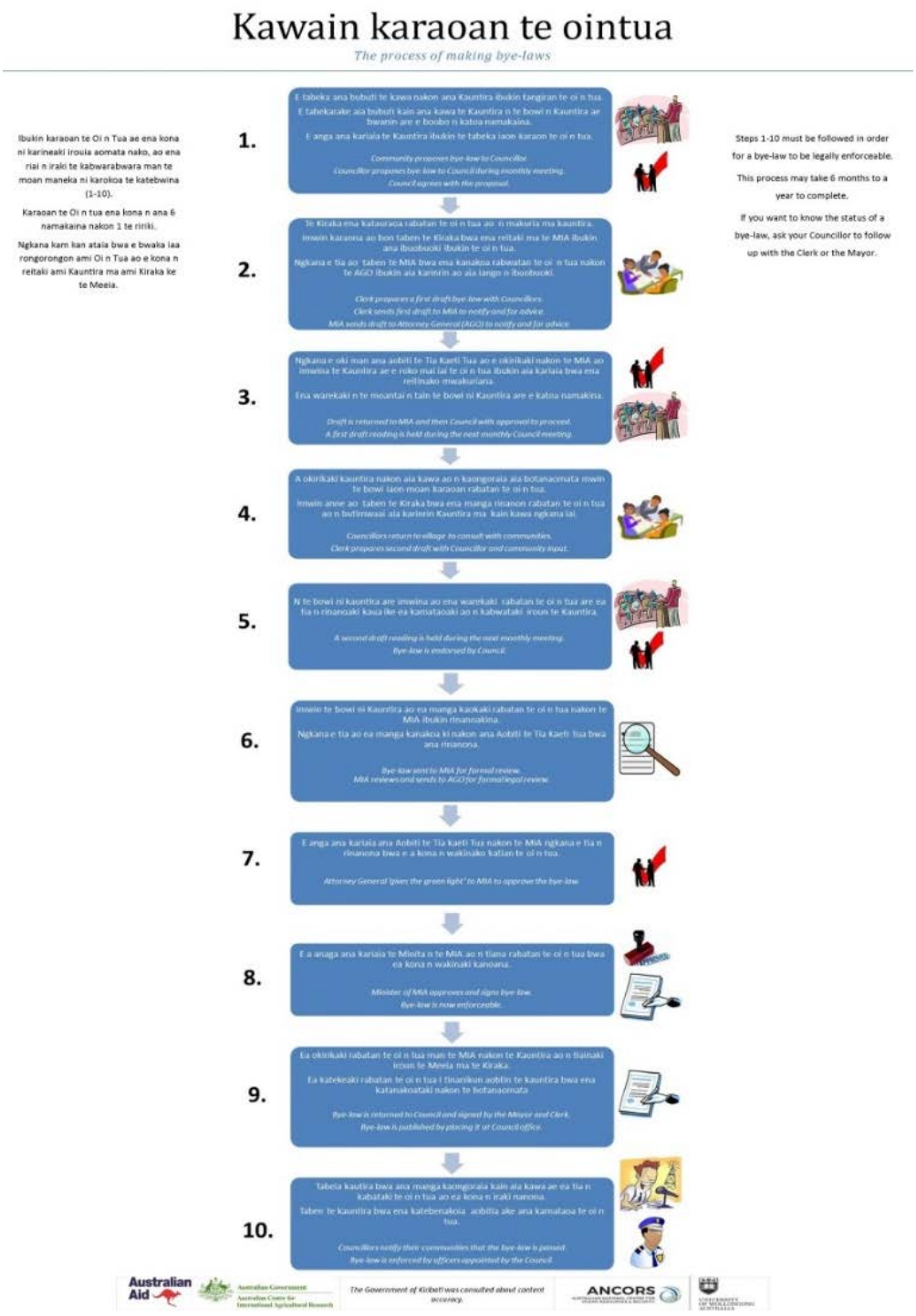


Figure 7.2.7 By-law reference guide poster

7.2.7 Gender in community processes

The project prioritised effective consultation with socially/culturally appropriate groups to help ensure management decisions are equitable and representative of the entire community. In Kiribati, our experience suggests that most of the decisions regarding resource use or management are made almost exclusively by men. Thus, a major part of community engagement consisted of liaising with informal local authorities (village committees mainly composed of men) about the importance of a broad engagement so that any management plan is as representative as possible of the diverse needs and opinions of all community

members. Understanding this, village committees considered, accepted and supported a two-step process for community engagement, as described above—firstly, consult with separate groups (*Unimwane*, men, women, youth) (e.g. Figure 7.2.8), then organise an assembly meeting in the local meeting place to allow all groups to openly discuss and bring forward their views.

Figure 7.2.8. Women's group management plan session

The project team had to plan and allocate enough time for these activities and find an appropriate time and place for people to participate effectively in the process. When meetings took place during weekdays, women in the pilot communities preferred to meet mid-afternoon because the older children had finished school and could look after younger siblings, and also because this time slot allowed enough time before dinner for meal preparation.

During the participatory diagnosis stage, a key success of implementing gender and age disaggregated focus groups was the difference in knowledge and views that emerged. Each group placed different levels of importance on different species, saw threats to the fishery differently and prioritised management goals slightly differently. With a single, whole-community meeting, these varied opinions would likely have been lost to the status quo, being male dominated.

In Kiribati, some communities proved to be more gender-sensitive than others. Of the three most active CBFM committees formed across the pilot sites, one has equal representation of men and women, the second has one woman out of five representatives, while the last one is exclusively composed of men. The follow-on ACIAR project FIS/2016/300 (*Strengthening and scaling community-based approaches to Pacific coastal fisheries management in support of the New Song*) will strengthen and continue efforts to involve women and youth to ensure that all community members benefit from the project.

This project also identified the current lack of knowledge within MFMRD of gender aspects of fisheries and how ministry staff could include gender concepts into their work. The follow-on project aims to provide training to ministry staff on gender as part of CBFM training. Such training will help ensure that CBFM activities equitably benefit women, youth and marginalised groups.

7.2.8 Reflections on the spread of CBFM

In 2016, the CBFM project team met with Makin Island Council, on the request of the mayor and the Elders' association, based on their awareness of ongoing activities in neighbouring Butaritari island. This meeting was attended by approximately 300 people and resulted in a statement of support by Makin for Butaritari's CBFM effort and informal requests for assistance. The team also started working in cooperation with Fisheries Extension Officers, and with support of MRMFD and the Ministry of Environment, Lands and Agricultural Development, to expand CBFM approaches in Maiana, Abemama and Nonouti islands.

In Abaiang and Marakei islands (other non-pilot islands), Island Councils requested formal assistance from MFMRD in 2017 to help develop community fisheries management plans. In June 2017, the in-country CBFM project team travelled with MFMRD to Abaiang to talk with the council about their wishes for a marine protected area. During this visit, the MFMRD team plotted the proposed area with GPS and undertook a baseline assessment of the area.

In Marakei, the project team has worked closely with that island's Fisheries Extension Officer, who was trained in CBFM engagement approaches through the project. He has since independently built a positive working relationship with the Island Council and Elders' association, and facilitated the sending of a formal letter to MFMRD for assistance with local fisheries management measures.

MFMRD has suggested the need for engagement in Betio, the most urbanised and populated centre in all of Kiribati, located in South Tarawa. This area of South Tarawa is projected to have a food fish deficit in the next decade due to supply and access issues, and this, in turn, has significant implications for the health of the outer island fisheries resources that supply Betio. Although the team has engaged with these groups, the urbanised and populous conditions here are such that the fisheries issues experienced are significantly different than in other pilot sites and therefore require a different CBFM approach.

As a direct result of work undertaken to facilitate development of CBFM plans on the two pilot islands and five pilot communities as part of the project mandate, an additional seven islands (Makin, Abaiang, Marakei, Maiana, Abemama, Nonouti, South Tarawa) and seven new communities (Taratai, Kainaba, Ukiangang, Tabontebike, Tekuanga, Betio, whole of Makin) have been directly impacted or influenced. This spread and scaling within a relatively short time frame for a project promoting new concepts and approaches to fisheries management is a testament to the good reputation and relationships that the project has built in Kiribati; particularly so, in the face of regular staff turnover in key positions across various ministries and Island Councils. It also demonstrates that project outreach has been at least partially effective, despite the project's limited capacity to engage in such activities.

The project has demonstrated the variability of conditions and issues across communities and islands. For example, the natural conditions throughout the Gilbert Islands group vary significantly. Hence, although the lessons learned from the first phase can indeed provide guidance for further scaling of CBFM to central and southern Gilberts, it will be important in the follow-on project (FIS/2016/300) to understand on what basis they may or may not accept CBFM principles. In-depth community diagnoses will be critical for appropriate CBFM design.

The diffusion of CBFM practices beyond target communities and islands reflects broader impact of the project activities. To increase impacts from village level to island level, the follow-on project will build on the momentum created by this project to engage communities that have been indirectly familiarised with CBFM. Based on the results of this project where signs of immediate diffusion already exist, we argue that the next project should consolidate and expand on several recommended focus areas as presented below.

- training and developing capacity of Island Councils around coastal fisheries governance
- engaging and training Fisheries Assistants
- identifying and supporting networks (island-wide CBFM committee)
- conducting communication forums for dissemination of CBFM data and information
- working with appropriate ministries to ensure that community activities are legally supported and legitimised through uptake in national legislation
- using the lessons learned and results of the first phase to create guidelines and manuals for scale-out.

7.3 Objective 3: Strengthen and enhance CBFM in Solomon Islands in collaboration with provincial government and national agencies

7.3.1 Introduction

This section summarises activities and outputs from Activities 3.1 to 3.5—see Section 6 for tabulated activities and milestones—and is drawn from the following published and yet-to-be published outputs. See also Section 7.1.5 for related work on FADs in Solomon Islands.

Bennett, G. Cohen, P., Schwarz, A.M., Rafe, M., Teioli, H., Andrew, N. (2014a). Solomon Islands: Western Hub scoping report. AAS Project Report AAS-2014-14.

Bennett, G, Cohen, P., Schwarz, A.M., Albert, J., Lawless, S., Paul, C., Hilly, Z. (2014b). Solomon Islands: Western Province situation analysis. CGIAR Research Program on Aquatic Agricultural Systems. Penang, Malaysia. Project Report: AAS-2014-15.

Cohen P., Schwarz A.-M., Boso D. and Hilly Z. (2014c). Lessons from implementing, adapting and sustaining community-based adaptive marine resource management. Lessons Learned Brief: AAS-2014-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia, 16pp.

Cohen P.J., Tapala S., Rikio A., Kukiti E., Sori F., Hilly Z., Alexander T.J. and Foale S. (2014b). Developing a common understanding of taxonomy for fisheries management in north Vella Lavella, Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 33, 3–12.

Govan H., Schwarz A.M., Harohau D., Oeta J., Orirana G. and Ratner B.D. (2013). Solomon Islands: essential aspects of governance for Aquatic Agricultural Systems in Malaita Hub. Project Report: AAS-2013-19. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Orirana G., Siota F., Cohen P.J., Atitete T., Schwarz A. and Govan H. (2016). Spreading community based resource management; testing the 'lite-touch' approach in Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 3–12.

Schwarz A.M., Cohen P.J., Boso D., Ramofafia C., Alexander T., Bennett G. and Andrew N. (2017). Critical reflections from fostering adaptive community-based, co-management in Solomon Islands small-scale fisheries. SPC Traditional Marine Resource Management and Knowledge Bulletin 38, 14–25.

Unpublished work and outputs 'in preparation' or 'submitted'

Cohen P.J., Baereleo R., Bennett G., Delisle A., Neihapi P., Orirana G., Siota F. and Uriam T. (in prep). Local contexts and engagement processes that influence development, design and implementation of community-based fisheries management.

History and broader context

The aim of this objective is to strengthen and enhance CBFM in Solomon Islands in collaboration with provincial government and national agencies. The extract below from Cohen et al. (2015a) —reported in Section 7.1.1—provides the history and broader context of CBFM as a form of governance in Solomon Islands:

> Governance of small-scale fisheries is influenced by formal national and provincial level governing bodies and institutions, as well as informal cultural and local institutions that operate at the community or clan level. The relative influence of state versus local institutions varies depending on social group, geographic location, resource of concern, exploited habitat and fishing method, but is also dynamic depending on local or state

responses to resource decline, harvesting opportunities or conditions external to the fishery. Coastal ecosystems and fisheries are formally governed by the state through environment and fisheries legislation administered by their respective government ministries (Lane 2006). Additionally, nine Provincial governments are recognized, in theory (Lane 2006) and in policy (e.g., Solomon Islands Government 2009), as key units for decentralization of resource management and development. In reality, financial, technical, and human resources required for delivering services or governing in rural areas far exceeds those made available to Provincial Governments (Lane 2006; Govan et al. 2013b). The national government concentrates on managing commodity invertebrates (e.g., trochus and sea cucumber) at points of export. Management instruments include size restrictions, export licensing and (in the case of sea cucumber) indefinite moratoria; instruments that are implemented to optimize economic efficiency, profitability, resource rent and/or sustainability. Rural communities are legally required to adhere to these regulations, but awareness and enforcement in rural areas is minimal. In practice, national and provincial governments have had low levels of success in affecting management on non-exported, small-scale fisheries (Ruddle 1998; Govan et al. 2013b).

This governance and management 'gap' has, in effect, been filled by numerous non-governmental organizations (NGOs) and research agencies working in Solomon Islands to support conservation of coastal ecosystems and management of small-scale fisheries. While these organizations hold no formally legitimized governing role, they commonly act as co-management partners to coastal communities and have been recognized as government 'partners' since 2007. In Solomon Islands, these partnerships have led to the formation of at least 137 community-based, co-managed areas [more recent estimate provided below] (Cohen et al. 2012). In most situations the national and provincial governments have relatively little direct involvement in these management efforts, in part because their capacity has been prohibitively low. Yet, in the last five years several national level, government-led policies have sought to capitalize on this emergent model by (1) explicitly recognizing and promoting community-based, co-management as a principle, national approach for resource management and rural development, and (2) creating and investing in mechanisms (e.g., governance networks) to coordinate the 'partner' agencies involved, and to improve alignment with national policies and strengthen relationships with government agencies to build and supplement their capacity (discussed further in section 5.3).

At the village or local level, customary governance systems remain intact and influential to varying extents. In any one village or community there may be several clans, each with its own leaders and leadership structure, as well as elected village chiefs (White 2004). Since the introduction of Christianity into Solomon Islands in the early 1900s, the Church has also emerged as important in village governance (White 2004). The church is influential in deciding, declaring and enforcing rules, including those associated with community-based, co-management (Cohen and Steenbergen 2015).

Throughout much of the Pacific customary land and marine tenure systems persist; 87 percent of land falling under customary tenure (AusAID 2008), which also frequently extends to coastal marine areas (Hviding 1998). Customary land and marine tenure align to different clans who have the rights to decide when and how resources are accessed, used and managed, and by whom (Hviding 1998). As a result, customary marine tenure is highly influential, and in fact foundational (Polunin 1984; Govan et al. 2009), in crafting and implementing contemporary small-scale fisheries management and development strategies in Solomon Islands, and many other Pacific Island Countries.

In association with customary tenure, coastal societies throughout the Pacific have developed other norms and institutions that influence the way marine resources are used and governed (e.g., Johannes 1982). Scholars draw analogies between these customary instruments (e.g., bans on consuming or harvesting certain species; temporary reef closures; restrictions on fishing methods) and contemporary resource management instruments (Colding and Folke 2001). And in fact, customary instruments are commonly adapted, and integrated into contemporary community-based management efforts in Solomon Islands (discussed further in section 5.1), and throughout the Pacific (Johannes 2002; Govan et al. 2009: Cohen and Steenbergen 2015).

In this report, we summarise (providing links to reports and research papers that provide detailed accounts) the methodologies we employed and refined to determine a focused approach to CBFM within provinces. We detail the processes through which our approaches were guided and legitimised through stakeholder engagement and reflection. We describe the outcomes from direct engagements with five communities. We include descriptions of the range of best-practice strategies used to build (team and partner) capacity to engage with communities (i.e. with a focus on gender and equity, and appreciative, empowering strategies), which were closely linked to our efforts to build an enabling environment to promote the effectiveness, sustainability and spread of CBFM.

7.3.2 Site selection, scoping and participatory diagnosis

A scoping exercise and a governance assessment were conducted in **Malaita** province as part of a situation analysis. Four major governance issues were identified at three main levels of governance (local, subnational and national): (i) family and community decision-making; (ii) poor links between community and national governance; (iii) little capacity for the provincial government to provide services to support CBFM; and (iv) lack of impact or government presence at the local level (Govan et al. 2013). This analysis fed into a stakeholder consultation workshop that brought together provincial NGO, civil society organisations (CSO) and government partners (Govan et al. 2013; Schwarz et al. 2013). At this workshop, the broader situation analysis was validated. A collective perspective agreed on Malaita province challenges and a vision to address those challenges was developed. The consultations led to consensus around a Malaita situation summary and a Malaita Development Challenge:

> Rural people in the Malaita Hub of Solomon Islands face major challenges from rising population and declining quality and availability of marine and land resources. The development challenge is to improve their lives through more productive, diversified livelihoods that empower communities to be better able to adapt to change and make more effective use of their resources. The research challenge we will address with the people of Malaita Hub is to develop and test alternative approaches to livelihood diversification and resource stewardship that will accelerate development and restore the productivity of their resources. (Malaita Development Challenge, determined through scoping research and participatory and multi-stakeholder processes facilitated by CRP AAS)

Similarly, a comprehensive scoping exercise was conducted in **Western Province** (Bennett et al. 2014a). This commenced as a desktop review, followed by interviews with key informants and site visits, then validated and adjusted in stakeholder consultation workshops with provincial NGO, CSO and government partners (unpublished report). Stakeholder consultations (Bennett et al. 2014b) led to consensus around a statement of the Western Province situation summary and CRP AAS Western Province Development Challenge:

> Western Province is spread over a wide area of sea and is comprised of small urban centers and many small, often isolated communities. Local and customary institutions are an important influence on people's live[s]. The hub supports major commercial industries including logging, tuna and tourism. The industries bring opportunities for employment but impacts are not universally positive or spread equitabl[y] across the province. Rural people are vulnerable to external shocks and this can be compounded or ameliorated by the degree of isolation. The development challenge is to improve the lives of people in Western Province communities to increase the benefits they derive from their natural resources, while accounting for the diversity and variability in the way they lead their lives and access resources and services. The research challenge we will address in the Western Province is to work with aquatic agricultural system-dependent communities and other partners to improve management of resources; and to improve value chains to increase benefits and resilience.

Community selection

After the diagnosis and consensus stage, we selected communities with which to work. While in practice this is often an imprecise process, we intended to take a deliberate and strategic approach to community selection which was to '... establish a network of communities of sufficient scale to be able to have tangible impact on the development challenges identified' (CRP AAS 2013). To do this, we selected communities using the CRP AAS (2013) process:

1. define the development challenge
2. look at areas where the development challenge is most pressing
3. within those areas, identify gradients of severity of the development challenges
4. identify partner organisations and their reach—based on their longer term commitment to an area, and their ability to achieve scale and support local-level community visions
5. make selection (selection in clusters along gradients).

We sought to select communities that had the highest potential to take solutions to scale (i.e. to act as a point of learning and spread), ensuring that they were also spread across gradients so as to capture some of the diversity of development challenges in the hub, and within reach of partners.

Following the revised principles for best practice for CBFM in Solomon Islands (Alexander et al 2011) we secured an 'expression of interest' from communities. Such a request ensured that the request for assistance in managing resources is genuine, community-wide and feasible.

Community engagement—theoretical

In the earlier phase of this project, the PDAM framework (Andrew et al. 2007; Evans and Andrew 2009; Alexander et al 2011) was loosely applied to guide the different phases of diagnosis, design and implementation. The framework emphasised an ecosystem-based approach (including a strong focus on the social and governance system) to designing management (i.e. compared with species-focused management facilitated in the even earlier ACIAR projects implemented more than a decade ago). The framework indicated that particular attention be focused on creating a locally owned and bounded definition of a fishery (from social, ecological and governance perspectives), while simultaneously acknowledging the impacts of factors/drivers from outside the fishery domain. In practice, there are tensions or trade-offs between putting effort and focus into a clear and bounded definition of what a community is able to manage, while ensuring a level of responsiveness or preparedness for externalities and external shocks (Schwarz et al. 2017). In other words, a definition that means something to a community, and fits within the scope of their governance is critical to move CBFM forward—yet is still subject to external shocks.

The PDAM framework identifies distinct opportunities for learning, reflection and adjustment in three main stages of implementation: (i) participatory diagnosis; (ii) defining the management constituency; and (iii) implementing management and monitoring. Catalysing community ownership of the process needs to recognise that progress within a community is discursive and open to many challenges outside the natural resource management framing. Yet, operationalising this and addressing it within a process that can still arrive at CBFM remains a challenge. Our expertise in fisheries and our understanding of local context in CBFM establishment has been strong, but on reflection, we have in the past paid insufficient attention to the learning loops of the framework. Our experience in using the PDAM framework to build resilient small-scale fisheries further reinforces the importance of the feedback loops that promote reflection and mutual learning. Reflexive practice became a stronger element of our later engagement strategies (see below).

In facilitating CBFM in the preceding project, we had inadvertently over-emphasised our role as a necessary or 'powerful, knowledgeable' partner in management; a greater emphasis on

participatory reflection and empowering facilitation within this project yielded different results and potentially greater sustainability of CBFM. The paper Schwarz et al. (2017) captures some reflections of the shift in our capabilities and view of our role (as an external organisation) in community engagement processes.

In acknowledging this power dynamic and potential over-reliance on our role as a management partner, we subsequently invested substantially, through CRP AAS, in building our own capacity from fisheries managers to facilitators of appreciative and strength-based approaches. CRP AAS provided resources to bring in community engagement experts (the organisation 'Constellation') to deliver this training, adjust it to the Solomon Islands context and apply and refine it in select communities (CRP AAS 2013, 2014). Community engagement facilitator trainings were held in Honiara, Malaita and Western Province during 2014 for members of the WorldFish team, our research/development partners and representatives from selected communities. In feedback provided at the end of CRP AAS, project staff in Solomon Islands reflected that this had been one of the most beneficial investments for their work with communities, and the lessons learned here continue to be applied across all projects in Solomon Islands. The objectives of the training and tools that were developed were to: (i) introduce the concept of the CLCP to team staff and community facilitators; (ii) strengthen the capacity of the team in facilitating community engagement; and (iii) develop community action plans using the engagement process in Malaita and Western Province communities. Throughout the 5-day training, participants were guided through each of the CLCP steps: mobilisation (Who are we? Who wants to join?); 'visioning' (Where do we want to be?); self-assessment (Where are we now compared to our dreams?); action planning (What will we do to get there?); and self-measurement (What progress have we made?) (CRP AAS 2013).

Community engagement and our approach to research incorporated a greater emphasis on participatory action research (PAR) (Apgar et al. 2017). Rather than being an easily definable method, PAR is better thought of as an approach and the application of four guiding principles to a research endeavour (Apgar et al. 2017):

1. ownership—the process is owned by participants who define their goals;
2. equity—facilitators recognise power relations and are mindful of who is participating and how;
3. shared analysis—resulting data are analysed jointly; and
4. feedback—results are fed back into ongoing development processes.

In practice, these principles, sit at one end of a continuum of research practice—our commitment was to shift as much of our research as possible towards the PAR end of the spectrum (and away from extractive or 'helicopter' research). Substantial reflections on the application, methods and outcomes from PAR are provided in CRP AAS and project outputs (e.g. Cohen et al. 2014a; Douthwaite et al. 2015; van der Ploeg 2016; Apgar et al. 2017).

7.3.3 Policy landscape at national and subnational scales

The *Fisheries Management Act 2015* was 10 years in the making, with WorldFish team members providing input throughout its development. The overarching objective of the Act is 'to ensure the long-term management, conservation, development and sustainable use of Solomon Islands fisheries and marine ecosystems for the benefit of the people of Solomon Islands', and the Act has a provision for CBFM. Operationalising this is a key and current challenge for MFMR. WorldFish will continue to play a role in navigating this and testing processes in close collaboration with MFMR in the follow-on project. There are some signs of increasing government capacity and investment in inshore fisheries and CBFM—these will be critical for traction and tangible and sustainable outcomes from engagement here.

Support to develop and gazette the provincial ordinances of Malaita and Western Province had commenced in the preceding project. Further support was provided via project FIS/2012/074 by project staff as members of the Fisheries Advisory Councils (FACs), which

are responsible for progressing and governing ordinances. The Western Province FAC finalised the Provincial Fisheries Ordinance in April 2016 ready for gazetting; however, since submission to MFMR, progress has stalled. The Malaita Provincial Fisheries Ordinance was gazetted in 2015. The development and gazettal of the ordinance was supported by WorldFish team members through technical advice and logistical support for provincial staff. Once gazetted, project staff developed a small lay-language brochure and conducted information sessions (in collaboration with Provincial Fisheries Officers) with communities in Malaita.

7.3.4 CBFM establishment—community-level processes

During 2013 and 2014, scoping was completed in Malaita and Western Malaita Province (as described in Section 7.3.2). Subsequently, in Western Province we decided to progress an engagement with a new community, Santupaele, as well as continue our engagement with Leona/Paramatta, given the momentum there and the opportunity to develop a longer term understanding of fisheries management, adaptive management and fisheries outcomes. In 2015, in response to need, opportunities and mid-term reviews, we more explicitly connected and articulated the Malaita province aspects of the project and integrated under this project the CBFM work with Fumamato'o , Mararo and Radefasu communities (the latter is referred to as Ratata in this project). By 2016, management committees (comprising both men and women) were operational, with management plans developed (over the course of many visits, presentations and stages of consultation) and were endorsed by Santupaele and Fumamato'o communities. Management arrangements had been drafted in Ratata, and in Leona/Paramatta pre-existing management plans had been reviewed and adapted twice. In addition to the establishment of CBFM, each community was involved in the panel study (discussed in Objective 6), established (after training) some form of quantitative monitoring with community engagement, and participated in lesson exchanges with other communities and in some form of livelihoods training delivered by partner organisations (e.g. organic farming methods, FAD design/fishing/deployment).

Leona/Paramatta originally established management in 2008 under its Jorio Management Plan (through an earlier WorldFish-led ACIAR project). Upon request from the community, the WorldFish team facilitated a substantial review and adaption of the management plan to account for research findings (e.g. Cohen et al. 2013), local governance challenges and local observations of effectiveness and resource change. The revised Leona and Paramatta Management Plan was finalised in 2013. In 2014, WorldFish again facilitated a review of the plan which saw some minor revisions to management arrangements—a subsequent review was conducted independently by the community in 2015. At time of writing, the communities continue to manage 103 hectares (ha) of reef under periodic closure/opening regimes, 20 ha under permanent closure and a total coastal area of approximately 500 ha under improved management. Substantial changes have occurred in the village with a majority of the village relocating to approximately 3 km from their previous coastal location due to logging activities and associated provision of permanent housing (the move inland had been an agenda item in the community since the tsunami of 2007). Early indications from interviews suggest this move has not impacted upon management but fishing pressure may be lighter than before; however, this requires further examination and may be a part of research in the next project. The Leona and Paramatta communities had, in the preceding project, collaborated with intensive research efforts looking at the fisheries benefits, fishing pattern changes and social processes/outcomes of CBFM (Cohen and Alexander 2013; Cohen et al. 2013; Cohen and Steenbergen 2015). Research efforts continued during this project (albeit less intensive) with the communities to produce long-time-series data on fish catch and management change. The analysis and write-up of these data will be completed in the subsequent project.

The engagement with the **Santupaele** community commenced in 2014 and built on an earlier enagement lead by the NGO "Live and Learn" - enagement therefore commenced in collaboration with Live and Learn. The renewed engagement employed the CLCP (outlined

in ‘Community engagement—theoretical’ in Section 7.3.2)—where a first step is to develop a community action plan. A community action plan is not focused on any particular sector, but includes a broad range of community concerns and development priorities. In Santupaele, this plan included a priority of managing marine resources—something the community had attempted before in partnership with another NGO, but which had failed. Santupaele endorsed its management plan in 2015 and it was then successfully implemented. While the committee membership has changed on several occasions (always including men and women representatives), the reviews of the actual management plan have not led to any changes in management arrangements as community members consider (through their observations) that both the 6.2 ha taboo area (indefinitely closed) and 24 ha managed area are working well for them. At various times, the community’s attention has been consumed by tenure and logging-related contestation, which has slowed some stages of the engagement. Visits by WorldFish to the Santupaele community have reduced in frequency as they are now implementing their management plan independently, although communication and support are still maintained through informal contact and communication with their marine conservation committee chairperson. The development of the action plan was well received by the community and anecdotal evidence indicates that it has helped community organisations. This may have influenced the proactive approach the community demonstrated in 2017 in asking for letters of support (i.e. indicting they are successfully managing their resources, and have a management committee with an action plan) in their requests for funding for their primary school and a small grant to bring tourist snorkelling to their taboo reef (a demand of the rising number of tourists in Western Province).

Fumamato'o (also referred to as Manaoba—the name of the island on which the communities are located) developed, under the facilitation of WorldFish, a community action plan in 2013. Through CRP AAS, other community priorities were identified—such as low agricultural productivity, addressed through organic farming training; and water and sanitation concerns alleviated through facilitation with relevant agencies. Marine resource management was also identified as a priority in the community action plan and WorldFish facilitated a ‘look and learn’ trip for people from Fumamato'o to visit Leona. After several stages of facilitation, the management plan (*Manaoba Komuniti Fisari Manejment* plan) was finalised in late 2015, although elements of management had already been implemented. In 2017, a total of 112 ha of coastal waters were under management, including a managed area (that can be open) and a no-take area.. The no-take (taboo) area remains closed, although there are reports of people harvesting sea cucumbers at night, which the management committee is finding very difficult to stop. The management area is regularly opened for community events (i.e. feasts, funerals, church gatherings, school events) or on special request (i.e. when someone needs a large amount of fish to sell in Honiara). When the management area is open, the community fishes together with nets and collects large amounts of fish. Some community members have voiced their concerns that the management area is opened too often—on average, one week every month. Nonetheless, CBFM is firmly institutionalised in the community and there is broad support for it. The management plan has proven to be sustainable, with minimal outside interventions and support. A FAD was deployed in Fumamato'o (funded by SPC), and a practical training session on nutrition and vegetable farming was organized for women in the community (co-funded by ADB). The management efforts of the Fumamato'o community were featured in an article in the *Malaita Star* magazine, which is widely distributed and read throughout Solomon Islands. WorldFish is collecting CPUE data in Fumamato'o to monitor the impact of the LMMA on fish catches. Time-series data (commenced 2017) will be analysed and written up in the subsequent project.

Engagement with **Rarata** and neighbouring communities commenced in 2012 when WorldFish arranged a workshop in Auki for interested people to design a project based on the ecosystem approach to fisheries management (funded by an aligned project). At this time, attendees indicated interest in improving management of their resources. In 2012, a lengthy participatory diagnosis commenced that facilitated the identification, prioritisation and

mobilisation around issues. This was followed by regular consultations that built community cooperation (Sukulu et al. 2016). Activities facilitated with the community included workshops on mangrove and coral replanting, and presentations on deployment of FADs, recording and awareness-raising. These activities promoted conversations, now including nine communities (Ura, Kona, Radefasu/Rarata, Oneoneabu, Oibola, Sita, Daulusu, Lalao and Malawe), around shared resources and their management. In 2015, the group of villages was successful in forming a community-based organisation referred to as OKRONUS (an acronym for the participating villages) (Sukulu et al. 2016 details the timeline of the management deliberations and the formation of this organisation). In terms of resource management, the villages had proposed to manage a very large marine area; however, the next stage of preparing and agreeing to a management plan stalled. In 2017, the OKRONUS board decided to make the proposed no-take zone significantly smaller and comprising three separate no-take zones: two in the mangrove area (8 ha and 7 ha, respectively) and one on Rarata reef (35 ha), together referred to as the **Rarata LMMA**. The OKRONUS board communicated this to the nine villages, and then delineated the no-take zones with billboards and markers. WorldFish has trained a youth group to conduct a basic inventory of invertebrates in these no-take zones and is currently supporting the collection of CPUE data in two of the communities so as to monitor the impact of the restrictions on fish catches. Time-series data (commenced 2017) will be continued and analysed and written up in the subsequent project. A FAD was deployed in Rarata/Radefasu (funded by SPC).

WorldFish commenced engagement with the **Mararo** community (Malaita province) in 2012 and employed the ‘lite-touch’ approach (summarised below, and described in depth in Orirana et al. 2016). After three visits to Mararo village, the community established CBFM (with 160 ha of marine and mangrove area falling under active management) and acted as a ‘core’ community (i.e. a community able to spread lessons and motivation for CBFM). In 2017, Mararo opened its mangrove areas that had been closed for over 5 years and permitted harvesting only the bivalve *Anadara* spp. In 1 day, around 25 people harvested 30,000 shells (WorldFish, unpublished data), where the right to fish had been gained through payment of an entrance fee. In its role as a ‘core community’, Mararo invited 17 adjacent villages (220 people attended) to observe the benefits of management. After 3 days, the area was closed again. Subsequent to the establishment of the CBFM plan, a panel study was conducted in Mararo and an ADB project has supported CPUE training, two people to continue CPUE monitoring and the erection of billboards detailing management arrangements.

Figure 7.3.1. A woman from Mararo harvesting *Anadara* in the LMMA.

Table 3.3.1 Chronology of the significant community engagement activities as part of the CBFM implementation, livelihood and monitoring activities at project sites. Note: attendees breakdown only included for subset but all can be complete using trip report documentation.

Date	Location	Activity	Objective and Outcome	Number Attendees	Number Female	Number Male
Jun-13	Fumamato'o	Scoping visit to Fumamato'o community	Familiarisation visit and awareness of community of action planning workshop.			
Jul-13	Kwai	North Malaita Community Visioning	To conduct community action planning in the three community clusters Suafa/Kwai	42	10	32
Jul-13	Fumamato'o	Fumamato'o Action Planning	Facilitate community meeting with male and female focus groups to design and commit to action plan. Action plan developed and agreed.			
Aug-13	Mararo	Mangrove Management plan development	A workshop was held to assist the community develop their management plan. Draft management plan developed.			
Oct-13	Kwai	After action review' trip Kwai	To review community action plans and capture most significant stories as part of monitoring and evaluation process	14	3	11
Oct-13	Fumamato'o	Fumamato'o ' After action review'	The 'After action review' report on progress of key activities in action plans and collect most significant change stories as part of the monitoring and evaluation process			
Oct-13	Mararo	Mangrove Management plan development (second trip)	Team present draft management plan to the community for verification and adjustment			
Oct-13	Mararo	Mangrove Management Planning Workshop Maramasike Passage	Workshop organized for communities in Maramasike passage to come together and share experiences and learning on mangrove management. Management scaling activity complete.			
Nov-13	Fumamato'o	After action review' visit Fumamato'o	To review community action plans and capture most significant stories as an monitoring and evaluation process	29	15	14
Jan-14	Fumamato'o and Kwai	Community consultation on CRA and follow up signing	Consultation was to get feedback from community on the draft "Community Research Agreement"			
Feb-14	Fumamato'o	Organic farm train activity led by Osanty Luda	Training complete to address need established in action plan. Report covered the process and people engaged in training and establishment of community demonstration farm			
Mar-14	Kwai/Suafa, North Malaita	CLCP Community Training	Training conducted to introduce the concept of Community Life Competence Process) to community facilitators & new WorldFish staff; strengthened capacity of facilitators to facilitate community engagement and developed detailed facilitation plans	11	2	9
Apr-14	Nusatupe, Western Province Hub	Look & Learn trip	To provide opportunity for community representatives from Lau (North Malaita) to interact, learn and share experiences/knowledge about CBFM (i.e. the processes and challenges) in Western Province.	12	1	11
Apr-14	Auki, Malaita	Aquaculture Farmers Workshop	To provide opportunity for men and women (farmers) to share and learn from their experiences/knowledge and the benefits of having pond fish.	31	11	20
May-14	Fumamato'o	Community 'After action review'	Annual review with community to determine progress on action plan and future next steps.			

Date	Location	Activity	Objective and Outcome	Number Attendees	Number Female	Number Male
May-14	Mararo	Visit to Mararo and the Surrounding Communities to Assess Coastal Erosion	Assist a scientist from Queensland university in assessment of coastal erosion at Mararo			
Jun-14	Mararo	Youth Monitoring training	Training to build the capacity of youths from Mararo and surrounding communities to enable them to monitor selected ecological or social indicators and understand the results and subsequent implications for management actions.			
Jul-14	Fumamato'o	North Malaita Community Visioning	To conduct community action planning in the three community clusters Fumamato'o	63	35	28
Jul-14	Fumamato'o	CBFM rule setting	Draft management plan and completed community profile (socio-economic-demographic descriptors of community)			
Jul-14	Mararo	Women in Fisheries Training Mararo Community	Training was organized for Mararo women to build the capacity and strengthening the knowledge and understanding of the on marine resources and resource management			
Aug-14	Malu'u, North Malaita	Community Facilitators Meeting	To support and build WorldFish relationship with community facilitators; discuss progress, challenges/actions to take and continue to build capacity/skills for facilitation	9	2	7
Aug-14	Western Province, multiple communities (including Santupaele)	Community selection process, Western Province	Visited four different regions/communities in Western Province to determine key fisheries and other resources related issues, constraints and opportunities. Western Province development challenge determined and community selection finalised.			
Aug-14	Mararo	Financial management training	Training delivered on running a committee and financial management skills to with members of the Mararo Community Based Organization (MCBO)			
Sep-14	Nusa Tupe (including Santupaele reps)	CLCP Training at Nusatupe (staff and Santupaele community representatives)	Training aimed to equip participants to become good facilitators to help address community's collective issues and implement agreed strategies by using their own strengths and resources. Facilitators trained in best practice methods.			
Sep-14	Santupaele	Community Visioning	A practical exercise on community about Community Life Competency Process (CLCP) in Santupaele. The community visioning and action planning process was facilitated by a facilitation team comprising of the AAS team of four WorldFish staff, the three local community facilitators and the Constellation coach.			
Sep-14	Fumamato'o	Resource mapping workshop	Identifying important resources in the respective communities through participatory mapping. Resource maps produced for women and men.			
Sep-14	Fumamato'o	Benchmarking	Fumamato'o community involved in gender benchmarking study. Data collection complete and transcribed.			
Sep-14	Mararo	Resource mapping workshop	Identifying important resources in the respective communities through participatory mapping. Resource maps produced for women and men.			
Oct-14	Alea	After action review' trip Alea	To review community action plans and capture most significant stories as part of monitoring and evaluation process. Action plans updated and change stories documented.	13	5	8

Date	Location	Activity	Objective and Outcome	Number Attendees	Number Female	Number Male
Nov-14	Auki (including Fumamato'o representatives)	AAS External Review	Participants from Fumatoo involved in the AAS Review conducted in Auki			
Mar-15	Mararo	Launching of the Mararo management plan	Program organized for Mararo community to launch their Mangrove management as awareness for their surrounding communities. Scaling activity completed.			
Mar-15	Mararo	The Anopou community based marine monitoring training workshop	A monitoring training organized by Live & Learn for Anopou community. Mararo representative also attended the training. Scaling activity completed.			
Apr-15	Santupaele	Awareness field Trip to Santupaele	To fulfil activity of action plan information requested) and also identify roles in Community Research Agreement revised. Resource maps updated.			
Apr-15	Santupaele	Resource map of Santupaele	Photos of maps drawn by the women and by the men			
May-15	Foufanea	Community 'After action review' & SALT visit Foufanea	To review community action plans and understand how communities learn, gain knowledge, skills, and attitudes as part of the reviewing/monitoring & evaluation process through informal stories and interviews/review.	33	15	18
May-15	Fumamato'o	Community 'After action review' & SALT visit Fumamato'o	To review community action plans and understand how communities learn, gain knowledge, skills, attitudes as part of the reviewing/monitoring & evaluation process through informal stories and interviews/review	28	13	15
May-15	Suafa/Kwai	Community 'After action review' & SALT visit Suafa Kwai	To review community action plans and understand how communities learn, gain knowledge, skills, attitudes as part of the reviewing/monitoring & evaluation process through informal stories and interviews/review	18	11	7
May-15	Alea	Community 'After action review' & SALT visit Alea	Aim of visit: to review community action plans and understand how communities learn, gain knowledge, skills, attitudes as part of the reviewing/monitoring & evaluation process through informal stories and interviews/review	11	0	11
May-15	Mararo	Monitoring and Evaluation on the CBFM program in Mararo Community	To monitor and evaluate the ADB funded CBFM program and the impacts it has on the people in the community and other nearby communities.			
Jul-15	Alea	AAS North Malaita Community Visioning	To conduct community action planning in the three community clusters Alea	34	12	22
Aug-15	Santupaele	Community meeting	Community Research Agreement signed			
Aug-15	Santupaele	Gender Benchmarking data collection trip with Sarah Lawless, etc.	To collect gender benchmarking data – a series of interviews and focus group discussions. Data collected and transcribed.			
Sep-15	Santupaele	Initial Management plan formed by the committee with community independently	Committee develops a draft resource management plan updated original plan and further information provided in response to queries on resource status.			
Sep-15	Fumamato'o	Fumamato'o draft management plan meeting trip	Facilitate a meeting for the community to come together and discuss their draft management plan with the village committee and WorldFish to assist them draft their plan. Consensus on draft plan.			

Date	Location	Activity	Objective and Outcome	Number Attendees	Number Female	Number Male
Sep-15	Mararo	Interviews conducted in Maroro communities.	Joined Follow up trip by Hugh Govan, MECDM, Malaita provincial Fisheries, WorldFish to Mararo community on the lite touch approach CBFM. Data for report produced "From village to village: Local approaches to promoting spread of community based resource management: Lessons from Mararo Community Based Organization, East 'Are'are, Malaita Province, Solomon Islands"			
Nov-15	Radefasu, Sita, Aibola, Oneoneabu (Malaita	Kiko Stove Training in Langalanga communities	Aim of Training: to encourage people to start using kiko stoves to help reduce the rate at which mangroves are cut down for firewood. Kiko stove use increased.	226	137	89
Nov-15	Santupaele	Management Documentation trip	To fulfil activity four of action plan and develop deeper understanding of management arrangements - challenges and successes.			
Nov-15	Fumamato'o	Fumamato'o management plan finalizing and marine resource monitoring trip	To review and finalize the community fisheries management plan and to discuss future work with the community			
Dec-15	Santupaele	Management plan review	To Fulfil final activity of their 2015 action plan and develop 2016 plan. Finalized one pager management plan/ reflect on their 2015 action/ develop 2016 action plan/ identify villagers to do CPUE monitoring in future.			
Mar-16	Santupaele	Compile changes to management committee	A quick analysis of the make up of 2016 management committee. Observation of the committee members (who are they, which village, Male or Female) as compare to 2015 to determine representation. Follow up on new management committee (interviews) and plan next activities and trips re action plan			
Apr-16	Mararo	CPUE data collecting	Trip conducted to collect CPUE data from community champions of Mararo & Hunanawa + follow up trip to Paleohau			
May-16	Santupaele	Fisheries outcomes reporting	Meet with the community and report back data on fisheries outcomes from management			
May-16	Fumamato'o	Nutrition survey trip	Nutrition survey completed with the Fumatoo village and its other surrounding villages.			
Jun-16	Santupaele	Fish landings survey	Check CPUE data and collect data on fish and invertebrate language names.			
Jun-16	Fumamato'o	Management interview and nutrition trip combined	Follow up with Fumamato'o on their management plan activities and committee and completed interviews on formation and performance of management arrangements.			
Oct-16	Santupaele	Action plan for 2016 review, 2017 preparation	Follow up with the New Management committee and plan activities together through their Action Plan and development of 2017 action plan.			
Oct-16	Fumamato'o and Alea	Nutrition survey trip to Lau	Nutrition Repeat Survey in Fumato and Alea Clusters			
Nov-16	Santupaele	WorldFish 5th trip to Santupaele in 2016	Review Community Management Plan and develop community action plan 2017			
Nov-16	Fumamato'o	Household Panel study - Fumamato'o	To identify households for panel study and collect baseline data.			

Date	Location	Activity	Objective and Outcome	Number Attendees	Number Female	Number Male
Nov-16	Mararo	Panel Study at Mararo	To identify households for panel study and collect baseline data.			
Dec-16	Nusatupe, Western Province	Look & Learn trip CBFM+/CPUE training for community champions (activity 5.1)	To train community champions in collecting fish catch data; and to raise awareness on natural resources management. Fumatoo also involved	14	4	10
Dec-16	Mararo	CBFM and CPUE Training	Train community champions to raise awareness on CBFM+ and to collect data on fish catch to monitor their management areas.			
Mar-17	Fumamato'o	FAD building trips	Anchor construction, FAD Deployment- Lau lagoon			
Apr-17	Fumamato'o and Gnorigifau	CPUE data collecting trips	Trip to collect CPUE data from Fumatoo, Gnorigifau.			
Apr-17	Fumamato'o	Supsup garden training +SLOPIC tool trial	A supsup (small-plot agriculture) garden training was organized for Fumamato'o to address nutrition findings. A session was held to test the Livelihood diagnosis tool.			
Jun-17	Santupaele	Meeting held by the New management committee	Review action plan 2017 and determine next steps for implementation.			
Jun-17	Mararo	CBFM Awareness Ambitona, Gwagwa East Kwaio, collection of stories about resource management.	To conduct awareness on CBFM to interested communities in East Kwaio (scaling activity) and to collect outcome stories on resource management from Mararo community and other surrounding communities.			
Jul-17	Fumamato'o (scaling activities in Futuna, Ferafalu and Takwa)	Seagrass mapping, CBFM Awareness, Panel study and Nutrition Follow-up trip to Lau lagoon	To conduct a seagrass mapping exercise; CBFM awareness at Futuna, Ferafalu and Takwa; panel study at Kafoere, Niukwaloai; and follow up on nutrition activity (small-plot agriculture) in Fumamato'o			
Jul-17	Auki, including Mararo representatives	CPUE Workshop, Auki	Community-based data collectors from around Malaita province came together to share their findings and to submit their data to WorldFish Auki office (Included people from East Are'are.			
Aug-17	Fumamato'o and Kwai	Aquaculture small-pond assessment	Assessment on suitability of inland backyard pond aquaculture in Kwai and Fumamato'o			

7.3.5 CBFM establishment II—national and subnational capacity development

We made considerable investments in engaging with, building capacity of and understanding governance and learning networks in Solomon Islands to ensure the fit of project activities, the sustainability of project outcomes and to maximise the reach and spread of approaches and associated outcomes.

In 2014, WorldFish (under the ACIAR-funded project FIS/2010/056) hosted a CBFM symposium in Western Province with representation from 10 NGOs, community-based organisations and government agencies. Discussions indicated strong demand and motivation to form a Western Province coalition or network to enhance and accelerate the impact of their, currently uncoordinated, activities. In consultation with the provincial government and Solomon Islands Community Conservation Partnership (SICCP), we developed a successful US$126,000 grant (leveraging from the ACIAR investment in this projects) from the Critical Ecosystem Partnership Fund (CEPF) to facilitate the formation and initial activities of a coalition of Western Province natural resource management and development partners. The coalition objectives were to mainstream environmental sustainability, fisheries and community concerns into provincial development dialogue and to build a more effective platform to coordinate and communicate among the many Western Province–based agencies.

The **Western Provincial Network for Sustainable Development** (WPNSD) was facilitated and chaired by project staff to develop its terms of reference, and was formally established and endorsed by the Western Provincial Government in May 2017. The network partners, particularly the NGOs and CBOs (community-based organisations), now collaborate and communicate more effectively, particularly with the Western Provincial Government. Outcomes include coordinating awareness-raising on environmental issues affecting the province (such as a successful ban on plastics and overharvesting of marine resources). The members (13 different organisations) also collaborated to develop a 3-day program organised for ‘Youth@work’ (an SPC youth training and employment program) on the range of social and environmental issues in Western Province. The network is designing and developing strategies for network sustainability based on the lessons of other Solomon Islands development and environment networks. An external evaluation of the impact and sustainability of the network is pending as a final activity of the CEPF-funded project).

In November 2016, CEPF and the project team convened 24 experts, representing eight multi-actor networks (including MPPD, described below) and more than three decades of networking experience in Solomon Islands. Each of the eight networks comprised different agencies and had a slightly different goal, but all of them shared a similar belief that if they worked together they could achieve their goal more quickly or effectively. Over 2 days, the participants shared lessons and identified principles to guide improved practices for networks in Solomon Islands. Lessons were summarised as ‘principles of network success’ (Blythe et al. 2017d) which were designed to help members of networks ensure that their investments (in terms of time, skills and resources) have an impact that is greater than the sum of their individual efforts.

The network Malaita Partnership for Development (**MPPD**; comprised of NGO, CSO and government partners, including WorldFish) was utilised as the formal steering committee for CRP AAS; guiding and validating community selection, activities and engagement ethics, as well as ensuring cross-sectoral/cross-agency communication, coordination and accountability. While the network was established and functional, there were substantial concerns about its capacity and sustainability, and a lack of clear direction. CRP AAS and ACIAR project investments were directed towards convening capacity, and PAR was initiated with a focus on institutional strengthening. A ToC was developed with network partners, linking with a ToC for CBFM spread in the province. This approach was well received and comments suggested that the activity created greater clarity of priorities and focus for the network. Nonetheless, the network members continued to voice (in interviews

conducted by the project) a range of concerns about the sustainability of the network in terms of internal management and facilitating external outcomes (Blythe et al. in prep).

In 2016, MPPD sought formal approval from the Malaita Provincial Government's Executive; however, this request is still pending and momentum for the entire MPPD program has stalled. Network functioning was also affected by the establishment of a parallel network by an international development NGO, that, despite being aware of the existence of MPPD, said that establishing a new network had to proceed as it was a deliverable of its project. This establishment of a parallel structure has generated a sense of confusion and frustration among MPPD members. Groups or networks created or coordinated by NGOs will need support from the provincial government, mainly the planning department, to function well. But, at present, the view is that the provincial government does not see the importance of these networks for their programs. The value of further investment in network capacity will be explored with MPPD members as part of the follow-on project and in response to lessons from applied research and broader lessons on coalition building (Blythe et al. in prep).

Three project staff were nominated as members of the national, Malaita and Western Province **Fisheries Advisory Councils** (FACs). In late 2015, Grace Orirana (WorldFish project staff member) was nominated to serve on the Malaita FAC—the first woman ever to serve on this committee. Unfortunately, the position of chair has not been filled and the Malaita FAC has only met twice since 2015. This reflects a broader challenge—that, for over 12 months, there were no provincial fisheries staff based in Malaita Province. In 2017, there were two MFMR staff who were working closely with WorldFish staff. Similar problems have been experienced in the Western Province FAC where the last FAC meeting was in April 2016 for the deliberation and gazetting of the Provincial Fisheries Ordinance. There was no FAC meeting called in 2017 as the Chief Fisheries Officer had no operational budget. Nonetheless, almost all members of the FAC regularly meet under the Western Provincial Network for Sustainable Development (WPNSE).

7.3.6 Reflections on the spread of CBFM

Although hundreds of communities have implemented CBFM already in Solomon Islands (to date, it is estimated that 350 communities have carried out some sort of CBFM in Solomon Islands; Govan et al. 2015), the majority of Solomon Islands communities have not, and it is not realistic for partner organisations such as NGOs and government agencies to spread the concept of CBFM by engaging individually and intensely with communities. The process of establishing CBFM through a well-designed, inclusive and appropriate-paced engagement process is incredibly time and resource consuming. More efficient and cost-effective approaches, such as awareness-raising, 'look and learn', building national and provincial office capacity as an information hub, and the application of the 'lite-touch' approach are strategies the project has actively employed to promote or accelerate the spread of CBFM in a more sustainable way. Some critical analysis of these approaches has been conducted, but this will be an important focus of the subsequent project (FIS/2016/300).

The 'lite-touch' approach uses relatively few, infrequent visits and appreciative facilitation methods to build on community strengths and capacities. This approach is proposed to improve the cost effectiveness in delivering support to communities and promote community ownership (rather than dependence on partners) of CBFM (Albert et al. 2013). It is assumed that, in many cases, the 'lite-touch' approach will lead to the uptake and spread of CBFM (Govan et al. 2011)—but until this project, this proposition had not been tested. A study was led and published (a first publication for the author) which described the application of the 'lite-touch' approach (Orirana et al. 2016). After three visits to Mararo village in Malaita province, the community established CBFM and acted as a 'core' community (as discussed in Section 7.3.4). Training workshops designed to accelerate CBFM spread were also provided to the community, which increased community confidence to become better CBFM advocates in their visits to adjacent villages. The message about CBFM appeared to resonate with other villages, and led to CBFM establishment in two additional, neighboring

villages. Yet, it was also clear that some other villages were less able to implement CBFM. In the follow-on project, we will continue to test and refine the 'lite-touch' approach and more critically examine the outcomes and uptake from community awareness, 'look and learn' visits and national/provincial programs of awareness-raising through popular media as other strategies.

With support from WorldFish, the Malaita provincial fisheries office organised community meetings to discuss CBFM at 17 locations: Ta'arutona, Pipisu, Masihuro, Oterama and Surairo in West Are'are Lagoon; Paleohau on Small Malaita; Bio in West Kwara'ae; Kwara'e, Manaere, Madalua, Mbita'ama and Onebusu in West Fataleka; Ambitona and Gwagwa in East Kwaio; and Ferafalu, Takwa and Futuna in Lau Lagoon (neighbouring communities of Fumamato'o). Project staff supported provincial fisheries officers with finances from the ADB-funded project and provided substantial input on presentations and materials (WorldFish produced DVDs, pamphlets etc.), and WorldFish staff participated at the meetings where possible. During these community meetings, the experiences from Fumamato'o and Rarata were often cited. Some of these communities have subsequently taken steps to form their own committee and draft a management plan: Ambitona, for example, has regulated fisheries in their mangroves and reefs (management spanning 37.5 ha of marine area).

Similar activities (albeit with less lead from the provincial government) have been conducted in Western Province. For example, project staff most recently responded to an expression of interest from the Madegugusu Women's Association to assist the communities in and around Simbo island to revitalise marine resource management. A female community champion from Santupaele (a focal community of this project) joined the WorldFish team (a Leona woman was unable to attend due to death in the village) to share her knowledge and experiences on the processes and outcomes from her community's management plan. Reflections from having a community representative were that the community gained a realistic picture and the community gained some clarity and further motivation to establish its own marine resource management.

7.3.7 Conclusions and recommendations

- Engagements with communities to establish new sites of CBFM are intense, time-consuming and require substantial investments of resources. While this investment is important for in-depth and, in some cases, long-time-series research, it is simultaneously critical to recognise the limits and costs of such an approach. This project, and its predecessors, have generated substantial lessons using reflection and qualitative and quantitative research. Subsequent projects need to carefully and critically evaluate the reasons and ToC for direct community engagements and specify precisely the research gap that is worth this substantial investment.
- There remains limited quantitative data on the food and nutritional benefits derived from community-based fisheries management. Initial research has been implemented as part of ongoing work to begin to quantify the impacts of management on fisheries outcomes and the impacts of management on food security outcomes.
- Investments made by CRP AAS in building partnerships and coalitions allowed project activities and fisheries objectives to be addressed in more integrated ways, accounting better for local context and validated by local experts. These had substantial benefits for project delivery, yet their impact on multi stakeholder platforms and their capacity to influence governance or to govern is, as yet, undetermined but clearly hindered by a range of internal and external challenges. The research questions that remain unanswered are 'Does investment in networks bring benefits in terms of outcome, greater than the costs?' and 'What is the nature of outcomes facilitated by investment in multistakeholder partnerships?'
- Investments in team, partner and community facilitation skills were valued by both community and team members. Similarly, investments in gender-sensitive facilitation

were equally valued. To ensure these skills are maintained and built, future projects also need to invest in these skills.

- Much speculation and evidence-based models for the potential of spread have been provided by Pacific and Solomon Islands experts over the years. This project has been the first (through the efforts of an early career researcher) to test, in a very applied and critical way, the costs and value of an approach designed to promote spread through a 'lite-touch' approach. Early evidence from this case suggests outcomes are favourable. Yet, the benefits of other strategies that aim to promote spread, and testing of the 'lite-touch' approach in another context are worthy of further research.
- Capacity limitations in coastal fisheries or CBFM-focused management in provincial and national agencies have been substantial (i.e. to the extent of no staff, or a couple of staff with no office facilities). In the very late stages of the project this has shown substantial improvement at the national level and in Malaita Province (but not Western Province fisheries capacity). The government capacity and focus is difficult to predict. Whilst regional and national policy commitments and increased accountability to communities can help to concentrate resources and capacity to coastal fisheries, this ultimately remains outside of the control of a project to overcome in the short term. Similarly, policy and legislation changes are, at times, incredibly slow and resolution unpredictable no matter the quality or degree of project input.

7.4 Objective 4: Design and implement CBFM in Vanuatu coastal communities in collaboration with provincial government and national agencies

7.4.1 Introduction

This section summarises activities and outputs from Activities 4.1 to 4.4 see Section 6 for tabulated activities and milestones—and is drawn from the following published and yet-to-be published outputs.

Published outputs

Eriksson H., Albert J., Albert S., Warren R., Pakoa K. and Andrew N. (2017b). The role of fish and fisheries in recovering from natural hazards: lessons learned from Vanuatu. Environmental Science & Policy 76, 50–58.

Raubani J., Eriksson H., Neihapi P.T., Tavue R.B., Amos M., Pakoa K., Gereva S., Nimoho G. and Andrew N. (2017). Past experiences and the refinement of Vanuatu's model for supporting community-based fisheries management. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 38, 3–13.

SPC (2017a). *Gaed long ol toksave blong ol fising komiuniti long Vanuatu* (Guide and information sheets for community fisheries management in Vanuatu). Stredder Print Ltd: Noumea, New Caledonia.

Baereleo Tavue R.B., Neihapi P., Cohen P.J., Raubani J. and Bertram I. (2016). What influences the form that community-based fisheries management takes in Vanuatu? SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 22–34.

Unpublished outputs or in preparation

VFD (Vanuatu Fisheries Department) 2017. *Hog Harbour komuniti-bes kostal fiseris manejmen plan 2017–2020* (Hog Harbour CBFM plan 2017–2020). VFU: Port Vila.

VFD (Vanuatu Fisheries Department) 2017. *Lolathe komuniti-bes kostal fiseris manejmen plan 2017–2020* (Lolathe CBFM plan 2017–2020). VFU: Port Vila.

VFD (Vanuatu Fisheries Department) 2017. *Lutes komuniti-bes kostal fiseris manejmen plan 2017–2020* (Lutes CBFM plan 2017–2020). VFU: Port Vila.

VFD (Vanuatu Fisheries Department) 2017. *Pelongk komuniti-bes kostal fiseris manejmen plan 2017–2020* (Pelongk CBFM plan 2017–2020). VFU: Port Vila.

VFD (Vanuatu Fisheries Department) 2017. *Peskarus komuniti-bes kostal fiseris manejmen plan 2017–2020* (Peskarus CBFM plan 2017–2020). VFU: Port Vila.

VFD (Vanuatu Fisheries Department) 2017. *Port Olry komuniti-bes kostal fiseris manejmen plan 2017–2020* (Port Olry CBFM plan 2017–2020). VFU: Port Vila.

Coastal communities across the >80 islands of Vanuatu have a long history of traditional tenure and customary law. Within the broad decentralised management narrative that prevails in the current governance vision are many complexities associated with how devolution may evolve and what may be required to enable co-management processes. Since the 1990s, various forms of CBFM have been supported and practiced, building on community cooperation with the Vanuatu Fisheries Department (VFD) and NGOs.

The project set out to design and implement CBFM in coastal communities in collaboration with Vanuatu's provincial government and national agencies. This involved: (i) conducting participatory diagnosis of the most appropriate entry points for management and governance responses; (ii) working with at least three communities to develop and implement adaptive management through local CBFM plans; (iii) designing and implementing questionnaires on the gendered dimensions of CBFM; and (iv) aligning with existing national policy design and implementing a provincial-level support network for communities undertaking CBFM.

These activities responded to Vanuatu's draft 20/20 Strategic Plan which highlighted the importance of artisanal and subsistence fisheries in sustaining food security. VFD has a central role in securing the benefits of inshore fisheries through sound management policies. The government has initiated a number of programs to develop capacity in resource assessment and fisheries management. The project aligned with, and contributed to, Vanuatu's Overarching Productive Sector Policy (OPSP), which establishes a coherent policy framework to guide strategic actions and investments, and the Vanuatu National Fisheries Sector Policy 2016- 2031.

In partnership with VFD, the project worked in three main regions: Maskelyne Islands (South Malekula), Santo and Aniwa. The choices of locations were guided by demand from national agencies and attempted to balance often-conflicting criteria, including the presence of existing interventions, strategic priority and accessibility. Although the project set out to work with three communities, it exceeded this target and developed CBFM across six communities in these regions. Details on the CBFM model, phased approaches and results from various stakeholder engagements are presented in the following sections.

7.4.2 Site selection, scoping and participatory diagnosis

VFD confirmed the project site selection and followed that with livelihood diagnoses per site. As part of Vanuatu's *Decentralization and Local Government Regions Act 1994*, implementation of all new projects must be presented to the respective provincial government to ensure their priorities are addressed, and that they are involved in a working collaboration. With approval and support from the provincial government authorities, following an extensive consultation phase, each site was visited to confirm the community's interest and approval to commence. The project team followed a simple process to design, implement and reflect on CBFM measures. This process involved four stages as shown in : (i) initial engagement, whereby community needs were aligned with project capacity, leading

to collaborative arrangements between communities and project staff; (ii) -re-implementation, whereby extensive diagnosis was carried out to identify CBFM needs, challenges and strengths per site; (iii) implementation of activities, whereby measures were carried out in response to the diagnosis with ongoing input from local stakeholders; and lastly (iv) enforcement and monitoring, whereby implemented measures were enforced to ensure compliance and processes were put in place to measure impacts and change. This process proved highly effective in guiding activity scheduling and necessary M&E steps across the different phases of the project.

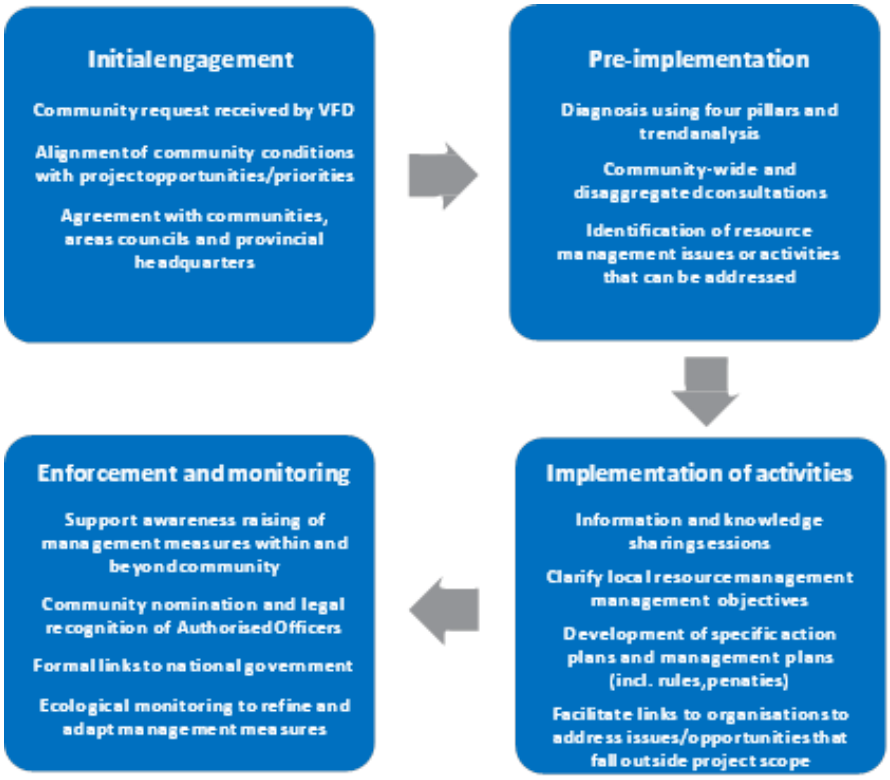


Figure 7.4.1 Schematic of the process employed in community workshops to identify management issues, provide support measures, address issues and develop monitoring and enforcement strategies (Baereleo Tavue et al. 2016)

Community selection

The project focused its CBFM work in six communities across two main areas: Santo with the communities of Hog Harbour, Port Olry and Lolathe, and Maskelyne Islands with the communities of Peskarus, Pellongk and Lutes.

Aniwa Island, in the southernmost province of Tafea, was initially identified as a third area for CBFM work but, due to the destruction caused by tropical cyclone (TC) Pam in March 2015, activities here refocused to address priority needs during their post-cyclone recovery phase (refer to section on TC Pam recovery in Section 7.4.5). The community of Naone on northern Maewo island entered the project in the final project stages under a joint initiative with VFD to improve fish handling and income for fishers in remote areas. Figure 7.4.2 shows the geographical spread of the project sites.

Selection of the main CBFM sites followed the formal processes agreed to by the government (i.e. there must be a request from a village chief for assistance to manage marine resources). Since requests are often numerous, consultations conducted between VFD and the Department of Environmental Protection and Conservation were essential to determine if activities were already ongoing in sites, and to identify opportunities for cross-agency collaboration. In addition to the guidance provided by government consultations, site selection was influenced by project objectives and priorities. Santo, for example, was identified as a priority site area because lobsters and coconut crabs were known to provide an important source of household income. With evidence indicating these resources were in decline, owing to the high demand from the tourism industry, establishing CBFM here warranted the project's focus. The Maskelyne area was selected because it has one of the largest reef areas in Vanuatu. Moreover, during the time of project development, livelihood focus in the area had reportedly shifted from agriculture to fisheries as a main source of income, largely as a result of fluctuation in copra and cocoa prices. This was leading to increased pressure on fisheries resources. Aniwa was initially chosen for its remoteness and because people have few livelihood options besides high dependence on fisheries for income. All three areas had experienced declines in fisheries resources, reported weak local governance and had received relatively little national management support.

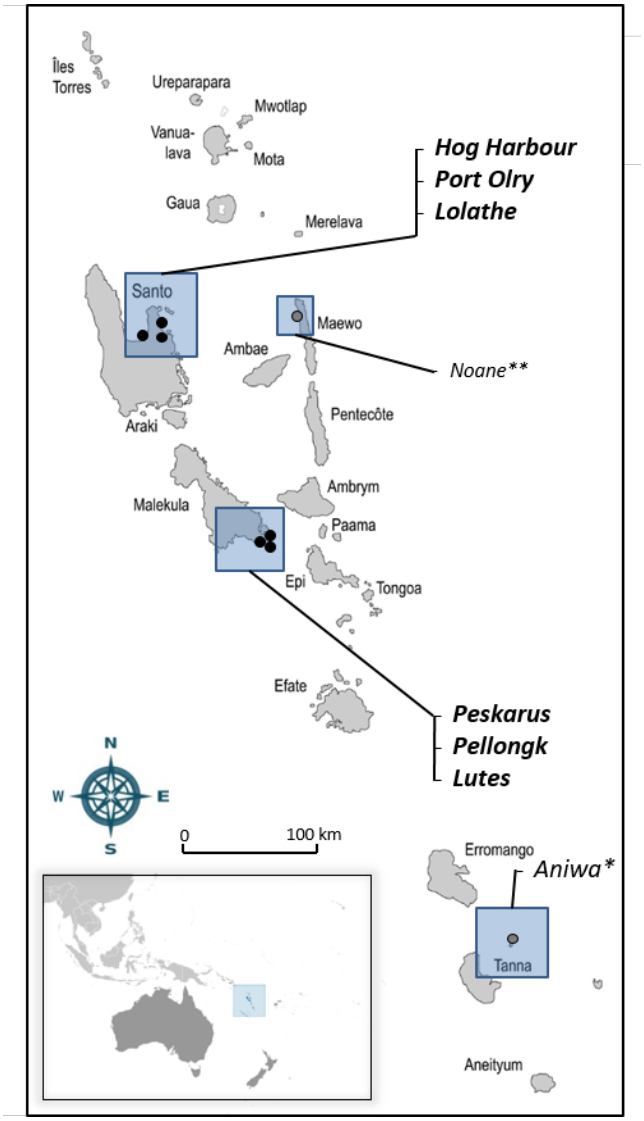


Figure 7.4.2. Map of Vanuatu, indicating location of the project's six main community sites, and two additional community sites

Prior to the extensive livelihood diagnosis phase, community selection processes yielded community profiles as summarised in Table 7.4.1 indicating information on population size, livelihood dependence and fishing capacity per community.

Table 7.4.1. Selected profile data of communities at project sites

	Pop	HHs	Livelihood dependence			Fishing cap.			Other notes
			1st	2nd	3rd	fishers (M:F)	boats (*obm*)	canoes	
Maskelyne (S. Malekula), Malampa province									
Peskarus	572	130	Fishing (*primarily reef*)	Farming (*copra*)	Mat weaving for local trade	~400 (4:1)	13	44	10 middlemen (reef fish to Port Vila, ~>1 t per wk),
Pellongk	375	56	Fishing (*primarily reef*)	Farming (*copra*)	Mat weaving for local trade	~340 (4:1)	8	42	3 middlemen (reef fish to Port Vila, ~150 kg per wk),
Lutes	336	52	Fishing (*primarily reef*)	Farming (*copra*)	Mat weaving for local trade	~270 (7:3)	2	28	5 active middlemen (reef fish to Port Vila, ~200 kg per wk). Smaller community but larger reef area
Santo, Sanma province									
Port Olry	928	193	Farming (*cattle, copra, kava and cocoa*) Fishing (*primarily reef*)	Tourism (*beach stalls: food and handicraft trade*)	Land transport	155 (1:0)	12	91	4 middlemen (1 *poulet fish* specialist [redsnapper], and the rest mixed reef fish)
Lolathe	112	22	Farming (*cattle, copra and some cocoa*)	Coconut crab for trade	Land transport	0	0	0	Main fishery commodity is coconut crab, sold at market and restaurants. Lolathe's marine territory is accessed by neighbouring fishing communities
Hog Harbour	718	146	Farming (*cattle and copra*)	Tourism (*trade in food, handicrafts*)	Fishing (*primarily reef*)	~60 (9:1)	~5	~20	~1 cruise ship visit per month, accounting for significant monthly HH income
Aniwa, Tafea province (3 communities—Ikaukau (202), Imatu (88) and Isavai (154))*									
	347	~55	Fishing (*primarily pelagic*)	Farming *(oranges)*	Sandalwood production (*periodic harvest*)	~330 (7:2)	6	50	Remoteness inhibits market access. Post–TC Pam rehab focus since 2015
Maewo, Penama province (2016)**									
Naone	~300	~50	Farming (*copra and water taro*)	Prawn trade to Port Vila	Fishing (*primarily reef local trade and subsistence*)	~60 (1:0)	2	10	Prawns are cultivated in freshwater taro ponds

* Aniwa activities were amended after March 2015, to focus on post-cyclone recovery activities and therefore followed a different project trajectory

** -Maewo's inclusion followed from a joint initiative with the Vanuatu Fisheries Department to improve coastal livelihood resilience in 2016, and therefore followed a different project trajectory, Note: HH = household; obm = outboard motor; TC = tropical cyclone

Counter to common assumptions of mono-dependence on fishery resources by island communities, across most project sites, livelihoods showed diverse dependence on both land and marine resources. So, although use of marine resources made up a significant, if not a majority, component of people livelihoods, their activities on small agriculture plots, or in engagement with other sectors like tourism, were important. Important distinctions existed between the three main project areas regarding the conditions in which CBFM operated, which, in turn, influenced the kind of challenges that needed addressing. As such, thematic areas emerged from each project area: in the Santo group, the influx of tourism influencing people's fish-based livelihoods; in the Maskelyne group, the strong market links with Port Vila for mixed reef fish; and in Aniwa, the presence of traditional management institutions as means to overcome challenges of remoteness and vulnerability.

In all sites, communities maintained claim to particular marine areas through clan ownership. All communities made use of these marine areas to meet livelihood needs, with the exception of Lolathe in Santo, where the community predominantly relied on terrestrial resources and exhibited little fishing capacity. Its inclusion was warranted since the villagers claimed traditional ownership over important parts of the reef area which were accessed by neighbouring community fishers. As owners, they were important stakeholders/'managers' in discussions regarding CBFM. Developing a CBFM plan for Lolathe was essential, as was the participation of neighbouring communities of Sara and Matandas in those processes (refer to Table 7.4.2 on community engagement activities between 2014 and 2017).

As a result of the refocus to address the priorities needs for rehabilitation and recovery following TC Pam, the Aniwa site followed a different trajectory that focused on supporting immediate livelihood needs and food security. The Aniwa case provided important lessons about resilience of coastal communities in the aftermath of acute shocks (refer to section on TC Pam recovery for further details).

Process of participatory diagnosis

Commencing with a project introduction meeting in each site, a series of community meetings and workshops held during 2014–2016 followed a participatory learning and action approach (Govan et al. 2008). Community members reflected on resource trends, identified challenges experienced locally, and clarified their objectives and intentions for establishing management. Where a high number of women and youth were present, they formed their own group discussions, otherwise discussion groups were mixed. Data were also collected through unstructured methods such as participant observation and informal *storians* (Bislama for 'informal discussion') with key informants (e.g. village chiefs, women leaders or resource monitors).

Our examination of issues and CBFM intervention design with communities drew also from experiences of ongoing work by bilateral agencies like the Japan International Cooperation Agency (JICA), in part to avoid duplication. The need for a holistic work focus was emphasised (i.e. avoiding narrow concentration on single species, or even single-sector fisheries issues). Processes therefore identified threats and solutions according to four pillars: (i) 'resource and environment', referring to the environmental status of a community's resources, especially fisheries resources and the environment; (ii) 'economy and production', dealing with the resource-based economy and production to enhance livelihoods; (iii) 'institutions and governance', dealing with the village rules, national regulations and various governance systems; and (iv) 'socio-culture', dealing with the social and cultural aspects of the community (as indicated in Figure 7.4.3). During the diagnosis, each was discussed, analysed and addressed separately to ensure the project team had a thorough understanding of the community situation, and that project activities were designed and implemented in ways that were sensitive to context. Project implementation was guided by WorldFish experiences elsewhere in the Pacific (Albert et al. 2013), and influenced by frameworks promoting breadth and participation in diagnosis (Andrew et al. 2007).

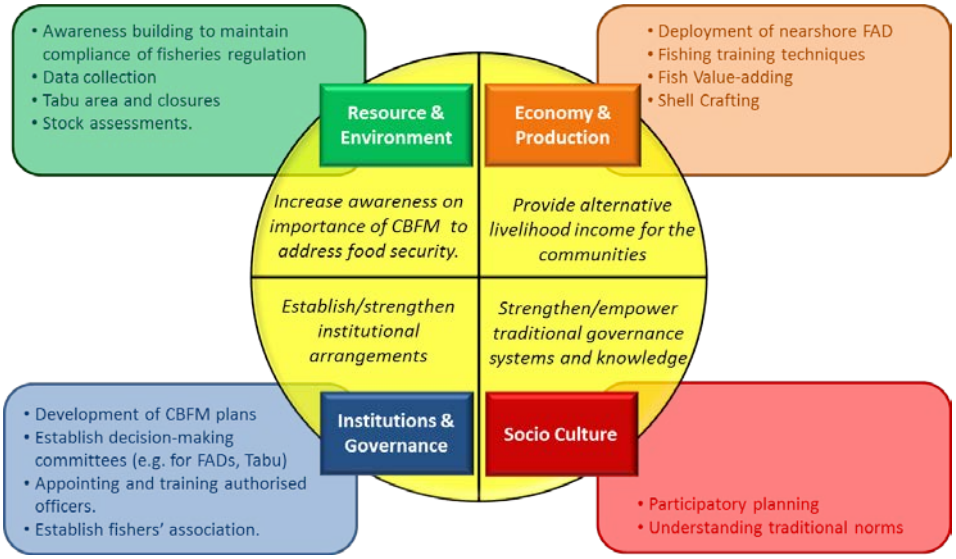


Figure 7.4.3. Schematic of the four pillars around which the CBFM diagnoses at community level were guided and which, in turn, facilitated CBFM design and implementation

7.4.3 Policy landscape at national and subnational scales

Throughout Vanuatu, historical community-level resource management structures have persisted to regulate local resource use and access. With increased external influences, customary structures gradually eroded leading to transformation of fisheries management towards a more centralised regime. Following Vanuatu's independence in 1980, centralised management was re-enforced by enacting the *Fisheries Act* No.10 of 2014[7] as the supreme law for the conservation, management and development of fisheries resources. Under the Act, policy formulation, implementation, enforcement and conservation were the responsibility of the state. Over time, shortcomings of centralised management became increasingly evident, leading to a gradual shift in the focus towards supporting CBFM.

With the development of the regional New Song (see Section 3), VFD is endowed with the responsibility to implement the principles of decentralised co-management of the New Song at the country level. Figure 7.4.4 shows the organisation of formal governance structures under the Ministry of Agriculture Livestock, Forestry, Fisheries and Biosecurity (MALFFB) in Vanuatu. It furthermore indicates a hierarchical path from ministerial level to community through which VFD operates in its development of CBFM networks. The grey-highlighted text to the left refers to important guiding documents for fisheries management at respective levels of governance.

[7] Fisheries Act No.10 of 2014 is the recent amendment act of the original Fisheries Act Cap 158 adopted in 1982

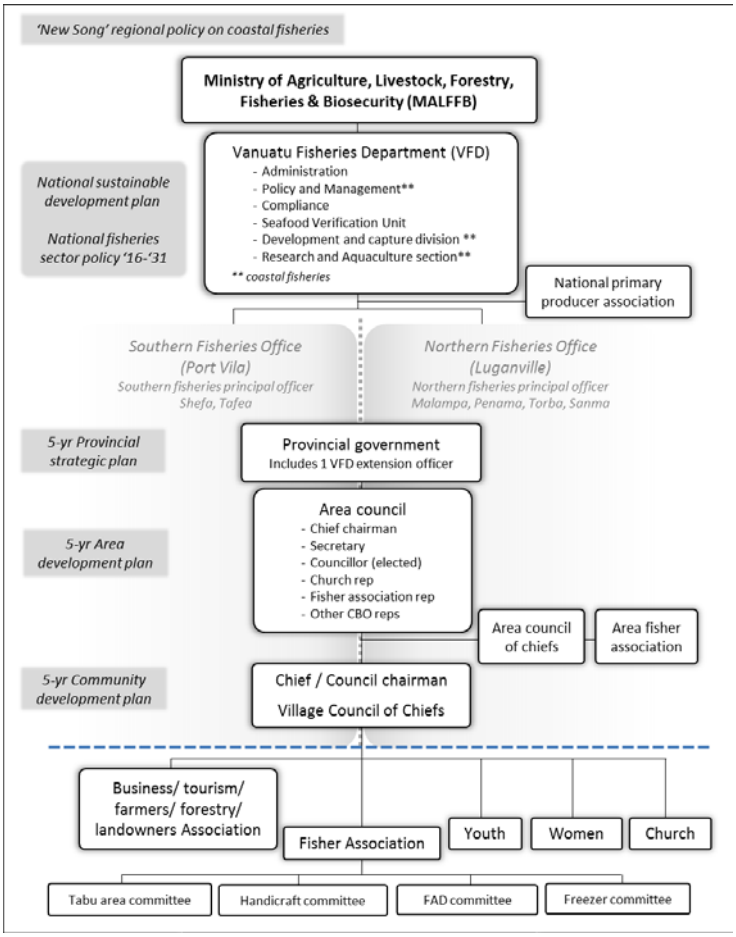


Figure 7.4.4. Schematic of Vanuatu's organisational governance structure relevant to coastal fisheries

7.4.4 Stakeholder meetings and CBFM implementation activities

As implementing partners, VFD completed a series of stakeholder consultations (Figure 7.4.5). The consultations were opportunities for VFD to inform the public about services available to communities, and for stakeholders to share their views and contribute to influencing VFD's model of engagement. Consultations included key stakeholders, such as community leaders, area secretaries, councillors, the provincial government and government extension officers. During 2013–2014, fisheries regulation consultations were carried out as part of the project team's diagnosis phase across project sites. Table 7.4.2 presents the chronology of important stakeholder meetings held in communities over the life span of the project.

(i) (ii) (iii)

Figure 7.4.5. Community stakeholder meeting activities as part of the initial situation analyses, showing (i) resource trend analysis, (ii) seasonal calendars and (iii) community mapping exercises.

Table 7.4.2. Chronology of the significant community engagement activities as part of the CBFM implementation activities at project sites

	Date	Location	Activity	Objective	Participants	Stakeholders present	Outputs
YEAR-1: Mar-14 – Feb-15	Nov '14	Lakatoro, - Malamba provincial HQ	Provincial project inception meeting	Gain provincial support for site selection Verify fisheries situation per community	~5	Provincial Planning Officer and Provincial Project Manager	Endorsement by provincial authority
	Nov '14	Maskelyne - Peskarus - Lutes - Pellongk (Avock)	3 community inception and awareness meetings	Introduce and socialise project Preliminary diagnosis (situation analysis, network mapping, needs analysis)	~50 per community meeting	Chief, traditional elders, fishers, church leaders, women's groups, youth groups, provincial officer, fisher association, land and reef owners, VFD	Community endorsement and support for project Community profiles complete and priority needs identified; Distribution of awareness material, posters and regulations.
	Dec '14	Santo - Port Olry, - Hog Harbour - Lolathe	5 community meetings (Sara and Matandas included as tabu area users)	Introduce and socialise project Preliminary diagnosis (situation analysis, network mapping, needs analysis) Increase awareness of Fisheries Act 2014	15-40 per community meeting	Chiefs, youth leaders, church leader, women's leader, fisher association, fishers, VFD	Community endorsement and support for project Community profiles complete and priority needs identified Distribution of awareness material, posters and regulations.
YEAR-2: Mar-15 – Feb-16	***All project activities temporarily suspended nationwide in Mar '15 due to TC Pam. VFD initiated assessments whereby the project staff team was assigned and first on site at Tanna, Aniwa, Eromango, Efate, Shepherd islands, Paama***						
	Mar '15	Tafea (Tanna) - Aniwa	Post–TC Pam assessment	Assess damage and disaster impact (HH level) Needs assessment	~50 HHs	Chiefs, fishers, women, area secretary, community HHs, VFD	Damage assessed and needs identified Adjustments to project focus
			Post–TC Pam relief	Distribute fishing gear Establish fishers association for each community (3): incl. appointment of president, secretary, treasurer & committees	Beneficiaries of fishing gear: Ikaukau 67 Imatu 12 Isavai 29	Households, fisher association, chief, church, traditional elders, VFD	49 canoe fishing lines 26 flying fish fishing line and reels; and 33 bamboo lines 23 sets of hooks (all sizes) 12 km 30 lb monofilament line; and 5 sets 20 lb line 4 spear guns Fisher associations established in all communities
	Jun '15	Tafea (Tanna) - Aniwa	Coconut crab assessment in Ikaukau	Population assessment of coconut crab	~7	Community members, VFD team (2)	Population estimate and size structure complete, to inform population status (indicating need for management)
	Jul '15	Maskelyne - Peskarus - Pellongk - Lutes	Community outreach meetings per community	Increase information and awareness on Fisheries Act, and importance of CBFM Verify activity plan	Peskarus: ~40 Pellongk: ~22 Lutes: ~20	Chiefs, youth leaders, church leaders, women's leader, fisher association, fishers, VFD	Awareness material, posters and regulations distributed Activity plan per community verified and confirmed
	Sep '15	Maskelyne - Peskarus [3 meetings involving all sites]	Catch monitoring training	Establish catch monitoring activities and training	~7 market vendors	Market vendors, fishers, VFD	Data collected on fish caught, quality
			FAD training and deployment	Construct and deploy 1 surface FAD (*Vatu-ika*) and 2 bamboo FADs	~25 fishers	Fishers from all 3 communities, VFD	3 FADS deployed (6–7 miles off Uliveo), and 25 people trained
			Community livelihood diagnosis consultation	Collect data on current issues, status of resource and livelihood challenges	~15	Committees from all 3 communities VFD	Inventory of challenges complete and assessment of needs for CBFM by fisher association
	Sep '15	Maskelyne	Ecological survey - 59 survey sites: 11 in tabu areas, 48 outside	Collect data for habitat assessment and status of trochus and green snail	~ 9	VFD Research Division	Tabu areas of Peskarus and Pellongk extended based on survey findings
	Oct '15	Maskelyne - Pellongk	CBFM plan consultation meeting (involving all Maskelyne sites)	Develop CBFM plans for Maskelyne sites (also involving Avock, Raniem, Hokai) Confirm community support for CBFM	~ 30	Chiefs, land and reef owners, fishers, women's groups, VFD	1st draft of CBFM plan per community in Maskelyne
	Nov '15	Santo - Luganville, VFD centre	FAD construction workshop	Develop necessary skills to construct, deploy and maintain FADs Increase awareness of FAD fishing rules	~ 20 fishers	Fishers from Hog Harbour, Port Olry and Lolathe (and Matandas), VFD	Fishers trained on construction, deployment and maintenance of FADs Agree on responsible fishing around FADs
		- Hog Harbour (and Matandas)	FAD deployment	Construct and deploy 2 surface FADs (*Vatu-ika*) and 2 bamboo FADs	~ 20 fishers	Fishers from Hog Harbour, Port Olry and Lolathe (and Matandas), VFD	4 FADS deployed (in Big Bay and Hog Harbour), and 20 people trained

	Feb '16	Santo - Hog Harbour	FAD fishing technique training workshop	Train fishers in FAD fishing techniques	~ 20 fishers	Big Bay fishers association, community fishers, VFD	20 fishers from Hog Harbour, Port Olry and Lolathe (and Matandas) trained in effective and responsible FAD fishing
YEAR-3: Mar-16 – end-of-2017	Mar '16	Maskelyne - Lutes	FAD fishing technique training (all Maskelyne)	Train fishers in FAD fishing techniques	~ 23 fishers	Fisher association, fishers from Lutes, Peskarus and Pellongk, VFD	23 people trained in more effective and responsible fishing at FADs
	Apr '16	Maewo, - Naone	Delivery of cool storage asset	Install additional freezer (1 freezer already in function)	~ 15	Community-appointed freezer committee	1 additional freezer deployed to enhance fish storage capacity
	May -Jun '16	Santo, - Hog Harbour - Port Olry - Lolathe	3 CBFM community meetings on CBFM management	Develop CBFM plans for Hog Harbour, Port Olry and Lolathe Verify CBFM plan draft by participants	Hg Harbour ~20 Port Olry ~20 Lolathe ~ 25	Chiefs, land and reef owners, fishers, women's groups, VFD	1st draft of CBFM plans for Hog Harbour, Port Olry and Lolathe
	Aug '16	Maskelyne - Lutes	FAD redeployment	Deploy 1 *Vatu-ika* FAD off Uliveo	~ 20 fishers	FAD committees, fishers from Pellongk, Peskarus and Lutes, VFD	1 FAD deployed to increase access to fish
	Oct '16	Santo - Hog Harbour	Training on shell crafting and value-adding (involving all Santo sites)	Develop tradeable skills and increase tourism income (in collaboration with JICA volunteers)	~ 35	Community members from Port Olry, Hog Harbour, Matandas and Pick Bay	35 people trained
	Oct '16	Maskelyne - Lutes - Pellongk - Peskarus	CBFM follow-up workshop	Verify and refine CBFM rules Increase awareness of CBFM plan	~ 50	Community members from Lutes, Pellongk and Peskarus, authorised officer, VFD	Local support and verification of CBFM plans
	Oct '16	Santo - Luganville, VFD centre	Authorised officers training workshop	Train appointed officers in enforcing fisheries regulations (3 authorised officers from Santo, 1 from Maskelyne)	~ 13	Reps from Gaua, Vanua Lava, Mota Lava, Torres, Ureparapara, Lolathe, Port Olry, Hog Harbour, Matandas, VFD	13 people trained to strengthen governance and increase compliance of fisheries regulations
	Aug '17	Aniwa, - Ikaukau	Delivery of cool storage asset	Install and additional fish freezer (1 existing freezer in operation)	~ 15	Community-appointed freezer committee	1 additional freezer deployed to enhance fish handling and storage capacity
	Nov '17	Port Vila, - VFD	'Lessons learned' workshop (involving 7 reps from project sites)	Deliver community and project presentations on experiences in project	~ 25	Area council, tabu area committee chairs, fisher association, authorised officers, chiefs, VFD, ANCORS project staff	Compilation of lessons learnt and recommendations for future work 'follow-on project'.

Note: ANCORS = Australian National Centre for Ocean Resources and Security; CBFM = community-based fisheries management; FAD = fish aggregating device; HH = household; HQ = headquarters; JICA = Japan International Cooperation Agency; tabu = no-take; TC = tropical cyclone; VFD = Vanuatu Fisheries Department

CBFM stakeholders' consultation workshop, Port Vila, 19–21 April 2016

A CBFM stakeholders' meeting (see Figure 7.4.6) was organised to reflect on community fisheries engagements and to start to develop a model that can further guide the implementation of CBFM across Vanuatu. The project activities at this point were approaching mid-term, with CBFM activities already running in Maskelyne and Santo. This meeting therefore also provided a useful point at which to reflect and refine approaches being used by the project team. The outputs of this workshop are summarised as part of the published output in Raubani et al 2017, wherein a CBFM model is described covering the four stages of initial engagement, pre-implementation, implementation and M&E.

Figure 7.4.6. Participants of the stakeholder consultation meeting on CBFM in Vanuatu

Lessons learned workshop, Port Vila, 6 November 2017

A lessons learned workshop was organised by the VFD project team, to allow reflection on project activities by local stakeholders, and to identify lessons learned to guide future work on CBFM. Of the 28 participants, the majority were leaders and representatives of various community-based organisations from the project sites (18 people, including clan chiefs, authorised officers, chairs of fisher associations, fishers and FAD committee members) (Figure 7.4.7). In addition to local representation, staff from VFD, SPC and ANCORS participated.

During the workshop's morning session, each community project site presented the activities carried out since 2012 and reported on experiences in the different stages of the project (i.e. inception, planning, implementation and monitoring activities). A total of 7 community presentations provided the local perspectives on CBFM development. For the afternoon session, participants were grouped into their regional clusters to carry out several reflective exercises. First, groups were asked to identify the institutional strengthening for fisheries management that had resulted (from community to intercommunity level within the clusters). Second, groups each identified: (i) three main achievements of the project and what changes were brought about for CBFM over the last 4 years; (ii) activities or approaches that didn't work very well and why; and (iii) future priorities for CBFM development for the next 4 years. Below we summarise the main findings from the morning and afternoon sessions, by regional cluster.

Figure 7.4.7. Participants (including chiefs, fisher association chairs, VFD staff etc.) at the lessons learned workshop.

In the **Maskelyne** community, representatives identified the main achievements to include: the formulation of CBFM plans per community (which clarified previously vague rules and regulations for fishers about access and fishing practices), the establishment of a proper standard of management for the tabu areas (through ongoing monitoring and training around enforcement of the CBFM plans), and the restructuring and legitimisation of the fisher association (as an important governance structure to which people can turn to resolve conflicts around illegal practice and access).

The main perceived changes following these activities were increased local awareness of allowable fishing practices and improved access to VFD support through the well-connected fisher association. Several challenges were identified on which the group felt the project could improve. These included: the material and construction design faults of FADs at some sites (making them inadequate to deal with particularly strong currents); the need for more effective conflict resolution mechanisms to allow for effective internal democratic decision-making; and the need for stronger enforcement by FAD and tabu area committees to deal with outside fishers who appear not sufficiently aware of the new regulations. As one representative from Peskarus noted:

> *There are a lot of communities that depend on the Maskelynes for food, not only our communities on Uliveo [island]. So we want the same training extended to those other areas.*

Representatives from the **Santo** group highlighted the instituting of an authorised officer position into local fisheries governance as an important achievement. Reportedly, this position provided an important (somewhat objective) brokering mechanism in decision-making. The authorised officer functions parallel to, and at the same level as, the fisher association. Other achievements included the practical training in fishing techniques, value-adding practices and other useful livelihood enhancement skills, and the development of the CBFM plans. The main changes brought about included an increased

level of knowledge on fishing regulations among fishers, and an increased 'respect for the marine environment'. Improved quality of fish products in trade was noted to have increased income, which was particularly important in the tourism-driven resource trade. Persisting challenges despite project work included: low fishing capacity due to lack of materials (e.g. fishing gears); weak performance of the fisher association in resolving management disputes around marketing of fish in Luganville' and the inability to enforce rules over tabu areas and prevent poaching.

Aniwa representatives reflected on CBFM activities and post–TC Pam recovery activities, and highlighted the most notable achievements as being: the increased diversification of fishing techniques (following training and gear handouts); a broader understanding of resource management around tabu area establishment; and the improved integration of the Area Council in local development. This was seen to have led to increased and improved livelihood opportunities, including value-adding to fish products. As one representative noted: 'previously we fished just for subsistence, but now we trade in fish also'. This development was largely due to better catch results, and improved storage capacity and market links. Particularly for vulnerable remote communities on Aniwa, such livelihood enhancements have proven to be of significant importance in overcoming impacts from natural disasters like TC Pam. The group also noted a need to improve in some initiatives, to address the lack of coordinating capacity around fish freezer management and FAD maintenance and/or replacement. Furthermore, awareness around fishery regulations reportedly remained low, with no billboards yet erected to inform the public.

Sets of priorities believed to be important for future CBFM collaborations were identified per group. In addition to the priorities presented in Table 7.4.3, each community cluster prioritised more attention towards enforcement of rules and monitoring of fishing practices in tabu areas. Poaching practices were reported across the board as a challenge.

Table 7.4.3. Immediate priorities as identified by local stakeholders to further improve CBFM practice in the future

	Priorities identified for effective CBFM development for the next 4 years
Maskelyne	- Bilateral projects (e.g: Vanuatu Coastal Adaptation Project (VCAP), Japan International Development Agency (JICA), this project) need to work together on resource management issues across the South Malekula area through the Area Council to ensure continuity - Continue extending the assistance that this project provided into the future, including in particular management trainings, improving fish storage and institutionalising management plans - Further improve awareness on resource management to leaders in and outside the project sites (including chiefs, youths, women, church etc.)
Santo	- Improve infrastructure to: (i) improve access to markets and resource areas (e.g. construction of market house and road to tabu area); (ii) minimise ecological damage (e.g. moorings in tabu area); and (iii) increase awareness of rules and regulations (e.g. billboards) - Continue establishing processes for local data collection, and further improve skills around methods to allow for local initial analysis and interpretation of data - Improve enforcement and surveillance capacity of tabu area - Strengthen the area's identity as a sustainable tourism hotspot (e.g. gain ecotourism site status)
Aniwa	- Strengthen capacity for community-based planning (e.g. necessary training to develop effective community plans independently) - Improve CBFM governance by, for example, coordinating between different external bilateral-project initiatives and empowering the role of the authorised officer with regards to community fisheries regulations - Further strengthen livelihood activities by: (i) improving fishing technology (e.g. deploying more FADs); and (ii) promoting and marketing local handicrafts

A final plenary discussion centered around the way different contexts had led to different CBFM outcomes. The contextual differences highlighted a need to address variation in developing tailored approaches in future scaling activities. Participants identified factors of importance, including involvement of the correct people in planning and implementation activities, and the importance of sound methodology for in-depth initial situation analysis that can accurately guide further design.

7.4.5 CBFM establishment I—community-level processes

The processes set out in the Vanuatu CBFM model (Raubani et al. 2017)—including the four dimensions of 'resource and environment', 'economy and production', 'institutions and governance' and 'socio-culture'—provided important guidance in community-level enquiry into priority needs and activities. Table 7.4.4 presents the most significant CBFM-related outputs in each community project site. Outputs are aggregated according to their contribution to improved governance, livelihoods, resource management and M&E.

Among the governance-related interventions, important organisational structures were established, including, most prominently, fisher associations and the appointment of authorised officers (see subsection below—'Institutional strengthening'). Furthermore, governance links between resource user groups and traditional owners, as well as between neighbouring communities, were developed to enhance local networking and awareness of rules. Awareness was also improved through billboards displaying the point of authority and management regulations around species, area, gear and temporal access limits. To enhance fish-based livelihoods and fishery production, FADs were deployed across most sites combined with training on FAD fishing techniques. Workshops were held targeting women's groups in several sites (particularly in the Santo sites, given the prominence of tourism) to train them in handicraft production (e.g. shell-crafting) and value-adding practices (e.g. production of fish cakes, known as 'fish balls', for sale to visiting tourists). All six communities formulated detailed CBFM plans wherein they clarified designated tabu areas. These areas limit access to various degrees depending on local conditions and contexts, ranging from total 3-year bans of access for harvest to regulated restriction on particular activities (see subsection below—' Community fisheries management plans'). Lastly, various monitoring activities were carried out; for example, on the trade of lobster in the tourism market at Hog Harbour and fish catch from FADs in Aniwa. Ecological surveys were undertaken on key species in Aniwa as part of recovery assessments after TC Pam to establish harvesting potential given the recent shocks to local livelihoods. Elsewhere, ecological surveys contributed to national fishery databases; for example, a trochus and green snail survey in Maskelyne. For the Maskelyne sites, most outputs span the three communities, as these were planned, implemented and monitored across all three communities with oversight of a single overarching fisher association. Resource management interventions are, however, community-specific since they follow the community management plans that were formulated per community (see subsection below—' Community fisheries management plans').

Institutional strengthening

Institutional strengthening at community level remains a focal priority action within VFD, not only within remote communities where government presence is often low but also between communities and government authorities. Developing the necessary connections and structures to allow for vertical reporting, communication and resource exchange required the formation of community-based organisations. As part of the national governing organisational structure, the project team facilitated coastal fishing communities to establish their fisher associations. This body most commonly fulfils a dual function; namely, to enhance decision-making around fisheries management (e.g. management of tabu areas and FADs), and to enhance marketability and benefit distribution of income from fish. These associations form a focal entry point for engagement between communities and VFD. They are made up of clan chiefs, representatives from community groups and religious leaders, and typically follow a standard organisational structure made up of a chair, secretary, treasurer and members. Across all sites, a total of six fisher associations were established, with four operating successfully (Table 7.4.4). In Maskelyne, one fisher association covered all three communities since all communities are in close proximity, have a long history of collaboration, and all fishers fish shared reefs. In parallel to each fisher association, an authorised officer was appointed. The role of the authorised officer is to provide objective control on processes, approve decision-making and moderate potential conflict resolution. These individuals are elected from

communities through a process facilitated by the fisher association and council of chiefs. Lastly, committees were established to provide management and coordination over particular CBFM-related interventions, such as establishing tabu areas, deploying FADS and launching shell-crafting initiatives. Committees had standard organisational structures, which are all detailed in the community fisheries management plans. Table 7.4.5 presents all community-based organisations set up during the course of the project.

Community fisheries management plans

Community management plans were developed and completed for all six of the communities across the northern focal areas. In mid-2017, all final management plans were presented to communities for final sign-off, and by the end of 2017, all communities had printed copies of their community management plans on site (e.g. Figure 7.4.8). These plans are a result of several stages of formulation that each involved extensive participatory planning and community engagement (see Section 7.4.4). The community management plans are critical documents for local leaders to legitimise their management authority in national policy over marine resource areas. The plans therefore form critical tools for local stakeholders to guide their governance and management roles.

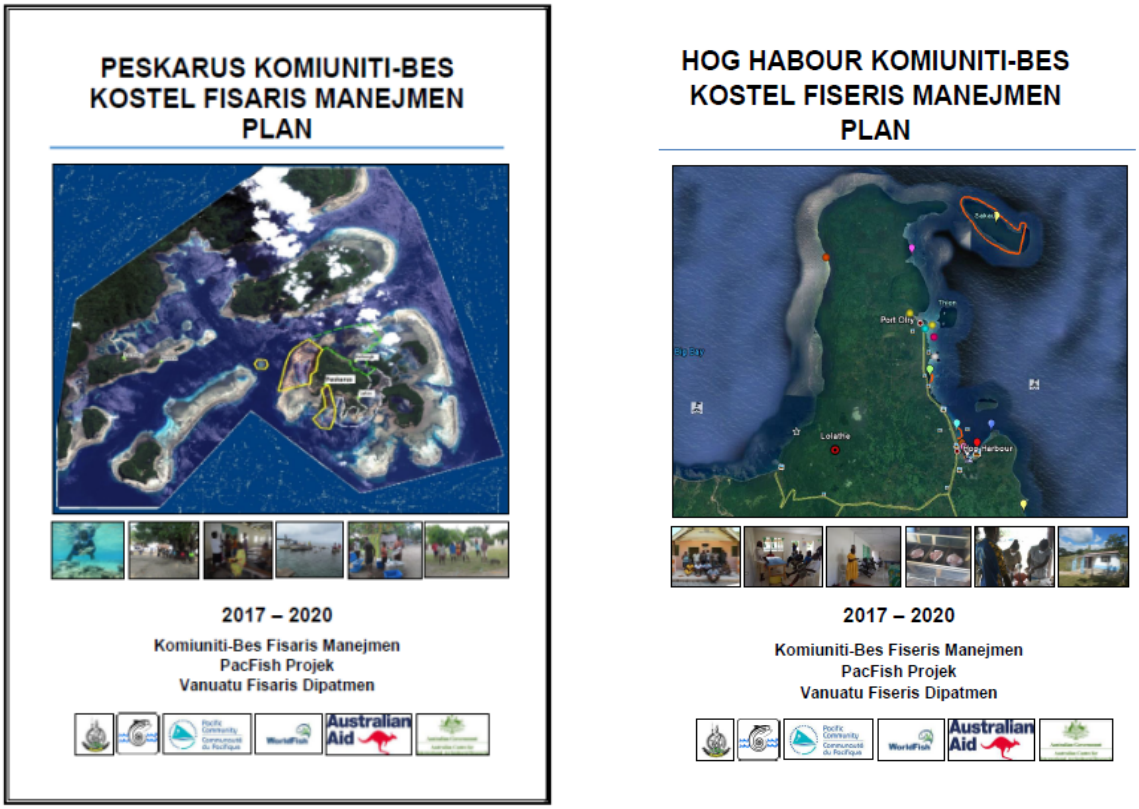


Figure 7.4.8. Examples of the CBFM plans from Hog Harbour and Peskarus communities, signed off by local leadership institutions.

Table 7.4.4. Overview of CBFM outputs per community

	Governance	Livelihoods	Resource management	M&E
Maskelyne (South Malekula) *[close proximity of Uliveo island communities meant some interventions addressed similar challenges collectively]*				
Peskarus	- Collective fisher association in place - Authorised fisheries officer appointed - Awareness billboards regarding rules and regulations around respective tabu areas installed - Governance networking on monitoring between all 3 villages	- 3 FADs deployed and used by all communities - FAD fishing technique training delivered - Women's participation in soap trade and manufacture strengthened	- CBFM plan - Tabu area established (~0.6 km^2) with 3-year ban on access	- 2015 Invertebrate and ecological habitat survey (trochus and green snail) - 2016 Subsistence catch data - Ongoing FAD catch monitoring
Pellongk			- CBFM plan - Tabu area established (~0.8 km^2) with 3-year ban on access	
Lutes			- CBFM plan - Tabu area established (~0.9 km^2)	
Santo				
Port Olry	- Fisher association in place - Authorised fisheries officer appointed	- Women's group involved in value-adding trade: 'fish balls' and shell-crafting	- CBFM plan - 7 tabu areas (~1.5 km^2): 5 for tourism (coral and fish snorkelling, and fruit bats); 1 for education (crown-of-thorns starfish management), and 1 for fish breeding	- Subsistence catch data collection initiated
Lolathe	- Authorised fisheries officer appointed - Governance network established with Sara and Matandas to control access to tabu area - Awareness billboards regarding rules and regulations around tabu area installed	- 1 FAD deployed through Matandas	- CBFM plan with involvement from neighbouring Matandas community - Tabu area established (~0.1 km^2) with 3-year ban on access	- Biweekly, tabu area monitoring by youths
Hog Harbour	- Fisher association in place - Authorised fisheries officer appointed - CBFM awareness through church and consultation meetings with the community	- Local fish market cooperative operating in the community, fishers from neighbouring villages sell fish to the cooperative - 1 FAD deployed - FAD fishing technique training delivered - Women's group involved in value-adding trade: 'fish balls'	- CBFM plan - 18 tabu areas (~3.1 km^2): 15 already in place, and an additional 3 as a result of consultation	- 2015–17 Lobster and coconut crab tourism trade data collection - Ongoing FAD catch monitoring
Aniwa*				
	- 3 fisher associations were established with 1 successfully operating in Ikaukau.	- Fishing gear provided as part of TC Pam rehabilitation - 1 solar freezer set installed in Ikuakau		- 2015 Post TC Pam impact assessment - 2015 Coconut crab population assessment
Maewo**				
Naone		- 1 solar freezer set installed		

* Tropical cyclone (TC) Pam recovery focus since March 2015

** Late inclusion into the project with the delivery and installation of solar fish freezer set

Table 7.4.5. Local community-based organizations and institutional strengthening.

	Fisher association	Activity-based committees			Authorised officer
		Tabu	FAD	Livelihood	
Maskelyne (South Malekula) *[a single fisher association and authorised officer operate across the three communities on Uliveo island]*					
Peskarus		Chair: Kensi Obedaiah *(1 secretary, 1 treasurer & 15 members)*			
Pellongk	Chair: Watsal Ron *(1 secretary, 1 treasurer, 1 manager & 23 members)*	Chair: Edley Wakon *(1 secretary, 1 treasurer & 4 members)*	Chair: Erick Simion *(1 secretary, 1 treasurer & 2 members)*		John Laket
Lutes		Chair: Kalo Kalsakau *(1 secretary, 1 treasurer & 7 members)*	Chair: Kalo Kalsakau *(1 secretary, 1 treasurer & 1 member)*		
Santo					
Hog Harbour	Chair: Ratley Iko *(1 vice-chair, 1 secretary, 1 treasurer, 1 manager & 2 members)*	Chair: Daniel W. *(1 secretary, 1 treasurer & 3 members)*	Chair: George Lol *(1 secretary, 1 treasurer & 1 member)*	Shell-crafting chair: Asnet Iko *(3 members)*	Philip Nare
Port Olry	Chair: Soter Palaud *(1 secretary, 1 treasurer & 3 members)*	Chair: Tarcisius Alguet *(1 secretary & 2 members)*	Chair: Peter Nohe *(1 vice-chair, 1 secretary, 1 treasurer & 6 members)*	Shell-crafting chair: Yollande Ceueord *(1 vice-chair, 1 secretary, 1 treasurer & 4 members)*	Soter Palaud, Leon Katty Worsel, & Maurice Alguet
Lolathe		Chair: Malaheae *(1 secretary and 7 members)*			Moses Joshua, & Judar Tal
Aniwa					
	Chair: Surah Naparao *(1 secretary, 1 treasurer & 7 members)*		Chair: Timothy *(1 vice-chair, 1 secretary & 4 members)*		Surah Naparao

Community management plans are valid for 3 years, after which they will be revise depending on the current issues facing the plan. The current series of management plans will cover the period until 2020. These plans present important guiding tools for local management and comprise the following sections:

- **Results of participatory diagnosis of coastal resources and pressures on these**: This section summarises main outputs from the various activities of the diagnosis phase, including a profile of social, economic and environmental factors affecting fisheries and local livelihoods, four–six of the main marine resource management issues of the area, and potential means to address each them (resulting from guided discussions during focus group discussions and community meetings).
- **Implementation plan**: Using the resource management issues, management action and proposed activities are presented in a table. The table also specifies who is responsible for actioning each activity and what the combined outcome of all activities should be for the particular resource management issue.
- **Management rules and associated fines**: The formulated rules over resource use and access in and around tabu areas are presented with corresponding fines. Fines typically range from Vanuatu vatu (VT)5,000 for prohibited harvest or access of a tabu area to VT7,000 if caught a second time (and VT10,000 if caught a third time).
- **Institutional structures of importance**: This section details the different committees or community-based organisations that have been established to manage and coordinate different interventions (e.g. tabu area, shell-crafting and/or FAD committees). It also includes definitions of the committee roles of chair, vice-chair, secretary, treasurer and members.
- **Tabu area fees for activities**: These fees clarify what people from outside are required to pay for access to the tabu area. Fees can vary according the kind of activity (e.g. tourism, research, filming and anchorage fees). Furthermore, clarification is included of how the revenue for each fee is divided (i.e. who gets/manages the income); often involving the land owner and the community management committee.
- **Terms of reference for the management plan**: Important parameters are defined under which implementation of the management plan should be carried out (e.g. the time period for which it is valid and its accordance with VFD as the ultimate authority in fisheries).
- **Process of reporting tabu area violations**: The sequence of relationships and responsibilities that each institution has are presented, to guide community leaders in the process of documenting violations, processing cases and passing sanctions on any violation to tabu area regulations.
- **National fisheries regulations**. A list of rules and regulations are defined about what species may be harvested (e.g. turtle, invertebrates, sea cucumber, aquarium species, lobster, coconut crab etc.), their size and seasonal limits, and what the maximum penalty is for violation.
- **Clarification of community mandate to enforce**: This section identifies species and activities that the community has been granted authority over to manage and pass appropriate sanctions (e.g. fishing gear limits, need for fishing permit, prohibition of beach seine fishing, minimum mesh sizes for drag and/or cast nets, prohibition of bomb fishing or other destructive fishing practices etc.).
- **Sign off**: Local leaders and important community representatives, as well as relevant authorities at provincial level, sign off on the plan's content in order to legitimise the document. VFD also registers its approval through this signing.

Aniwa's post–tropical cyclone Pam recovery

This subsection summarizes outputs from recovery work carried out in communities and coastal fisheries following TC Pam in March 2015. The outputs presented here result from

activities a carried out as part of this project and a sister ACIAR project, FIS/2015/031. The findings draw from Eriksson et al. (2017).

TC Pam was the largest natural disaster to impact Vanuatu. In the wake of natural disasters like TC Pam, improving access to fisheries resources can provide a coping strategy for food security while other food production systems or livelihoods are disrupted. Having well-maintained and managed fisheries and early fisheries post-disaster interventions can play an important role in community recovery processes. Directly after TC Pam, a number of development projects were initiated in Vanuatu. The original activity schedule for this objective was revised to accommodate the unforeseen duplication of activities. For example, several other organisations and donors focused efforts on the implementation of fisheries and development interventions to aid community recovery. Fisheries interventions included the provision of fishing gear and the deployment of FADs. Hence, we modified our objective to assess the status and needs of households post–TC Pam through community focus group discussions and to implement fish catch monitoring at FADs to assess the role of FADs in coastal fisheries recovery.

Socioeconomic surveys were done between 25 August and 29 September 2016 at 10 sites across Shefa, Tafea, Malampa and Sanma provinces in Vanuatu (almost 18 months after TC Pam). Six of the sites were considered impacted by TC Pam and four of the sites were considered unimpacted. The key findings from the surveys highlighted the profound impact on the terrestrial food and income-generating systems in rural Vanuatu communities. While TC Pam clearly had more significant acute impacts, it was the prolonged El Niño for over 18 months that perhaps caused the greatest hardship for subsistence communities (see Figure 7.4.9. for a graphical summary).

Core impacts from the combined impacts of TC Pam and the El Niño were: (i) damage to houses and community infrastructure; (ii) loss of most garden crops (cassava and banana were the most resilient for replanting); (iii) loss of cash crops (e.g. kava, coconut, cocoa, sandalwood); (iv) loss of pandanas leaves for weaving; (v) critical water shortages (placing increased burden on people's time as they had to travel further to obtain it) and (vi) loss and/or reduced productivity of fruit trees.

Impacts on the marine system appear to have been relatively minor, with some reported cases of increased crown-of-thorns starfish due to El Niño–driven warm waters, some wave damage to fringing reefs from TC Pam and short-term impacts on fishing efficiency due to dirty waters in the weeks following TC Pam. However, in all cases, fishers reported that fishing returned to normal (by the end of 2016) and no ongoing legacy impacts from TC Pam were noted.

Marine management initiatives that existed prior to TC Pam appear to have supported post-disaster recovery in some cases. An immediate opening of the full closure of sea cucumber harvesting throughout Vanuatu for 4 months provided an opportunity for a rapid injection of income into struggling communities. However, the original quota of 21 tonnes of sea cucumber to be exported under this temporary opening was exceeded, with 71 tonnes exported in 2015, worth an estimated US$3 million. In addition, the Government of Vanuatu recommended that communities opened their marine protected areas (MPAs) to provide a source of food and income. In some cases, communities did open their MPAs for several months after TC Pam and expressed that this reservoir of fish was important for their short-term survival. In other sites, 'MPAs' were more traditional closures linked to specific seasonal events (e.g. yam harvest) and, as such, TC Pam did not alter their normal schedules for opening/closing of tabu areas.

FADs have the potential to provide an alternative source of fish while allowing coastal reef fisheries to recover from disasters such as TC Pam. In this case, despite significant resources being provided for post–TC Pam FADs in Vanautu, a lack of human resources to deploy the FAD materials provided meant the desired outcome was not reached, at least not in the short to medium term. A similar scenario was identified with the provision of material

for communities to rebuild common infrastructure lost (e.g. schools and community halls), while households were left to rebuild their own homes with limited material and human resources to do so. The community assessments highlight that while the provision of materials is of great importance in a post-disaster context, donor and disaster recovery teams need to consider the broader limitations on human resources in the recovery phase.

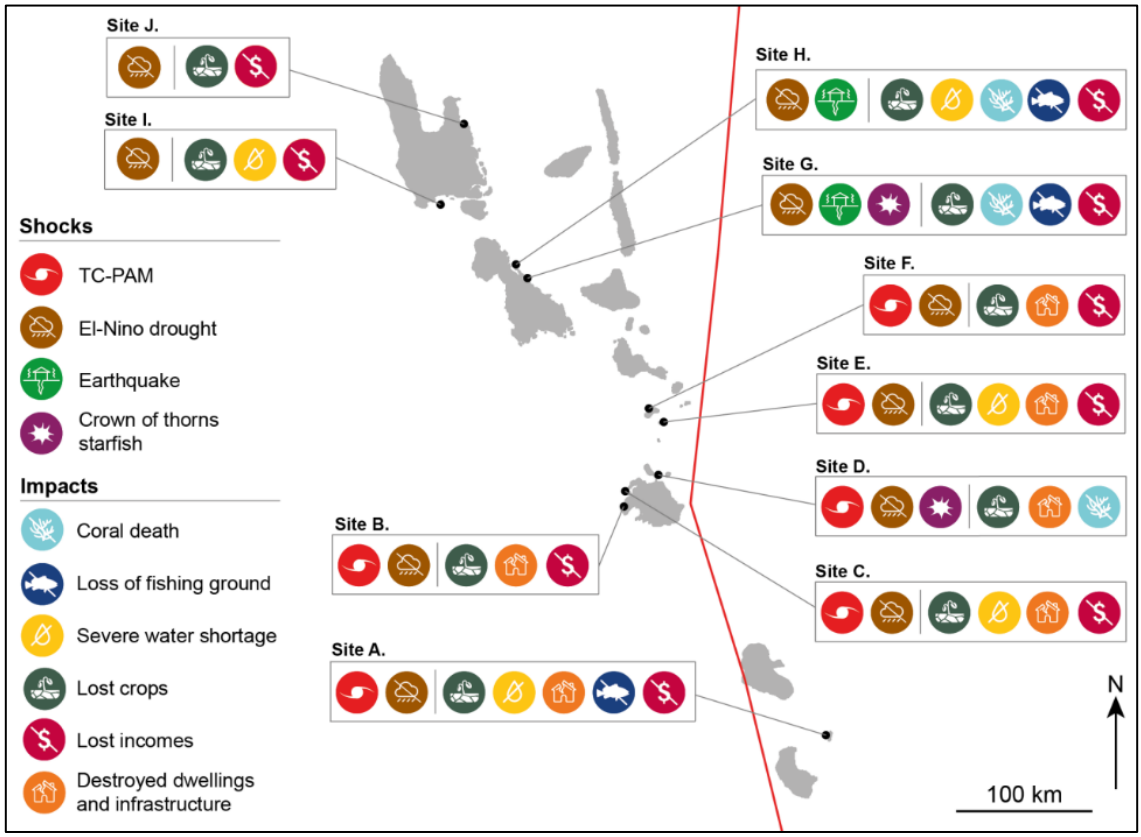


Figure 7.4.9. Shocks that occurred in 2015-2016, and their impacts on daily life, identified by focus group participants at 10 sites in Vanuatu in 2016. The red line through the map represents the approximate path of category 5 tropical cyclone Pam that hit Vanuatu in March 2015. Note that the map does not contain the northern Torba province, as there were no study sites there (Eriksson et al. 2017).

7.4.6 CBFM establishment II—national and subnational capacity development

Community support, regardless of the project's specific CBFM context, must involve a focus broader than just regulating use of marine resources. This became further evident from community diagnosis processes which identified, and in some cases prioritised, issues outside fisheries management. It is unreasonable to expect VFD or individual NGOs to have the range of technical capacities needed to address all concerns or community-prioritised activities. For this purpose, networked partnerships that cover the full breadth of prioritised issues and concerns are needed. There are several international and national NGOs operating in Vanuatu, which offer opportunities for innovative partnerships to support communities across several sectors. Community support staff at national agencies have a role in facilitating the co-management process and delivering services. However, staff turnover and inadequate operational resources for coastal fishery extension services remain common organisational challenges in Vanuatu, as well as in the region (Govan 2013, 2015). Partnerships developed as part of this project have offered scope for adding further capacity to VFD's central responsibility, as it expands the network of agencies and NGOs active in the field of CBFM. Institutional partnerships furthermore offer opportunities to share lessons learned across the multiple cases where different organisations are working. The various

stakeholder meetings organised during the course of the project (as detailed in Section 7.4.4) have further highlighted the value of cross-sectoral and inter-agency knowledge exchange.

As part of the objective to build capacity within VFD, the recruitment of two project officers at the start of the project not only yielded useful CBFM outcomes by VFD, but further enhanced competence in VFD for CBFM. Both project officers commenced their positions with impressive skill sets in the field of CBFM (see profiles below). Their professional portfolios have been further shaped through their working partnership with international projects of WorldFish and ANCORS. Co-developing the design of data collection procedures, publishing work and engaging in site exchanges have all enriched their community engagement and technical fisheries management capacities.

Professional development profiles of recruited project officers

Both members of the Vanuatu in-country project team were awarded the SPC director general award in 2015 in reconition of their contribution to furthering knowledge and practice on CBFM in the Pacific.

Pita Neihapi is a graduate from the University of South Pacific, Laucala Campus (Suva, Fiji) with a BSc in Marine Science. Prior to starting on the project, Pita worked on CBFM as part of a MacArthur Foundation-funded project. Originally from north-western Malekula, his familiarity with this region and with Santo region provided existing networks. Pita's professional development saw him participate in an exchange to Kiribati in 2016, to work with project staff on CBFM planning and to draw from Vanuatu experience in furthering development in Kiribati. Pita also participated as part of an SPC team at the Forum Fisheries Committee meeting, held in Maroochydore (Queensland, Australia) on 5–6 July 2017. His presentation addressed various pressures on Vanuatu's coastal fisheries resource stocks as part of a session devoted to the Coastal Fisheries Report Card system.

Rolenas Baereleo Tavue completed her education at Matevulu College in Santo, and had over 10 years of experience working in the Department of Environmental Protection and Conservation under the Ministry of Lands and Natural Resource before starting with the project in 2014. In addition to facilitating community outreach activities, Rolenas took the lead on the gender components of research in the project. She received an Australian Award in 2015 through her work in the PacFish project to attend Reef Ecology Management course in Townsville. Her exposure to research in collaboration with senior scientists at WorldFish resulted in her leading a publication on CBFM formation in Vanuatu (Baereleo Tavue et al. 2016).

7.4.7 Gender in CBFM processes

In the project output of Raubani et al. (2017), specific note is made of the importance of including explicit gender dimensions in CBFM planning and implementation in Vanuatu. Social inequalities associated with gender affect access to resources, networks and assets. For example, women and men in Vanuatu use different parts of the coastal seascape according to their differentiated access to resources and gender norms—women spend more time on the reefs gleaning and fishing compared with men. This exemplifies the importance of the inclusion of women in the management of those environments; however, in past CBFM projects, the representation of women in decision-making for management, and documentation of their views, has been limited. Anecdotally, it is often seen as more difficult to work with women in communities because they are typically regarded as cooks, whereas men attend decision-making workshops and meetings. Approaches that seek to catalyse critical questioning of norms and actions in response to them must also be sensitive, so as not to exacerbate them (Cohen et al. 2016). It is recommended that seeking partnership with established women's groups and networks in the village, such as the female resource monitors, the committee against violence against women (CAVAW) network, and the government Department of Women's Affairs can be a way in which VFD and partners can be more deliberate about gender.

As part of project activities, attention was given to including women in community meetings and decision-making. Some alternative livelihood activities targeted women as recipients of

training activities, given their role in trade and fisheries. For example, the shell-crafting and fish value-adding workshops organised in the Santo community sites included women as the majority of participants. This was done to counter trends of common exclusion of women in local decision-making. In many village contexts in Vanuatu, often only chiefs and other male leaders attend meetings with government or NGO visitors. Moreover, meetings are called when women are occupied with managing home affairs. A common perception by women was that chiefs make the decisions and that they have no voice, as we came to learn during the first and second rounds of community meetings. As a result, in our early engagements in 2014, the participation of women was relatively low. However, our project had an emphasis on encouraging wider participation and consultation with women, youth and people with disabilities. In the first consultation meeting in Port Olry on Santo, the president of the women's association said: 'As representative of women in this village, I would like to say that this project will help us women and our children, therefore I am in full support of the project to be implemented in this area'. Initially in Port Olry, only the president of the women's association attended; however, in the later phases, women's participation in project activities increased substantially. Particularly in Port Olry, once women's attendance increased, so did their vocal participation in meetings (i.e. more so than in the Maskelyne sites). We attributed this to the higher levels of women's education and their prior experience with external project activities.

In the facilitation of workshops and consultations, participation of women and youth was encouraged through a number of strategies. Community invitation letters and phone calls clearly articulated that women and youth were invited and that their attendance was valued. We were flexible in when we started meetings to allow a satisfactory number of women and youth to be present, and we considered women's availability in the timing and selection of venue. Most workshops were facilitated by at least two facilitators, one male and one female, where the female facilitator spent more time with the women in a separate group. The female facilitators deliberately made the most of break times, meal times and evenings to engage women in discussions and hear their perspectives. The participation of women increased and the substantial proportion of women amongst attendees at meetings led to cases where revisions to the management plan resulted. As one woman noted in discussions:

> *We women use resources differently, and we collect more species from the reef compared to the men. We spend so long in the water to try our best to get fish for our meals. (Female participant, Peskarus village)*

Amendments based on the women's input to include considerations for invertebrate capture were passed into the first draft of the Peskarus management plan, which had previously focused predominantly on fish and resources of economic value. Women noted it was common to use iron rods to break reefs while collecting octopus, but that their catches were starting to reduce due to this destructive practice. Discussion among women resulted, with some voicing concerns that a ban on this practice could lead to loss of income, while others advocating for the ban to ensure the longevity of octopus fishery in the newer version of the management plan. Ultimately amendments were passed which included a ban on the use of iron rods was included in the management plan. Such active inclusion in discussions among women indicates positive developments in gender representation.

Women also began to undertake a range of different other activities in the CBFM activities (i.e. roles considered 'outside of the norm'). For example, in Pelongk village (Maskelyne), one woman provided voluntary help to collect fish data from artisanal and subsistence fisheries as part of monitoring efforts; and on Santo, there is now considerable representation of women in the Big Bay Fishers' Association.

supports these observations and shows the absolute and relative increase in women's participation during the first 2 years of the project.

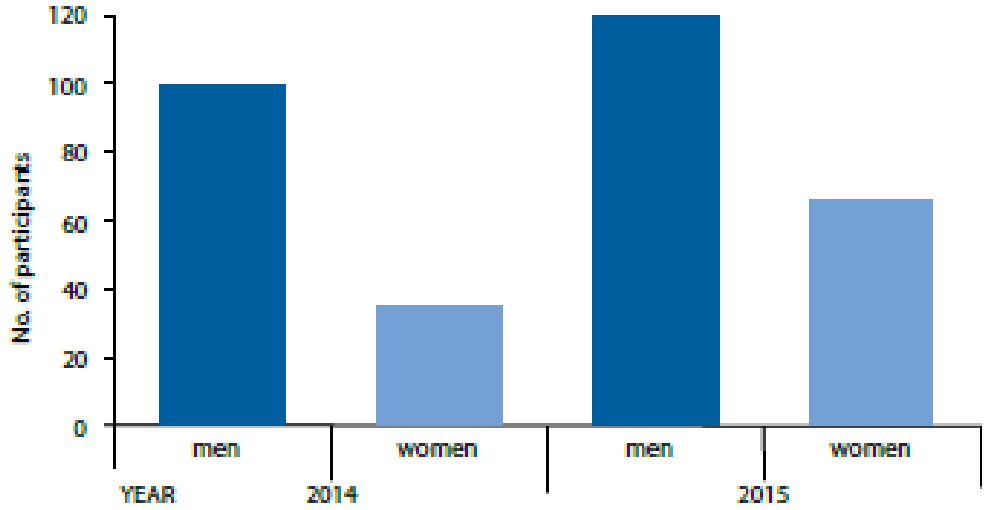


Figure 7.4.10. Number of participants in all six main community project sites and Aniwa combined, indicating an increase in women's participation into later stages of project implementation (Tavue et al 2016)

7.4.8 Reflections on the spread of CBFM

The second phase of CBFM development (to be implemented under the ACIAR-funded project FIS/2016/300) strongly drives an objective to spread CBFM from the sites targeted in this project. This will see expansion of CBFM from the existing 8 sites where activities have been initiated to an additional 12 sites across Vanuatu. There are opportunities for expansion across two strategies: (i) expansion within existing focal regions (i.e. Santo, Maskelyne and Aniwa) which would see the inclusion of more communities to further develop regionally distinct networks of CBFM; and (ii) establishment of new sites in new regions where no CBFM work has yet been carried out. The former strategy provides opportunity to facilitate networks of CBFM that are tailored to particular contexts and conditions that characterise a region (e.g. tourism in Santo or fish marketing to Port Vila in Maskelyne). In that, the current inter-community governance networks (involving project sites and non-project sites) that have been established over the course of CBFM development during the project form solid institutional foundations on which further expansion can build. The latter strategy likely provides greater outputs towards spreading CBFM across the country; however, it would involve greater investment in time and resources as experienced in the initial diagnostic phases of this project.

In Vanuatu, a challenge lies in the widely distributed nature of coastal villages in the outermost islands. With increased remoteness, population density and village size become small, while the investment to establish CBFM becomes higher. Furthermore, a critical obstacle to expansion of CBFM will be to balance the distribution of support and resources over new sites (where CBFM is yet to be established) and existing sites (where transitions to increased independence in planning, management and monitoring responsibilities will be vital but where support is still imperative). As emphasised by Raubani et al. (2017), alignment of activities across different bilateral initiatives (e.g. those undertaken though the Vanuatu Coastal Adaptation Project (VCAP), JICA etc.) will be crucial towards inclusion of coastal communities in a national CBFM network.

7.5 Objective 5: Enhance understanding and mechanisms to accelerate scaling-out of CBFM in the Pacific region

This section summarises activities and outputs from Activities 5.1, 5.2 and 5.4—see Section 6 for tabulated activities and milestones. Activities and outputs focused on examining practices and gaps in knowledge regarding scaling of CBFM. These more regional analyses included theoretical work completed by the postdoctoral fellows co-funded by James Cook University. Six thematic areas appeared critical to developing understanding of what such scaling involves and, given the gaps in CBFM literature, warranted further research:

(i) social networks
(ii) leadership
(iii) the New Song and theories of change
(iv) policy coherence across governance scales
(v) transformation

7.5.1 Social network research

The summary draws primarily from the following published outputs.

Published outputs

Blythe J., Bennett G., Cohen P., Moveni M. and Kwatelae A. (2017). Five principles for network success in Solomon Islands. Penang, Malaysia: WorldFish. Program Brief: 2017–04.

Blythe J., Cohen P., Abernethy K. and Evans L. (2017). Navigating the transformation to community-based resource management. Pp. 141–156 in 'Governing the coastal commons: communities, resilience and transformation', ed. by D. Armitage, A. Charles and F. Berkes. Routledge: London.

Output 'in preparation'

Blythe J., Cohen P. and Eriksson H. (in prep). Do networks build collaborative governance capacity? (Target journal: Journal of Environment and Development)

Social network research

Cohen et al. (2012) critically informed the research agenda on social network analysis for the project. In this publication, the authors examined two configurations of a governance network in Solomon Islands that were developed explicitly to improve adaptive co-management of coastal ecosystems. The first configuration described collaborative relationships among stakeholders in implementing management, while the second captured the knowledge-exchange relationships facilitating learning among stakeholders. The publication showed how social network analysis (SNA) provides methods to systematically quantify: (1) relations between actors; and (2) resultant network structures. In their results, network structure and function were examined and related to environmental governance performance. The concluding recommendation from this work reiterated that efforts to form effective governance networks in practice benefit from reflexive, iterative approaches to learn what level of investment in networks is sustainable while delivering sufficient added value to adaptive co-management itself.

In Solomon Islands, networks consisting of multiple partners are gaining momentum because of their potential to improve the capacity of communities, NGOs and government stakeholders to achieve their goals. Many organisations see the value of creating, leading

and being a part of networks, and there are some examples of where these investments have led to bigger or more widespread outcomes than organisations could have achieved on their own. Nevertheless, strong networks can be difficult to establish and maintain, and they often come at a considerable cost of time and money to bring people together. Determining and sharing lessons from networks was seen to help to overcome these and other challenges and to avoid recurrence of failures while delivering optimal results into the future.

In November 2016, 24 experts, representing eight multi-actor networks and more than three decades of networking experience, met in Western Province of Solomon Islands. Each of the eight networks (Table 7.5.1) included different agencies and had a slightly different goal, but all of them shared a similar belief that if they worked together they could achieve their goal more quickly or effectively. Over 2 days, the participants shared lessons learned and identified principles to guide improved practices for networks in Solomon Islands.

Table 7.5.1. The eight networks that bring together information and promote collaborations between multiple organisations to maximise environmental and development outcomes in Solomon Islands (Blythe et al. 2017a).

	Network	Est.	Mission
National	**Development Services Exchange (DSE)**	1984	To strengthen effective NGO coordination. This will be achieved through advocacy, collecting and sharing information, capacity building and enhancing relationships with members and stakeholders. This will ensure that accredited, accountable and transparent NGOs and community organisations are working toward equal and sustainable development.
	Solomon Islands Locally Managed Marine Areas (SILMMA)	2003	To help communities manage/conserve marine resources to maximise benefits and ensure food security by sourcing funds, facilitating, coordinating and providing information, building capacity and empowering partners through traditional and scientific approaches.
	National Coordination Committee (NCC)	2009	Established as a mechanism to coordinate and promote country-level implementation of the national and regional Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) plans of action.
Provincial	**Gizo Environment Livelihood Conservation**	1998	To protect, conserve and manage the species and their habitats within the Gizo Conservation and Protected Areas to help ensure food security, cultural identity and income for future generations.
	National Resources Development Foundation (NRDF)	2004	To help people in Solomon Islands recognise the value of natural resources. This will be accomplished by actively supporting and engaging in sustainable natural resource management opportunities to improve and secure the social and economic future through sustainable forest management and livelihood programs.
	Malaita Province Partnership for Development (MPPD)	2012	To build a strong partnership and collaborative effort to oversee the implementation of programs and projects that are significant for meaningful development in Malaita Province.
Community	**Tetepare Descendants Association (TDA)**	2002	To protect and manage Tetepare Island and its resources.
	Kolombangara Island Biodiversity Conservation Association (KIBCA)	2008	To protect Kolombangara Island's rich marine and forest biodiversity and to educate, promote and encourage sustainable management of natural resources through viable economic (livelihood) and social ventures for communities.

Building on this work, the project output by Blythe et al. (2017e) distilled outcomes from the workshop into five principles for successful network formations for environmental governance in Solomon Islands. These included: (i) creating clear and shared objectives; (ii) promoting regular communication; (iii) sharing expertise and resources; (iv) fostering strong leadership; and (v) thinking long term (Figure 7.5.1). These principles were developed to help members of networks ensure that their investments (in terms of time, skills and resources) in those networks have an impact that is dramatically greater than the sum of their individual efforts.

Principle 1: Create clear shared objectives
- Develop common goals, terms of reference, work plans and clear member roles

Principle 2: Promote regular communication
- Update members via multiple methods (e.g. face-to-face meetings, e-mails, Facebook, etc.)

Principle 3: Share expertise and resources
- Source technical assistance through network members and share logistical costs/resources

Principle 4: Foster strong leadership
- Support, train and build the capacity of leaders at all levels of the network

Principle 5: Think long-term
- Create conditions that support the network beyond any single member (e.g. develop a funding plan)

Figure 7.5.1. Principles for network success drawn from the experiences of eight conservation and development networks in Solomon Islands (Blythe et al. 2017e)

Although networks have formed throughout Solomon Islands to tackle the challenging tasks of environmental management and sustainable development (following recognition that the challenges and solutions are more complex than any one organisation can deliver), working as a network has its own set of challenges. In part through initiatives like this, networks across Solomon Islands are overcoming obstacles and achieving environmental and development goals. It is expected that by applying the five principles, networks can contribute further to a stronger, healthier and self-reliant environmental governance landscape.

In another publication that is currently in its final stages of preparation for submission to the Journal of Environment and Development, Blythe et al. (in prep) evaluate the extent to which a multistakeholder network contributed to four dimensions of collaborative governance capacity: individual, relational, organisational and institutional. They draw from a qualitative case study in Solomon Islands. Their study responds to the trend that governments and NGOs are increasingly investing in multistakeholder networks in an effort to build capacity for governing complex collective-action problems. However, the empirical evidence on the

influence of networks on governance capacity remains limited. This shortfall challenges managers to know whether investing in networks is worth the time and effort, particularly in context of limited resources.

Blythe et al. (in prep) found the network made moderate contributions to organisational capacity by providing formal structures necessary to facilitate effective communication and increased access to resources. However, the results indicate that cooperative skills (individual capacity), social connections (relational capacity) and collaborative practices and norms (institutional capacity) remained limited despite engagement in the network. After 5 years of investment, the network was ultimately unable to remain functional. Their analysis suggests that the continued proliferation of collaborative networks without targeted investment in capacity building is likely to lead to unsatisfactory outcomes. The study is expected to be published in early 2018.

7.5.2 Leadership and CBFM

This section summarises activities and outputs from Activity 5.1—see Section 6 for tabulated activities and milestones. We draw here primarily on three studies that were carried to advance theoretical understanding of 'leadership' and its role in NRM. These studies were carried out through collaborations between WorldFish staff and researchers from the University of Exeter and University of West England. Extensive literature reviews resulted in two publications: Evans et al. (2015) and Case et al. (2015). Recommendations generated in these initial publications drove the subsequent empirical-based study presented in Evans et al. (2017).

We also reflect on the important lessons from this environmental leadership research to examine their implications for CBFM; for this we draw from Cohen and Steenbergen (2015) (see Section 7.1.1).

Published outputs

Case P., Evans L.S., Fabinyi M., Cohen P.J., Hicks C.C., Prideaux M. and Mills D. J. (2015). Rethinking environmental leadership: the social construction of leaders and leadership in discourses of ecological crisis, development, and conservation. Leadership, 11(4), 396–423.

Cohen P. and Steenbergen D. (2015b). Social dimensions of local fisheries co-management in the Coral Triangle. Environmental Conservation 42, 278–288.

Evans L.S., Cohen P.J., Case P., Hicks C.C., Prideaux M. and Mills D.J. (2017). The landscape of leadership in environmental governance: a case study from Solomon Islands. Human Ecology 45(3), 357–365.

Evans L.S., Hicks C.C., Cohen P.J., Case P., Prideaux M. and Mills D.J. (2015). Understanding leadership in the environmental sciences. Ecology and Society 20(1), 50.

Results and discussion

The review of environmental leadership research by Evans et al. (2015) included academic papers from the past 10 years that were selected on the basis of their relevance to critical thinking around the effective implementation of environmental governance and climate change policy. The review was carried out in response to the trend in the sustainable NRM literature whereby a universally accepted definition of leadership is applied. This definition is coupled with assumptions that are too often not critically examined. Much of the environmental leadership literature, for example, focuses on leadership as something a person embodies. Leadership is therefore often conceptualised in association with an individual or formal position, whereby particular competencies are detailed. These

competencies can be generally categorised as: (i) attributes and personality traits (e.g. intelligence, charisma, strength, reputation etc.); (ii) capacity to function and strategise (e.g. sense making, knowledge building, innovating, trust building, networking, navigating big picture from detailed scale etc.); and (iii) style of leadership (e.g. operating with defined vision). Only a subset of the literature highlights interacting sources of leadership, disaggregates leadership outcomes or explicitly evaluates leadership processes in detail; all of which, the authors argue strongly, warrant a concentrated focus on understanding and conceptualising what constitutes 'leadership'.

'Leadership' is consistently considered to be one of the key requirements to achieving successful NRM outcomes. However, in the material reviewed, it was rarely identified as singularly important; rather it was more often noted in combination with other important factors, including social capital, defined rights, participatory processes and regulatory tools. In particular, the roles of institutions, social networks and links to political leadership were identified as being imperative in meeting particular objectives.

Following from this, it was noted that leadership is often framed from a strongly normative position, implying that its effectiveness or success is thereby measured in the context of particular pre-defined objectives. While there is certain value in providing a frame of reference or benchmark based on collectively accepted norms from which one can distinguish good from bad practice (i.e. sustainability principles), such perspectives can negate, or at least underplay, oppositional leadership. Organisations, institutions or individuals in positions of leadership that are in opposition to an objective are thus often not recognised in similar terms to those in favour. As such, leadership is typically depicted as an unequivocal good, and its importance is often asserted rather than tested.

Building on the Evans et al. (2015) review, the same collaboration yielded a second literature review by Case et al. (2015). This review aimed to highlight the centrality and importance of environmental science's construction and mobilisation of leadership discourse, and from that offer a critical analysis of environmental sciences' deployment of leadership theory and constructs. The authors argued that environmental leadership research reflects rather narrow framings of leadership. An analytical typology proposed by Grint (2005) was employed to demonstrate how any singular framing of environmental leadership as person, position, result or purpose is problematic and needs to be supplanted by a pluralistic view. An important observation made by the authors was that *research studies* employing taken-for-granted conceptions of leadership often find it to be a more significant factor (in statistical terms) than do *managers* who routinely observe, and are embedded within, the messy workings of governance on the ground.

The Case et al. (2015) review moreover argued that crisis narratives around the state of resource stocks, environmental degradation and anthropogenic pressures tend to polarise various 'agents of change' as either conducive or adverse towards sustainability. In doing so, nuances are overlooked and potential unconventional entry points for alternative leadership to contribute to effective governance are missed. Accepting pluralistic rationales on the topics of environmental management/sustainability is imperative. The paper concludes by highlighting key areas for improvement in environmental leadership research, with emphasis on how a political ecology of environmental crisis narratives contributes to a more critical body of research on leadership in environmental science.

Solomon Island leadership landscape: In response to the call in the previous reviews for more empirically based work on environmental leadership, Evans et al. (2017) carried out a case-based study examining the Solomon Islands' leadership landscape in the context of environmental governance. In particular, the study focused on Solomon Islands' engagement in the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF). The study firstly determined the various sources of leadership in addition to key individuals and organisations. Secondly, it established how leadership varies across three different CTI-CFF goals—food security, biodiversity conservation and climate change

adaptation. Thirdly, it determined whether, and how, leadership can also disrupt or stall progress towards improved environmental governance outcomes.

A participatory network mapping activity was carried out by drawing on face-to-face expert interviews that were used to map leadership influences on the respondents' organisations in relation to the three CTI-CFF goals. Four leadership actants ('influencing agent' of a particular cause) were considered to be influential; namely, (i) organisation and networks; (ii) donors; (iii) policies and laws; and (iv) beliefs and values. Respondents' ranking of the relative influence of each of these four types of actants was noted and analysed (see Figure 7.5.2 for an example of the participatory mapping result).

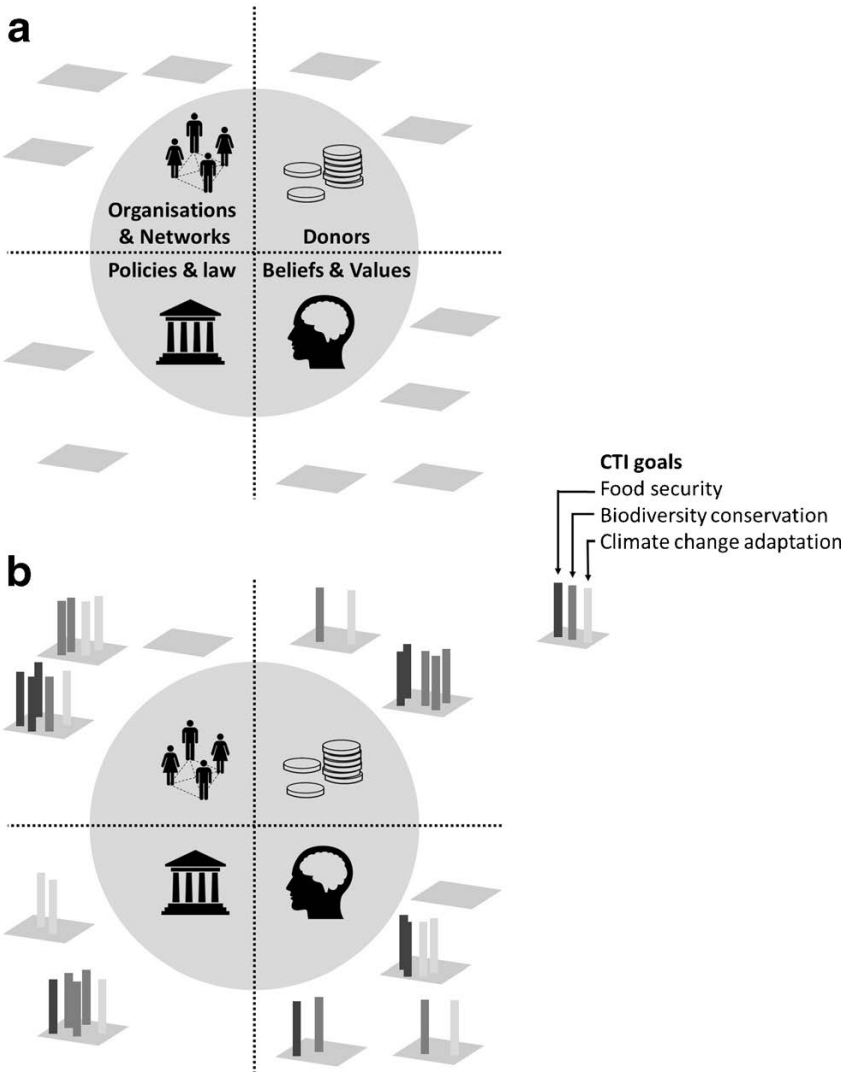


Figure 7.5.2. A schematic of the participatory method used with respondents in the study by Evans et al. (2017) to identify different sources of leadership and their relative influence on the three CTI-CFF goals: (a) illustrates the initial map of actants considered to be influential; and (b) depicts how respondents ranked the relative influence of actants on these goals

The study illustrated the potential of broader and more nuanced understandings of leadership in environmental governance, in that the importance of the institutional environment supporting good leadership is too often neglected whereas the impact of individuals and "champions" is overemphasised and normative.

Implications for CBFM: Relating these leadership research findings to those from the study by Cohen and Steenbergen (2015b) on social dimensions of fisheries co-management connects several observations relevant to leadership in CBFM work:

- *The importance of recognising different forms of leadership, regardless of their alignment to defined (sustainable fisheries) objectives*—contested interests, and the negotiations that endeavour to find accepted middle ground between them, are often embodied locally by differences in formal and informal leadership structures. For example, customary leadership positions (defined by inherited right) versus democratically elected leadership positions (defined by majority choice of a particular group of people) often enjoy somewhat equal legitimacy in a community, but contest one another in fisheries management. Understanding the norms and values that are associated with those different forms of leadership potentially catalyses more harmonious co-functioning of the two.
- *CBFM's necessary commitment to adaptive capacity is emphasised given the diverse and dynamic nature of leadership*—for example, the successful 'change of guard' of key leaders (whether as result of organisational rules, shifts in institutional context or changes in personal circumstances) are often critical events that determine continued functioning of a system.
- *The importance of entrepreneurial capacity and conducive context for successful negotiation of competing interests*—successful cases of CBFM rely on active alignment of political tools, resources and people to match local institutional conditions.
- *Experiences in CBFM echo the arguments made in the leadership research review regarding the roles of influences of, for example, religious institutions, markets and modernisation in shaping decision-making by leaders*—appreciating the embeddedness of CBFM management systems in larger systems, and their dialectic links to (social, economic, political and physical) forces at different scales, is imperative to anticipating change and managing sustainable responses.

Conclusions and recommendations

To summarise, environmental leadership research is beginning to critically analyse (1) multiple, interacting leaders, (2) leadership practices and processes, (3) leadership in different contexts and (4) leadership outcomes from different perspectives.

The reviews have identified an important subset of the environmental leadership scholarship that represents the state of the art. This includes research that: (1) considers leadership as a value-neutral variable, so does not assume a priori that it is either good or bad but treats this as an empirical question; (2) queries followers' perceptions of leaders and disaggregates outcomes; and (3) conceptualises leadership as a process and empirically investigates leadership tactics. The final point relates to a suggested conceptual shift of 'leadership' towards encompassing notions of entrepreneurship. This would require gaining more understanding from empirical cases about what conditions, contexts and attributes allow for effective mobilisation of resources and relationships towards desired change. Research questions need to enquire into who these entrepreneurs are and how they practice their craft or 'mobilise the central skills' to sense-make, build partnerships, resolve conflicts and leverage resources. This presents an important new research agenda in the field of leadership in NRM (and CBFM).

Leadership research that is focused on individuals underplays not only the importance of institutional contexts supporting the emergence of leaders but also the potential for more distributed forms of leadership. There is a need to develop the body of work on environmental leadership studies to incorporate more attention to the dialectic relationship between leadership and context; that is, to understand what type of leadership is effective in particular situations and how leadership itself shapes context.

Building on, for example, the network data presented in Evans et al. (2017) provides the kind of foundations for interesting research extensions that use longitudinal and ethnographic methods to investigate how different forces and actors (i.e., actants) influence the concepts, mandates, approaches and actions of key organisations. Of particular interest is how non-human entities like policies and discourses act as sources of influence independently of the human actors and organisations that formulate or construct them.

Considering these perspectives, strengthening leadership in practice may not be limited to a focus on key individuals, which risks making system change and progress vulnerable to loss of these individuals. Instead, investment should be directed towards forming webs of reinforcing actants that, in combination, constitute 'leadership', and ultimately both facilitate and direct collective action.

7.5.3 The New Song and theories of change

This section summarises activities and outputs from Activity 5.2—see Section 6 for tabulated activities and milestones.

Published output

Hanich Q., Govan H., Andrew N., Amos M. and Chapman L. (2017). Enabling government—empowering communities: national implementation of the New Song. Working Paper 2. 10th SPC Heads of Fisheries Meeting, Noumea, New Caledonia, 14–17 March 2017. Pacific Community (SPC): Noumea.

In 2015, SPC launched an initiative to boost the contribution of coastal fisheries to food security in the Pacific region—the New Song—as detailed previously (see 'Key issues addressed' in Section 3). The New Song is a significant policy outcome for the region. While the project does not claim the New Song as an output, it made significant contributions to its development and ongoing implementation:

- As a project partner, named SPC Fisheries, Aquaculture and Marine Ecosystems Division staff made significant contributions to the New Song, including Amos, Raubani, Jimmy, Chapman.
- Amos, Chapman, Andrew and Hanich served on the organising/steering committee.
- Non-SPC project staff (Andrew, Campbell, Cohen, Delisle, Schwarz, and Sulu) participated in the workshop, including leading breakout sessions and summarising conclusions.

The advent of the New Song in mid-2015, two years into the project, precipitated major change in the project and guided both this project and the design of follow-on project FIS/2016/300 which was designed to address all eight New Song outcomes. Major outputs from the project that respond and contribute to the New Song include:

- New Song results framework and impact assessment
- Analyses of policy coherence with other regional and global instruments (Section 7.5.4)
- Regional Gender toolkit

The New Song may be framed as a theory of change (ToC) and indeed the phrase 'pathways to change' in its title makes this intention plain. Building on the four key steps recognised by Mackenzie and Blamey (2005), a ToC requires five important steps: (1) articulating a vision; (2) identifying overarching outcomes; (3) identifying intermediate outcomes and contextual features required to achieve long-term outcomes; (4) describing activities needed to realise intermediate outcomes; and (5) identifying the resources (inputs) required. The Noumea workshop achieved the first three of these steps which resulted in the New Song's pathway of desired outcomes (Figure 7.5.3). The New Song results framework identifies enabling, structural and development outcomes that contribute to the overarching outcomes of improved wellbeing of coastal communities and productive and healthy

ecosystems and stocks. Regional activities were not developed as part of the process and resourcing was not identified (i.e. steps 4 and 5 of the ToC process were not addressed).

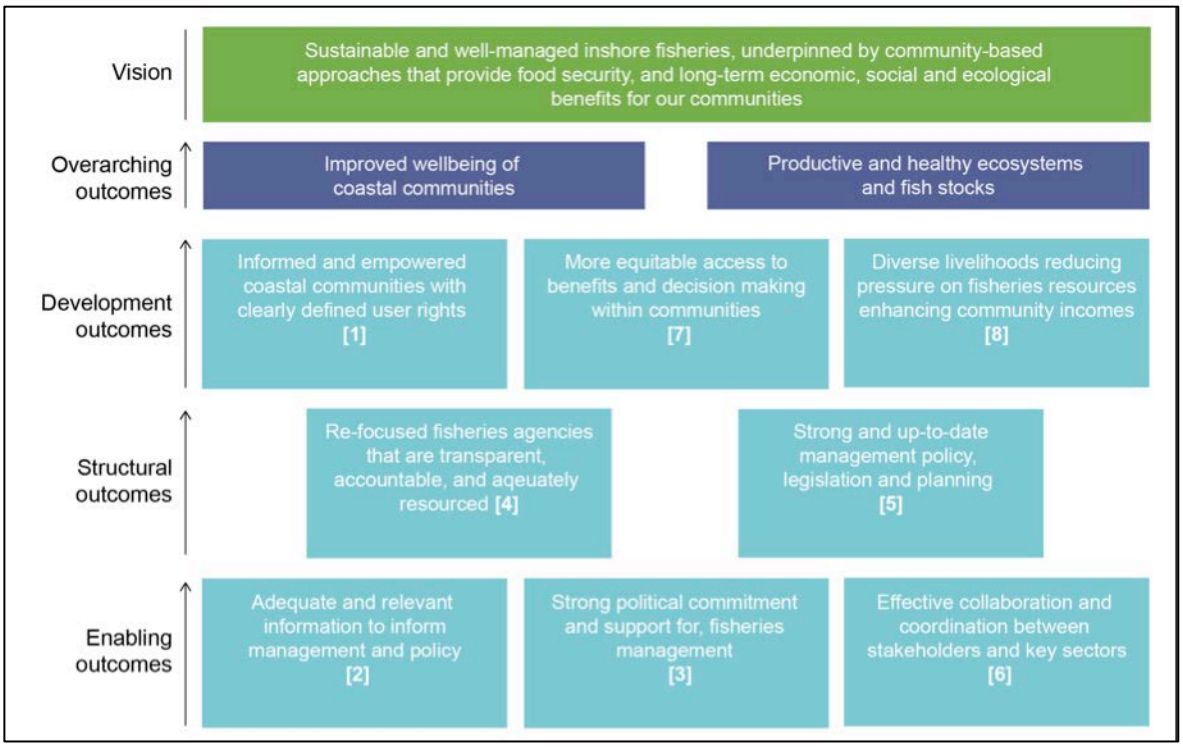


Figure 7.5.3. Generalised impact pathway for New Song outcomes (1–8 in pale blue boxes) and overarching outcomes

A complete ToC for the New Song will require a set of interrelated ToCs—a regional one and a ToC at the national scale for each of the PICs. The regional-scale ToC is half-done (see Figure 7.5.3) and will be completed under the aegis of the SPC-led Coastal Fisheries Working Group in April 2018. National ToCs will need to be updated or completed from scratch. As part of FIS/2016/300, the Vanuatu ToC has been completed and will form part of a national coastal fisheries strategy. The ToC completed for Solomon Islands will need to be updated. The Kiribati ToC was not done with the current project and will need to be completed in FIS/2016/300.

7.5.4 Policy coherence and the New Song

This section summarises activities and outputs from Activity 5.4—see Section 6 for tabulated activities and milestones. This summary is drawn from the published outputs listed below.

Published outputs

Cohen PJ, Song A. and Morrison T. (2017). Policy coherence with the Small-scale Fisheries Guidelines: analysing across scales of governance in Pacific small-scale fisheries. Pp. 55–77 in 'The Small-Scale Fisheries Guidelines', ed. by S, Jentoft, R. Chuenpagdee, M. Barragán-Paladines, M. and N. Franz. Springer: Cham, Switzerland.

Davis R., Gourlie D., Govan H., Marshman J. and Hanich, Q. (2017). Legislating for A New Song: Ensuring effective and up-to-date coastal fisheries laws in the Pacific Region. SPC Fisheries Newsletter 153, 36–39.Gourlie D., Davis R., Govan H., Marshman J.

and Hanich Q. (in press). Performing ‘a New Song’: suggested considerations for drafting effective coastal fisheries legislation under climate change. Marine Policy.

Song A.M., Cohen P.J. and Morrison T.H. (2017). Policies in harmony? Does the New Song agree with the Small-Scale Fisheries Guidelines? SPC Traditional Marine Resource Management and Knowledge Bulletin 38, 26–36.

Output ‘submitted’

Song A.M., Cohen P.J., Hanich Q., Morrison T.H., Tekatau T. and Andrew N. (submitted). Multi-scale policy diffusion and translation in Pacific island coastal fisheries. Marine Policy.

Results and discussion

The work carried out under this activity focused on studying broader scale policy status and processes that will influence the application of CBFM in PICs, including Solomon Islands, Kiribati and Vanuatu. The need for such multi-scale policy-oriented research became timelier in recent years due to the official endorsement of two supranational policy guidelines generated at the global and regional levels; namely, the SSF Guidelines led by FAO) in 2014 and the New Song led by SPC) in 2015 (as previously described; see ‘Key issues addressed’ in Section 3). Amidst enthusiasm over their potential to improve and streamline the governance of coastal fisheries, we recognised that these two new international instruments “do not enter a policy vacuum” (Cohen et al. 2017). Therefore, these four outputs closely examined the existing policy landscape to determine the alignment (or misalignment) with existing policy goals. With high alignment (or strong coherence) these international policy instruments may be easily implementable; by contrast, low coherence may indicate particular commitments (or thematic areas) where either national or international instruments might need adjustment. In sum, this work provides a policy baseline for the ultimate goal of facilitating and tracking the integration or complementarity of international policy instruments with national and subnational policies.

Song et al. (2017) directly compared the two international policy texts to search for thematic similarities and differences in their prescriptions, as well as provide a summary of their content. A high level of coherence between them would be beneficial for the PICs in terms of channelling their focus and even lowering the cost of policy delivery. As shown in Figure 7.5.4, the results indicate a significant thematic overlap. Both documents emphasise co-/community-based management approaches as well as efforts to strengthen tenure rights, enhance human wellbeing and improve gender and social equity. Notably, climate change impacts and rights-based approaches were absent from the New Song’s elaboration of the coastal fisheries’ future direction. Nevertheless, the results indicate a reasonable level of coherence and raises a likely option of using the regionally developed New Song as the focal point of policy integration - with specific areas being strengthened by the more nuanced principles provided by global and national policies.

Taking these insights to describe what such integration of high-level policies may mean to a particular country setting, Cohen et al. (2017) examined policy coherence between the SSF Guidelines, the New Song and the existing Solomon Islands national/subnational (provincial) policies. The results identified themes that are consistently mentioned in the domestic policies (i.e. indicative of coherence) and themes that are absent, sparsely represented or those that offer divergent meanings (i.e. indicative of incoherence). For example, more widely discussed topics in contemporary fisheries governance literature, such as co-/community-based management, institutional cooperation and strengthening, and research and awareness-raising were shown to be reliably featured, implying the (sub) national policy domain as already sensitised to these themes. On the other hand, emergent or other intricate social topics that currently lack mention, such as gender equity and rights-based

approaches, will likely require greater policy deliberation and commitment to bring alignment between global, regional and (sub)national commitments and contexts.

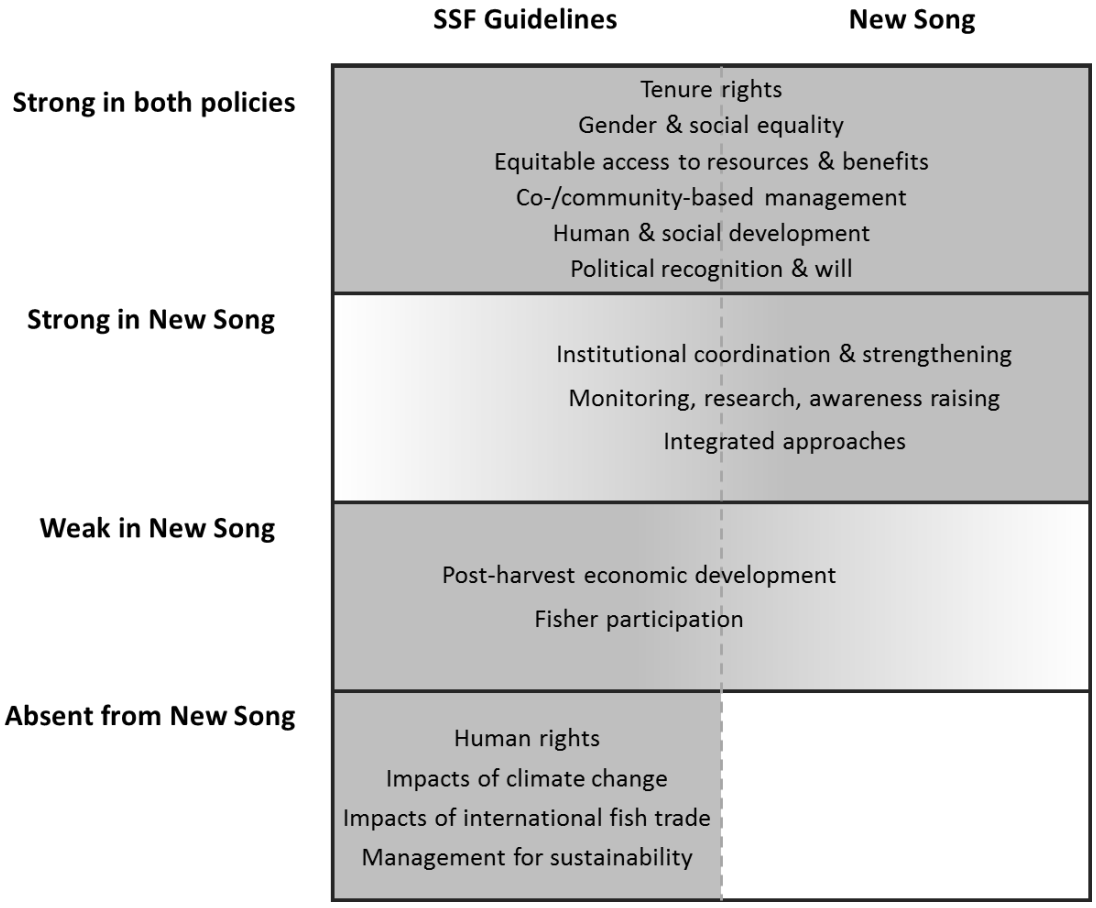


Figure 7.5.4. The implementation themes identified from the Small-Scale Fisheries Guidelines and their relative representation in the New Song

In the third output, Gourlie et al. (in press) examined to what extent these two pivotal policy tools (the SSF Guidelines and the New Song) have integrated considerations for climate change in the proposed processes toward legislative change, and whether PICs are sufficiently equipped to adopt these. They do so by firstly identifying 12 benchmarks that the 2 documents put forward as guidance, and secondly conducting a coarse analysis of how well existing legislation in PICs meets these benchmarks. Results indicate that deficiencies in current legislation vary considerably across the region, with some countries showing stronger focus on offshore fisheries rather than coastal fisheries, and other countries with coastal fisheries legislation showing deficiencies in actually operationalising that legislation.

In addressing the gaps in legislation, the 12 benchmarks have potential to steer the process as they are designed to facilitate effective and sustainable management of small-scale fisheries. They therefore form crucial goals by which progress of legislative change can be measured. To allow for climate change challenges, in particular, to be addressed, seven considerations for legislative change processes are proposed, including:

(i) diversify efforts and ensure legislation allows for management flexibility (i.e. to deal with a variety of resource dependencies)
(ii) base decision-making on accurate and up-to-date information
(iii) develop connectivity between place-based management measures (e.g. marine protected areas)
(iv) consider cumulative impacts of climate change (e.g. collective livelihood impacts of sea-level rise, drought, extreme weather)

(v) expand livelihoods of resource-dependent people
(vi) ensure safety of fishers that are affected by climate change in their fishing behaviour (e.g. increased distance of fishing trips)
(vii) facilitate local ownership of adaptation process (e.g. incorporating CBFM principles in legislation implementation).

Conclusions and recommendations

For PICs seeking to use global/regional policies to guide their (sub) national effort, the New Song can provide an accessible starting point. While less comprehensive than the SSF Guidelines and weak on several important areas of concern, such as climate change impacts, the New Song shares many common prescriptions with the SSF Guidelines. It is also more specific to the Pacific island context and has therefore attracted greater institutional support in the region.

At the same time, we recommend that policymakers and practitioners take time to become more familiar with the SSF Guidelines, especially for emerging social themes such as gender and human rights. Such proactive engagement would be advantageous for the domestic policy innovation required to cope with the growing challenges of coastal fisheries and also for keeping pace with the fluctuating global discourse.

In anticipation of intensifying interest in applying these high-level policy guidelines into country contexts, similar work assessing the policy 'state of play' is recommended for Kiribati and Vanuatu. Particularly in view of climate change variables, such assessments need to draw from broad sets of considerations that address the inherent variability, diversity and flexibility required in adaptation processes.

7.5.5 Transformation

This section summarises activities and outputs from Activity 5.4—see Section 6 for tabulated activities and milestones. This summary is drawn from the published output detailed below.

Published output

Blythe J., Silver J., Evans L., Armitage D., Bennett N., Moore M.-L., Morrison T. and Brown K. (in press). The dark side of transformation. Antipode.

The notion of 'transformation' is increasingly common in the language of development. More and more it may be found alongside other normative terms such as 'innovation', 'resilience' and 'wellbeing' in national strategies and policies. The term appears in the Intergovernmental Panel on Climate Change (IPCC's) fifth assessment report, the United Nations' Sustainable Development Goals and Future Earth's core objectives, among other global policy platforms. The essence of the term may also be found in the New Song with its appeal for new pathways, innovation and new thinking.

The appeal of 'transformation' likely resides in a sense that 'business as usual' will not be good enough to build toward a sustainable future—that radical change is required in, for example, gender norms, natural resource use, and even public health. As aspirational as it is, and as clear as it may be in common usage, there are dangers in its popularity without more definitional clarity.

New ways of theorising and supporting transformations are emerging and, so the argument goes, opening exciting spaces to (re)imagine and (re)structure radically different futures. Yet, the rapid diffusion of the term is proceeding largely without challenge or careful interrogation. Critical questions remain as to how the concept is being translated from theory into an assemblage of normative policies and practices and how these might shape social, political and environmental change.

Motivated by these questions, Blythe et al. (in press) offer a critical reflection on the notion of 'transformation towards sustainability'. Through a discourse analysis, they propose five core risks associated with discourse that frames transformation as apolitical and/or inevitable:

1. Transformation discourse risks shifting the burden of response onto vulnerable parties.
2. Transformation discourse may be used to justify business as usual.
3. Transformation discourse pays insufficient attention to social differentiation.
4. Transformation discourse can exclude the possibility of non-transformation or resistance.
5. Insufficient treatment of power and politics threatens the legitimacy of transformation discourse.

Blythe et al. (in press) refer to these risks as the dark side of transformation, and caution against the implications of this semantic shift, particularly when transformation is cast as apolitical or inevitable. Like other popular terms before it (such as sustainable livelihoods), which emerged as critiques of the status quo, they argue that the term is at risk of losing its radical character as it becomes mainstreamed.

7.6 Objective 6: Design and implement an impact assessment program to evaluate progress in implementation of the New Song'

7.6.1 National Theories of Change

This section summarises the work under Activity 6.1. Theories of change in Solomon Islands were completed in 2013 and 2015, in Malaita and in Western Province in 2014. A ToC was scheduled in Vanuatu for 2015 but deferred because of TC Pam and subsequently not done because activities at the national level were re-oriented to reconstruction. In November 2017 a national ToC workshop was completed in Port Vila under FIS/2016/300. At time of reporting this was being further developed in collaboration with VFD and SPC. In Kiribati, a training workshop was completed in Tarawa in June 2016 but no further progress was made. This section summarizes the Solomons Islands Theories of Change work.

Published outputs

Apgar J.M, Allen W., Albert J., Douthwaite B., Paz Ybarnegaray R. and Lunda J. (2016). Getting beneath the surface in program planning, monitoring and evaluation: Learning from use of participatory action research and theory of change in the CGIAR Research Program on Aquatic Agricultural Systems. Action Research, 15, 15–34.

CRP AAS (2014) Malaita Hub – Solomon Islands, Initiatives Theory of Change Workshop. Facilitators' report. Honiara, March 10-12, 2014. CRP AAS. [unpublished report].

Blythe J. and Harohau D. (2015). Theory of Change workshop with the Malaita Province Partners for Development (MPPD), Auki, Solomon Islands May 7-8, 2015. Unpublished Workshop Report. WorldFish.

Schwarz A.-M., Bennett G., Albert J., Saepioh K., and Mazin J. (2014a). AAS Western Hub – Solomon Islands Program Design Workshop, Gizo, Western Province, Solomon Islands, October 9-10 and 15, 2014. CRP AAS Facilitators' Report.

Background

A theory of change is a comprehensive description and graphical illustration of how and why a desired outcome is expected to happen in a given context. It describes the set of causal assumptions that link action to desired outcomes (Douthwaite, et al. 2013). A ToC

encourages project planners to work with stakeholders to define long-term outcomes and the necessary pre-conditions to achieve a change (outcome). In Solomon Islands under the CRP AAS, ToC were initially developed with partners as an approach and tool for planning, monitoring and evaluation on research initiatives (CRP AAS, 2014). The ToC approach continued with the development of partnerships, including the MPPD in Malaita (Blythe and Harohau, 2015) - see also section 7.3.5 - and a partnership for a research initiative on sustainable farming for nutrition and income (Apgar et al. 2016).

Results and discussion

The ToC approach in Malaita with the MPPD was well received by partners and comments suggested that the activity created greater clarity of priorities and focus for the network. Nonetheless, the network members continued to voice (a range of concerns about the sustainability of the network in terms of internal management and facilitating external outcomes (Blythe et al. in prep)).

An initial broad ToC was developed with Solomon Island CRP AAS stakeholders in March 2014 (CRP AAS, 2014) to kick start program implementation of three research initiatives (natural resource management, governance and sustainable farming for nutrition and income). For the sustainable farming for nutrition and income initiative, subsequent activities bought together appropriate partnerships and refined the ToC. The ToC process itself was found to help a diverse group of people to negotiate and reach collective agreement on a set of inter-related outcomes. While importantly, at the same time identifying important pre-conditions for implementation – the need to build a coalition of stakeholders across organisations and sectors that usually do not work together. Key partnerships have remained and resulted in the formalisation of joint research with for example the Ministry of Health and Medical Services, who are a key partner on this project as well as FIS 2016/300.

The implementation of ToC approach in Solomon Islands, has provided some key lessons:

- ToC approaches can forge collective ownership (joint outcomes) and build partnerships across organisations
- ToC approachs can create greater clarity of priorities and focus
- ToC are nested processes that are able to be developed as needed and be fit for purpose
- ToC are time intensive and a sometime difficult process to understand, brining the right stakeholders to the table is an important step during the intial phase of ToC development.

7.6.2 Baselines for monitoring and evaluation

This section summarises the work under Activity 6.2 for the development of project M&E theory, activities and the development of a longitudinal panel study survey protocol.

Published output

Blythe J., Cohen P., Eriksson H., Cinner J., Schwarz A. and Andrew N.L. (2017). Strengthening post-hoc analysis of community-based fisheries management through the social-ecological systems framework. Marine Policy 82, 50–58,

Outputs 'in preparation'

Donato-Hunt C., Eriksson H. and Andrew N. (in prep). Synthesizing the process of regional coastal fisheries indicators: overcoming overlap and confusion, harmonization across multiple agencies. (Target journal: Marine Policy)

Results and discussion

The project initiated a significant effort to structure the project M&E, and particularly an outcome evaluation protocol, around the Ostrom (2009) social-ecological systems (SES) framework. The SES framework has been seminal for advancing the research frontier on complex social-ecological systems. Its application as a research framework is showcased in a growing number of NRM settings (Agrawal and Chhatre 2011; Basurto et al. 2013; Cox 2014). The research-driven nature of utilising and tailoring the framework has resulted in a body of literature that remains predominately academic and theoretical. The use of the framework to guide participatory processes, such as advocated for participatory diagnosis of small-scale fishery or farmer SES dimensions (Andrew et al. 2007; Béné et al. 2011), has great potential but remains largely untested. An important aspect of the framework's future development is hence to test its practical application in participatory work. The project aspired to integrate the framework to guide implementation and organise the outcome evaluation across the project countries.

One key advantage with analytical frameworks is that they are not prescriptive to method (Eriksson et al. 2015), so this approach was sought to accommodate the many and diverse activities of the project that generated varying sources of data and information under different country circumstances. The conceptual framing of this approach was also meant to align with the WorldFish CRP AAS, which had developed M&E theory and protocols (Douthwaite et al. 2014) and the necessary scientific infrastructure and resources to support project M&E. The scientific endeavour to apply the SES framework in the project's CBFM context was published by Blythe et al. (2017a). The study is a proof of concept that synthesises scattered information from several CBFM-supported communities in Solomon Islands by mapping ex-post data to framework indicators. Through this analytical process, conclusions about CBFM outcomes ex-post could be drawn and features of the CBFM support process evaluated.

The resources and effort required to structure an M&E program around the SES framework were significant. This was compounded when the CRP AAS ended, as it had been providing much support in this activity. However, at the same time, the New Song was developed and this provided a new results framework for the project to use. Following the recognition of the difficulty in further pursuing the SES framework approach and the development of the New Song framework, the project M&E adjusted its course as recommended in the project's mid-term review. The reviewers of the mid-term review stated:

> 'It is recommended that the project team develop an explicit and simple Management [sic.] and Evaluation (M&E) framework for reporting on this project to ACIAR and DFAT from the theoretical development that has been done by building on Ostrom's Social-Ecological Systems framework and the CGIAR outcomes evaluation framework used in the Aquatic Agricultural Systems program. While the theoretical work is useful for making use of existing project data, embedding M&E thoroughly into the research process, and also for developing general ways of evaluating outcomes across different contexts, the project also needs to report against the specified indicators to the funding bodies. This needs to happen soon so that the M&E can be implemented for the remainder of the project.'
>
> 'It is recommended that in developing the M&E framework for this project, the project team consider how to dovetail with SPC's need to develop M&E report cards for coastal fisheries under the New Song policy. Liaise with Moses Amos and the new SPC M&E person for this.'

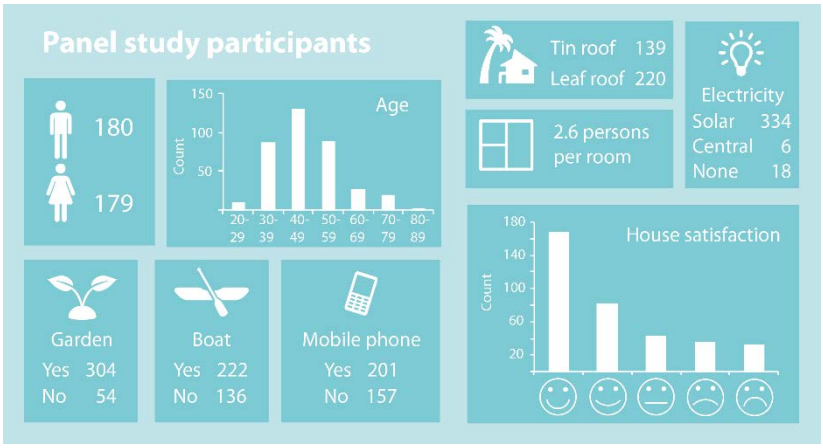
Consequently, the second part of the project took a different approach, focusing on strong integration with SPC and a greater regional program of M&E (see Activity 6.3 and Section 7.6.2). Much of the theoretical groundwork for outcome evaluation had been done during the early phase of the project and this contributed substantially to the intellectual dimensions of M&E reporting in the region.

The mid-term review also highlighted that the project required a more structured approach to collecting primary data. In essence, the original commitment to measure a baseline at

commencement of the project was not fulfilled. To address this shortcoming, and collect primary data for the development outcomes, a longitudinal panel study (Menard 2007) was implemented during 2016/2017. The panel study has two components, a village profile and surveys of individuals. Profiles collect data on community-level metrics for services, economy, living conditions, infrastructure and cost of living, and interviews collect individual data on socioeconomics, wellbeing, governance participation and livelihoods. Data are collected from equal numbers of men and women in each community.

The main component of the panel study is the face-to-face interview survey instrument. The intent with this module is a relatively short questionnaire with questions predominantly for monitoring purposes. The survey was developed to incorporate individual-level metrics from already existing instruments that are suitable for monitoring purposes. For example, the questionnaire is built on many of SPC's socioeconomic survey questions (Kronen et al. 2008), as this will extend the relevance of these data for historical and geographical comparison. The survey has been created using software Open Data Kit (ODK) Collect and implemented using tablets. A database has been constructed to archive panel study data. Teams in Solomon Islands, Vanuatu and Kiribati have been trained and have collected data managed by the in-country teams to create baselines for future assessments.

For the purpose of this report, a subset of the baseline data have been amalgamated and presented across sites and countries in Figure 7.6.1. This indicates the kinds of variables that were collected and presents the format by which data can be presented for easy understanding and quick interpretation. Greater resolution in the data will be applied in later evaluations and in journal papers that the data will support.



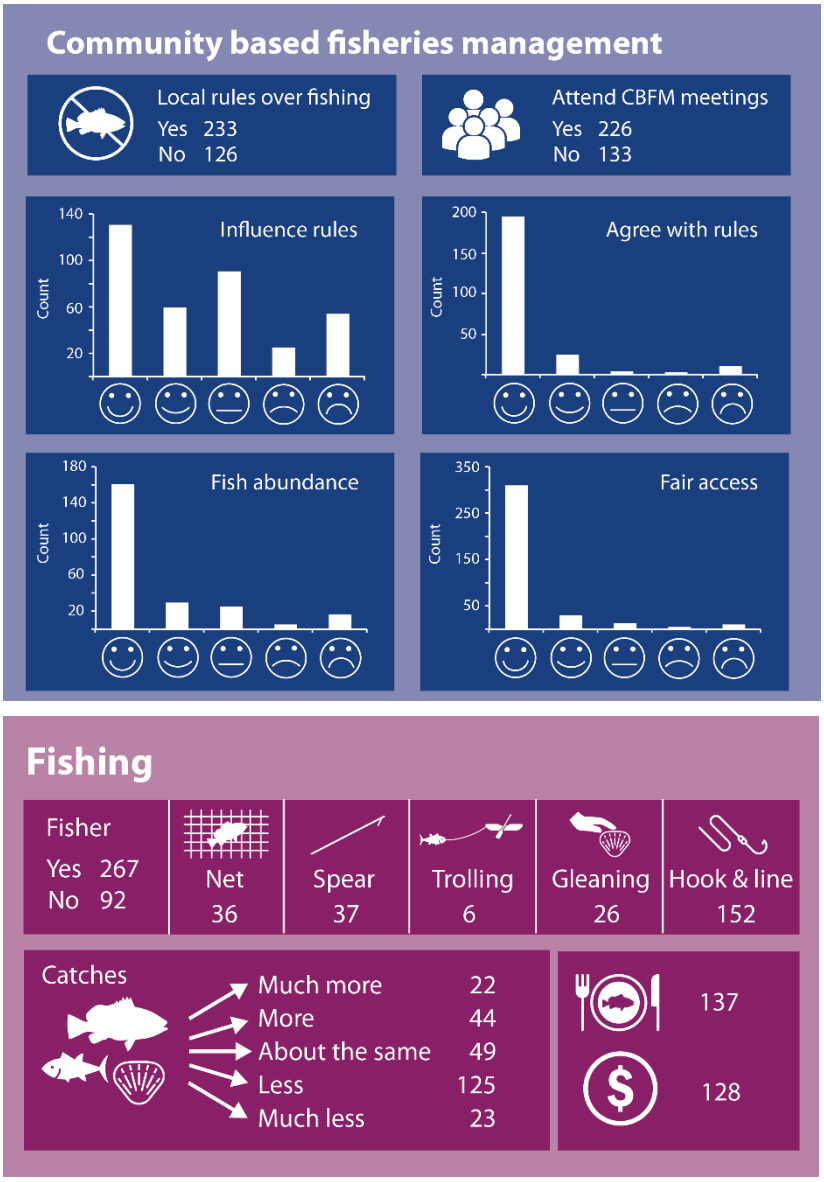


Figure 7.6.1. Examples of panel study dashboard from baseline survey, indicating format and relevant variables for information on 'panel study participants', 'CBFM' and 'fishing'

The panel study for monitoring purposes is of particular value in conjunction with assessment of qualitative information around change processes. Used in this fashion, it offers an opportunity for a big step forward in terms of understanding the linkages between development investments, processes and outcomes. It provides a sound scientific evidence base that contributes to basic and applied questions on development practice. The panel study on its own, however, has more limited use relative to the study of development as an ongoing process; hence, the data presented must be interpreted accordingly.

7.6.3 Designing a results framework for Pacific island coastal fisheries (the New Song)

This section summarises the integration with SPC M&E initiatives and the process of designing the results framework for the New Song coastal fisheries strategy as outlined under Activity 6.3.

Published outputs

Donato-Hunt C. and Eriksson H. (2017). Regional reporting for the New Song for Coastal Fisheries Strategy. Information Paper 5. 10th SPC Heads of Fisheries Meeting, Noumea, New Caledonia, 14–17 March 2017. Pacific Community (SPC): Noumea.

SPC (2017b). The Coastal Fisheries Report Card 2017. Working Paper 10. 14th Annual Ministerial Forum Fisheries Committee Meeting, Mooloolaba, Australia, 5–6 July 2017. Pacific Islands Forum Fisheries Agency: Honiara.

Output 'in preparation'

Donato-Hunt C., Eriksson H. and Andrew N. (in prep). Synthesizing the process of regional coastal fisheries indicators: overcoming overlap and confusion, harmonization across multiple agencies. (Target journal: Marine Policy)

Results and discussion

The development of the M&E framework for the New Song reflects the regional approach utilised to develop the strategy itself. As such, a key aim of the process was to develop a regionally agreed upon set of indicators for coastal fisheries. In light of this, SPC and WorldFish collaborated to undertake an audit and review of existing indicators for coastal fisheries outcomes used in the region. During 19–22 July 2016, WorldFish and ANCORS hosted an M&E workshop (Activity 6.3.1). The workshop developed a visual ToC diagram for the New Song and focused broadly on obtaining feedback, validation and input into the indicator audit and review process from others working in the field. At the workshop, regional policy indicators were mapped and aligned, and the process of developing suitable indicators for the eight New Song policy outcomes was initiated.

The theory developed during the early phase of the project (Activity 6.2; see Section 7.6.1) was further built on at the workshop, particularly the approach to evaluating and illustrating amalgamated information as trajectories. Methodology for study questions of 'how?' and 'why?' related to social interaction must include qualitative research approaches to encompass meaning from participants' perspectives and experience in natural, rather than experimental, settings (Maxwell 2009). By mixing qualitative and quantitative data, programs can generate nuanced understandings of qualitative process (e.g. empowerment) and broader understanding about causality and attribution (Mayne and Stern 2013). The outcome-monitoring mechanism that the project pursued in partnership with SPC hinged on these principles.

The New Song outcomes comprise complex social-ecological dimensions that are not easily measured. These outcomes share their complex multidimensional nature with the resilience concept, which is also seen as a contextual, desired and normative state in the development literature (Walker and Salt 2012). In resilience assessments, metrics that attempt to capture human–environment interactions necessarily simplify this complexity and may inhibit deeper understanding of critical process (Quinlan et al. 2015). To build enriched pictures of understanding for environmental governance challenges, Tengö et al. (2014) propose a multiple evidence-based (MEB) approach. The outcome evaluation is influenced by MEB thinking: instead of focusing on single measurements, the outcome evaluation draws on multiple sources of information to generate narratives around 'outcome trajectories' (Figure 7.6.2).

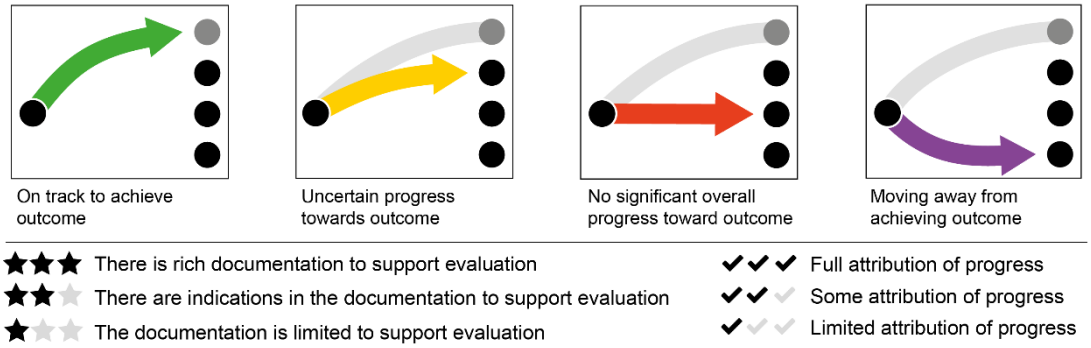


Figure 7.6.2. Graphic illustrations of categorical outcome trajectories as part of outcome evaluations

The outcome trajectories are conceptualised and meant to illustrate that the development outcomes are perpetual challenges and not endpoints measurable with quantitative metrics alone. Broad evaluative mechanisms that gauge change processes from multiple sources of information appear attuned to evaluate contributory cause in this reality (Mayne and Stern 2013). This approach is also utilised to track progress towards targets in various scenarios where absolute measurement is made complicated by the multidimensional nature of the target—as, for example, in tracking progress towards the Aichi targets for global biodiversity conservation (Secretariat of the Convention of Global Biodiversity 2014).

The project contributed substantially to harmonising regional outcome reporting. Both the Pacific Islands Forum Secretariat's Framework for a Pacific Oceanscape Report Card 2017 and SPC's Future of Fisheries: Coastal Fishery Report Card 2017 (which relates to the Regional Roadmap that is explained below) have employed this trajectory language and illustration.

Following the workshop in Wollongong, the work continued to develop a set of prospective indicators for each New Song outcome in consultation with representatives from SPC, the Office of the Pacific Ocean Commissioner, WorldFish and LMMA network. International instruments and reporting requirements for the Sustainable Development Goals, SIDS [Small Island Developing States] Accelerated Modalities of Action (SAMOA) Pathway, Aichi targets and SSF Guidelines, along with subregional instruments Melanesian Spearhead Group Roadmap for Inshore Fisheries and Micronesia Challenge were considered in the selection of indicators.

The alignment to the Future of Fisheries Regional Roadmap for Sustainable Fisheries (the Regional Roadmap) was significant. The Regional Roadmap identifies that an annual 'fishery report card' will be provided to the annual meeting of the Ministerial Forum Fisheries Committee. Annual report cards will measure the relative success of each strategy for oceanic and coastal fisheries over 10 years, as well as indicators that can be used to measure progress. Reporting is split into the Tuna Fishery Report Card produced by the Pacific Islands Forum Fisheries Agency (FFA) and SPC, and the Coastal Fishery Report Card produced by SPC. Report cards were produced in 2015, 2016 and 2017; however, data availability remains an issue, and limited regional consensus on indicators has limited the effectiveness of the Coastal Fishery Report Card in particular. The intentional alignment of the Regional Roadmap and the New Song, along with their commitments for reporting and monitoring, have enabled a single reporting mechanism for both regional instruments. That is, the annual Coastal Fishery Report Card will use the same reporting mechanism to measure progress in coastal fisheries for both the New Song and the Regional Roadmap.

The next stage of consultation was to utilise the 10th SPC Heads of Fisheries Meeting for consultation with countries and regional partners. The draft indicators were presented to the meeting as part of an Information Paper on regional coastal fisheries reporting commitments and streamlining (Activity 6.3.2; Donato-Hunt and Eriksson 2017). Input was sought from

participants, focusing on obtaining feedback, validation and input into the indicator audit and review process. Meeting participants further evaluated the indicators in working groups, as part of the lengthy and rigorous process of identifying and selecting the indicators most suitable considering available data sources. A key objective of this was to ensure that regional M&E for fisheries continues to be coordinated and relevant, while not adding extra reporting burden on stakeholders. More normative learning from the entire indicator development process is being used to help understand the harmonisation requirements of multiple agencies and regional uptake and M&E implementation (Activity 6.3.3).

This input was used to confirm the indicators for measuring progress towards the region's goals for coastal fisheries. This completed set of New Song outcomes indicators were also mapped across to other relevant instruments and policies developed for incorporation into national programs, endorsed by the Forum Fisheries Committee and published (SPC 2017; Activity 6.3.4). The indicators then used for reporting in the Coastal Fishery Report Card 2017.

While challenges relating to data availability and resources remain, regional efforts have led to the successful development of an integrated evaluation framework to assess collective impact for Pacific coastal fisheries. The indicator selection process was originally thought of as an exercise whereby the project would integrate appropriate indicators. However, as the process unfolded, it became clear that the objectives for the New Song indicators differed from those required for the project; hence, they needed further interpretation and adjustment so that they were relevant to the scope of the project. For example, New Song indicator 2.1—'Number and % of coastal fisheries management decisions informed by evidence'—is beyond the scope of the project, so a selected indicator is instead '>50 policy briefs and other guidance documents' or '>30 outputs summarizing outcomes, lessons learned, new technologies and new regional data analyses'—highlighting that the project is able to support the New Song outcome #2 ('Adequate information') while not being able to directly measure the New Song indicator 2.1 (the project does not make decisions on coastal fisheries management).

For the purpose of this report, we have mapped the original project indicators, which were taken from the AusAID (now DFAT)/ACIAR Concept Note (see Section 5.2), against the New Song outcomes, and added the indicators developed for phase two of the project (Table 7.6.1). The evolution of evaluation planning has progressed significantly since the advent of the project, as seen in the resolution and content of the Pathways indicators.

Table 7.6.1. New Song coastal fishery strategy mapping to original project indicators, and those indicators developed for Phase Two 'Pathways' (FIS/2016/300).

New Song policy outcomes	DFAT/ACIAR indicators (from FIS/2012/074)	Pathways indicators and end-of-project targets (for FIS/2016/300)
[#1] 'Empowered communities'	3: Communities actively engaged in management of their fisheries resources 8: Increased number of communities that have effective governance mechanisms 7: Capacity of coastal communities to manage their fisheries	>36 new community management plans endorsed and being implemented using new models of engagement >20 current and new community plans supported and monitored 100% of management plans consider fishing activities and management solutions of women or endorsed by women 50% of households surveyed in coastal communities in KIR [Kiribati], SLB [Solomon Islands] and VUT [Vanuatu] have improved perceptions about CBFM implementation

[#2] 'Adequate information'		Direct engagement with 4,000 households and 50 communities National language information kits broadly available in KIR, SLB and VUT Online/in-country/short courses widely available to nationals of KIR, SLB and VUT 75% of communities in KIR, SLB, and VUT have received information about CBFM >30 outputs summarising outcomes, lessons learned, new technologies and new regional data analyses 40% of research outputs reflect analysis based on gender and social inclusion >50 policy briefs and other guidance documents 40 information and exchange events or activities 100% of project staff demonstrate an increased capacity to incorporate gender in their work
[#4] 'Re-focused fisheries agencies'	6: Capacity of provincial institutions to support CBFM	50% increase in staff allocated to coastal fisheries in each agency (30% of those have capacity to include gender in their work delivery) >75% project outputs led by or co-authored with national collaborators Increased number of activities delivered by national agencies are gender-sensitive
[#5] 'Policy, legislation, planning'		40 regional, national and sub-national policy and planning documents and events >10% increase in national/provincial fisheries and environment policies making explicit commitments to gender
[#6] 'Effective collaboration'		>75% of outputs as collaborations with >1 partner institution >50% activities involve >1 sectoral national agency
[#7] 'Equitable access and benefits'		50% of participants in project activities are women 50% of women participating in forums report they feel free to speak and are listened to 40% of partner agency staff attending short courses are women 80% of women in target communities believe they are adequately represented and have a voice in CBFM and livelihood decision-making 75% of community CBFM committees have women representatives 80% of women in target communities feel satisfied with the benefits they are receiving from livelihood engagements and from improvements to fisheries 50% of women declare better opportunities to solely or jointly make strategic life decisions around livelihoods and earnings
New Song policy outcomes	**DFAT/ACIAR indicators (from FIS/2012/074)**	**Pathways indicators and end-of-project targets (for FIS/2016/300)**
[#8] 'Diverse livelihoods'	4: More secure livelihoods for target communities 9: Value of fisheries products captured/traded from sustainable coastal fisheries in formal and informal economies	20 tilapia ponds established or improved in VUT Improved household food security (as measured by the household hunger scale (Ballard et al. 2011) and incomes among panel study participants 50% of new livelihood opportunities promoted for women FADs deployed and catch monitored at >10 sites in VUT

Overarching NS outcome of productive and healthy ecosystems and fish stocks	2: Sustainable near shore marine fisheries systems 1: Increased sustainable supply of fisheries products for domestic consumption	>25 management plans endorsed and implemented Catches maintained or increased in more than 75% of communities 200 tonnes of tilapia produced by Efate farmers in 2021 Nearshore FADs provide >15% of fish sourced for income and food in coastal communities in VUT
Overarching NS outcome of improved wellbeing of coastal communities	5: Improved nutrition in target communities	>50% of panel study participants experience increased income and wellbeing (both men and women)

7.7 Objective 7: Greater gender equity in decision-making and control of assets

This section summarises activities and outputs from Activity 7.1—see Section 6 for tabulated activities and milestones. The summary is drawn from the published and yet-to-be published outputs detailed below.

Published outputs

Cohen P.J., Lawless S., Dyer M., Morgan M., Saeni E., Teioli H. and Kantor P. (2016). Understanding adaptive capacity and capacity to innovate in social-ecological systems; applying a gender lens. Ambio 45, 309–321.

Iniesta-Arandia I., Ravera F., Buechler S., Díaz-Reviriego I., Fernández-Giménez M.E., Reed M.G., Thompson-Hall M., Wilmer H., Aregu L., Cohen P., Djoudi H., Lawless S., Martin-Lopez B., Smucker T., Villamor G.B. and Wangui, E.E. (2016). A synthesis of convergent reflections, tensions and silences in linking gender and global environmental change research. Ambio 45, 383–393.

Kruijssen F., Albert J.A., Morgan M., Boso D., Siota F., Sibiti S. and Schwarz A.M. (2013). Livelihoods, markets, and gender roles in Solomon Islands: case studies from Western and Isabel Provinces. Project Report: AAS-2013-22. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Lawless S., Doyle K., Cohen P., Eriksson H., Schwarz A.M., Teioli H., Vavekaramui A., Wickham E., Masu R., Panda R. and McDougall C. (2017). Considering gender: practical guidance for rural development initiatives in Solomon Islands. Program Brief: 2017-22. WorldFish: Penang, Malaysia.

Locke C., Muljono P., McDougall C. and Morgan M. (2017). Innovation and gendered negotiations: insights from six small-scale fishing communities. Fish and Fisheries 18, 943–957.

McDougall C., Cole S.M., Rajaratnam S., Brown J., Choudhury A., Kato-Wallace J., Manlosa A., Meng K., Muyaule C., Schwarz A. and Teioli H. (2015). Implementing a gender transformative research approach: early lessons. Pp. 41–56 in 'Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems', ed. by B. Douthwaite et al. Working Paper: AAS-2015-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Promundo-US and the CGIAR Research Program on Aquatic Agricultural Systems (2016). Promoting gender-transformative change with men and boys: a manual to spark critical reflection on harmful gender norms with men and boys in aquatic agricultural systems. Promundo-US: Washington DC and Penang: CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia. [with CGIAR and Promundo]

Schwarz A.-M., James R., Teioli H.M. and Cohen P. (2014b). Engaging women and men in community-based resource management processes in Solomon Islands. Case Study

Brief: AAS-2013-33. CGIAR Research Program on Aquatic Agricultural Systems: WorldFish, Penang, Malaysia.

Unpublished work and outputs 'in preparation' or 'submitted'

Barclay K., McClean N., Cohen P., Foale S., Sulu R. and Lawless, S. (submitted). Lagoon livelihoods; the shifting role of shell money in Langalanga, Solomon Islands. Maritime Studies.

Barclay K., McClean N., Leduc B., Raubani J., Cohen P., Sanders J., Donato-Hunt C., Andrew N.L. and Delisle A. (in prep). Toolkit for Pacific gender and social inclusion in coastal resource management and development. Target: SPC article and website

Delisle A. et al. [TBD] (in prep a). Applying a gender lens to the interactive governance framework for small-scale fisheries in the Pacific region.

Delisle A. et al. [TBD] (in prep b). Understanding gender norms in Kiribati to better inform practice of CBFM projects. SPC article.

Lawless S. (2014) Literature review of gender and social norms in Malaita Hub, Solomon Islands. WorldFish: Honiara, Solomon Islands, 28pp. [unpublished]

Lawless S., Cohen P., McDougall C., Orirana G., Siota F. and Doyle K. (submitted). Gender norms and relations: implications for agency in rural livelihoods in Solomon Islands. World Development.

Lawless S. and Teioli, H., (2015). Aquatic Agricultural Systems benchmarking Malaita and Western Provinces; key findings. WorldFish: Honiara, Solomon Islands, 50pp. [unpublished]

WorldFish and Promundo-US (2015) Integrating gender transformative approaches into Aquatic and Agricultural Systems. WorldFish: Honiara, Solomon Islands. [unpublished]

Background

Globally, the role of women in fisheries, fish value chains and coastal livelihoods more broadly is relatively poorly understood and accounted for (Kleiber et al. 2015). Mirroring this, few gender-differentiated or women-inclusive accounts of roles in fishing are available for the Pacific (but see Kronen and Vunisea 2007, 2009). The perception that fishing is a man's domain is not uncommon and this view perpetuates women's exclusion from deliberations and decision-making (at all levels of governance) about how assets that produce benefits from fisheries are allocated, how resources should be managed and the direction that community developments should take.

There are multiple social structures (as well as characteristics of individuals) that differentiate people's ability to participate in decision-making or have control over productive assets. For example, in Solomon Islands:

> women [even in matrilineal descent systems] and [female or male] non-landowners are more likely to be marginalized from decisions about how natural resources are used, developed, and managed (Foale and Macintyre 2000, Crow and Sultana 2002, Cohen et al. 2016). Customary tenure systems often give certain individuals and groups preferential access and more power in decision making than others. (from project output Apgar et al. 2017—listed in Section 7.3)

Vunisea (2008) explains that women in fisheries across the Pacific suffer a 'culture of silence', in which the voices of women and youth are commonly not heard as their culture restricts their participation in, particularly community-level, discussions where decisions might be deliberated and made. The marginalisation or exclusion of women or other social groups in community consultation processes (including for the establishment of fisheries management or livelihood initiatives) may mean male leaders remain dominant and further empowered in decision-making or preferentially receiving new opportunities, further

marginalising women and their interests (Akao and Strachan 2012; Cohen and Steenbergen 2015b). The challenge with community-level management, livelihood or development engagements is that engaging with and respecting existing local governance and social structures is a necessity, but may inadvertently reinforce, sustain or take advantage of inequitable gender norms and power imbalances. To overcome this problem, explicitly inclusive and reflexive strategies need to be employed.

In an earlier project (FIS/2010/056), strategies were tested in Solomon Islands to try to redress the gender imbalances in decision-making around CBFM. Project staff were involved in testing, documenting and translating these strategies into mainstream guidance for women-targeted awareness-raising (Hilly et al. 2012), recommendation for gender-analyses in the diagnosis phases (Alexander et al. 2011) and a range of gender-sensitive approaches to apply in the design of management (Albert et al. 2013; Schwarz et al. 2014b). These were important, but perhaps relatively modest, steps towards more gender-sensitive practices.

There was a recognition that these strategies did not necessarily lead to more equitable processes or outcomes. In some instances, 'simplistic applications of tools to promote greater participation and more inclusive consultation will … be insufficient to sustainably address such underlying governance challenges' (project output Apgar et al. 2017). Initiatives should increasingly be guided by improved understandings of the determinants and dynamics of power within decision-making and allocation of assets. 'Without sufficient understanding of the complexities of the multiple dimensions of power differentiated by social groups (gender, wealth, physical location, livelihood/economic groups, etc.), interventions that aim to improve livelihoods [including through resource management] may in fact reinforce existing inequalities' (Apgar et al. 2017).

This project developed a deeper and more critical engagement with gender and invested in the capacity of our team and partners to do so. Our gender work under Objective 7 is captured by four interconnected lines of enquiry and practice. These contribute towards the overarching research question posed in the project proposal: *What constraints are there to gender equity in decision-making around CBFM and related livelihood choices and what innovations and interventions are most effective in addressing these constraints to reduce gender inequality and enhance the productivity and diversity of women's livelihoods?* The four areas of work were:

1. research to understand and account for gender differences in fisheries and coastal livelihoods
2. research to account for the underlying norms and relations that influenced how men, women and youth experience opportunities, benefits and change in coastal systems
3. approaches developed and refined within community-level engagements to account for (and in some instances challenge) gendered roles, norms and relations that perpetuate inequality
4. capacity building and policy analysis that sought to determine and address structural barriers (beyond the local scale) to gender equity in fisheries.

Country-specific activities and insights are also captured under Objectives 2 (Kiribati), 3 (Solomon Islands) and 4 (Vanuatu) (see Sections 7.2, 7.3 and 7.4, respectively).

7.7.1 Gender and fisheries in the Pacific region

The project undertook a range of different **research initiatives and activities to understand gender differences in fisheries and coastal livelihoods**, including roles in harvesting activities and along the fisheries value chain. Early stages of community engagement generally involved activities to determine differences in men's and women's resource use and fisheries concerns (e.g. participatory resource mapping, free-listing of key species, discussions of issues and concerns). The findings were presented back (women to men, men to women) to ensure there was an improved mutual understanding of use and concerns, and ultimately to ensure that these differences were accounted for in the design of

management. These data are yet to be analysed across sites, but would benefit from analysis alongside quantitative data. Fisheries catch data collected in communities as part of CBFM monitoring (described in preceding objectives) is sex-disaggregated and will provide complementary and detailed understandings of gender roles in fisheries harvesting.

In collaboration with researchers working with MFMR and WorldFish in Solomon Islands, Barclay et al. (submitted) provides a synthesis of research examining gender, culture and livelihoods in coastal communities in Langalanga Lagoon. The synthesis provides a detailed, mixed-method account of fisheries-reliant livelihoods and their gendered dimensions along the value chain and will inform the livelihoods work continuing in Langalanga as part of the next phase of this project. Similarly informative for work around markets and value chains is the gender value-chain analysis looking at 'Livelihoods, markets, and gender roles in Solomon Islands' done in conjunction with the CRP AAS where project staff contributed (Kruijssen et al. 2013).

The project undertook **research to understand the underlying norms and relations that influenced how men, women and youth experience opportunities**, benefits and change in coastal communities. The intention of this research was to guide the design and adjustment of strategies to promote gender equity or to challenge norms that will perpetuate gender inequality. Through the CRP AAS, WorldFish contributed to the development of research tools created as part of the GENNOVATE initiative; a global and comparative research initiative examining gender norms and agency in agriculture and natural resource management (Badstue et al. 2015). These "gender benchmarking tools" included four focus group discussion formats and one interview protocol. Each focus group discussion format was designed to examine a broad thematic area, including: (1) community and individual wellbeing; (2) social norms associated with household roles and livelihood activities (e.g. what it is to be a 'good' man or woman); and (3) self- and collective efficacy around strategic life decisions, particularly related to livelihoods. The fourth focus group discussion format was specifically designed to gather youth perspectives and employed a combination of questions from the three other formats. The interview protocol employed a semi-structured key informant interview to explore the innovations instigated by particular men and women.

In a project workshop, WorldFish led research training in the use of the gender benchmarking tools—including their adaptation and translation for the Solomon Islands context. Subsequently tools were adapted for the Kiribati context by ANCORS. WorldFish employed these tools and finalised analysis for benchmarking three different clusters of communities that were engaging in CBFM (Cohen et al. 2016; Locke et al. 2017; Lawless et al. submitted). ANCORS has applied the tools in Kiribati and completed preliminary stages of analysis, including comparison with Solomon Islands data (Delisle et al. in prep a and b). This research was postponed in Vanuatu due to TC Pam and the departure of the project staff with the skills and motivation to lead this intensive research effort; the follow-on project provides the opportunity to develop these understandings in Vanuatu.

In terms of **developing approaches within community-level engagements to account for (and in some instances challenge) gendered roles**, norms and relations, the project built strongly on the developments made in the preceding phase of this project. The community engagement training (described in detail for Solomon Islands in Section 7.3.4) included a stronger emphasis and tools for improved consultation and engagement with men, women and youth (tools included separate focus groups to detail resource use, visioning, joint reflections, quotas on committees and so forth).

In 2015, WorldFish co-hosted with Promundo (https://promundoglobal.org/; a formal partner of the CRP AAS) a 3-day workshop attended by all of the WorldFish Solomon Islands project team and representatives from MRFR, the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), the Ministry of Agriculture and Livestock, and the Ministry of Women, Youth, Children and Family Affairs (MWYCFA), as well as

NGOs. Practical strategies (Figure 7.7.1) were included the workshop which focused on promoting gender-transformative change:

> Gender transformative approaches are interventions, programs or policies that actively attempt to examine, question and change harmful gender norms and the imbalance of power between men and women while obtaining their specific programmatic or policy objective. This type of approach creates spaces for men and women to critically examine inequalities and gender roles, identifies and strengthens positive norms that support equality and an enabling environment, promotes the relative position of women and girls and marginalized groups, and transforms the underlying social structures, policies and broadly held social norms that perpetuate gender inequalities. (WorldFish and Promundo 2015)

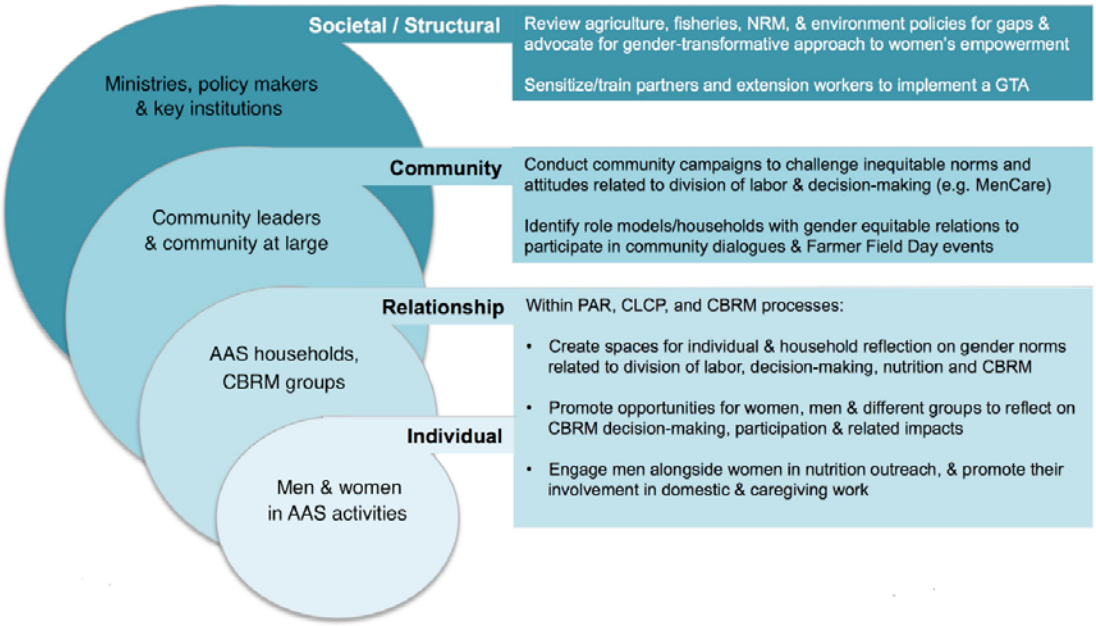


Figure 7.7.1. The different strategies under a gender transformative approach that can be employed at different scales (WorldFish and Promundo 2015)

Using Solomon Islands as a case study, through the course of two multi-stakeholder workshops and subsequent consultations, we adapted insights and perspectives from (a) the Promundo training, (b) the gender benchmarking and (c) from field expert experience into a series of practical recommendations for considering gender in community development and NRM (Lawless et al. 2017). The authorship of this work (i.e. WorldFish, James Cook University, Promundo, ANCORS, MFMR, MECDM and MWYCFA) reflects the broad collaboration and consultations that went into building and validating this practical guidance. The next phase of this project offers the opportunity to create or adapt this guidance for the Kiribati and Vanuatu contexts, and to test the principles and guiding questions in action research.

The skills developed in these workshops and disseminated in practice briefs have had a notable flow-on impact on capacity to consider and address gender within programs. First, WorldFish team members who had received training went on to design and conduct a 2-day workshop funded by the United States Agency for International Development (USAID) on ‘Gender’ for Solomon Islands Community Conservation Partnership (SICCP) staff and their community coordinators in Honiara in April 2017. SICCP is leading the project ‘Strengthening Community’s Climate Change Planning and Adaptation’, in which gender is an important cross-cutting issue, but called on WorldFish support given its existing team previously did not have the skills or knowledge to address gender in a meaningful way. Thirteen people attended the workshop, including eight staff from SICCP, four community

coordinators and a representative from SPC/GIZ Fisheries office. Second, in a project led by WorldFish and funded by SwedBio, a half-day session was conducted at the inception meeting. At this meeting, a major task was to modify a sustainable livelihoods diagnostic tool to better consider gender differences and gender implications of livelihood initiatives. This tool is currently being tested and will be refined and published in 2018. Third, anecdotal accounts from partners and the frequency of requests for expert input on gender suggest that project expertise on gender is growing and recognised in the field of fisheries management.

We conducted a series of **policy analyses to determine structural barriers and opportunities (beyond the local scale) to gender equity in fisheries** across national (Kiribati, Solomon Islands, Vanuatu), regional (the New Song) and global (the SSF Guidelines) fisheries and environment policies. We built an overview of policy commitments that related to fisheries and considered gender (Song et al. 2016; Cohen et al. 2017; Song et al. submitted—see Section 7.5.4). These analyses and associated interviews (Song et al. submitted) contribute some reflections on national capacity gaps. Focused analyses on gender capacity is still necessary, and is an initiative that SPC is leading throughout the region. An early step in this initiative has been taken in a collaboration between WorldFish, SPC and the Solomon Islands MFMR where we have started the development of research tools for national-level gender capacity assessment and stocktake. The application of these tools and refinement for other countries will continue in the next phase of the project and in conjunction with other projects led by SPC. From a different perspective, Kate Barclay of the University of Technology Sydney has, as part of this project, conducted data collection in Kiribati, Solomon Islands and Vanuatu to gain a more in-depth understanding of the structural issues in gender in fisheries. Analysis is complete and the write-up will be conducted in 2018 as part of FIS/2018/300.

In the later stages of the project, we drew together a community of practitioners comprising gender and fisheries experts focused on the Pacific region. The first activity of this group was a design workshop in August 2017 in Sydney, followed by a regional gender and fisheries expert group write-shop' in Fiji in November 2017. The output from the latter includes a review and a toolkit for addressing gender within analyses and activities in coastal fisheries. The 'toolbox' output is in development and will be completed as part of ACIAR project FIS/2016/300. Recommendations for an R&D agenda will be clarified and formalised at a meeting in mid-2018, but early results from this project work in Kiribati, Solomon Islands and Vanuatu are reflected in the 'Conclusions and recommendations', below.

Results and discussion

A member of MFMR in Solomon Islands reflected that 'the marine management plans that MFMR have implemented in the past have sometimes overlooked the role of women or only seen fish species as important for men' (Lawless et al. 2017, p.7). Consequently, fisheries development initiatives have tended to target men and overlooked the value and contributions of women in fisheries. Community engagements in this project were sensitive to these differences, and then used strategies to try to account for them. The paper on the CBFM process developed and applied in Vanuatu provides a snapshot into those understandings:

> We women use resources differently, and we collect more species from the reef compared to the men. We spend so long in the water to try our best to get fish for our meals (female participant, Peskarus village; Bareleo Tavue et al. 2016)

To redress the deficit of qualitative and quantitative sex-disaggregated data, we have started to build fish catch datasets that take better account of the contributions made by women. In retrospect, the project perhaps moved too quickly to the more advanced aspects of gender transformative approaches and gender benchmarking without sufficient attention paid to some of the more basic knowledge gaps (i.e. sex-disaggregated fisheries data). These gaps could be addressed through the analysis of participatory resource maps alongside landings

data (collected at various points and continuing alongside CBFM efforts). The follow-on project provides an opportunity to take stock of these data and address this information gap.

The assessment of fisheries value chains developed insights from two cases studies and highlighted some key differences. The overarching findings were:

> Men and women often fulfill different roles in a value chain, have differential access to assets, and have disparate levels of influence in decision-making processes. Value chain roles also include other actors and activities besides the key processes (production, processing, trading, transporting, and marketing) in the chain, as there are many tasks to be fulfilled within each process. In the case study communities, men tend to dominate the catching of fish, use more fishing methods than women, and catch different species of fish. Women contribute labor to the fishing activities by preparing gear and bait for fishing and meals for the men to take on long fishing trips, and by assisting in gutting and cleaning of fish. Women's fishing activities are in general restricted to fishing from or near the shore and/or gleaning for shells and other marine resources. Sales usually seem to be conducted by those who have also caught or collected the marine resources. (Table 7.7.1) (Kruijssen et al. 2013)

The research also provided some straightforward guidance for value chain assessments that could be applied to livelihood and value chain work, including that in the subsequent phases of this project.

While gendered differences in roles along the fisheries value chain and livelihoods provide a critical and foundational understanding (and one that is often overlooked), this understanding, or even accounting for these differences, will not necessarily improve outcomes for gender equity. For this reason, we employed the GENNOVATE tools to take a deeper look at **underlying gender norms and relations** that affect household roles, livelihood activities and self- and collective efficacy around strategic life decisions (i.e. much more broadly than a narrow fisheries focus). In the first instance, we used the tools to gather information to guide and adjust specific engagement strategies. In subsequent projects, we can reapply these tools to determine if gender norms and roles have changed over time.

In our first analysis of these data, we used the framing of adaptive capacity and capacity to innovate. In three communities in Solomon Islands, we found that five dimensions of capacity to adapt and to innovate (i.e. assets, flexibility, learning, social organisation and agency) were mutually dependant. For example, limits to education, physical mobility and agency meant that women and youth, particularly, felt it was difficult to establish relations with external agencies to access technical support or new information important for innovating or adapting. Willingness to bear risk and to challenge social norms hindered both women's and men's capacity to innovate, albeit to differing degrees. Our findings illustrated that there was substantial room for improvement in the way in which we (project-related activities) and others delivered and adapted initiatives (Cohen et al. 2016). For example, in the village of Fumamato'o , where we had delivered training on organic farming (a community-wide request), the new techniques were not taken up well by women because they felt: (i) it was too risky to trial new methods; and (ii) pressure to conform to tried and true farming techniques. One of the recommendations that emerged from this research is that the role of a partner organisation may be to carry some of that risk while women, in particular, trial and mainstream new approaches.

Table 7.7.1. Gender roles in the value chains of marine resources in a case study community in Isabel Province, Solomon Islands (Kruijssen et al. 2013)

Value chain process	Gender roles (community 2)
Production: fishing & gleaning	• Both men and (some) women participate in reef fishing, but women use a more limited number of specific fishing methods, usually from the shore or close to home. • Women play a "hidden" role by assisting in preparing gear, food, and drinks for men to take on their fishing trips and other tasks. • Gleaning of other marine resources such as mud shells and clamshells is dominated by women, while crab collection is a shared responsibility between men and women. • Children usually assist in the tasks of the parent with the same sex.
Processing: gutting & cleaning	• Gutting and cleaning of fish is the responsibility of the person that has caught the fish – typically men – however, women assist in this activity. • Cleaning of trochus shells is conducted by women.
Trading	• Men are mostly responsible for selling of fish to the Fisheries Center. • Women have primary responsibility for selling of all other marine resources. • There are market channels for women outside the village, but these are limited, and women report receiving low prices from (mostly male) buyers and market intermediaries. • Role of intermediary for trochus is only fulfilled by men (those who sell to the secondary processors or their agents).
Marketing	• In local markets selling is done by men, women, and children; however, which household member dominates depends on the type of resource and the product. • Marketing products for income within the village has limited social acceptance. • In the market in Honiara men dominate and during fieldwork for this study no female reef fish vendors were found in the central market (although women had a strong presence marketing pelagic fish obtained from commercial fishing boats) as well as in other marine resources such as shells and mudcrabs, however vendors interviewed did indicate normally women vendors are present, although they thought that this was possibly declining.
Consumption	
Inputs and services	• Input supply stores (fishing gear, fuel, etc.) in community are all run by men, and buyers are also mostly men; women may buy some hooks and fishing lines. • The transporter (freight ship) has an all-male crew but many women in the office in Honiara. • Ice is mainly sold to fishers to keep fish fresh during overnight trips; few women buy ice as they are less involved in fishing. • Extension services are mostly provided to fishers, which are mainly men; thus women receive less training.

Subsequent analysis of data from the same three communities focused on how gender norms and relations influence an individuals' agency (i.e. having choice and being able to exercise choice) in rural livelihoods. We found that the livelihood portfolios of women and men have diversified from those of the past. However, livelihood diversification does not necessarily lead to improved wellbeing and, in fact, women reported that the labour burden had increased as livelihoods became more diverse. In our first paper (Cohen et al. 2016), we argued that the insight that livelihood diversity might equate to a burden has been overlooked in adaptive capacity and resilience research (and livelihood diversification projects) which tends to emphasise the correlation between high livelihood diversity and high adaptive capacity. While more diverse, the livelihoods women and men were able to pursue were still restricted by norms shaping expectations of gender-appropriate activities, and individual perceptions of risk (found to be greater for women). Capacity to exercise choice within households involved intra-household negotiation, and consensus was considered more important than male or female dominance in decision-making. Whereas in community decision-making, men's capacity to exercise choice was perceived to be greater. We found that initiatives seeking to improve livelihoods can either contribute towards the destabilisation of gender norms and relations or amplify existing gender inequalities – depending on attributes their design and implementation. These findings brought to the fore two important insights. Firstly, rural livelihood initiatives are more likely to bring about sustained and equitable improvements to wellbeing if the different ways in which men and women participate in, and experience, livelihood opportunities are taken into account. Secondly, there is substantial opportunity to catalyse the re-negotiation of gender norms and relations to promote greater individual agency through the way in which livelihood initiatives are delivered—particularly through the application of gender transformative approaches.

We drew insights on **community engagement** from earlier stages of the project. Schwarz et al. (2014b) identified the importance of explicitly targeting the attendance of men, women

and youth groups in community consultations, to ensure consultations are inclusive and all community members have the opportunity to benefit from initiatives. This may seem obvious, but even where facilitators are sensitive to equitable attendance, there are still challenges in realising that goal (for example strategies and challenges detailed in Section 7.4.7 for Vanuatu, also see detail within Bareleo Tavue (2016)). In sum, field teams still face substantial challenges in securing good participation of women. This illustrates further work is required to build team skills, to modify our practices and to adjust/broaden the nature of interventions. For example, as noted by Bareleo Tavue (2016): 'this training and the FADs benefited only men directly, due to gender norms associated with fishing practices'.

Fortunately, however, there is some evidence that our investments in building partner capacity and documenting practical approaches for programs to be more gender sensitive and gender accommodating are having some traction. A more comprehensive or external review would be valuable in determining how these improved governance norms and practices are spreading and where they are taken up. To this end, it is the focus of PhD research aligned to the follow on project FIS/2016/300'.

We also sought to start to bring new insights to community engagement through the CRP AAS and Promundo work to develop and test gender transformative approaches; that is, those that actively attempt to examine, question and change harmful gender norms and the imbalance of power between men and women while reaching their specific program or policy objective (Figure 7.7.2). Many tools and strategies had already been integrated into community engagement practice, yet there was still some hesitancy about what a culturally sensitive and Solomon Islands–adjusted gender transformative approach looked like. This was the reason we developed a comprehensive tool (in strong collaboration with country partners), as detailed in the output *Considering gender: practical guidance for rural development initiatives in Solomon Islands* (Lawless et al. 2017). The next opportunity is to test this tool, including in sites where we have collected the GENNOVATE benchmarking data on norms and relations to determine if shifts in these eventuate.

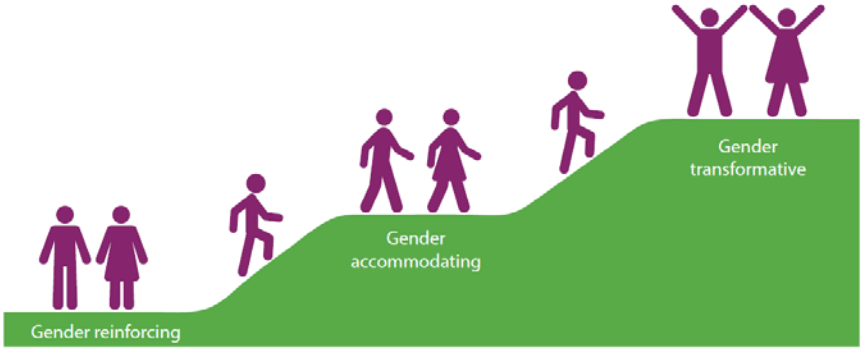


Figure 7.7.2. The way in which organisations and initiatives and consider and work with gender can be viewed on a spectrum and highlighted that there are opportunities to move towards more accommodating and transformative approaches (Lawless et al. 2017).

Rural women's groups and savings clubs have become examples of women empowerment in the Pacific. In Solomon Islands, the West Are'Are Rokotanikeni Association (WARA) women's savings group in Malaita is one such rural women's organisation that has been operating since the 1999 and has over 1,000 members. Through the association, women support each other and develop skills and practices for economic empowerment. These types of groups offer 'entry points' to support women's skills and capabilities for earning and saving cash in rural settings. There are now more than 10 similar groups in Solomon Islands, offering the potential to reach thousands of women across rural environs. The project has partnered with WARA in seeking to enhance their fish-based income-earning activities. The

women sell both fresh and cooked fish. For example, the women make fish balls that they sell as a nutritious meal. Throughout 2017, livelihood diagnosis meetings were held in West Are'Are, during which women identified that fluctuations in access to fish and access to markets to sell fish are constraints to their ability to earn income from fish. Being able to hygienically store fish for longer periods would allow them to better plan their fish trading and cooking practices and allocate more time to other household tasks, so the women prioritised trialling solar-powered freezers. In 2017, three freezers were delivered to three zones (WARA geographical groups) (Figure 7.7.3). During the follow-on project, and in partnership with the Malaita Provincial Fisheries Office and a WorldFish-led project, the WARA initiative with solar-powered freezers will be evaluated and expanded as an example of a technology-driven support mechanism for enhancing rural women's capacity for economic empowerment.


Handing over of solar panel and deep freezer to WARA Zone six at Pipisu.

Figure 7.7.3. Newspaper clipping from Solomon Star. WorldFish staff member Margaret Batalofo leads the handing over of a solar-powered freezer to a WARA zone representative in Pipisu village.

Our early work on **structural barriers and opportunities** for gender equality focused on policy and capacity within the fisheries sector. Two major policy developments (the New Song and the SSF Guidelines) represent high-level commitments to gender in fisheries. In three areas, the New Song reflects some sensitivity towards issues around gender:

> Gender relations have a significant effect on the course of development and so the voice of women and youth must be heard and acted upon effectively in all future CEAFM [Community-based Ecosystem Approach to Fisheries Management] strategies. In addition to playing a greater role in decision-making, women and youth must have more equitable access to the benefits flowing from coastal fisheries.
>
> Outcome; More equitable access to benefits and decision making within communities, including women, youth and marginalised groups
>
> … Plans take account of equity issues, especially those involving gender and youth'

The SSF Guidelines give more substantial treatment to gender considerations (with 13 specific commitments made to gender), yet even still the guidelines are criticised by gender experts as being insufficiently sensitive, accommodating or transformative. Nonetheless, when we used these two policies as a benchmark from which to measure national policies in Kiribati, Solomon Islands and Vanuatu, we found that commitments to gender are not, as yet, reflected in national level policy and capacity (Song et al. submitted; Figure 7.7.4).

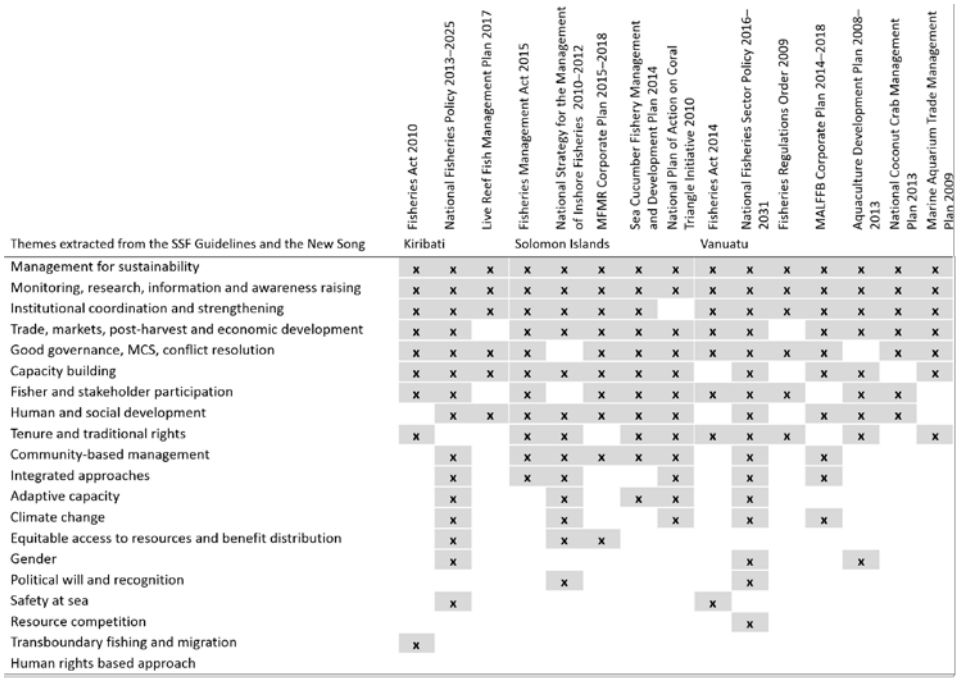


Figure 7.7.4. Comparison of national-level fisheries policies of Kiribati, Solomon Islands and Vanuatu in terms of their coverage of the themes prescribed in the SSF Guidelines and the New Song. Explicit mention of a theme in the document text (i.e. presence/absence) is indicated with a shaded 'x' (from Song et al. submitted)

The systematic analysis we conducted on Solomon Islands environment and fisheries policies/strategies found gender was rarely mentioned and, if it was, only in a very superficial manner (Cohen et al. 2017). In Solomon Islands, there is a policy on 'Gender Empowerment and Women Development' to which all government agency leaders are contractually accountable. However, informal discussions with leaders of fisheries and environment departments indicate, for example, that 'clear, targeted sector-based gender policies are absent, and in practice human and fiscal capacity are too low to meaningfully consider gender' (Agnetha Vave-Karamui, Ministry of Environment, Solomon Islands, pers. comm).

Similarly, both government and NGO partners of FIS/2012/074 express that a range of donors are calling for gender to be considered within community-level engagements, yet they state that they do not have capacity adequate to meet these obligations in a meaningful way. These trends are likely similar in other Pacific countries; in the follow-on project, we will examine this more closely through a gender capacity analysis to aid in identifying gaps and particular opportunities for impact. Nonetheless, there is substantial opportunity in the next phase of the project to continue efforts within the project team and with project partners to address gender in meaningful ways, at a range of scales; from community work, to national policies to international commitments.

Conclusions and recommendations

- There is still a substantial gap in sex-disaggregated fisheries and value-chain data in the Pacific and in the three countries of focus. The next phase of the project and

other projects led by partners offer an important opportunity to increase focus on collection of such data.
- While gender was a strong focus of this project and some gains were made, we suffered from low capacity to ensure that best practice was always applied in our own engagements. The resourcing provided in the next project reflects an increase in resources allocated to gender activities. Simultaneously, however, there need to be continued efforts to build gender understandings within teams—to ensure that gender is not left up to only those considered to be the gender focal points or experts.
- While some tools developed by Promundo and CRP AAS have translated into practice applied in this project, there is substantially more scope (related to the point above) to further test and develop the gender-transformative guidance with guiding questions (i.e. Lawless et al. 2017) in Solomon Islands, Vanuatu and Kiribati. This will require substantial investment in capacity, and likely further support from experts outside the project.
- In the early stages of the follow-on project, gather benchmark data in new sites before the gender transformative approach is introduced, then later in the project, assess any shifts in norms or relations—and the consequences of, and contributions towards, those shifts.
- Ongoing efforts to build capacity of researchers, partners and all practitioners are absolutely critical and an important area for real impact. This should focus on all members of project teams, as well as with partners.
- Collaborative work with SPC should be undertaken to develop methods for gender and fisheries stocktakes and capacity assessments in PICs
- Further development is needed of the gender-sensitive livelihood diagnosis and testing tool with critical reflections on whether and how it facilitated gender-equitable processes and outcomes.
- The Women's Empowerment Index as is applies to fisheries was not developed, assessed or tested for the Pacific. However, aspects of the index will be applied into data collection and analysis methodologies around gender studies as part of the follow-up project FIS/2016/300.

7.8 Objective 8. Improve utilisation of fish in the Pacific region

7.8.1 The role of fish, local and imported foods in diet quality of rural Solomon Island women and young children

This section summarises activities and outputs from Activities 8.1 and 8.2—see Section 6 for tabulated activities and milestones. This work involved collaboration with, and built on activities undertaken as part of, FIS/2015/031 and related publications are detailed below.

Published output

Albert J.A., Bogard J., Siota F., McCarter J., Diatalau S., Maelaua J. and Thilsted S.H. (2017b). The contribution of small-scale fisheries to nutrition in Solomon Islands rural communities. P. 61 in 'Resilient Small-scale Fisheries Symposium: proceedings of a workshop held in Penang, Malaysia, 5–7 September 2017. Australian Centre for International Agricultural Research: Canberra. [Abstract]

Unpublished work and outputs 'in preparation' or 'submitted'

Albert J., Siota F., Hasi A., Ngarakana N., Posala R., Orirana G., Saeni E., Teioli H., Suruma B., Sukulu M., Papae R. and Jimuru M (2017c), An analysis of dietary diversity and anthropometry of women, infants and young children from rural communities in

Malaita and Western Provinces, Solomon Islands, report prepared for the Solomon Islands Ministry of Health and Medical Services.

Albert J., Bogard J., Siota F., McCarter J., Diatalau S., Maelaua J., Andrew N. and Thilsted S. (in prep). Poor nutrition and diets in rural Solomon Islands communities: a mixed methods approach to framing the problem and its drivers. (Target journal: Maternal and Child Nutrition)

Albert, J., Siota, F., Diatalau, S., Andrew, N., Thilsted, S. (in prep). The role of fish, local and imported foods in the diets of rural Solomon Island women.

WorldFish (2017a). Fish: food for good health. Unpublished poster prepared for community development activities in Solomon Islands. WorldFish: Honiara.

WorldFish (2017b). The first 1000 days. Unpublished poster prepared for community development activities in Solomon Islands. WorldFish: Honiara.

Results and discussion

This activity was included as part of an extension to the project and builds on from activities within FIS/2015/031 aimed to improve the utilisation of fish in the Pacific region through a case study in rural communities in North Malaita, Solomon Islands, by focusing on diet quality of women and young children.

A tablet-based survey instrument to determine nutritional status and determinants of malnutrition was developed as part of FIS/2015/031. The survey instrument included a quantitative survey module on diet quality, determined using the women's minimum dietary diversity (MDD-W) indicator and the minimum dietary diversity for children aged 6–23 months (IYCFMDD) indicator. The diet quality survey module was implemented in May/June 2016 (as part of the broader nutrition assessment) and again in September 2016 (initially planned for November 2016). The purpose of the repeat survey was to gain an understanding on how seasonality, markets and food availability influences diet quality. The planned survey for November was shifted to September as the communities identified November as an intensive time in the community due to garden preparation requirements for the festive season. The planned surveys for February 2017 were not undertaken as local staff members identified survey fatigue in the study communities. Communities were requesting activities to help improve their nutrition rather than more surveys to reporting on their diet quality; hence, nutrition awareness and behavioural change interventions were initiated and are discussed further below.

Results from the broader nutrition survey (undertaken under FIS/2015/031 in May/June 2016) were compiled in a report and have been reported as part of FIS/2015/031. Key findings included:

- There was evidence of the double burden of malnutrition in rural Solomon Islands communities, with a prevalence of overweight or obese women and stunted children.
- Overall, half of women of reproductive age assessed from the four study areas were overweight (30.3%) or obese (20.7%).
- Malnutrition was evident in children under the age of five in all study communities. The most prevalent form of child malnutrition was stunting, with 24.3% of children between 6 months and 5 years of age measured having stunted growth.
- Dietary diversity of women and children aged 6–23 months was extremely low (Figure 7.8.1). Based on this assessment, the majority of women (94%) and children aged 6–23 months (87%) across the North Malaita study communities are likely to have inadequate intake of micronutrients in their diets.
- Diets generally lacked dairy, nuts and seeds, fruits and vegetables.
- In combination with low diversity diets, there was a high proportion of women and young children that consumed energy-dense, nutrient-poor foods (mostly fats/oils and sweet drinks) (Figure 7.8.2).

- A high proportion of women and young children consumed imported/store foods; in particular, rice.
- Fish formed an important component of women's diets, yet there was a delayed consumption of fish by young children, typically after 12 months of age (Figure 7.8.3).

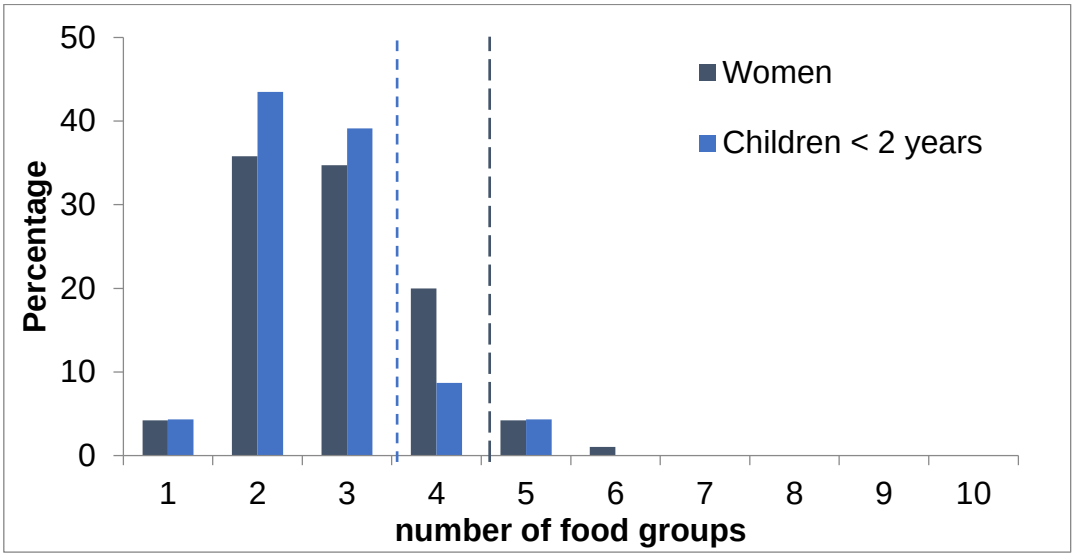


Figure 7.8.1. Number of food groups (between 1 and 10) consumed by women and young children (between 1 and 7) in North Malaita. The women's minimum dietary diversity score (MDD-W) is defined as the proportion of women who consume 5 or more out of 10 food groups, and minimum infant and young child dietary diversity (IYCFMDD) is defined as the proportion of children under 2 years who consume 4 or more out of 7 food groups in a 24-hour period. The results highlight that fewer than 6% of women and 13% of children under 2 years of age achieved MDD-W and IYCFMDD, respectively.

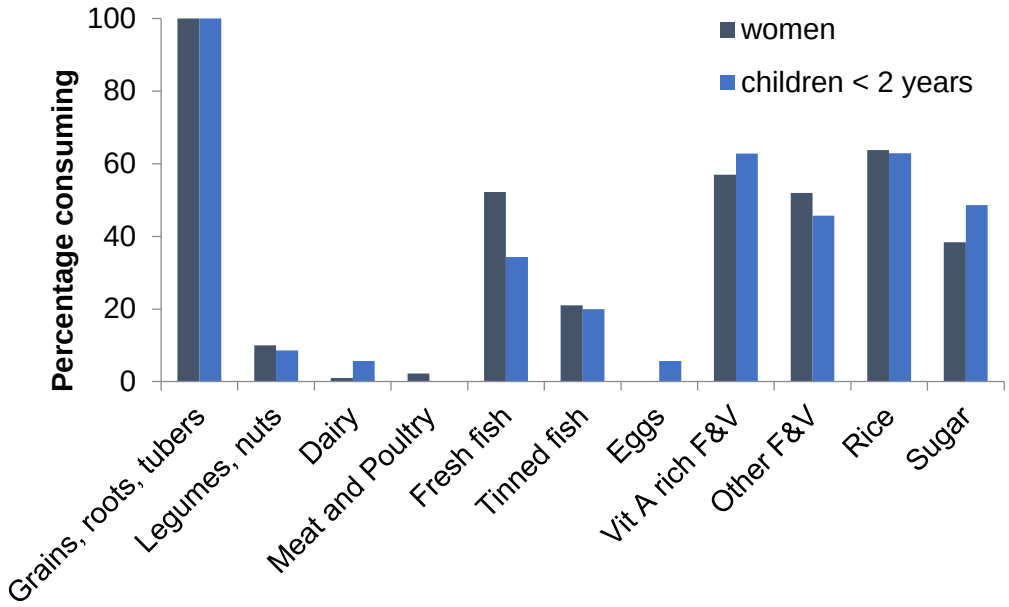


Figure 7.8.2. Percentage of women and young children (<2 years) that consumed selected food groups. These results highlight the importance of fresh fish as an animal source food along with the high proportion of imported foods (rice and sugar) in the diets of women and young children.

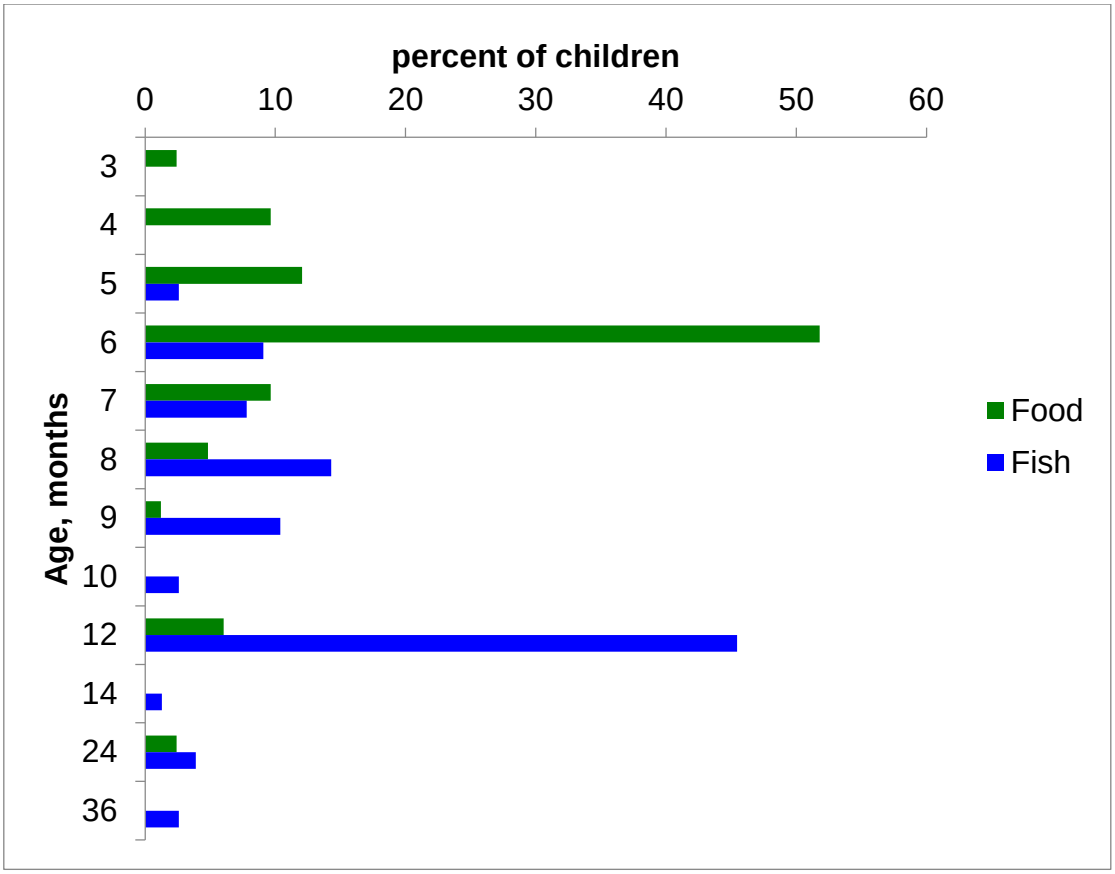


Figure 7.8.3. The age (months) for the introduction of complementary foods and fish to children under the age of 5 years. These results highlight the delayed feeding of fish to young children with the highest percentage of children first receiving fish at the age of 12 months.

The repeat surveys were conducted with a subset of women from the cluster communities of Alea on the mainland in North Malaita and a cluster of communities (Fumamato'o cluster) on the island of Manaoba. We assessed the daily changes in diet quality during a 6-day period and assessed changes in diets between May/June and September 2016.

Overall results from September 2016 were consistent with the May/June surveys, with poor dietary quality of women in both the mainland and island communities in North Malaita. Generally, women from island communities had diets lower in diversity, with only 3% of women from the island communities achieving minimum dietary diversity.

During a typical week there was little daily variation in the average MDD-W across the both groups. While the average scores were consistently low, they were slightly higher for the mainland women than the island communities and were similar to those scores recorded in a 24-hour period assessed 4 months earlier (Figure 7.8.4).

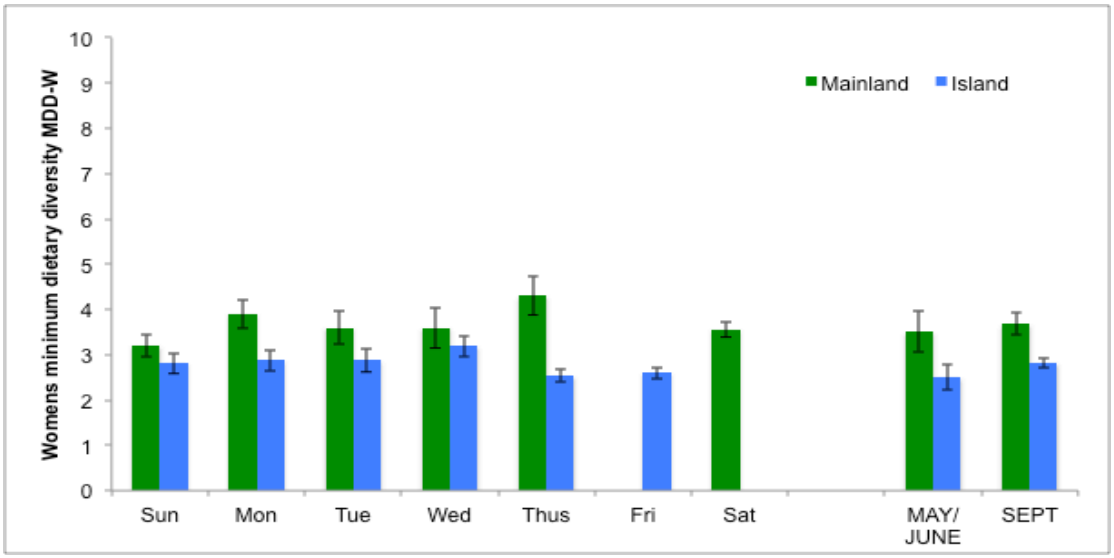


Figure 7.8.4. Women's minimum dietary diversity score (MDD-W) over the 6 days of assessment in September 2017 (and estimated monthly average for May/June 2017 and September 2017). Note: no data available for mainland communities on Friday and no data available for island communities on Saturday.

Access to fresh fruits and vegetables and locally caught fish in the study region is through backyard gardens and small-scale local markets. Markets occur twice weekly (e.g. Figure 7.8.5), with the most accessible markets to the study communities on a Tuesday and Thursday, with the Thursday market being the most significant.

Figure 7.8.5. Local market in Solomon Islands

Although dietary diversity of women in both communities was low, there were some interesting differences in consumption of specific food groups between the mainland and coastal communities (Figure 7.8.6). For the island communities of Fumato, fish formed an important component of women's diets, being consumed by 60% to 88% of women for all days except of Wednesday. In contrast, the mainland communities in the Alea cluster where fish consumption varied throughout the week with peaks in consumption on Monday, Thursday and Saturday. Higher fish consumption in Fumato is not surprising given the accessibility of fish to the island communities. The communities of Fumato have been involved in CBFM activities as part of the FIS/2015/031 project (see Section 7.3) and numerous community members highlighted the importance of marine management in securing their access to fish. For those on the mainland, fewer families are located close to the coast and involved in daily fishing, so most of their access to fish is through local markets and exchange/barter with family members. The affinity of island communities to fish

is further apparent with a higher proportion of women consuming tinned tuna. There was an interesting peak in the consumption of canned tuna on Wednesday, which corresponded with a lower consumption of fresh fish. This may be related to markets, as the largest local market accessible to these communities occurs on Thursday.

In contrast, leafy greens were more consistently consumed on a daily basis by a higher percentage of women on the mainland compared with the island communities of Fumato. This again reflects consumption being linked to availability—in this case, greater access to garden produce on the mainland, which is driven by higher quality soils. Manaoba Island is a coral atoll and the communities have identified soil quality as an ongoing constraint in terms of their ability to grow garden produce.

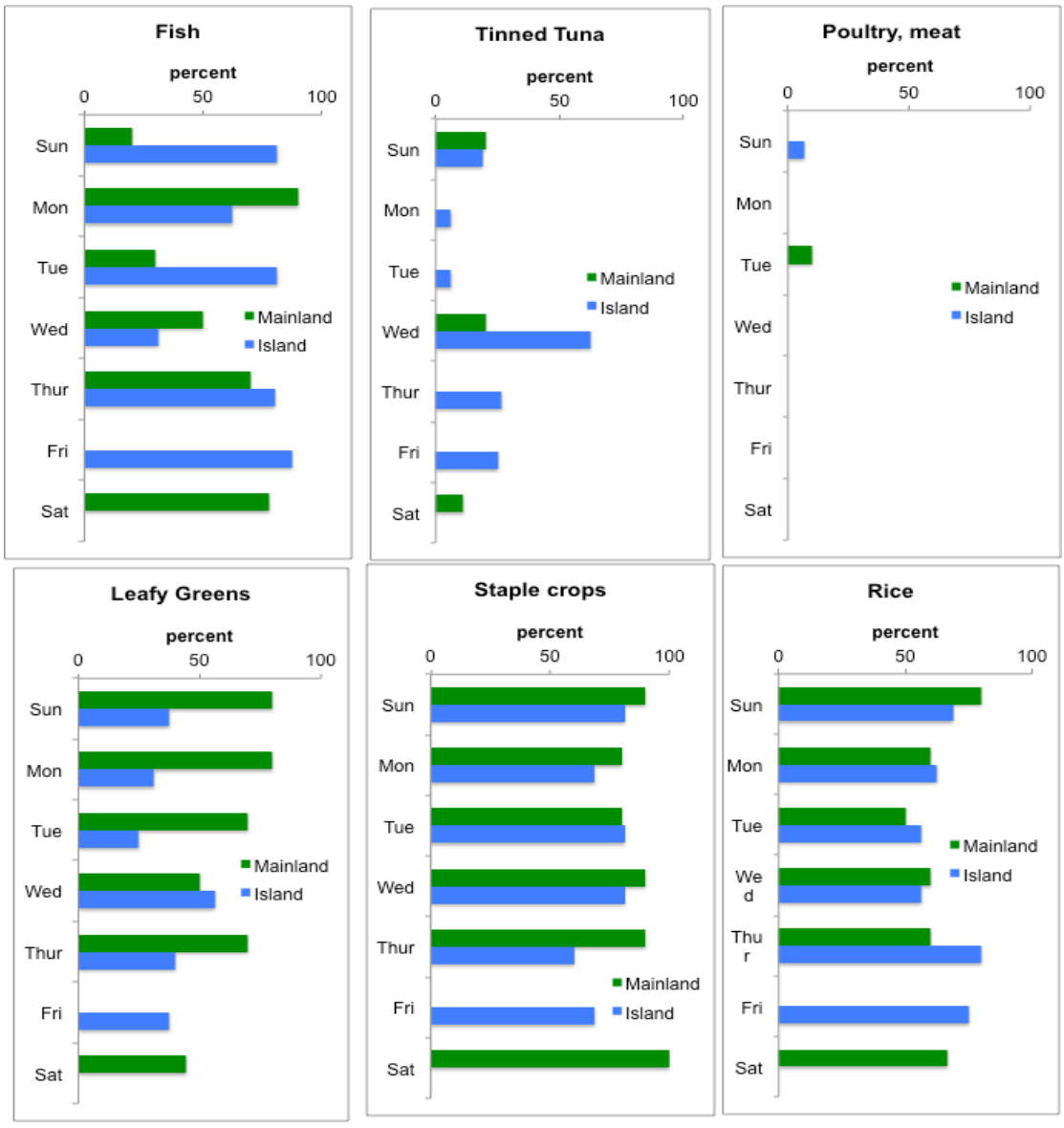


Figure 7.8.6. Weekly trends in women's consumption of selected foods in the two cluster communities in North Malaita. Note: no data available for mainland communities on Friday and no data available for island communities on Saturday.

For both communities, the majority of women typically consumed staple root crops daily, along with rice, an imported food purchased at local stores. It is increasingly common in rural

communities for rice to be consumed along with staple carbohydrates, rather than replacing them. During early participatory research under the CRP AAS, communities attributed the increased consumption of store-brought foods to challenges in agriculture (declining yields), a preference for imported foods (due to taste and convenience), changing social norms (including a shift to a market-based economy) and a lack of nutrition knowledge.

During both survey periods (May/June and September 2016), project staff undertook an analysis of the diversity and price of locally available produce and foods in the local stores and markets (Figures 7.8.7 and 7.8.8). Based on these assessments, there was slightly reduced diversity of local foods available in September compared with May/June 2016, coupled with lower prices for some goods.

More in-depth value-chain analysis is required to understand the role of markets in household diets and whether interventions in the market value chain can improve the nutrition of women and young children in rural Solomon Islands communities. This research will be conducted as part of FIS/2016/300.

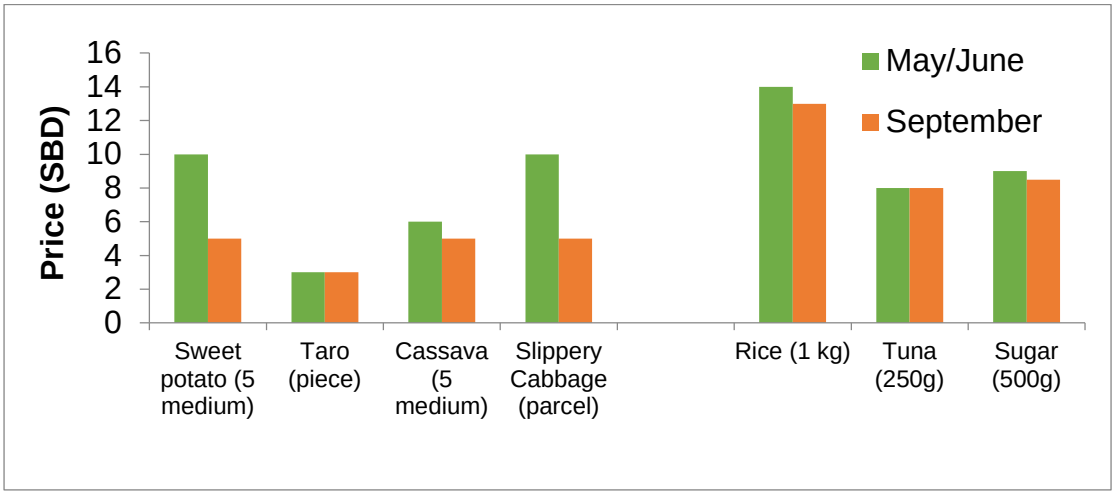


Figure 7.8.7. Prices of selected local market and store foods in North Malaita during the May/June and September surveys. Results show a slight decrease in the price of some foods during the September period.

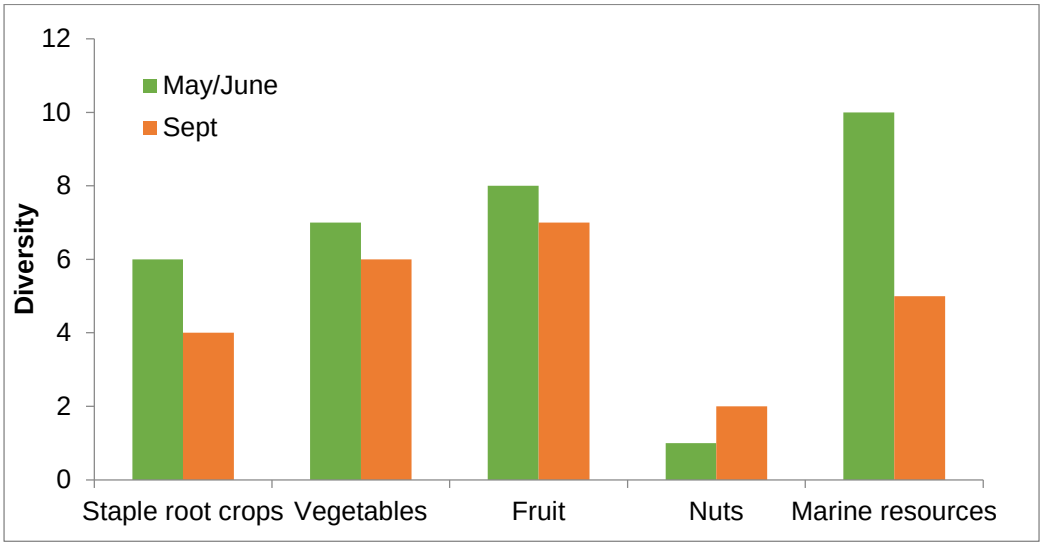


Figure 7.8.8. Diversity of local market produce in North Malaita during the May/June and September surveys. Results show a slight decrease in the diversity of most locally available foods during the September period, with the exception of nuts.

The findings on the poor dietary quality of women and young children led to a number of key focal areas for intervention, including: (i) interventions within the first 1,000 days (from a child's conception until their second birthday); (ii) interventions to improve the productions of household gardens; and (iii) education to improve communities' knowledge and awareness of nutritional issues.

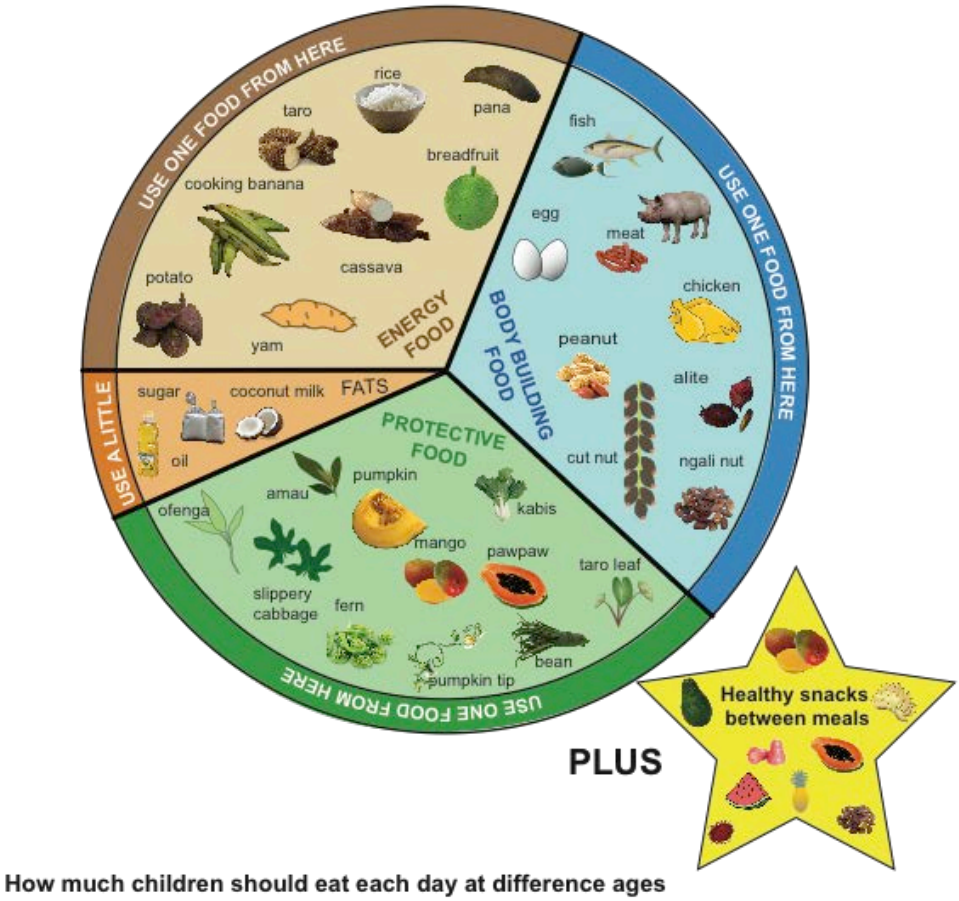
In April 2017, as a direct request from the cluster communities, a workshop was arranged in Fumato to implement some early nutrition interventions. Two local Solomon Island experts in the fields of agriculture, nutrition and soil management (Roselyn Kabu and Pita Tikai) led the workshop with contributions from the Ministry of Health Provincial Nutrition Officer (Arimer Hasi), a Kastom Gaden Association trainer (Joyce Mary) and WorldFish research staff (Joelle Albert, Margaret Batalofo and Meshach Sukulu). The workshop was a joint initiative and was co-funded through a SwedBio-funded project to enhance livelihood and an ADB-funded project on CBFM. The specific purpose of the workshop was to provide nutritional awareness and agricultural training to improve dietary quality, especially for women, infants and young children. Growing varieties of nutritional vegetables closer to the house in nutritional gardens or '*sup sup* gardens' are a mechanism identified by the Solomon Islands Government as one way to improve household nutrition and is a focal area of the Solomon Islands Nutrition Policy 2016–2020 (currently in draft form).

In total, 36 participants (22 of whom were women) attended the workshop from households within the Fumato communities. The workshop was conducted over 4 days and included:

- presentations on the key findings of the dietary surveys and the importance of a diverse array of food groups to be consumed on a daily basis especially for women, and young children
- awareness and participatory activities led by the Ministry of Health to emphasise the importance of healthy diets and the causes and mechanisms to reduce food related diseases
- participatory cooking demonstrations to improve infant and household meals with a focus on sanitation and hygiene, ways of cooking to retain nutrients and the selection of foods from the main food groups to maintain diversity. This was complemented with a healthy meal guide that was laminated and provided to households as a guide for meal planning, particularly for infants and young children (Figure 7.8.9)
- practical demonstrations on seed saving to reduce costs of purchasing seeds and retain high-quality and highly nutritious food varieties
- demonstration and practical exercises to build understanding of soil management and composting to improve soil quality
- awareness and identification of insect pests and diseases and their management
- *sup sup* garden design, layout and establishment (Figure 7.8.10). The *sup sup* garden training involves the entire process from the selection of a suitable location, building composting heaps and 'garden baskets' along with nursery establishment and transplanting seedlings, and planting a living boundary fence as both a means to keep out unwanted animals as well as providing highly nutritious local leafy vegetables
- workshop wrap-up where participants assessed the feasibility of *sup sup* garden as a means to improve food and nutrition security using the SLOPIC (Supplementary Livelihood Opportunities for Pacific Island Countries) toolkit. The result of the SLOPIC assessment was that the participants thought sup sup gardening was a positive livelihood investment.

In June 2017, a follow-up trip was undertaken to make an initial assessment on outcomes from the nutrition awareness and *sup sup* garden training. We were able to follow-up with 50% of the original 36 workshop participants. Of those, 78% had implemented a *sup sup* garden, highlighting the success of the workshop and the potential feasibility of *sup sup* gardens. Future nutrition research under FIS/2016/300 will ascertain the nutrition outcomes

of this livelihood enhancement activity across the community, along with any early behavioural changes associated with the nutrition awareness and practical interventions.



How much children should eat each day at difference ages

	MEALS			BREASTFEEDING
	morning	middle day	evening	
less than 6 months	EXCLUSIVE BREASTFEEDING			on demand
6 months				on demand
7-8 months	½ cup	½ cup	½ cup	on demand
9 - 11 months	1 cup	1 cup	1 cup	on demand
1 - 2 years	1 cup	1 cup	1 cup	on demand
2 years +				

Figure 7.8.9. Healthy meal guide developed for communities in North Malaita and distributed to households as a guide to improve dietary diversity with a focus on young children

Conclusions and recommendations

Nutrition research in rural Solomon Island communities highlights that women and young children's diets have extremely poor dietary quality. These poor diets are contributing to the double-burden of malnutrition experienced across the entire nation. The lack of regular consumption of fruits and vegetables, dairy and nuts, coupled with the high consumption and affinity for store-brought foods, such as rice, noodles and sugar are the contributing factors

to poor diet quality. The shift in diet to store-bought foods was attributed by communities to challenges in agriculture (declining yields), a preference for imported foods (due to taste and convenience), changing social norms (including a shift to a market-based economy) and the lack of nutrition knowledge.

Figure 7.8.10. Participants engaged in various *sup sup* garden workshop activities

The lack of varied animal-source foods in the diet of women and young children highlights the integral role of fish and fisheries management for maintaining and improving nutrition in rural communities. In particular the exclusion of fish from the diets of young children warrants further investigation. Recommendations from nutrition research to date include: (i) the need to focus nutrition awareness and interventions on the first 1,000 days (from time of a child's conception until their second birthday); (ii) the need for a greater understanding on how CBFM approaches (including market chain analysis) can improve nutrition and iii) a nutrition-sensitive approach to the broader agriculture–fish food system to address the multiple drivers of nutrition issues in rural Solomon Island communities.

7.8.2 Understanding and promoting the use of fish for nutritional security

This section summarizes activities and outputs from Activity 8.3.1 – see Section 6 for tabulated activities and milestones. This work has collaborated with and built on activities undertaken as part of FIS/2015/031 and other projects and is published as:

Outputs published

Albert, J., Bogard, J. (2015) Planning a nutrition-sensitive approach to aquatic agricultural systems research in Solomon Islands, Program Brief: AAS-2015-15. CGIAR Research Program on Aquatic Agricultural Systems, WorldFish, Penang, Malaysia, 20pp.

Bell, J.D., Allain, V., Allison, E.H., Andréfouët, S., Andrew, N.L., Batty, M.J., Blanc, M., Dambacher, J.M., Hampton, J., Hanich, Q., Harley, S., Lorrian, A., McCoy, M., McTurk, N., Nicol, S., Piling, G., Point, D., Sharp, M.K., Vivili, P., Williams, P. (2015b) Diversifying the use of tuna to improve food security and public health in Pacific Island countries and territories. Marine Policy 51, 584-591.

Bell, J.D., Cisneros-Montemayor, A., Hanich, Q., Johnson, J.E., Lehodey, P., Moore, B., Pratchett, M., Reygondeau, G., Senina, I., Virdin, J., Wabnitz, C. (2017b) Adaptations to maintain the contributions of small-scale fisheries to food security in the Pacific Islands. Marine Policy, in press.

Results and Discussion

The research described here has largely been undertaken as part of related projects, with input and contribution from staff involved in activity 8.3.1. The outcomes from this research provide valuable insights to contribute to the knowledge base of understanding and promoting fish for nutrition security in the Pacific Region.

Malnutrition is evident across the Pacific region, with a number of PICs experiencing the double burden of malnutrition – the combination of overweight/obesity, stunting, micronutrient deficiencies and non-communicable diseases, in particular diabetes. This double burden of malnutrition is placing immense pressure on the health and economic development of many Pacific nations. Historically, nutrition-specific approaches (e.g. vitamin supplements and child immunisation), were the primary mechanisms to address issues of malnutrition. While these approaches play an essential role, it is now recognised that alone they are inadequate to achieve global reductions in malnutrition (Bhutta et al. 2013). Protection of natural resources, equitable economic growth, women's empowerments and development of sustainable and resilient food systems are essential to improve nutrition and health. Nutrition-sensitive approaches are those that address these basic and underlying determinants of malnutrition (Figure 7.8.11).

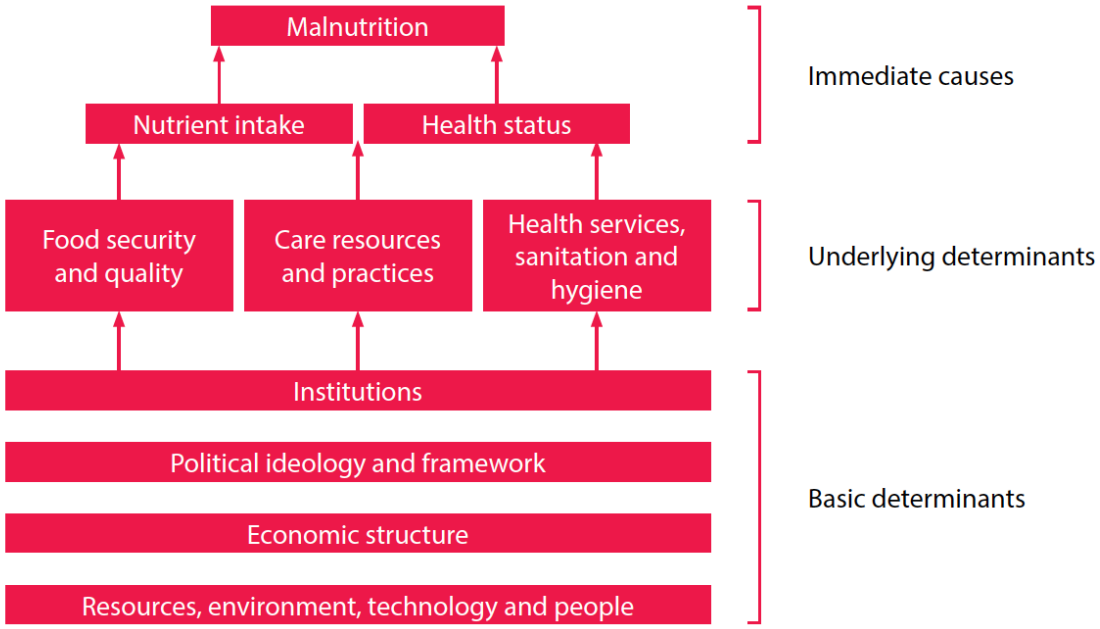


Figure 7.8.11. The UNICEF causal framework for nutrition

The FAO best practise principles for developing nutrition-sensitive approach provided a useful guide for planning nutrition-sensitive agri-food system research in Solomon Islands (output Albert and Bogard, 2015b). Importantly, context assessments provided the basis for the identification of nutrition issues and enabled the development nutrition research and interventions that focused on the local food system nutrition issues (see section 7.8.1). Improved policy coherence, good governance and multi-sector partnerships were identified as essential for scaling and addressing other underlying determinants of malnutrition (e.g. sanitation and hygiene).

Fish play an important role in nutrition security in PICs, as the primary animal source food as well as being an important resource that contributes to household income. Fish and other marine resources harvested from small-scale coastal fisheries account for 50-90% of animal source food in coastal populations. Yet it has been demonstrated that coastal fisheries will not be able to supply fish recommended for good nutrition of 16 of the 22 growing Pacific Island populations, particularly under future climate change scenarios (project output Bell et al 2015b).

Practical interventions and adaptations to minimise and close the gap between coastal fisheries production and consumption needs have been identified (project outputs Bell et al 2015b and Bell et al. 2017b).

Key measures to minimise the gap include:

- Manage and restore vegetation in catchments to protect coastal fish habitats from destruction form land-based sediment and nutrient runoff and reduce future damage from predicted increases in extreme rainfall events.
- Minimise coastal degradation for other present-day stressors including controlling pollution and waste and eliminating destructive practice that threaten coastal mangrove, seagrass and coral ecosystems.
- Provide for landward migration of mangrove habitats to provide further opportunities for these important fish habitats to migrate through current and future planning
- Strengthening community-based approaches to sustain production of coastal demersal fish and invertebrates

- Maximise the efficiency of spatial management ensuring that habitat complexity (seagrass, corals and mangroves) are included within well-designed protected area networks
- Diversify catches of coastal demersal fish to respond to changes in species distribution and help maximise resilience of reef ecosystems

Adaptations to fill the gap in fish supply include:

- Increasing community's access to the abundant tuna resources of the region by expanding nearshore fish aggregation devices, distributing small tuna and by catch offloaded by industrial fleets and improving access to canned tuna, especially for inland communities.
- Expanding fisheries for small pelagic species (mackerel, anchovies, sardines, scads) through the introduction of new fishing technologies
- Extending the shelf life of fish caught through training to improve existing and introducing new post-harvest storage methods

Adaptations to increase the supply of coastal fish and increase the availability and accessibility of tuna will require interventions at a range of scales, from community-level initiatives to trade and taxation changes, and at all stages of the food system.

Conclusions and Recommendations

Outcomes from this research highlight important adaptations and interventions to minimise and fill the gap in supply of fish for nutritional security in the region under a range of external drivers of change (population increase and climate change). While an enhanced supply of fish (either through community-based management approachs or increasing access to pelagic fisheries) play an integral role in to nutritional security; fish need to be better integrated into a food systems approach with all the feedback loops between trade, supply and demand, and the choices people make about their diets. These findings are consistent with nutrition-sensitive approaches and have contributed to the development of ACIAR FIS/2017/300. This ongoing food systems research includes activities not only to influence policy for enhancing the role of fish in nutritional security but to also understand how national and regional trade and nutrition policies – some of the basic determinants of malnutrition - determine the structural drivers of nutrition security.

7.8.3 Patterns in acquisition and apparent consumption of fish

This section summarizes activities and outputs from Activity 8.3.1. This work is ongoing – it builds on activities undertaken as part of FIS/2015/031 and will be continued in FIS/2016/300. The work will be published as:

Output 'in preparation'

Sharp, M., N.L. Andrew, A. Delisle, H. Eriksson, A. Romeo (in prep). Patterns in acquisition and apparent consumption of fish in eight Pacific Island Countries. Target journal: *Fish and Fisheries*

Andrew, N.L., M. Amos, J. Bell, H. Eriksson, E.H. Allison, J. Fanzo, A. Fink, J. Sanders, A. Romeo, M. Sharp, W. Snowden, A-M. Thow, C. Tukiatonga (in prep). Fish in the Pacific Food System. Target journal: Global Environmental Change

Household acquisition of fish in eight PICs

The vast majority of households in the eight PICs acquired fish in the reporting period, but a surprisingly large proportion did not report acquiring some categories (Table 7.8.1). Most households acquired reef fish, except in Vanuatu and Tonga where fewer than half of rural households acquired reef fish in the reporting period. Acquisition of pelagic fish was greatest

in FSM, Nauru, Tokelau and in urban Solomon Island households. Households in Samoa reported the highest acquisition of tinned fish at 90% national scale.

Relatively few households in most countries acquired shellfish in the period, particularly in Nauru, Tokelau, Tonga and Samoa. Acquisition of shellfish in Solomon Islands appears to be anomalously high and was driven by rural households. For example, fewer than 13% of urban households in Vanuatu and fewer than 9% of rural households in Samoa reported shellfish acquisition.

A large majority of households purchased or were gifted canned fish, with acquisition being greatest in Solomon Islands, Samoa and Vanuatu. Canned fish was least popular in urban Tongan households, where just over half of households reported acquiring it. Canned fish was only less popular in urban households in Federal States of Micronesia.

Table 7.8.1. Proportion of rural and urban households that acquired fish, by product type. Country codes are: Federated States of Micronesia (FSM), Nauru (NRU), Palau (PLW), Solomon Islands (SLB), Tokelau (TKL), Tonga (TON), Vanuatu (VUT) and Samoa (WSM). Note that the "Total" column is the overall proportion of households that acquired fish from any category in the reporting period.

Country	Pelagic fish	Reef fish	Shellfish	Canned fish	Fish other, not canned	Total
FSM (Total)	70%	82%	33%	52%	0%	98%
Rural	63%	89%	44%	61%	0%	98%
Urban	82%	71%	16%	38%	0%	97%
NRU (Total)	69%	52%	4%	45%	19%	94%
PLW (Total)	23%	56%	19%	71%	5%	89%
Rural	12%	57%	22%	67%	2%	88%
Urban	25%	55%	18%	71%	6%	89%
SLB (Total)	56%	67%	40%	82%	8%	98%
Rural	54%	69%	44%	79%	9%	97%
Urban	66%	59%	23%	99%	3%	100%
TKL (Total)	60%	88%	12%	60%	0%	97%
TON (Total)	12%	11%	16%	54%	47%	81%
Rural	11%	13%	18%	58%	45%	82%
Urban	17%	4%	11%	42%	52%	76%
VUT (Total)	36%	18%	27%	81%	10%	92%
Rural	42%	18%	31%	79%	13%	92%
Urban	17%	18%	13%	87%	4%	90%
WSM (Total)	1%	60%	13%	90%	0%	96%
Rural	1%	63%	14%	91%	0%	96%
Urban	3%	47%	9%	83%	0%	94%

In Federal States of Micronesia, Palau, Tokelau and Tonga, reef fish was proportionally the most acquired type in those households that reported acquiring fish of any type (Figure 7.8.1). Reef fish was least represented in Solomon Islands, Vanuatu and Samoa. Acquisition of shellfish in Solomon Islands was the highest and was driven by rural households. The large contribution of "Other fish" in Tonga is a measurement error in the data collection.

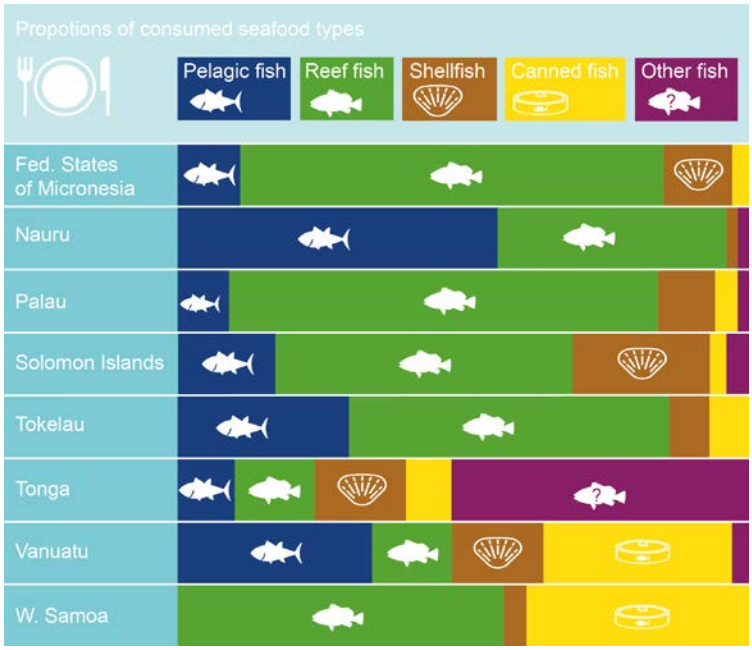


Figure 7.8.12. Proportions of fish types acquired in eight PICS for households reporting fish acquisition (whole fish).

Table 7.8.2. Per capita whole fish acquisition (kg/person/year), by fish category in urban and rural households from 8 PICs. No urban/rural distinction is made in NRU or TKL.

Country	Pelagic fish	Reef fish	Shellfish	Canned fish	Fish other, not canned	Total
FSM (total)	16.6	114.4	18.5	5.0	0.0	154.5
Rural	14.2	154.2	27.6	6.6	0.0	202.7
Urban	20.7	46.9	3.2	2.1	0.0	72.9
NRU (total)	56.0	39.8	0.3	2.0	2.4	100.5
PLW (total)	11.6	92.1	12.0	5.4	2.0	123.1
Rural	6.0	75.4	7.9	6.3	0.6	96.2
Urban	12.9	95.9	12.9	5.1	2.3	129.2
SLB (total)	18.7	58.2	26.9	2.9	4.9	111.6
Rural	20.6	66.6	31.2	2.4	5.8	126.6
Urban	10.5	21.3	8.0	4.9	0.7	45.3
TKL (total)	33.2	61.6	7.4	8.1	0.0	110.3
TON (total)	4.4	6.0	7.1	3.7	21.8	43.0
Rural	3.7	7.3	8.0	3.9	20.4	43.2
Urban	6.9	1.9	4.0	2.9	26.6	42.2
VUT (total)	6.3	2.6	2.9	6.0	0.5	18.3
Rural	8.1	2.9	3.9	5.6	0.7	21.0
Urban	2.5	1.9	0.6	7.1	0.2	12.3
WSM (total)	0.0	18.2	1.2	12.6	0.0	32.1
Rural	0.0	20.3	1.3	13.2	0.0	34.9
Urban	0.1	7.7	0.5	9.7	0.0	18.0

Proportionally more rural households reported fish consumption than urban households. Less than 15% of urban households in Vanuatu reported acquiring fresh fish in the reporting period. Taken in aggregate, rural households acquired more fish products by weight per person than urban households in all countries except Palau where the trends was the reverse (Table 7.8.2).

No urban/rural categorization is made for Nauru, or Tokelau. Per capita fish acquisition by fish category varied between countries. Breaking acquisition down among fish types and urban/rural differences, there are large differences in acquisition. Pelagic fish are most important for households in Nauru; reef fish are most important for households in Palau and Tokelau; shellfish are most important for households in rural Solomon Islands, while canned fish are most heavily relied on by urban households in Vanuatu and rural households in Samoa.

Sources of fish

The new standardized HIES method captured gifting of fish as well as other sources of acquisition (Table 7.8.3). In some countries, particularly Tokelau and Palau, gifting accounted for 41% and 28% of fish coming into respective households, and so was an important inclusion in the analysis. Unsurprisingly, subsistence acquisition was much greater in rural households than in urban areas, except for Tonga where a very small percentage of acquisition was home produced.

Table 7.8.3. Percentage of per capita whole fish acquisition purchased, home produced or received from gifts, by rural-urban. No urban/rural split is made in NRU or TKL.

Country	Purchases	Subsistence	Gift
FSM (Total)	39%	41%	20%
Rural	26%	52%	21%
Urban	61%	21%	17%
NRU (Total)	58%	38%	4%
PLW (Total)	49%	23%	28%
Rural	44%	33%	24%
Urban	50%	21%	29%
SLB (Total)	39%	51%	10%
Rural	29%	61%	10%
Urban	81%	9%	11%
TKL (Total)	14%	45%	41%
TON (Total)	74%	7%	19%
Rural	72%	9%	19%
Urban	82%	2%	16%
VUT (Total)	62%	37%	1%
Rural	54%	45%	1%
Urban	90%	10%	1%
WSM (Total)	63%	16%	21%
Rural	59%	19%	22%
Urban	80%	2%	17%

Comparisons among estimates of whole fish acquisition

Although broadly similar, there were significant differences among estimates of national whole fish acquisition among countries (Table 7.8.4). Using different CPI-inflated price denominators across fish products and including gifts received by surveyed household FSM, Nauru and Samoa have reduced the per capita whole fish acquisition between the two survey periods. In contrast, Palau, Solomon Islands, Tonga and Vanuatu have increased the per capita whole fish acquisition between the two survey periods. The most significant reduction was in Samoa where the very high estimate from Bell et al. more than halved. In this report we use the total expenditure divided by the total population (method 3 mean) for the Bell et al. re-analysis. We will report a fuller method comparison in the forthcoming journal articles.

Table 7.8.4. Per capita whole fish acquisition (kg/person/year) by country highlighting best estimates using population mean.

Country	Bell et al. (2009)	HIES Best estimate (method 3 mean)	FBS*	Gillett (2016)
FSM (Total)	**69.3**	**61.0**	**44.0**	72.0 – 142.0
Rural	76.8	70.4		
Urban	67.3	45.2		
NRU (Total)	**55.8**	**40.9**	**24.0**	46.7 – 63.9
PLW (Total)	**33.4**	**60.7**	**67.7**	84.0 – 135.0
Rural	43.3	73.6		
Urban	27.8	57.7		
SLB (Total)	**33.0**	**51.0**	**32.8**	32.2 – 45.5
Rural	31.2	51.3		
Urban	45.5	49.9		
TKL (Total)	**n/a**	**100.2**		119.4
TON (Total)	**20.3**	**29.5**	**35.0**	25.2 – 35.0
Rural	n/a	29.8		
Urban	n/a	28.9		
VUT (Total)	**20.3**	**39.4**	**33.6**	15.9 – 25.7
Rural	20.6	42.4		
Urban	19.3	31.4		
WSM (Total)	**87.4**	**33.6**	**46.8**	46.3 – 129.5
Rural	98.3	34.9		
Urban	45.6	27.8		

* Per capita food consumption based on Food Balance sheets from FAO (2007-2009 average) in kg/person/year.

Apparent consumption of fish in 8 PICs

Applying estimates of edible proportions from the fish types provide greater resolution of apparent consumption from the fish acquisition data. The pattern of apparent fish consumption (edible portions) mirrors that of fish acquisition (Figure 7.8.2). The edible portion available from the various seafood types influences the proportions of apparent fish consumption. In particular the edible portions from shellfish is small relative to reef fish,

which provides the biggest edible proportion relative to whole fish size (contrast to Figure 7.8.1).

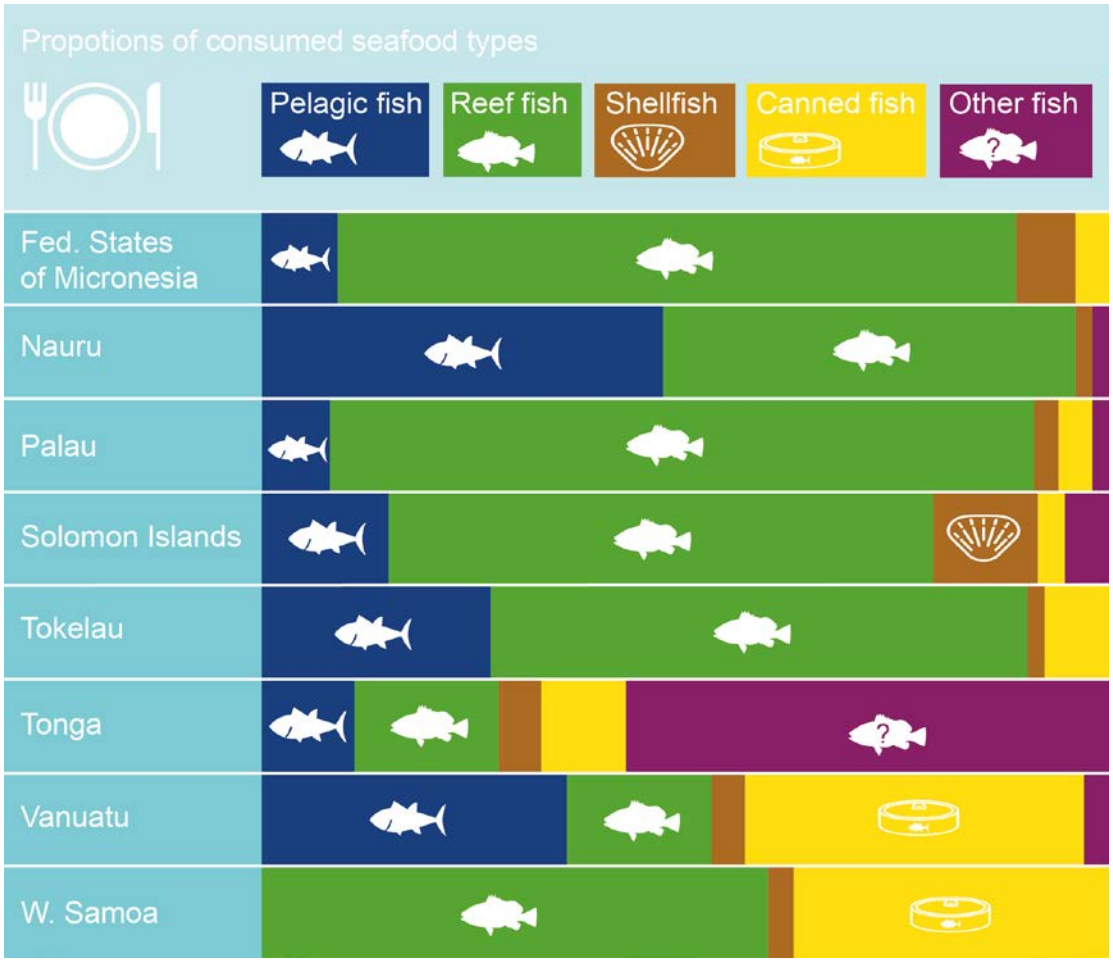


Figure 7.8.13. Proportions of fish types apparently consumed (edible portions) in eight PICS for households reporting fish acquisition.

Calories contributed by apparent consumption of fish in 8 PICs

A further layer of resolution can be applied to the data by using calorie estimates for fish group volumes of edible portions in the previous section (Table 7.8.6). The pattern mirrors that of apparent consumption, but calculating the calorie estimates allows for more detailed whole-of-food-basket analyses and the contribution of fish to diets. We will report such detailed analyses in the forthcoming journal articles.

Conclusions and Recommendations

Across the Pacific fish is differently acquired and consumed. Our analysis confirms that reef fish plays a key role in the apparent consumption as a whole, but that there are nuances to the narrative that are important to understand. For example, the sourcing modes of fish (gifting, purchase or subsistence) help illustrate a complex fish distribution system often built on social institutions and informal trade. The data on shellfish consumption in Solomon Island resonates with other data and observations from project activities in Malaita. It is clear that the type of fish that people eat is often a reflection of the environment and societal situation that people live in. Getting the estimates right is crucial to generate realistic gap analyses and identify where interventions are most required to secure fish for nutrition. The apparent consumption of reef fish confirms the importance of the project activities towards improved CBFM, which most often focuses on reef resources.

Table 7.8.5. Annual per capita apparent acquisition of kilocalories by country and by location. Presented data are averages by fish category in urban and rural households from 8 PICs. No urban/rural distinction is made in NRU or TKL.

Country	Pelagic fish	Reef fish	Shellfish	Canned fish	Fish other, not canned	Total
FSM	18,363	111,964	8,023	8,359	0	146,708
Rural	15,757	150,960	10,979	12,545	0	190,242
Urban	22,780	45,913	3,011	1,263	0	72,967
NRU	59,915	38,953	2,953	164	2,643	104,627
PLW	12,815	90,133	7,647	2,800	2,197	115,592
Rural	6,643	73,788	9,026	3,267	672	93,396
Urban	14,213	93,842	7,333	2,694	2,544	120,625
SLB	20,425	57,017	4,099	10,381	5,289	97,210
Rural	22,488	65,244	3,457	12,100	6,315	109,602
Urban	11,337	20,816	6,942	2,807	767	42,669
TKL	37,113	60,291	10,640	1,314	0	109,358
TON	5,187	5,920	4,719	1,248	23,543	40,617
Rural	4,318	7,114	4,993	1,416	22,017	39,858
Urban	8,147	1,847	3,781	683	28,755	43,212
VUT	7,504	2,497	9,475	467	580	20,524
Rural	9,545	2,789	8,563	631	748	22,276
Urban	2,982	1,847	11,498	102	204	16,633
WSM	33	17,863	17,538	668	0	36,102
Rural	29	19,878	18,374	741	0	39,022
Urban	58	7,512	13,253	288	0	21,112

8 Impacts

8.1 Scientific impacts – now and in 5 years

To date, the project has produced a total of 112 outputs of which 45 were peer reviewed scientific outputs (published, in-press or submitted) see table 8.1. The cost per publication falls well below the mean estimated in the recent (2016) review of ACIAR fisheries investments.

Table 8.1. The number of peer reviewed and non-peer reviewed publications produced per objective showing the percentage co-authored by national researchers, the number of publication outputs led by national researchers and the percentage of publications produced in collaboration.

Publication type	Objective								
	1	2	3	4	5	6	7	8	All
# peer reviewed	21	--	2	3	10	2	2	2	42
% co-authored by nationals	38%	--	100%	100%	--	--	--	--	36%
# non-peer reviewed	7	6	6	7	3	5	8	2	43
(% co-authored by nationals)	85%	33%	100%	100%	67%	60%	76%	50%	77%
# submitted	--	--	--	--	1	--	2	--	3
# in-preparation	11	5	--	--	1	2	2	4	25
# led by nationals	3	2	4	3	3	--	--	--	12
% collaborative	36%	0	0	10%	31%	0	15%	75%	22%

This project has produced examples of high impact and influential research. Papers in leading journals, for example *Frontiers in Ecology and the Environment*, *Fish and Fisheries*, and *Ecology and Society*, are already attracting good citations. For example, the two papers on global beche-de-mer (Eriksson and Clarke (2015) and Eriksson et al. (2015) - see 7.1.9), despite having been published less than 2 years, have accumulated 70 citations. Eriksson and Clarke achieved an altimetric score of 166 which is in the top 5% of all research ever scored and within the 99th percentile for similar age publications.

We have developed a strong community of practice in CBFM that extends beyond the project partners and the region. Consistent with our programmatic approach to implementation, 22% of the published or submitted outputs listed below were led or significantly funded by other projects (Table 8.1). The body of research published in the project is contributing to a more reflective analysis of CBFM in the literature. Publications produced thus far, and those planned will have a significant influence on the science of CBFM in the region and globally in the coming years.

The project has made significant advances in under-represented areas of research in fisheries, including gender, policy coherence, community engagement, the use of HIES to estimate consumption, and FADs. Examples include:

- The analysis on processes to implement FADs and their ultimate contributions to food security and livelihoods (described in 7.1.6) is the first of its kind and provides methods for more critical assessments of FADs, their costs and their benefits.
- Application of women's minimum dietary diversity indicator is a first for the Pacific region (described in 7.8.1), and provided evidence of poor diet quality of women in rural communities in Solomon Islands.
- The "gender benchmarking" work has adapted and applied a global methodology within the Pacific region. These data provide a benchmark from which changes in gender norms and relations can be detected, and allow for determination of factors that contribute to those social shifts.
- The research on policy coherence (see 7.5.3) provides a method with which to baseline the policy landscape against normative policy commitment (the SSF Guidelines and the New Song).
- The research in Langalanga (from 7.1.8) has helped frame a scientific line of enquiry around how resources can be managed in growing and urbanising environments – increasingly common scenarios the world over. This work was the springboard for a forthcoming special feature in the journal *Ecology and Society* edited by Hampus Eriksson. The feature is framed around the resilience concept of "social-ecological traps" and collates global cases from the natural resource management discipline in the context of modernity.
- The foundational review on leadership (see 7.5.4) highlights the noncritical way in which leadership has been treated within in the natural resource management field to date. It lays out a framework to guide empirical research (including the two case studies produced here) can give more critical consideration to the role of leadership in both progressing and stalling environmental management agendas.
- The analyses done on the eight (soon to be10) HIES datasets will provide baselines for a range of indicators needed to track progress in achieving New Song and national ambitions in fisheries and food security.

Publications in these areas will become increasingly influential and will have a significant impact on the direction of research in the next five years. At the end of the follow-on project, FIS/2016/300, our ambition is that the majority of research papers in the region in these fields will cite this body of work.

8.2 Capacity impacts – now and in 5 years

Substantial investments were made in building the capacity of project staff, village leaders, government officials and community champions in the three countries. For many people this provided new insights and possibilities, and profoundly influenced their career. Many of these people are now taking up leadership roles in government, NGOs and communities, the long term unanticipated impacts of the project can be substantial. The project forged new links between marginal fishing communities on the one hand and provincial and national governments, NGOs and donors on the other hand, which prove to be profitable (in terms of service delivery and technical and financial support) and lasting, and strengthen communities to deal with contemporary pressures and shocks. By empowering communities to make better decisions about safeguarding their marine resources, the project improved food security. Most of these activities will have a lasting social impact beyond the spatial and temporal limits of the target communities.

Training workshops, mentoring and on-the-job-training enhanced capacity in community facilitation, project evaluation, gender transformative approaches and PAR were completed. An estimated 1500 person days of training and workshop participation were undertaken across the three countries. Building the capacity of community leaders, provincial government staff, partner organisations and national staff is arguably the best way to foster

social change and sustainable development, although results are often indirect and difficult to measure.

The project significantly improved national capacity to implement CBFM in all three countries. In Kiribati for example, the project has influenced the political narrative on CBFM, with the Secretary of MFMRD announcing CBFM principles to be adopted across all MFMRD activities, with an important governance capacity outcome being the formulation of guidelines for local stakeholders to develop by-laws.

Regional and national stakeholder workshops held through the life of this project that involved communities and stakeholders from multiple government ministries and sub-national management authorities have provided important mechanisms for addressing a common understanding for a shared vision of fisheries management, taking into consideration broader development ambitions.

The development of facilitators guides, such as the CBFM manual [produced by WorldFish; Albert et al., 2013)] have provided resources that have been applied by project officer across countries. In Kiribati for example, once the project staff had become familiar with the guide they subsequently used it [the guide] to train MFMRD officers in Kiribati. In Solomon Islands the guide has provided a valuable resource for partner organisations in Solomons Islands. As noted by the Solomon Islands MECDM;

> "*The CBFM manual [*produced by WorldFish; Albert et al. 2013] *is the most used and referred to resource in the Environment division. But that has gaps because officers are thinking we should be for conservation not for general community engagement*" Agnetha Vave-Karamui, 2017.

In 2014 the WorldFish team started formal training activities with a workshop on community based resource management, to ensure we are reflecting and sharing lessons (with project staff from Kiribati, Vanuatu and University of Wollongong) from the last nine years of CBFM in Solomon Islands. Subsequently, trainings have been conducted on community facilitation (CLCP processes), gender-sensitive engagements, participatory action research, inclusive livelihood diagnosis, community-CPUE monitoring etc. All trainings have been followed up with grounded practical application. Lessons from these investments in capacity are emerging in our practice-briefs and scientific literature. We have anecdotal evidence that these practices are influencing CBFM practice in Solomon Islands and the broader Pacific region.

> *"The robust processes that WorldFish had developed to support their community engagement had resulted in a set of methodologies that were suited to fieldwork in communities in the Solomons, a valuable check in a diverse fieldwork environment"* Joe McCarter (representative of the American Museum of Natural History, and Wildlife Conservation Society, 2017)

The project has facilitated and directly invested in building capacity of youth. This has included engagement with SPC's "Youth@work" program and hosting of around ten interns external to that program. Below is the story of Elton Kukiti about being involved in AAS/PacFish associated research in his community and then in subsequent employment as an intern:

> *"I first started working in research four years ago - at that time I was a high school dropout sitting in my village without any plans to continue my education…. My role in research began with collecting data from fishermen and women, asked them about their catches, time spent fishing and fishing methods used. We used this information as feedback to help the community work out how their marine management was going, especially their taboo areas…. Working in Vella and Sandfly has enabled me to fully understand and experience research work…. I have also experienced that*

> *in research, the way we conduct research and prepare research activities, it is important things are simple and clear so that researchers and research participants can easily understand…. Finally, because of being involved in research, I recently graduated from Solomon Islands National University in April 2015."* [Source AAS Partners Newsletter, July 2015]

The project has also built research capacity among project staff and partners. National researchers co-authored the majority of non-peer reviewed publications (77%) and 36% of peer-reviewed publications. National researchers Rolenas Tavue Baereleo, Jason Raubani, Meshach Sukulu, Reuben Sulu, Tarateiti Uriam and Grace Orirana senior authored 12 outputs, marking significant personal achievements (Table 8.1).

Five project staff progressed from the project to post-graduate studies at international universities. Kayziah Saepioh completed a masters and is now a lecturer at Solomon Islands National University and will be teaching on coastal fisheries and community based management. Ms Zelda Hilly completed her masters studies in Australia and is now a project officer with WWF, Solomon Islands. Mr Enly Saeni, project staff on this and FIS/2015/031 is currently undertaking a masters degree in Hawaii on gender relations in the fisheries sector. Ms Janet Saeni-Oeta has recently completed her masters assessing the RinD approach to CBFM in Solomon Islands and Mr Daykin Harohau, largely supporting FIS/2010/057, is undertaking his PhD at James Cook University in Australia on the factors that drive the adoption of inland aquaculture. Kiribati staff member, Mr Ben Namakin, co-founded a national volunteer organisation (Kiribati Island Conservation Society) in 2016 in recognition of the lack of coordinated civil society engagement in moving forward management, conservation and sustainable development in Kiribati and have utilised their skills and knowledge through this project to upskill and build capacity of young volunteers. Rolenas Baereleo Tavue has moved to a position with the Vanuatu Ministry of Environment and remains engaged with project staff to formalise community CBFM plans.

The project contributed to building regional capacity in FAD programs. The nearshore FAD expert consultation strengthened capacity of the 14 member countries that contributed their knowledge and experience through the consultation. This knowledge was shared with the region through an SPC article enabling those at the forefront of FAD programs (fisheries officers, national government organisations) to access and utilise lessons within their own national nearshore FAD programs. At the national level, in Solomon Islands, for example, the deployment of FADs is a key activity for the Solomon Islands MFMR and a strategic priority for the DCC Government Policy Strategy. The outputs published under activity 1.4 have provided a guide for MFMR in establishing the national FAD program. This has resulted in improved capacity for MFMR to plan, implement, monitor and evaluate FADs deployed across the country. This improved capacity can be seen through a shift over the past 5 years from FADs being deployed by NGO's/other organisations to MFMR (MFMR 2017).

In activity 8.1.2 participatory training in sup sup gardening provided a mechanism for communities to enhance livelihoods while improving accessibility to nutritious foods and address issues relating to declining agricultural yields. Early community uptake of this activity provides evidence for its feasibility and it is anticipated that early successes will result in further uptake and expansion. Sup sup gardens are a priority activity identified in the Solomon Islands Government Nutrition Policy (2016 – 2020) and further analysis of the nutrition outcomes from such interventions will contribute to the evaluation of the national nutrition policy.

8.3 Community impacts – now and in 5 years

In this section we summarize the achieved and anticipated changes in economic, social, environmental conditions at the community level beyond the scientific sphere of the project.

8.3.1 Economic impacts

The projected gap between declining coastal fish catches and growing demands, presents a substantial threat for the prosperity, well-being and stability of Vanuatu, Solomon Islands and Kiribati (Bell et al. 2011). But quantifying and projecting the economic impacts of improved fisheries management in the future remains difficult due to data constraints and the specific geographic, cultural and economic context of these Pacific Island countries. These data gaps have been partially addressed in this project. For example; the results from our data collected on nearshore FADs in Solomon Islands highlight that nearshore FADs increase the supply of fish to rural coastal communities. Across study sites, between 25 and 60 % of fish were sold at local markets, suggesting that nearshore FADs have the potential to increase rural household incomes. However this analysis does not take into consideration income losses associated with a shift in livelihood activities. So that whilst nearshore FADs have the potential for positive economic impact in rural communities, further research is required to fully assess these impacts now and in the future. Furthermore data collected on the improved efficiency in harvesting from periodically closed areas (as part of community-based management processes) shows substantial economic returns, albeit in pulse, but in response to times of high need. Research undertaken under FIS 2016/300 will further analyse the economic outcome of these return.

Clearly, the economic impact of CBFM goes well beyond direct monetary returns, as many fishing communities in the three project countries remain largely self-sufficient. There is growing recognition in the region that in order to provide affordable and nutritious local sources of food for a rapidly growing population, it is essential to *safeguard* coastal fish catches. The Melanesian Spearhead Group (MSG) for example stated that, 'the costs of improved fisheries management […] would be offset by benefits to the national economies'. The recognition of the economic value of coastal fisheries at the highest political level in the three project countries is a major step forward; all too often the contribution of small-scale fisheries to food security and rural livelihoods is underestimated and undervalued (Mills et al. 2011). The scientific outputs, partnerships and practical innovations at the grassroots level of the project played a pivotal role in advancing this recognition, and contributed to on-going coastal fisheries policy reforms in Vanuatu, Kiribati and Solomon Islands.

8.3.2 Social impacts

This project aimed to contribute to the overall well-being of remote coastal communities in Kiribati, Solomon Islands and Vanuatu, particularly through: (i) increased control over marine resources; (ii) increased and more sustainable livelihood opportunities; (iii) increased capacity to manage fisheries; and (iv) improved food and nutrition security. The project worked with communities in Western Province and Malaita in Solomon Islands, Maskelynes and Santo in Vanuatu, and Butaritari and Tarawa in Kiribati. Clearly, attributing processes of social change to specific project interventions (such as facilitating a community meeting) is near impossible (Mayne & Stern 2013). But the emphasis of project activities on for example equal gender roles, sustainability, democratic decision-making processes, the value of traditional ecological knowledge, cultural norms and the prospects of youth, contributed to on-going societal transformations in these remote fishing communities, that can produce positive, lasting social impacts.

The project identified and tested potential livelihood enhancement and diversification interventions, such as FADs, tilapia aquaculture and solar freezers, which have the potential to transform local economies. Scaling up these innovations remains a major challenge and will be a focus of work in FIS 2016/300. Building on research undertaken in FIS/2015/031, this project identified poor diet quality in Solomon Island rural women and children. Subsequent awareness and practical interventions to improve nutrition in these rural communities has improved their knowledge of these issues and the need for change - recognition and knowledge is the first step towards transition. Research over the coming four years in FIS 2016/300 will identify constraints for improved nutrition in the Pacific region.

In Kiribati, the project began from a zero base and has: (i) built awareness, relationships and staff capacity with national partners (fisheries institutions and others) to enable CBFM in Kiribati. In Tarawa and Butaritari we: (ii) built awareness and increased social capacity within communities to undertake change, built relationships and networks with Island Councils, Uniwmane associations of Elders and communities to enable the development and implementation of management plans in five communities, encouraged local mechanisms to diffuse CBFM principles beyond the initial communities (3 non-CBFM villages and 1 new island), created new institutions within local political structures to support scaling of CBFM, and actively included women and youth in decision-making within communities (40% of CBFM committees include women and youth). In Tarawa lagoon, we facilitated a dialog among national agencies and three Island Councils in conflict over fishing in the shared lagoon and trained stakeholders to undertake marine spatial planning of the lagoon.

In Vanuatu, the project built on the country's long history in CBFM to extend the awareness, relationships and capacity needed to scale out management. The project engaged with seven communities on the islands of Maskelyne, Santo and Aniwa. Further communities were included in awareness raising workshops. Activities on Aniwa Island were terminated in March 2015 after TC Pam. Extensive community training was completed on management planning, FAD construction, fishing techniques, data collection, shell-craft, and training for Authorized officers. In the aftermath of TC Pam we collaborated with VFD to provide fishing equipment to 25 affected communities on the islands of Aniwa, Maskelyne, Emae, Mikira, Mataso, Efate, Tanna, and Aneityum. Fishing equipment purchased by the project was distributed by VFD to further sites on other islands. Situation analyses completed on these islands also informed national post-disaster responses.

In Solomon Islands, the model of CBFM developed and detailed in ACIAR project FIS/2010/056 was employed and tested in three new communities; in Western Province we commenced a new community engagement in one community and continued a long term engagement (over five years) in two communities. In Malaita, under phase 1 funding, we engaged with clusters of communities in Lau and Langalanga lagoons in Malaita, and in Western Province. In addition to the design and development of fisheries-focused management plans, broader community-development concerns and priorities were identified through community facilitation and diagnosis – community action plans were developed. The role of project staff became one of brokering opportunities beyond the project to bring communities technical support to, for example, FAD deployment, organic farming and sustainable fuel stoves. These objectives were realised by substantial investment in the capacity of project and community facilitators. For example, we organised gender training to staff/partners from different rural-focused development organizations and project staff from Solomon Islands, Kiribati and Vanuatu received training on fisheries science for CBFM in 2014.

Regionally, we built awareness, relationships and capacity to implement CBFM in SPC, helped shape the New Song workshop and its outputs; we organized and ran a scenario workshop on the future of the Pacific food system under climate change (with CRP AAS), and organized and ran a regional workshop on FADs in collaboration with SPC to share lessons in the development of national FAD programs. Regional analyses of lessons learned among the three countries are also forthcoming on gender, community engagement, livelihood diversification, aquaculture and food security and coastal fisheries management in situations with contested or no customary tenure.

8.3.3 Environmental impacts

There is growing evidence that improved CBFM, particularly the establishment of closed areas and the deployment of FADs, has a long-term positive impact on coastal habitats (particular coral reefs, mangrove forests and seagrass meadows), the sustainability of targeted fish stocks and the conservation of biodiversity. Quantifying these impacts and attributing this to a specific intervention remains a major scientific challenge, particularly in

complex and dynamic tropical marine environments in the developing world. But to a large extent that remains an academic exercise, irrelevant for coastal communities in Kiribati, Solomon Islands and Vanuatu. In most cases fishers are well aware of the environmental changes affecting their coastal resources. Improved fisheries management strongly builds on local/traditional knowledge and CBFM principles align with widely-shared perceptions on stewardship and wise use. The project catalysed this knowledge and ideas, and enabled coastal communities to take action and innovate.

In many instances people have seen for themselves that the fish stocks are recovering following the creation of a managed area or that a FAD attracts scad and tuna, and that knowledge is spreading rapidly through informal social networks. On Malaita, Solomon Islands for example a CBO opened their fishing ground in November 2017 after a 3-year closure, and harvested a large amount of mangrove mud shells (See image 7.3.1 in section 7.3.4). More than two hundred people from neighbouring communities attended the opening, and saw the environmental impacts of improved community-based fisheries management: an abundancy of shells, crabs, fish and sea-cucumbers. Such examples resonate throughout the region, and are fundamentally changing the way key stakeholders think about environmental sustainability.

8.4 Communication and dissemination activities

A central component of the project (objectives 2 to 4) was to use PAR approaches (See Section 7.1.2) to implement activities with communities and households. By definition, these activities and the outcomes generated were co-developed with communities. These activities may be classified as communication and dissemination activities, but such classification may infer a one-way extension of research outputs to stakeholders - which is antithetical to a PAR approach. The reader is referred to Sections 7.2, 7.3 and 7.3 for more detailed descriptions of community activities, meetings and workshops.

Significant communications and dissemination activities, such as newspaper articles, blogs and interviews are listed in Appendix 3. A total of 16 policy briefs and other outputs (e.g. SPC Fisheries Newsletter) designed to directly influence policy makers were produced or are in preparation (see Section 8.2).

Project communication and extension activities and strategies focused on influence with communities and appropriate national agencies and SPC (principally project partners). In this regard the project was successful in building awareness and influencing change. On critical reflection, the project did not, however, invest adequately in communicating outputs and outcomes to a broader audience – outside the network of national and regional agencies that were the direct stakeholders in the project. Given the progress made and the outputs produced - the profile of the project and the Australian Government's investment, should have been larger.

A decision was taken at the beginning of the project not to 'brand' the project as a separate entity and, for example, create a website. Rather, we wanted to promote the work through national agencies and SPC, as well as through research partners. To a degree this was successful and a number of activities were competed through those vehicles, but it remains an open question whether the relative lack of profile was a consequence of this decision or inadequate implementation of the approach. The project did an inadequate job of recording in detail the many smaller communications events and activities, including presentations, trainings and so forth.

9 Conclusions & recommendations

Here we briefly summarize conclusions and recommendations from the major themes of research. The reader is referred to Sections 7.1 to 7.8 for more detailed reflections on work completed and its potential impacts.

9.1 Conclusions

Community-based fisheries management is widely recognized as one of the most promising approaches for securing sustainable small-scale fisheries under the various threats facing Pacific Island Countries. Through this project we have sought to improve rural lives through the vehicle of community-based fisheries management, with a focus on enhancing the structures, processes and capacity to implement and sustain national programs of CBFM in Kiribati, Solomon Islands and Vanuatu. These three countries differed in their history of engagement with CBFM processes.

In **Kiribati**, given the minimal prior exposure to CBFM, the project focused on developing institutional capacity within communities and national fisheries authorities. Important national level outcomes from this project have been the incorporation of CBFM principles into the coastal Fisheries Regulations and the alignment of CBFM activities. The diffusion of CBFM beyond target communities reflects broader impact of the project. Through FIS 2016/300, the momentum created by this project will engage communities indirectly familiarised with CBFM to shift from village to island level impacts.

Long-term engagement in **Solomon Islands** by various organisations has led to a well-defined process for engaging communities in CBFM. While an estimated 350 communities have engaged with CBFM, the investment required is unrealistic for broad outreach. The 'lite-touch' approach to CBFM was tested for the first time under this project, with early evidence suggesting outcomes are favourable. Testing the 'lite-touch' approach in another context along with the benefits of other strategies that aim to promote spread will be evaluated as part of future research.

In **Vanuatu**, despite the impacts and delays associated with TC Pam, community management plans were developed for six communities across the northern-focal areas. These plans are considered critical documents for local leaders to legitimise their management authority within national policy over marine resource areas. Institutional strengthening at community level remains a focal priority action within VFD, not only within remote communities where government presence is often low but also between communities and government authorities. Alignment of activities across different bilateral initiatives will be crucial towards inclusion of coastal communities in a national CBFM network.

Our reviews and engagements highlighted that the adaptive nature of the **CBFM approach** have contributed to its acceptance and proliferation in the region. Yet, there remains a need for critical perspectives to examine the potential and the shortcomings of CBFM. A post-hoc diagnosis of CBFM, identified that successful CBFM outcomes were facilitated by effective information sharing, harvesting rules that merge traditional and contemporary practices, strong leadership, and resource monitoring, while uneven power differentials undermined positive outcomes.

Investments in **partnerships** and **capacity building** for community leaders, island councils, provincial governments, national ministries and NGOs are a clear ongoing need across all focal countries. While substantial progress has been made, the challenge remains to continue working with partners to build and maintain capacity, particular in the area of gender transformative approaches.

The **New Song**, while less comprehensive than the SSF Guidelines, has attracted institutional support in the region and provides PICs with a regional policy to guide their national efforts. Regional efforts through this project have developed an integrated evaluation framework to assess collective impact for Pacific coastal fisheries. This has resulted in the resolution of indicators adopted for ACIAR project FIS/2016/300.

CBFM alone cannot fill the projected gap in fish supply to address the nutritional security in many PICs. Fisheries interventions, including **aquaculture** and **nearshore FADs** have been touted as means to fill this gap. Our work highlights that while there have been substantial advances in the technical aspects of aquaculture production and nearshore FAD design and deployments, it is apparent that limitations in data and national statistics hinder the comprehensive understanding on the contribution of these interventions to food and nutrition security. Without further research and evaluation, the ability to substantiate the contributions made by aquaculture and FADs in achieving national objectives will be limited. This will severely impact the ability of national fisheries departments to secure recurring budgets and ensure food security and alternative livelihoods.

The Pacific is rapidly changing through population growth, the impacts of climate change, urbanization and increased market integration; change that is often operating beyond the local scale, but nonetheless presents challenges to local governability of coastal fisheries. Common across multiple project objectives was the need for interdisciplinary solutions to address this complexity. **Gender** transformative approaches have the potential to significantly improve small-scale fisheries management, while nutrition-sensitive approaches to broader food systems research provides a mechanism to address emerging issues production, trade, supply and demand, and the choices people make about their diets. These important outcomes and new ways of approaching research in development have provided the framing for the development of FIS/2016d/300.

Nutrition research in rural Solomon Island communities highlights that women and young children's diets have extremely poor dietary quality. These poor diets are contributing to the double-burden of malnutrition experienced across the entire nation. While fish is the primary animal-sourced food, it is not part of complementary foods for infants and is generally excluded from the diets of young children until 12 months of age. The lack of regular consumption of fruits and vegetables, dairy and nuts, coupled with the high consumption and affinity for store-brought foods, such as rice, noodles and sugar are the contributing factors to poor diet quality. The shift in diet to store-bought foods was attributed by communities to challenges in agriculture (declining yields), a preference for imported foods (due to taste and convenience), changing social norms (including a shift to a market-based economy) and the lack of nutrition knowledge.

9.2 Recommendations

- Identify CBFM strategies and implementation modalities that recognises the role of government in addressing fisheries concerns, while allowing community development aspirations to be met. For example working with appropriate ministries to ensure that community activities are legally supported and legitimised through uptake in national legislation and aligning activities across various initiatives.
- There is clearly a need to strengthen links between community action plans and research initiatives. One way to do this is to make the research questions much more specific and aligned with the problems identified by communities.
- It is critical to build the capacity of community leaders, island councils, provincial government staff, partner organizations and national staff to foster social change and sustainable development, although it must be recognized that results are often indirect and difficult to measure.

- Investments in team, partner and community and gender-sensitive facilitation skills were valued by both community and team members. To ensure these skills are maintained and built, future projects also need to invest in these skills.
- While the New Song has attracted greater institutional support in the region compared to the small-scale fisheries guidelines. We recommend that policymakers and practitioners take time to become more familiar with the SSF Guidelines, especially for emerging social themes such as gender and human rights. In anticipation of intensifying interest in applying these high-level policy guidelines into country contexts, similar work assessing the policy 'state of play' is recommended for Kiribati and Vanuatu.
- Interventions such as aquaculture and FADs need to focus on those most in need, this requires deeper engagement with broader social and institutional contexts to translate innovations into sustainable benefits to rural communities
- Future research on fisheries related interventions will need to target data collection and reconcile different data sources to enable key research questions to be answered *Do aquaculture/FAD contribute meaningfully to food security? And, if so are its contributions hidden by poor data and reporting of the evidence?*
- PICs must tailor management of high value target species (e.g. beche-de-mer) based on the intrinsic productivity of shallow inshore habitats: harvests from atoll nations will need to be smaller per unit area than at the high islands. Countries with low productivity fisheries must consider the crucial economic "safety nets" that export SSFs make up for dispersed island populations and incorporate them into broader development and island resilience strategies.
- There is a need to adopt nutrition-sensitive approaches to broader agriculture–fish food system research to address the drivers of nutrition issues at multiple scales. Nutrition awareness and interventions need to focus on those most vulnerable e.g. women and young children.
- In large and complex projects such as this, more investment is required to more effectively communicate results and build profiles amongst a larger audience. In the follow-on project FIS/2016/300 a dedicated communications expert will be recruited to lead communications.

10 References

10.1 References cited in report

Note: See Section 10.2 for references cited in this report and produced by the project.

Abernethy K., Bodin O., Olsson P., Hilly Z. and Schwarz A. (2014). Two steps forward, two steps back: The role of innovation in transforming towards community-based marine resource management in Solomon Islands. Global Environmental Change 28, 309–321.

Agrawal A. and Chhatre A. (2011). Against mono-consequentialism: Multiple outcomes and their drivers in social–ecological systems. Global Environmental Change 21, 1–3.

Akao S. and Strachan J. (2012). A gender analysis of the education sector in the Solomon Islands. University of Waikato: Hamilton, New Zealand.

Albert J., Schwarz A. and Cohen P. (2013). Community-based marine resource management in Solomon Islands: A facilitators guide: Based on lessons from implementing CBFM with rural coastal communities in Solomon Islands (2005-2013). Manual: AAS-2013-17. WorldFish, CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Alexander T., Manele B., Schwarz A.-M., Topo S. and Liliqeto W. (2011). Principles for best practice for community based resource management (CBFM) in Solomon Islands. WorldFish Center: Honiara, Solomon Islands.

Allison E.H. and Ellis F. (2001). The livelihoods approach and management of small-scale fisheries. Marine Policy 25(5), 377–388.

Allison E.H. and Horemans B. (2006). Putting the principles of the Sustainable Livelihoods Approach into fisheries development policy and practice. Marine Policy 30(6), 757–766.

Amos M., Garcia R., Pickering T. and Jimmy R. (2014). Study on the potential of aquaculture in the Pacific. Unpublished report to ACP-EU. SPC: Noumea.

Anderson S.C., Flemming J.M., Watson R. and Lotze H.K. (2011). Serial exploitation of global sea cucumber fisheries. Fish and Fisheries 12, 317–39.

Andrew N.L. and Evans L. (2011). Frameworks and approaches for research and management of small-scale fisheries. Pp. 16-35 in 'Small-scale fisheries management: Frameworks and approaches for the developing world', ed. by R.E. Pomeroy and Andrew N.L. CABI Publishing: UK.

Andrew N.L., Bene C., Hall S., Allison E., Heck S. and Ratner B. (2007). Diagnosis and management of small-scale fisheries in developing countries. Fish and Fisheries 8, 1–14.

Basurto X., Gelcich S. and Ostrom E. (2013). The social-ecological system framework as knowledge classificatory system for benthic small-scale fisheries. Global Environmental Change 23, 1366–1380.

Badstue L., Kantor P., Prain G., Ashby J. and Petesch P. (2014). Innovation and development through transformation of gender norms in agriculture and natural resource management: A global comparative research initiative. Concept note.

Ballard T., Coates J. and Swindale A. (2011). Household hunger scale: Indicator definition and measurement guide. FANTA (Food and Nutrition Technical Assistance III Project) and FHI 360: Washington D.C.

Barrett C.B., Reardon T., Webb P. (2001). Non-farm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. Food Policy 26, 315–331.

Bell J.D., Kronen M., Vunisea A., Nash W.J., Keeble G., Demmke A., Pontifex S. and Andréfouët S. (2009). Planning the use of fish for food security in the Pacific. Marine Policy 33(1), 64–76.

Béné C., Evans L., Mills D., Ovie S., Raji A., Tfida A., Kodio A., Sinaba F., Morand P., Lemoalle J. and Andrew N. (2011). Testing resilience thinking in a poverty context: experience from the Niger River Basin. Global Environmental Change 21, 1173–1184.

Bennett G. (2012). Customary marine tenure and contemporary resource management in Solomon Islands. In 'Proceedings of the 12th International Coral Reef Symposium, Cairns Australia, 9–13 July 2012', ed. by D. Yellowlees and T.P. Hughes James. Theme 22: ICRS2012_22A_3. Cook University: Cairns, Australia.

Berkes F., Hughes T.P., Steneck R.S., Wilson J.A, Bellwood D.R., et al. (2006). Globalization, roving bandits, and marine resources. Science 311, 1557–1558.

Bhutta Z.A., Das J.K., Rizvi A., Gaffey M.F., Walker N., Horton S., Webb P., Lartey A. and Black R.E. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?. The Lancet 382, 452–477.

Blamey A. and Mackenzie M. (2007). Theories of change and realistic evaluation: Peas in a pod or apples and oranges. Evaluation 13, 439–455.

Bodin Ö. and Crona B.I. (2009). The role of social networks in natural resource governance: What relational patterns make a difference?. Global Environmental Change-Human and Policy Dimensions 19, 366–374.

Boso B., Paul C., Hilly Z. and Pita J. (2010). Community-based adaptive resource management in Solomon Islands. Lessons Learned No. 2122. WorldFish Center: Penang, Malaysia.

Brugère C., Holvoet K. and Allison E. (2008). Livelihood diversification in coastal and inland fishing communities: misconceptions, evidence and implications for fisheries management. Working paper: SFLP (Sustainable Fisheries Livelihoods Programme). FAO/DFID: Rome.

Campbell B. and Hanich Q. (2014). Fish for the future: Fisheries development and food security for Kiribati in an era of global climate change. Project Report: 2014–47. WorldFish Center: Penang, Malaysia.

Carrington B., Tymms P., and Merrell C. (2008). Role models, school improvement and the 'Gender Gap': Do men bring out the best in boys and women the best in girls?. British Educational Research Journal 34, 315–327.

Chen C-L. (2010). Diversifying fisheries into tourism in Taiwan: Experiences and prospects. Ocean and Coastal Management 53, 487–492.

Chuenpagdee R. and Jentoft S. (2015). Exploring challenges in small-scale fisheries governance. Pp. 3–16 in 'Interactive governance for small-scale fisheries: Global reflections', ed. by S. Jentoft. Chuenpagdee R. Springer: Cham, Switzerland.

Coates J., Swindale A. and Bilinsky P. (2007). Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide (v. 3). FANTA,

AED (Food and Nutrition Technical Assistance Project, Academy for Educational Development): Washington, D.C.

Cohen P.J., Evans L. and Govan H. (2015). Community-based, co-management for governing small-scale fisheries of the Pacific: A Solomon Islands' case study. Pp. 39–59 in 'Interactive governance for small-scale fisheries: Global reflections', ed. by S. Jentoft. Chuenpagdee R. Springer: Cham, Switzerland.

Cohen P.J. and Alexander T.J. (2013). Catch rates, composition and fish size from reefs managed with periodically-harvested closures. PLoS ONE 8, e73383.

Cohen P. and Foale S.J. (2013). Sustaining small-scale fisheries with periodically harvested marine reserves. Marine Policy 37, 278–287.

Cohen P.J., Cinner J. and Foale, S. (2013). Fishing dynamics associated with periodically-harvested marine closures. Global Environmental Change 23, 1702–1713.

Cohen P., Evans L. and Mills M. (2012). Social networks supporting governance of coastal ecosystems in Solomon Islands. Conservation Letters 5, 376–386.

Cohen P. and Foale S.J. (2011). Fishing taboos: Securing Pacific fisheries for the future?. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 28, 3–13.

Cox M. (2014). Understanding large social-ecological systems: Introducing the SESMAD project. International Journal on Commons 8, 265–276.

Crow B. and Sultana F. (2002). Gender, class, and access to water: Three cases in a poor and crowded delta. Society and Natural Resources 15, 709–724.

CRP AAS. (2013a). Community competence process: Facilitators manual: Solomon Islands. Unpublished Report. CGIAR Research Program on Aquatic Agricultural Systems and the Constellation: Honiara.

CRP AAS. (2013b). Learning from implementation of community selection in Zambia, Solomon Islands, and Bangladesh AAS hubs. Evaluation and Learning Series Paper: AAS-2013-24. CGIAR Research Program on Aquatic Agricultural Systems. Penang, Malaysia.

Dixon-Woods M., Agarwal S., Jones D., Young B. and Sutton A. (2005). Synthesising qualitative and quantitative evidence: A review of possible methods. Journal of Health Services Research 10, 45–48.

Douthwaite B., Apgar C. and Crissman C. (2014). Monitoring and Evaluations strategy brief. Program Brief: AAS-2014-04. CGIAR Research of Aquatic Agricultural Systems: Penang, Malaysia.

Ellis F. and Allison E. (2004). Livelihood diversification and natural resource access. LSP (Livelihood Support Programme): Working Paper No. 9. FAO (Food and Agriculture Organization of the United Nations).

Ellis F. (2000). Rural livelihoods and diversity in developing countries. Oxford University Press: Oxford, UK.

Ellis F. (1998). Household strategies and livelihood diversification. Journal of Development Studies 35(1), 1–38.

Evans L. and Andrew N.L. (2011). Diagnosis and the management constituency of small-scale fisheries. Pp. 35–59 in 'Small-scale fisheries management: Frameworks and approaches for the developing world', ed. by R.E. Pomeroy and Andrew N.L. CABI Publishing: UK.

FAO (Food and Agriculture Organization of the United Nations) (2017). FAO term portal – aquaculture. URL: www.fao.org/faoterm/collection/-aquaculture/en/. Accessed 08/12/2017.

FAO (Food and Agriculture Organization of the United Nations) (2016). Minimum dietary diversity for women: A guide for measurement. FAO: Rome.

FAO (Food and Agriculture Organization of the United Nations) (2014). Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication. FAO: Rome.

FAO (Food and Agriculture Organization of the United Nations) (2002). The state of food insecurity in the world 2001. FAO: Rome.

Fiedler J., Carletto C. and Dupriez O. (2012). Still waiting for Godot? Improving household consumption and expenditures surveys to enable more evidence-based nutrition policies. Food and Nutrition Bulletin 33(3 Supplement), S242–251.

Finkbeiner, E.M. (2015). The role of diversification in dynamic small-scale fisheries: Lessons from Baja California Sur, Mexico. Global Environmental Change 32, 139–152.

Foale S. and Macintyre M. (2000). Dynamic and flexible aspects of land and marine tenure at West Nggela: Implications for marine resource management. Oceania 71, 30–45.

Gillett R. (2016). Fisheries in the economies of Pacific island countries and territories. SPC (Secretariat of the Pacific Community): Noumea, New Caledonia.

Gillett R. (2009). Fisheries in the economies of Pacific island countries and territories. Asian Development Bank: Philippines.

Gough D, Thomas J. and Oliver S. (2012). Clarifying differences between review designs and methods. Systematic Reviews 1(28), 1–9.

Govan H., Maeda T., Warakohia D., Atitete T., Boso D., et al. (2015). From village to village: Local approaches to promoting spread of community based resource management: Lessons from Mararo Community Based Organization, East ‘Are’are, Malaita Province, Solomon Islands. Report to IUCN Oceania Regional Office for the ADB TA 7753 IUCN Oceania Learning Component. Honiara.

Govan H. (2013). Review of Guadalcanal and Central Islands Provincial Governments capacity for implementation of the NPOA: Strengthening the role of provincial level governments in community based resource management Part 1: Review. Part 2: Strategy Report to the Solomon Islands National co-ordinating Committee for the CTI. Australian Government support program to the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) National Program: Solomon Islands.

Govan H., Schwarz A.M., Harohau D. and Oeta J. (2013). Solomon Islands national situation analysis. Project Report: AAS-2013-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Govan H., Schwarz A. and Boso D. (2011). Towards integrated island management: Lessons from Lau, Malaita, for the implementation of a national approach to resource management in Solomon Islands. Report to the Secretariat of the Pacific Regional Environment Programme. WorldFish Center: Penang, Malaysia.

Govan H., Tawake A., Tabunakawai K., Jenkins A., Lasgorceix A., Schwarz A.-M., et al. (2009). Status and potential of locally-managed marine areas in the South Pacific: Meeting nature conservation and sustainable livelihood targets through wide-spread implementation of LMMAs. Unpublished report to LMMA (Locally-Managed Marine Area) Network: Suva.

Govan, H., Aalbersberg, W., Tawake, A. and Parks, J. (2008). Locally-managed marine areas: A guide for practitioners. LMMA (Locally-Managed Marine Area) Network: Suva.

Grint K. (2005). Leadership: Limits and possibilities. Palgrave Macmillan: New York.

Gunderson L.H. and Holling C.S. (2002). Panarchy: Understanding transformations in systems of humans and nature. Island Press: Washington D.C., USA.

Hilly Z., Schwarz A.-M. and Boso, D. (2011). Strengthening the role of women in community based marine resource management: Lessons learned from community training workshops. SPC Women in Fisheries Information Bulletin 22, 29–35.

Hviding E. and Ruddle K. (1991). A regional assessment of the potential role of Customary Marine Tenure (CMT) systems in contemporary fisheries management in the South Pacific. FFA (Forum Fisheries Agency): Honiara.

Johannes R.E. (1982). Implications of traditional marine resource use for coastal fisheries development in Papua New Guinea. Pp. 239–249 in: 'Traditional Conservation in Papua New Guinea: Implications for Today' ed. by L. Moruata, Pernetta J. and Heaney W. Institute of Applied Social and Economic Research: Port Moresby, Papua New Guinea.

Jones A.D., Ngure F.M., Pelto G. and Young S.L. (2013). What are we assessing when we measure food security? A compendium and review of current metrics. Advances in Nutrition 4, 481–505.

Kantor P., Morgan M. and Choudhury A. (2015). Amplifying outcomes by addressing inequality: The role of gender transformative approaches in agricultural research for development. Gender, Technology and Development 19, 292–319.

King M. and Faasili U. (1998). Village fisheries management and community-owned marine protected areas in Samoa. Naga 22, 34–38.

Kleiber D., Harris L.M. and Vincent A.C.J. (2015). Gender and small-scale fisheries: A case for counting women and beyond. Fish and Fisheries 16, 547–562.

KNSO (Kiribati National Statistics Office) (2006). Household income and expenditure survey (HIES) report. KNSO: Tarawa, Republic of Kiribati.

KNSO (Kiribati National Statistics Office) and MFED (Ministry of Finance and Economic Development) (2012). Report on the Kiribati 2010 census of population and housing. Vol 1. KNSO/MFED: Tarawa, Republic of Kiribati.

Kooiman J., Bavinck M., Jentoft S. and Pullin, R. (eds) (2005). Fish for life: Interactive governance for fisheries. Amsterdam University Press: Amsterdam, the Netherlands

Kronen M., Stacey N., Holland P., Magron F. and Power M. (2008). Socioeconomic fisheries surveys in Pacific islands: A manual for the collection of a minimum dataset. Secretariat of the Pacific Community: Noumea.

Kronen M. and Vunisea A. (2007). Women never hunt – but fish: Highlighting equality for women in policy formulation and strategic planning in the coastal fisheries sector in Pacific island countries. SPC Women in Fisheries Information Bulletin 17, 3–15.

Kronen M. and Vunisea A. (2009). Fishing impact and food security: Gender differences in finfisheries across Pacific island countries and cultural groups. SPC Women in Fisheries Information Bulletin 19, 3–10.

Mackenzie M. and Blamey A. (2005). The practice and the theory: lessons from the application of a Theories of Change approach. Evaluation 11, 151–168.

Maxwell J.A. (2009). Designing a qualitative study. Pp 214–253 in 'The SAGE handbook of applied social research methods', ed. by L. Bickman, Bog D. 2nd ed, SAGE: USA.

Mayne J. and Stern E. (2013). Impact evaluation of natural resource management research programs: A broader view. ACIAR Impact Assessment Series Report No. 84. Australian Centre for International Agricultural Research: Canberra.

Menard S.W. (ed) (2007). Handbook of longitudinal research. Elsevier: Burlington, MA.

NEPO (National Economic Planning Office) and MFED (Ministry of Finance and Economic Development). (2016). Kiribati Government Budget 2017. NEPO and MRED: Bairiki, Tarawa, Republic of Kiribati.

MFED (Ministry of Finance and Economic Development) and MFMRD (Ministry of Fisheries and Marine Resource Development). (2016). Fishing Licence Revenues in Kiribati: 2016 Report. MFED and MFMRD: Republic of Kiribati.

MFMR (2017). Solomon Islands Ministry of Fisheries and Marine Resources: Annual Report 2016. Prepared by the Policy Planning and Project Management Division, MFMR.

Mills D.J., Tilley A., Pereira M., Hellebrandt D., Fernandes A.P. and Cohen P.J. (2017). Livelihood diversity and dynamism in Timor-Leste: Insights for coastal resource governance and livelihood development. Marine Policy 82, 206–215.

Morand P., Kodio, A., Andrew, N., Sinaba, F., Lemoalle, J. and Béné, C. (2012). Vulnerability and adaptation of African rural populations to hydro-climate change: Experience from fishing communities in the Inner Niger Delta (Mali). Climatic Change 115(3-4), 463–483.

Ostrom E. (2009). A general framework for analyzing sustainability of social-ecological systems. Science 325, 419–422.

Park S.E., Marshall N.A., Jakku E., Dowd A., Howden S.M., Mendham E. and Fleming A. (2012). Informing adaptation responses to climate change through theories of transformation. Global Environmental Change 22, 115–126.

Pawson R., Greenhalgh T., Harvey G. and Walshe K. (2005). Realist review: A new method of systematic review designed for complex policy interventions. Journal of Health Services Research and Policy 10(Supplement 1), 21–34.

Pham M.T., Rajić A., Greig J.D., Sargeant J.M., Papadopoulos A. and McEwen S.A. (2014). A scoping review of scoping reviews: Advancing the approach and enhancing the consistency. Research Synthesis Methods 5(4), 371–385.

Ponia B. (2010). A review of aquaculture in the Pacific Islands 1998-2007. Aquaculture Technical Paper. Secretariat of the Pacific Community: Noumea, New Caledonia

Quinlan A.E., Berbés-Blázques M., Haider J. and Peterson G.D. (2015). Measuring and assessing resilience: Broadening understanding through multiple disciplinary perspectives. Journal of Applied Ecology 53, 677–687.

Ratner B.D., Cohen P., Barman B., Mam K., Nagoli J. and Allison E.H. (2013). Governance of aquatic agricultural systems: Analyzing representation, power and accountability. Ecology and Society 18(4), 59.

Schwarz A.M., Andrew N., Govan H., Harohau D. and Oeta J. (2013). Solomon Islands Malaita Hub Scoping Report. Project Report: AAS-2013-18. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Secretariat of the Convention on Biological Diversity (2014). Global Biodiversity Outlook 4: Summary and Conclusions. Secretariat of the Convention on Biological Diversity: Montréal.

SPC (Secretariat of the Pacific Community) (2015). A new song for coastal fisheries – pathways to change: The Noumea strategy. SPC: Noumea, New Caledonia.

SPC (Secretariat of the Pacific Community) (2011). Opportunities for the development of the Pacific Islands' mariculture sector. Report to SPC. SPC: Noumea, New Caledonia.

Smith L.C. and Subandoro A. (2007). Measuring food security using household expenditure surveys. Food Security in Practice Technical Guide Series. International Food Policy Research Institute: Washington D.C., USA.

Smith L.E., Khoa S.N. and Lorenzen K. (2005). Livelihood functions of inland fisheries: Policy implications in developing countries. Water Policy 7(4), 359–383.

Song A.M., Johnsen J.P. and Morrison T.H. (2017a). Reconstructing governability: How fisheries are made governable. Fish and Fisheries. In press.

Taplin D.H., Clark H., Collins E. and Colby D.C. (2013). Theory of change: A series of papers to support development of theories of change based on practice in the field. Technical Papers. ActKnowledge: New York.

Tengö M., Brondizio E.S., Elmqvist T., Malmer P. and Spierenburg M. (2014). Connecting diverse knowledge systems for enhanced ecosystem governance: The multiple evidence approach. Ambio 43, 579–591.

Thomas J. and Harden A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Medical Research Methodology 8, e1–45.

University of Wollongong, Pacific Community and FAO (2017). Pacific Island Food Composition Tables: version 3. Database update and user guide. SPC report and on-line database. In press.

Vunisea A. (2008). The 'culture of silence' and fisheries management. SPC Women in Fisheries Information Bulletin 18, 42–43.

Walker B. and Salt D. (2006). Resilience thinking: Sustaining ecosystems and people in a changing world. Island Press: USA.

World Health Organization. (2008). Indicators for assessing infant and young child feeding practices: Part I: Definitions. WHO: Geneva.

10.2 List of publications produced by project

A total of 112 published, in press or submitted outputs are listed below. We differentiate published peer reviewed papers (n = 42), unpublished or non-peer reviewed research outputs (43), and those submitted (3) or in preparation (25). Communications, media and other outreach outputs are listed in Section 8.4.

Consistent with our programmatic approach to implementation, 20% of the 112 published or submitted outputs listed below were led or significantly funded by other projects. These are highlighted in *italics* and other funding sources are indicated in [square brackets]; the reader is referred to the individual outputs for full acknowledgement of funding and the institutional affiliations of authors. In this context, outputs/activities were considered to be project funded if funding was explicitly recognized in the project document, from: DFAT/ACIAR, CGIAR CRP AAS (through WorldFish), James Cook University (fte for Blythe and Song), ANCORS and SPC.

10.2.1 Peer reviewed papers published or in press

Albert J.A., Beare D., Schwarz A.-M., Albert S., Warren R., Teri J., Siota F. and Andrew N.L. (2014). The contribution of nearshore fish aggregating devices (FADs) to food security and livelihoods in Solomon Islands. PLoS ONE 9, e115386.

Albert S., Aswani S., Fisher P.L. and Albert J. (2015). Keeping food on the table: Human responses and changing coastal fisheries in Solomon Islands. PLoS ONE 10(7), e0130800.

Apgar J.M., Cohen P.J., Ratner B.D., de Silva S., Buisson M.-C., Longley C., Bastakoti R. and Mapedza E. (2017). Identifying opportunities to improve governance of aquatic agricultural systems through participatory action research. Ecology and Society 22, 9.

Apgar J.M, Allen W., Albert J., Douthwaite B., Paz Ybarnegaray R. and Lunda J. (2016). Getting beneath the surface in program planning, monitoring and evaluation: Learning from use of participatory action research and theory of change in the CGIAR Research Program on Aquatic Agricultural Systems. Action Research, 15, 15–34.

Baereleo Tavue R., Neihapi P., Cohen P.J., Raubani J. and Bertram I. (2016). What influences the form that community-based fisheries management takes in Vanuatu?. Secretariat of the Pacific Community Traditional Marine Resource Management and Knowledge Bulletin 37, 22–34.

Bell J.D., Albert J., Amos G., Arthur C., Blanc M., Bromhead D., Heron S.F., Hobday A.J., Hunt A., Itano D., James P., Lehodey P., Liu G., Nicol S., Potemra J., Reygondeau G., Rubani J., Scutt Phillips J., Senina I. and Sokimi W. (2017a). Operationalising access to oceanic fisheries resources by small-scale fishers to improve food security in the Pacific Islands. Marine Policy in press. [with ADB and NOAA]

Bell J.D., Cisneros-Montemayor A., Hanich Q., Johnson J.E., Lehodey P., Moore B., Pratchett M., Reygondeau G., Senina I., Virdin J. and Warbnitz C. (2017b). Adaptations to maintain the contributions of small-scale fisheries to food security in the Pacific islands. Marine Policy in press. [with Nereus program]

Bell J.D., Albert J., Andréfouët S., Andrew N.L., Blanc M., Bright P., Brogan D., Campbell B., Govan H., Hampton J., Hanich Q., Harley S., Jorari A., Smith M.L., Pontifex S., Sharp M.K., Sokimi W. and Webb A. (2015a). Optimising the use of nearshore fish aggregating devices for food security in the Pacific islands. Marine Policy 56, 98–105. [with Dalio Foundation, MacArthur Foundation, Packard Foundation]

Bell J.D., Allain V., Allison E.H., Andréfouët S., Andrew N.L., Batty M.J., Blanc M., Dambacher J.M., Hampton J., Hanich Q., Harley S., Lorrian A., McCoy M., McTurk N., Nicol S., Pilling G., Point D., Sharp M.K., Vivili P. and Williams P. (2015b). Diversifying the use of tuna to improve food security and public health in Pacific island countries and territories. Marine Policy 51, 584–591. [with AusAID, EU and various].

Blythe J., Silver J., Evans L., Armitage D., Bennett N., Moore M.-L., Morrison T. and Brown K. (2018). The dark side of transformation. Antipode, in press.

Blythe J., Cohen P.J., Eriksson H., Cinner J., Boso D., Schwarz A.-M. and Andrew N.L. (2017a). Strengthening post-hoc analysis of community-based fisheries management through the social-ecological systems framework. Marine Policy 82, 50–58.

Blythe J., Sulu R., Harohau D., Weeks R., Schwarz A.-M., Mills D. and Phillips M. (2017b). Social dynamics shaping the diffusion of sustainable aquaculture innovations in the Solomon Islands. Sustainability 9, 126. [with ACIAR project FIS/2010/057]

Blythe J., Cohen P.J., Abernethy K. and Evans L. (2017c). Navigating the transformation to community-based resource management. Pp 141-156 in 'Governing the coastal commons: Communities, resilience and transformation', ed. by D. Armitage, Charles T. and Berkes F. Routledge Press/Earthscan: London.

Campbell B., Hanich Q. and Delisle A. (2016). Not just a passing FAD: Insights from the use of artisanal fish aggregating devices for food security in Kiribati. Ocean and Coastal Management 119, 38–44.

Case P., Evans L.S., Fabinyi M., Cohen P. J., Hicks C. Prideaux, M., Mills D. (2015). Rethinking environmental leadership: The social construction of leaders and leadership in discourses of ecological crisis, development, and conservation. Leadership 11, 396–423. [with James Cook University]

Cohen P.J., Song A.M. and Morrison T.H. (2017). Policy coherence with the small-scale fisheries guidelines: Analysing across scales of governance in pacific small-scale fisheries. Pp. 57–77 in 'The small-scale fisheries guidelines', ed. by S.Jentoft, Chuenpagdee R., Barragán-Paladines M. and Franz N. MARE Publication Series Vol. 14. Springer: Cham, Switzerland.

Cohen P.J., Lawless S., Dyer M., Morgan M., Saeni E., Teioli H. and Kantor P. (2016). Understanding adaptive capacity and capacity to innovate in social-ecological systems; applying a gender lens. Ambio 45, 309–321.

Cohen P.J., Evans L. and Govan H. (2015a). Community-based, co-management for governing small-scale fisheries of the Pacific: A Solomon Islands' case study. Pp. 39–59 in 'Interactive governance for small-scale fisheries: Global reflections' ed. by S. Jentoft and Chuenpagdee, Springer: Switzerland.

Cohen P.J. and Steenbergen D. (2015b). Social dimensions of local fisheries co-management in the Coral Triangle. Environmental Conservation 42, 278-288.

Cohen P.J., Jupiter S.D., Weeks R., Tawake A. and Govan H. (2014a). Is community-based fisheries management realising multiple objectives? Examining evidence from the literature. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 34, 3–44.

Cohen P.J., Tapala S., Rikio A., Kukiti E., Sori F., Hilly Z., Alexander T.J. and Foale S. (2014b). Developing a common understanding of taxonomy for fisheries management in north Vella Lavella, Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 33, 3–12.

Eriksson H., Friedman K., Amos M., Bertram I., Pakoa K., Fisher R., Andrew N. (2017a). Geography limits island small-scale fishery production. Fish and Fisheries. In press.

Eriksson H., Albert J., Albert S., Warren R., Pakoa K., Andrew N. (2017b). The role of fish and fisheries in recovering from natural hazards: Lessons learned from Vanuatu. Environmental Science and Policy 76, 50–58. [with ACIAR project FIS/2015/031]

Eriksson H., Adhuri D. S., Adrianto L., Andrew N. L., Apriliani T., Daw T., Evans L., Garces L., Kamanyi E., Mwaipopo R., Purnomo A. H., Sulu R. J. and Beare D. J. (2016). An ecosystem approach to small-scale fisheries through participatory diagnosis in four tropical countries. Global Environmental Change 36, 56–66. [with European Union].

Eriksson H. and Clarke S. (2015a). Chinese market responses to overexploitation of sharks and sea cucumbers. Biological Conservation 184, 163–173. [with Mistra and Nereus program]

Eriksson H., Osterblom H., Crona B., Troell M., Andrew N., Wilen J. and Folke C. (2015b). Contagious exploitation of marine resources. Frontiers in Ecology and the Environment 13, 435–440.

Evans L.S., Cohen P.J., Vave-Karamui A., Masu R., Boso D. and Mauli S. (2018). Reconciling multiple societal objectives in cross-scale marine governance: Solomon Islands' engagement in the Coral Triangle Initiative. Society and Natural Resources 31, 121–135.

Evans L., Cohen P.J., Case P., Hicks C.C., Prideaux M., Mills M. (2017) The landscape of leadership in environmental governance: A case study from Solomon Islands. Human Ecology 45, 357–365. [with James Cook University]

Evans L., Hicks C.C., Cohen P.J., Case P., Prideaux M. and Mills D. J. (2015). Understanding leadership in the environmental sciences. Ecology and Society 20(1), 50. [with James Cook University]

Gourlie D., Davis R., Govan H., Marshman J. and Hanich Q. (2017). Performing 'a new song': Suggested considerations for drafting effective coastal fisheries legislation under climate change. Marine Policy (in press). [with Nereus program]

Hanich Q., Wabnitz C., Ota Y., Amos M., Donato-Hunt C. and Hunt A. (2017). Small-scale fisheries under climate change in the Pacific islands region. Marine Policy (in press). [with Nereus program].

Iniesta-Arandia I., Ravera F., Buechler S., Díaz-Reviriego I., Fernández-Giménez M. E., Reed M. G., Thompson-Hall M., Wilmer H., Aregu L., Cohen P., Djoudi H., Lawless S., Martin-Lopez B., Smucker T., Villamor G.B. and Wangui E.E. (2016). A synthesis of convergent reflections, tensions and silences in linking gender and global environmental change research. Ambio 45, 383–393. [with CGIAR]

Jupiter S.D., Cohen P.J., Weeks R., Tawake A. and Govan H. (2014) Locally-managed marine areas: Multiple objectives and diverse strategies. Pacific Conservation Biology 20, 165–179.

Locke C., Muljono P., McDougall C. and Morgan M. (2017). Innovation and gendered negotiations: Insights from six small-scale fishing communities. Fish and Fisheries 18, 943–957. [with Promundo and CRP AAS]

Orirana G., Siota F., Cohen P.J., Atitete T., Schwarz A., Govan H. (2016). Spreading community based resource management: Testing the 'lite-touch' approach in Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 3–12.

Purcell S. W., Crona B. I., Lalavanua W. and Eriksson H. (2017). Distribution of economic returns in small-scale fisheries for international markets: A value-chain analysis. Marine Policy 86, 9–16. [with ACIAR projects PARDI/2010/004 and FIS/2010/096]

Raubani J., Eriksson H., Neihapi P.T., Baereleo Tauve R., Amos M., Pakoa K., Gereva S., Nimoho G. and Andrew N. (2017). Past experiences and the refinement of Vanuatu's model for supporting community-based fisheries management. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 38, 3–13.

Schwarz A.M., Cohen P.J., Boso D., Ramofafia C., Alexander T., Bennett G. and Andrew N. (2017). Critical reflections from fostering adaptive community-based, co-management in Solomon Islands small-scale fisheries. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 38, 14–25.

Song A.M., Cohen P.J. and Morrison T.H. (2017b). Policies in harmony? Does the new song agree with the small-scale fisheries guidelines?. Secretariat of the Pacific Community Traditional Marine Resource Management and Knowledge Bulletin 38, 26–36.

Sukulu M., Orirana G., Oduagalo D., Waleilia B., Sulu R., Schwarz A.M., van der Ploeg J. and Eriksson H. (2016). Management over ownership: Towards community-based natural resource management in Langalanga Lagoon, Solomon Islands. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 37, 13–21.

Sulu R.J., Eriksson H., Schwarz A.-M., Andrew N.L., Orirana G., Sukulu M., Oeta J., Harohau D.O., Sibiti S., Toritela A. and Beare D. (2015). Livelihoods and fisheries governance in a contemporary Pacific Island setting. PLoS One 10, e0143516. [with EU]

Webster F.J., Cohen P.J., Tauati M., Vidler K., Mailau S., Vaipunam L. (2017). Detecting fisheries trends in a co-managed area in the Kingdom of Tonga. Fisheries Research 186, 168–176. [with James Cook University]

10.2.2 Non-peer reviewed outputs published or in press

Albert J. and Sokimi W. (2017a). Sharing Pacific nearshore FAD expertise. SPC Newsletter 150, 37–41. [with French Pacific Fund and SPC]

Albert J., Bogard J., Siota F., McCarter J., Diatalau S., Maelaua J. and Thilsted S.H. (2017b). The contribution of small-scale fisheries to nutrition in Solomon Islands rural communities. Abstract. P. 61 in 'Resilient small-scale fisheries symposium: Proceedings of a workshop held in Penang, Malaysia, 5–7 September 2017', ed. by P.Cohen. Huchery C. and Roscher M. Australian Centre for International Agricultural Research: Canberra.

Albert J., Siota F., Hasi A., Ngarakana N., Posala R., Orirana G., Saeni E., Teioli H., Suruma B., Sukulu M., Papae R. and Jimuru M. (2017c). An analysis of dietary diversity and anthropometry of women, infants and young children from rural communities in Malaita and Western Provinces, Solomon Islands. Report prepared for the Solomon Islands Ministry of Health and Medical Services. [with ACIAR project FIS/2015/031]

Albert J.A., Albert S., Andrew N., Blanc M., Carlos A., Luda L., Tofuakalo F., Masu R., Oengpepa C., Oeta J., Posala R., Schwarz A.-M., Sibiti S., Siota F., Sokimi W., Tan S., Tawaki A., Teri J. and Warren R. (2015a). Nearshore fish aggregating devices (FADs) for food security in Solomon Islands. Program Brief: AAS-2015-05. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Albert J. and Bogard J. (2015b). Planning a nutrition-sensitive approach to aquatic agricultural systems research in Solomon Islands, Program Brief: AAS-2015-15. CGIAR Research Program on Aquatic Agricultural Systems/WorldFish: Penang, Malaysia.

Anon. (2017). Sustainable national artisanal FAD programmes: What to aim for. SPC Policy Brief No. 31. SPC/WorldFish. [with French Pacific Fund and SPC]

Bennett G., Cohen P., Schwarz A.M., Rafe M., Teioli H. and Andrew N. (2014a). Solomon Islands: Western Hub scoping report. Project Report: AAS-2014-14. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Bennett G., Cohen P., Schwarz A.M., Albert J., Lawless S., Paul C. and Hilly Z. (2014b). Solomon Islands: Western Province situation analysis. Project Report: AAS-2014-15. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Blythe J., Bennett G., Cohen P., Moveni M. and Kwatelae A. (2017d). Five principles for network success in Solomon Islands. Program Brief: 2017-04. WorldFish: Penang, Malaysia.

Blythe J. and Harohau D. (2015). Theory of Change workshop with the Malaita Province Partners for Development (MPPD), Auki, Solomon Islands May 7-8, 2015. Unpublished Workshop Report. WorldFish.

Campbell B. and Delisle A. (2017). Exploring the use of bylaws as an enabling tool for sustainable community-based fisheries management in Kiribati. SPC Fisheries Newsletter 153, 40–46.

Campbell B. and Delisle A. (2016). *Kawain karaoan to Ointua*: Guidelines for by-law processes relating to coastal fisheries activities in Kiribati. Report to MFMRD (Ministry of Fisheries and Marine Resources Development). ANCORS (Australian National Centre for Ocean Resources and Security): Wollongong, Australia.

Cohen P., Schwarz A.-M., Boso D. and Hilly Z. (2014c). Lessons from implementing, adapting and sustaining community-based adaptive marine resource management. Lessons Learned Brief: AAS-2014-16. CGIAR Research Program on Aquatic Agricultural Systems/WorldFish: Penang, Malaysia.

CRP AAS. (2014). Facilitators' report. Delivered at the Malaita Hub, Solomon Islands: Initiatives Theory of Change Workshop. Honiara, 10–12 March 2014.

Davis R., Gourlie D., Govan H., Marshman J. and Hanich Q. (2017). Legislating for a new song: Ensuring effective and up-to-date coastal fisheries laws in the Pacific region. SPC Fisheries Newsletter 153, 36–39.

Delisle A., Namakin B., Uriam T., Campbell B. and Hanich Q. (2016). Participatory diagnosis of coastal fisheries for North Tarawa and Butaritari island communities in the Republic of Kiribati. Program Report: 2016-24. WorldFish: Penang, Malaysia.

Donato-Hunt C. and Eriksson H. (2017). Regional reporting for the new song for coastal fisheries strategy. Information Paper No. 5. Delivered at 10th SPC Heads of Fisheries Meeting, 14–17 March 2017: Noumea, New Caledonia.

Douthwaite B., Kabir K., Karim M., Lando L.A., Longley C., Muyaule C., Perez M., Siota F. and Sukulu M. (2015). More inclusive science for the poor: linking farmers to research using the RinD approach. Pp. 57–80 in 'Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems', ed. by B. Douthwaite, Apgar J.M. and Schwarz A., McDougall C., Attwood S., Senaratna S. and Clayton T. Working Paper: AAS-2015-16. CGIAR Research Program on Aquatic Agricultural Systems Penang, Malaysia.

Govan H., Schwarz A.M., Harohau D., Oeta J., Orirana G. and Ratner B.D. (2013). Solomon Islands: Essential aspects of governance for Aquatic Agricultural Systems in Malaita Hub. Project Report: AAS-2013-19. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Hanich Q., Govan H., Andrew N., Amos M. and Chapman L. (2017). Enabling government - empowering communities: National implementation of the New Song. Working Paper No. 2. Delivered at 10th SPC Heads of Fisheries Meeting: Noumea, New Caledonia.

Hanich Q., Delisle A. and Campbell B. (2016). Pacific small-scale coastal fisheries: Strengthening sustainability, food production and livelihoods. Policy Brief. Pacific Economic Monitor Series pp. 28–32: Manila, Philippines.

Kruijssen F., Albert J.A., Morgan M., Boso D., Siota F., Sibiti S. and Schwarz A.-M. (2013). Livelihoods, markets, and gender roles in Solomon Islands: Case studies from Western and Isabel Provinces. Project Report: AAS-2013-22. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Lawless S., Doyle K., Cohen P., Eriksson H., Schwarz A.-M., Teioli H., Vavekaramui A., Wickham E., Masu R., Panda R., McDougall C. (2017). Considering gender: Practical guidance for rural development initiatives in Solomon Islands. Program Brief: 2017-22. WorldFish: Penang, Malaysia.

Lawless S. and Teioli H. (2015). Aquatic agricultural systems benchmarking Malaita and Western provinces: Key findings. Unpublished Report. WorldFish: Honiara, Solomon Islands.

Lawless S. (2014). Literature Review of Gender and Social Norms in Malaita Hub, Solomon Islands. Unpublished Report. WorldFish: Honiara, Solomon Islands.

Masu R. and Albert J. (2015). Nearshore fish aggregating devices for food security in Solomon Islands. SPC Fisheries Newsletter 146, 25–31.

McDougall C., Cole S.M., Rajaratnam S., Brown J., Choudhury A., Kato-Wallace J., Manlosa A., Meng K., Muyaule C., Schwarz A. and Teioli H. (2015). Implementing a gender transformative research approach: Early lessons. Pp. 41-56 in 'Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems', ed. by B. Douthwaite, Apgar J.M. and Schwarz A., McDougall C., Attwood S., Senaratna Sellamuttu S. and Clayton T. Working Paper: AAS-2015-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Promundo-US and CGIAR Research Program on Aquatic Agricultural Systems. (2016). Promoting gender-transformative change with men and boys: A manual to spark critical reflection on harmful gender norms with men and boys in aquatic agricultural systems. Promundo-US: Washington DC and CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Schwarz A.-M., Cole S.M., Downing B., Perez M.L., Kamp K., Crissman C. Johnstone G., Paz-Ybarnegaray R., Aleem N., Apgar J.M., Golam F, Rodericks A, Longley C., Lunda Kalembwe, J., Mulele, S., Muyaule C., Mulanda A., Mwasi D., Nasilele F., Songe M.M., Sumaya M.A.D., Wang J., Ward A. and Waters-Bayer A. (2015). Collaborating for development impact: Learning from research partnership experiences. Pp. 25–40 in 'Research in development: Learning from the CGIAR Research Program on Aquatic Agricultural Systems', ed. by B. Douthwaite, et al. Working Paper: AAS-2015-16. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

Schwarz A.-M., Bennett G., Albert J., Saepioh K., and Mazin J. (2014a). Facilitators' Report. Delivered at AAS Western Hub: Solomon Islands Program Design Workshop, Gizo, Western Province, Solomon Islands, October 9-10 and 15, 2014. CRP AAS.

Schwarz A.-M., James R., Teioli H.M., Cohen P., Morgan M. (2014b). Engaging women and men in community-based resource management processes in Solomon Islands. Case study brief: AAS-2013-33. CGIAR Research Program on Aquatic Agricultural Systems/WorldFish: Penang, Malaysia.

SPC (Secretariat of the Pacific Community) (2017a). *Gaed long ol toksave blong ol fising komiuniti long Vanuatu* (Guide and information sheets for community fisheries management in Vanuatu). Stredder Print: Noumea, New Caledonia.

SPC (Secretariat of the Pacific Community) (2017b). The Coastal Fisheries Report Card 2017. Working Paper No. 10. Delivered at the Annual Ministerial Forum Fisheries Committee Fourteenth Meeting. Mooloolaba, Australia, 5-6 July 2017. [with SPC]

Uriam T. (2016). Stakeholders of the Kiribati Community Based Fisheries Management Project gather to discuss lessons learned and way forward. Secretariat of the Pacific Community Fisheries Newsletter 149, 19–21.

Uriam T. and Delisle A. (2014). Community-based fisheries management project in Kiribati: First steps. Secretariat of the Pacific Community Fisheries Newsletter 144, 22–23.

van der Ploeg J., Albert J., Apgar M., Bennett G., Boso D., Cohen P, Daokalia C., Faiau J., Harohau D., Iramo E., et al. (2016). Learning from the lagoon: Research in development in Solomon Islands. Program Report: AAS-2016-02. CGIAR Research Program on Aquatic Agricultural Systems: Penang, Malaysia.

VFD (Vanuatu Fisheries Department) (2017a). Hog Harbour komuniti-bes kostal fiseris manejmen plan 2017–2020 (Hog Harbour CBFM plan 2017–2020). VFD: Port Vila.

VFD (Vanuatu Fisheries Department) (2017b). Lolathe komuniti-bes kostal fiseris manejmen plan 2017–2020 (Lolathe CBFM plan 2017–2020). VFD: Port Vila.

VFD (Vanuatu Fisheries Department) (2017c). Lutes komuniti-bes kostal fiseris manejmen plan 2017–2020 (Lutes CBFM plan 2017–2020). VFD: Port Vila.

VFD (Vanuatu Fisheries Department) (2017d). Pelongk komuniti-bes kostal fiseris manejmen plan 2017–2020 (Pelongk CBFM plan 2017–2020). VFD: Port Vila.

VFD (Vanuatu Fisheries Department) (2017e). Peskarus komuniti-bes kostal fiseris manejmen plan 2017–2020 (Peskarus CBFM plan 2017–2020). VFD: Port Vila.

VFD (Vanuatu Fisheries Department) (2017f). Port Olry komuniti-bes kostal fiseris manejmen plan 2017–2020 (Port Olry CBFM plan 2017–2020). VFD: Port Vila.

WorldFish and Promundo-US (2015) Integrating Gender Transformative Approaches into Aquatic and Agricultural Systems 11-13th August 2015, Honiara, Solomon Islands. Unpublished Report.

10.2.3 Submitted outputs

Barclay K., McClean N., Cohen P., Foale S., Sulu R. and Lawless S. (submitted). Lagoon livelihoods: The shifting role of shell money in Langalanga, Solomon Islands. Maritime Studies.

Hanich Q. and Uriam T. (submitted) Government of Kiribati Cabinet briefing 2018. Community-based approaches to fisheries management.

Hanich Q. and Dunstan P. (submitted). Ministry of Fisheries and Marine Resources Development (MFMRD) policy brief. Theories of change for fisheries.

Hanich Q., Eria T., Hayes D. and Dunstan P. (submitted) Ministry of Fisheries and Marine Resources Development (MFMRD) policy briefing: Tarawa Lagoon management, community tenure and spatial planning.Lawless S., Cohen P., McDougall C., Orirana G., Siota F., Doyle K. (submitted). Gender norms and relations: Implications for agency in rural livelihoods in Solomon Islands. World Development.

Song A.M., Cohen P.J., Hanich Q., Morrison T.H., Tekatau T. and Andrew, N. (submitted). Multi-scale policy diffusion and translation in Pacific island coastal fisheries. Marine Policy.

10.2.4 'In preparation' peer reviewed papers

These papers will be completed in collaboration with ongoing projects, including the Worldfish CRP FISH and ACIAR project FIS/2016/300

Albert J., Bogard J., Siota F., McCarter, J., Diatalau S., Maelaua J., Andrew N., Thilsted S. (in prep). Poor nutrition and diets in rural Solomon Islands communities: A mixed methods approach to framing the problem and its drivers. Target journal: Maternal and Child Nutrition.

Albert J., Siota F., Diatalau S., Andrew N., Thilsted S. (in prep) The role of fish, local and imported foods in the diets of rural Solomon Island women. Target journal: Food Policy.

Andrew N.L., Jimmy R., Pickering T., Campbell B., Sammut J., Gereva S., Paul N. and Wabnitz C. (in prep). Review of the status and impact of aquaculture for food security in Oceania. Target journal: PLoS One.

Andrew N.L., Amos M., Bell J., Eriksson H., Allison E.H., Fanzo J., Fink A., Sanders J., Romeo A., Sharp M., Snowden W., Thow A-M. and Tukiutonga C. (in prep). Fish in the Pacific Food System. Target journal: Global Environmental Change

Andrew N.L., Mills D., Hellebrandt D., Roscher M. and Allison E. (in prep). Pathways to livelihood diversification in fisheries and aquaculture in the developing world. Target journal: Fish and Fisheries.

Barclay et al. [TBD] (in prep) Structural issues in gender in fisheries in the Pacific region.

Blythe J., Cohen P. and Eriksson H. (in prep). Do networks build collaborative governance capacity?

Campbell B. and Delisle A. (in prep). Strengthening coastal fisheries governance: What role for community-based fisheries management in Kiribati?

Cohen P.J., Baereleo R., Bennett G., Delisle A., Neihapi P., Orirana G., Siota F. and Uriam T. (in prep). Local contexts and engagement processes that influence development, design and implementation of community-based fisheries management.

Delisle A., McDougall C. and Cohen P. (in prep). Applying a gender lens to the interactive governance framework for small-scale fisheries in the Pacific region.

Donato-Hunt C., Eriksson H. and Andrew N. (in prep). Synthesizing the process of regional coastal fisheries indicators: Overcoming overlap and confusion, harmonization across multiple agencies. Target journal: Marine Policy.

Eriksson H., Sulu R., Blythe J., van der Ploeg J., Cohen P. and Andrew N. (in prep). Reconciling resilience and development at the nexus of food security and livelihood strategies in Langalanga lagoon, Solomon Islands.

Eriksson H., van der Ploeg J., Sukulu M., Batalofo M. and Boso D. (in prep). What happens when the sea cucumber fishery closes? A case study from Melanesia.

Sharp M., Andrew N.L., Delisle A., Eriksson H. and Romeo A. (in prep). Acquisition and apparent consumption of fish in eight Pacific Island Countries. Target journal: Fish and Fisheries

10.2.5 'In preparation' non-peer reviewed outputs

Barclay K., McClean N., Leduc B., Raubani J., Cohen P., Sanders J., Donato-Hunt C., Andrew N.L. and Delisle A. (in prep). Toolkit for Pacific Gender and Social Inclusion in Coastal Resource Management and Development. SPC guidelines and website.

Namakin B. and Uriam T. (in prep) Toolbox for community-based fisheries management in Kiribati. MFMRD Fisheries Newsletter.

11 Appendices

The following appendices are included as separate sections:

Appendix 1: Survey instrument for maternal and child health surveys in Malaita (see Section 7.8.1).

Appendix 2: Survey instrument for panel studies (see Section 7.6.2).

Appendix 3: Communication and dissemination activities and outputs (see Section 8.4).

11.1 Appendix 1: Survey instrument for maternal and child health surveys

This survey was designed and implemented in Solomon Island pijin, using a tablet base survey instrument (Kobotoolbox). Only the english questions have been provided here and do not include the linkages to the 'choices' for responses. An excel file with the coded responses can be made available upon request.

Section A Enumerator details and Household Code

A1. Date of interview

A2. Interviewers name

A3. Household GPS location

A4. Household reference

A5. Region

A6. Village name

Section B Informed Consent

My name is ${interviewers_name} and I work for WorldFish (Ministry of Health). Project information provided to the respodant (as per informed consent sheet) including what, who, why, risk and benefits, confidentiality, choice not to answer.

Digital signature recorded

Section C Household members

Record of all household members (coded)

C1. First name

C2. Last name

C3. Gender

C4. Year born (yyyy) (Adults – approximate using dates guide)

C4 1. When is the childs birthday? (DAY, MONTH, YEAR)

Confirm on their health/vaccination card with the birthdate recorded. If they do not have a health/vaccination card we need to record at least the month as accurately as possible - use times/events/dates.

C4 1a. How accurate was the birthdate/year?

C5. Who is the primary care giver for this child?

Section D: Household Assets

D1. Who is the head of the household?

D2. What is the highest level of education of the head of household?

D3. What is the main activity for earning cash income within the household?

D4. What is the second most important activity for earning cash income within the household?

D5. Does your household or someone in your household own a paddle canoe?

D5 a. How many paddle canoes does your household own?

D6. Does your household or someone in your household own a fibre canoe?

D6 a. How many fibre canoes does your household own?

D7. Does your household or someone in your household own an engine?

D7 a. How many engines does your household own?

D8. Does your household or someone in your household own a vehicle or truck?

D8 a. How many vehicles does your household own?

D9. Does your household or someone in your household own a mobile phone?

D9 a. How many mobile phones does your household own?

D10. Does your household or someone in your household own a screen (TV)?

D10 a. How many screen (TVs) does your household own?

D11. Does your household or someone in your household own a computer?

D11 a. How many computers does your household own?

D12. Does your household or someone in your household own solar?

D12 a. How many solar does your household own?

D13. Does your household or someone in your household own a generator?

D13 a. How many generator does your household own?

D14. Does your household or someone in your household own a radio?

D14 a. How many radios does your household own?

D15. Does your household have a water tank?

D16. Does your household or someone in your household own livestock (pigs. chicken etc)?

D16 a. What type of livestock does your household own?

D16 b. How many ${asset_livestock_type} does your household own?

D17. What is the main type material for the roof of your house?

D18. What is the main type material for the walls of your house?

D19. What is the main type material for the floor of your house?

D20. Does your household have a market garden (to grow food for selling)?

D20 a. How many market gardens does your household have?

D21. What main foods are you growing now in your gardens for consumption?

D22. What main foods are you growing now in your gardens for market?

D23. What is your households main toilet facility?

D24 a. If other please specify

D 25. What is the main source of drinking water?

D 25a. What is the main source of water for washing/swim ?

Section E: Household Food Frequency

This next section is about what your household has eaten in the last 7 days either within the household, think about what you, your husband, your children or any other people in your household have had to eat over this past week.

E1 1. Did anyone in your household eat sweet potato in the past week (7 days)

E1 3. On a day when your household eats sweet potato, how much sweet potato does your household normally eat?

E1 2. How many days in the past week did your household eat sweet potato?

E1. 4 Could you please tell me the primary source for obtaining sweet potato for your household?

E2 1. Did anyone in your household eat taro in the past week (7 days)

E2 3. On a day when your household eats taro, how much taro does your household normally eat?

E2 2. How many days in the past week did your household eat taro?

E2 4. Could you please tell me the primary source for obtaining taro for your household?

E3 1. Did anyone in your household eat yam in the past week (7 days)?

E3 3. On a day when your household eats yam, how much yam does your household normally eat?

E3 2. How many days in the past week did your household eat yam?

E3 4. Could you please tell me the primary source for obtaining yam for your household?

E4 1. Did anyone in your household eat cassava in the past week (7 days)

E4 3. On a day when your household eats cassava, how much cassava does

E4 2. How many days in the past week did your household eat cassava?

E4 4. Could you please tell me the primary source for obtaining cassava for your household?

E5 1. Did anyone in your household eat cooking banana in the past week (7 days)

E5 3. On a day when your household eats cooking banana, how much cooking banana does your household normally eat?

E5 2. How many days in the past week did your household eat cooking banana?

E5 4. Could you please tell me the primary source for obtaining cooking banana for your household?

E6 1. Did anyone in your household eat pumpkin in the past week (7 days)

E6 3. On a day when your household eats pumpkin, how much pumpkin does your household normally eat?

E6 4. Could you please tell me the primary source for obtaining pumpkin for your household?

E7 1. Did anyone in your household eat leafy green vegetables (e.g.taro leaf, slippery cabbage, chinese cabbage, pumpkin tip, amau, ute, kasume) in the past week?

E7 3. On a day when your household eats leafy greens how much does your household normally eat?

E7 2. How many days in the past week did your household eat dark leafy greens (e.g.taro leaf, slippery cabbage, chinese cabbage, pumpkin tip, amau, ute, kasume)

E7 4. Could you please tell me the primary source for obtaining leafy green vegetables for your household?

E8 1. Did anyone in your household eat other vegetables (e.g. tomato, eggplant) in the past week?

E8 2. How many days in the past week did your household eat other vegetables?

E8. 3 Could you please tell me the primary source for obtaining other vegetables for your household?

E9 1. Did anyone in your household eat pawpaw in the past week (7 days)

E9 3. On a day when your household eats pawpaw, how much pawpaw does your household normally eat?

E9 2. How many days in the past week did your household eat pawpaw?

E9. 4 Could you please tell me the primary source for obtaining pawpaw for your household?

E10 3. On a day when your household eats mango, how much mango does your household normally eat?

E10 2. How many days in the past week did your household eat mango?

E10 4. Could you please tell me the primary source for obtaining mango for your h ousehold?

E11 1. Did anyone in your household eat banana in the past week (7 days)

E11 3. On a day when your household eats bananas, how many bananas does your household normally eat?

E11 2. How many days in the past week did your household eat banana?

E11 4. Could you please tell me the primary source for obtaining bananas for your household?

E12 1. Did anyone in your household eat red fleshed banana in the past week

E12 3. On a day when your household eats red fleshed bananas, how many red bananas does your household normally eat?

E12 2. How many days in the past week did your household eat red fleshed banana?

E12 4. Could you please tell me the primary source for obtaining red fleshed bananas for your household?

E13 1. Did anyone in your household eat other fruit (e.g. banana, avocado, ripe breadfruit, rambutan, rose apple, pineapple, watermelon, cocoa fruit, mandarine, passionfruit, soursop, coconut flesh) in the past week (7 days)

E13 2. How many days in the past week did your household eat other fruit?

E13 3. Could you please tell me the primary source for obtaining other fruit for your household?

E14 1. Did anyone in your household eat fresh fish in the past week (7 days)

E14 3. On a day when your household ate fresh fish, in what type of fish did your household eat?

E14 5. On a day when your household eats fresh fish, in general what size fish would you eat? (cm)

E14 4.On a day when your household eats fresh fish, in general how many fish would your household eat?

E14 2. How many days in the past week did your household eat fresh fish?

E14 7. Could you please tell me the primary source for obtaining fresh fish for your household?

E14 6. Are there any members of your household that do not eat fish for any reason?

E 14 6a. Who in your household does not eat fish?

E 14 6b. What is the reason for this person/people not eating fish

E15 1. Did anyone in your household eat other seafood (squid, shell, seafood, octopus etc) in the past week (7 days)

E15 3. On a day when your household ate seafood, what type of seafood was most eaten?

E15 4. On a day when your household ate that seafood, in general how many ${seafood_HH_type} would your household eat?

E15 5. On a day when your household eats that seafood, in general what size ${seafood_HH_type} would your household eat? (cm)

E15 2. How many days in the past week did your household eat seafood?

E15 7. Could you please tell me the primary source for obtaining seafood for your household?

E15 6. Are there any members of your household that do not eat seafood for

E15 6a. Who in your household does not eat seafood?

E15 6b. What is the reason for this person/people not eating seafood?

E16 1. Did anyone in your household eat taiyo in the past week (7 days)

E16 3. On a day when your household eats taiyo, how many taiyo does your household eat?

E16 3a. If other detail how much used (in grams). For example if one small and one large tin add up total amount in grams (i.e 280gm). E16 2. How many days in the past week did your household eat taiyo?

E16 4. Could you please tell me the primary source for obtaining taiyo for your household?

E16 5.Are there any members of your household that do not eat taiyo for any reason?

E16 6. Who in your household does not eat taiyo?

E16 6a. What is the reason for this person/people not eating taiyo? LIST OUT

E17 1. Did anyone in your household eat canned meat (e.g. SPAM, corned beef) in the past week (7 days)

E17 3. On a day when your household eats canned meat how much canned

E17 2. How many days in the past week did your household eat canned meat?

E17 4. Could you please tell me the primary source for obtaining canned meat

E18 1. Did anyone in your household eat fresh meat (e.g. chicken, chicken wing, frozen red meat, pig) in the past week (7 days)

E18 2. What is the main type of fresh meat that your household ate?

E18 4. On a day when your household eats ${fresh_meat_type}, how much fresh meat does your household normally eat? DESCRIBE IN WORDS

E18 3. How many days in the past week did your household eat ${fresh_meat_type}?

E18 5. Could you please tell me the primary source for obtaining fresh meat for your household?

E19 1. Did anyone in your household eat rice in the past week (7 days)

E19 3. On a day when your household eats rice, how much rice does your household normally eat?

E19 4. How many kg's of rice did your household consume in the past week (7days)

E19 2. How many days in the past week did your household eat rice?

E19 5. Could you please tell me the primary source for obtaining rice for your household?

E20 1. Did anyone in your household eat noodle in the past week (7 days)

E20 3. On a day when your household eats noodles, in general how much noodle does your household normally eat?

E20 2. How many days in the past week did your household eat noodle?

E20 5. Could you please tell me the primary source for obtaining noodles for your household?

E21 1. Did anyone in your household eat biscuit (e.g. navy, coconut, butter, breakfast cracker) in the past week (7 days)

E21 3. On a day when your household eats biscuit, how many packets of

E21 2. How many days in the past week did your household eat biscuits?

E21. 4 Could you please tell me the primary source for obtaining biscuit for your household?

E22 1. Did anyone in your household eat bun or ring cake in the past week (7 days)

E22 3. On a day when your household eats buns/ringcake, how much would your household normally eat?

E22 2. How many days in the past week did your household eat buns or ring cake?

E22. 4 Could you please tell me the primary source for obtaining bun/bread/ringcake for your household?

E23 1. Did anyone in your household eat sugar in the past week (7 days)

E23 3. During a normal week when your household has sugar, how much sugar does your household normally have?

E23 2. How many days in the past week did your household have sugar?

E23 4. Could you please tell me the primary source for obtaining sugar for your household?

E25 1. Did your household cook with oil in the past week (7 days)

E25 3. During a normal week when your household uses oil, how much oil does your household normally use

E25 2. How many days in the past week did you cook with oil?

E25 4. Could you please tell me the primary source for obtaining oil for your household?

E26 1. Did your household cook with coconut in the past week (7 days)

E26 3. During a normal week when your household uses coconut, how many coconuts does your household use?

E26 2. How many days in the past week did you cook with coconut?

E26 4. Could you please tell me the primary source for obtaining coconut for your household?

E27 How many people (including adults and children) have shared meals in your household in the past week?

Section F Women's Dietary Quality

This section of the survey is about what women eat on a daily basis, we would like ask one representative women in your household between the age of 15 and 49 years old about the food that have been eaten in the last 24 hours.

Section F.1 General Information

F1 1. Name of women being interviewed

F1 2. What is your highest level of education?

F1 2a. What is your religion?

F1 3. Was yesterday a celebration or feast day (e.g. funeral, wedding) where you ate special foods or where you ate more, or less than usual?

F1 4. Was yesterday your sabboth day?

F1 5. In general do you eat different foods on Sabboth compared to other days of the week?

F1 7. Are you currently pregnant ?

F1 8. Are you currently breastfeeding?

Section F.2 24 hour diet recall

Describe all the foods and drinks (meals and snacks) in last 24 hours. Yesterday during the day and night, whether at home or outside the home.

Start with the first food or drink in the morning.

Write down all foods and drinks mentioned on paper provided (record information in tablet after interview).

Section G Infant and young child feeding practices

This module is to be administered to the caregiver (USUALLY the mother) of children recorded in the household roster as less than two years of age. Repeated for multiple children

Section G.1 IYCF General Information

G1 1. Name of infant that these questions will relate to

G1.2 Name of child's mother

G1 3. Has (child name) ever received breastmilk?

G1 3a. Did the child receive colostreum (first milk, yellow in colour)?

G1 3b. How long after birth did the child receive the colestreum?

G1 3c. How long after birth did the child receive breastmilk?

G1 4. No susu true one

Sometimes babies are fed breast milk in different ways, for example by spoon, cup or bottle. This can happen when the mother cannot always be with her baby. Sometimes babies are breastfed by another woman, or given breast milk from another woman by spoon, cup or bottle or some other way. This can happen if a mother cannot breastfeed her own baby. Did (child name) consume breast milk in any of these ways yesterday during the day or at night?

G1 5. Is (child name) still breastfeeding now?

G1 6. Was (child name) breastfed yesterday during the day or at night?

G1 6a. How many times was (child name) breastfed yesterday during the day and night

G1 7. Was (child name) given any vitamin drops yesterday during the day or at night?

G1 8. Was (child name) given oral rehydration salts (ORS) yesterday during the day or at night? ORS are usually given to young children with diarrhea.

G1 9. Does (child name) currently eat solid or semi-solid (smashed) foods?

G1 10. What age (in months) was food introduced to (child name)?

G1 11. Does (child name) currently eat fish (in any way)?

G1 12. What age (in months) was fish introduced to (child name)?

Section G.2 IYCF 24 hour recall - liquids

G2 1. Did (child name) have any plain water?

G2 2. Did (child name) have any coconut water?

G2 3. Did (child name) have any infant formula (e.g.SMA or S-26)?

G2 3a. How many times did (child name) have formula during the day and night yesterday?

G2 4. Did (child name) have any milk (anchor, pauls milk)?

G2 4a. How many times did (child name) have milk during the day and night yesterday?

G2 5. Did (child name) have any juice (e.g. made from fruit or vegetables)?

G2 5a. If juice was given, document what it was (pure squeezed juice, boiled fruit etc) and which fruit and vegetables.

G2 6.Did (child name) have any softdrinks or ice block?

G2 7. Did (child name) have anything else to drink yesterday or last night?

Section G.3 IYCF 24 hour recall - food

Now I would like to ask about everything that (child name) ate yesterday during the day or night, whether at home or outside the home.

Write down all foods and drinks mentioned on paper provided. When composite dishes are mentioned, ask for the list of ingredients. When the respondent has finished, probe for meals and snacks not mentioned. Probe for added foods such as sugar in tea, oil in mixed dishes or fried foods. After the interview you will need to input this detail into the tablet

Section G.4 IYCF Dietary Diversity Score

G4 1. Did (child name) eat any rice yesterday during the day or night?

G4 2. Did (child name) eat any noodle, ring cake, bread, navy biscuit, coconut biscuit or other food made from grains yesterday during the day or night?

G4 3. Did (child name) eat any orange coloured vegetables like pumpkin or orange sweet potatoes yesterday during the day or night?

G4 4. Did (child name) eat any white sweet potatoes, yams, cassava, or any other white root crops yesterday during the day or night?

G4 5. Did (child name) eat any dark green leafy vegetables like slippery cabbage, fern, taro leaves, chinese cabbage yesterday during the day or night?

G4 6. Did (child name) eat any orange coloured fruit like ripe mangoes or pawpaw yesterday during the day or night?

G4 7. Did (child name) eat any other fruits or vegetables yesterday during the day or night?

G4 8. Did (child name) eat any fresh fish yesterday during the day or night?

G4 9. Did (child name) eat any taiyo yesterday during the day or night?

G4 10. Did (child name) eat any other seafood yesterday during the day or night?

G4 11. Did (child name) eat any eggs yesterday during the day or night?

G4 12. Did (child name) eat any meat, such as beef, pig, goat, chicken, or duck yesterday during the day or night?

G4 13. Did (child name) eat any liver, kidney, heart, or other organ meats yesterday during the day or night?

G4 14. Did (child name) eat any cutnut, ngali nut, peanut or other nuts or seeds yesterday during the day or night?

G4 15. Did (child name) eat any lentils or legumes yesterday during the day or night?

G4 16. Did (child name) eat any cheese, yogurt, or other milk products (not including coconut milk) yesterday during the day or night?

G4 17. Did (child name) eat any oil, fats, or butter, or foods made with any of these yesterday during the day or night?

G4 18. Did (child name) eat any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits yesterday during the day or night?

G4 19. Did (child name) have any flavor, such as chilies, spices, herbs, or curry powder yesterday during the day or night?

G4 20. Did (child name) have any grubs, snails, or insects yesterday during the day or night?

G4 21. Did (child name) have any baby food that can be purchased from a store?

G4 22. How many time did (child name) eat solid or semi-solid foods yesterday during the day and night?

Willingness to repeat

We have now completed the questionnaire part of the survey. We would like to know if you would be willing to participate in this survey on a regular basis (every two months). By repeating the survey with a selection of households it will help us to understand more about the seasonal differences in foods available and how that influences what people eat.

Would you be willing to participate on a regular basis over the next year of the program?

Thank you.

We have now completed the survey and we would like to thank you for taking the time to participate. In the coming months we will have some nutrition awareness and other programs on nutrition that we hope you will be willing to join. If you would like any specific feedback from your responses to this survey, please contact one of our staff at the WorldFish Office in Auki.

11.2 Appendix 2: Survey instrument for panel studies

11.3 Appendix 3: Communication and dissemination activities and outputs

Below we list communication and dissemination activities and outputs from a range of mediums including blogs, print media, posters and radio. See also Sections 7.2, 7.3 and 7.4 for training and community engagement activities. Where appropriate an author is named, otherwise the outputs are listed under the name of the media outlet. Only significant meetings, workshops and symposia are included.

Significant meetings, workshops and symposia

ANCORS (2014) Kiribati stakeholder meeting to introduce CBFM and the ACIAR FIS 2012/074 project, Tarawa, 27–29 October [participation by pilot communities, national government ministries, project staff and NGOs - See Section 7.2.4 for details]

ANCORS (2016) Kiribati second stakeholder meeting to lessons learned and ways forward, Tarawa, April [participation by pilot communities, national government ministries, local government officials and project staff - See Section 7.2.4]

Barclay, K (2017) Gender in Fisheries design workshop, Sydney, 22nd – 24th June 2017 [participation by WorldFish, SPC, FAO, UoW, UTS]

Barclay, K (2017) Regional gender and fisheries expert group write-shop, Fiji 14th-16th November 2017[participation by WorldFish, MFMR, WCS, Fiji, SPC, FAO, JCU, UoW and UTS]

IUCN (2014) Pacific Ministerial beche-de-mer summit, Fiji, 6-7 August 2014. [Hampus Eriksson presented]

IUCN/SPC/FAO (2015) Pacific Ministerial beche-de-mer summit, Nuku'alofa, 29 September - 1 October.[Hampus Eriksson was the opening presenter, the project supported and paid for the participation of Rosalie Masu from Solomon Islands MFMR]

Pacific Community (SPC) (2015) Regional Stakeholder workshop on Community-based fisheries management. 6–12 March [participation by project staff, partners and community representatives]

Pacific Community (SPC) (2015) 9th SPC Heads of Fisheries Meeting, Noumea, New Caledonia, 6–12 March 2017. [participation by numerous project staff and partners]

Pacific Community (SPC) (2017) 10th SPC Heads of Fisheries Meeting, Noumea, New Caledonia, 14–17 March. [participation by numerous project staff and partners]

Pacific Islands Forum Fisheries Agency (2017) 14th Annual Ministerial Forum Fisheries Committee Meeting, Mooloolaba, Australia, 5–6 July 2017. [participation by numerous project staff and partners]

Promundo, WorldFish (2015) Gender Workshop, Honiara, 11–13 August 2015 [participation by project staff, national government ministries and NGOs]

CRP AAS (2014) Solomon Islands CRP AAS Initiatives Theory of Change Workshop 5–7 March, Honiara [participation by communities, NGOs and national government]

WorldFish (2017) Resilient Small-scale Fisheries Symposium, Penang, Malaysia, 5–7 September [project results presented by Pip Cohen, Hampus Eriksson and Joelle Albert]

WorldFish (2017) Global Workshop on Nutrition-sensitive Fish Agri-food Systems, Siem Reap, Cambodia, 5–8 December [attended by Joelle Albert]

VFD (2016) CBFM stakeholders consultation workshop, Port Vila , 19–21 April [participation by project staff, national government ministries and community representatives]

VFD (2017) Vanuatu CBFM lessons learned workshop, Port Vila, 6 November 2017. [participation by project staff, partners, national government ministries and community representatives – See Section 7.4.4]

Posters, factsheets and guidelines

Anon (2016).*Kwain karaoan te ointua*: The process of making by-laws. Kiribati '10-step' bylaw process poster translated and distributed to pilot village executive committees in 2017.

SPC (2017a). *Gaed long ol toksave blong ol fising komiuniti long Vanuatu* (Guide and information sheets for community fisheries management in Vanuatu). Stredder Print: Noumea, New Caledonia. [The project paid for these SPC/LMMA guidelines and factsheets to be translated into Bislama and printed]. 25 pages.

WorldFish (2017a). *Fish: Food for good health*. Poster prepared for community development activities in Solomon Islands, Honiara. https://www.worldfishcenter.org/publications-resources

WorldFish (2017b) *The first 1000 days*. Poster prepared for community development activities in Solomon Islands, Honiara. https://www.worldfishcenter.org/publications-resources

Social media communication – blogs, interviews, newspaper articles

Amos M. (2017). "Can science save the Pacific's threatened fisheries?" WorldFish blog. 31 May 2017. WorldFish blog. http://blog.worldfishcenter.org/2017/05/can-science-save-the-pacifics-threatened-fisheries/

Cohen, P. (2016). Linking gender and global environmental change research. WorldFish blog. http://blog.worldfishcenter.org/2016/11/linking-gender-and-global-environmental-change-research/

Eriksson H. (2016). ABC Radio. Pacific Beat interview. http://www.radioaustralia.net.au/-international/radio/program/pacific-beat/lucrative-pacific-ocean-sea-cucumber-overexploited/1419227.

Eriksson H. (2016). Article in *Hakai Magazine* by I. Loomis on sea cucumbers built on Hampus' work. https://www.hakaimagazine.com/article-long/sea-cucumbers-vanishing-act

Eriksson H. (2015). ABC Radio. Pacific Beat interview. http://www.radioaustralia.net.au/-international/radio/program/pacific-beat/lucrative-pacific-ocean-sea-cucumber-overexploited/1419227

Eriksson H. (2015). Scientific American. Research featured https://www.scientificamerican.com/article/trade-in-shark-fins-takes-a-plunge/

Eriksson H. (2015). New Scientist. Research featured. https://www.newscientist.com/article/mg22630164.800-changing-chinas-tastes-could-save-worlds-wildlife/

Eriksson H. (2015). Deutchlandfunk (German). Radio interview. http://www.deutschlandfunk.de/studie-chinas-appetit-gefaehrdet-seegurken.676.de.html?dram:article_id=314389

Eriksson H. (2015). Der Spiegel (Germany's TIME Magazine). Research featured. http://www.spiegel.de/wissenschaft/natur/chinas-feinschmecker-dezimieren-seegurken-weltweit-a-1024000.html

Eriksson H. (2015). Deutche Welle (German). Research featured. http://www.dw.com/global-ideas-nature-biodiversity-sea-cucumber-china/a-18324837

Eriksson H. (2015). TakePart Magazine. Research featured. http://www.takepart.com/article/2015/02/19/china-eating-fewer-shark-fins-countys-appetite-another-imperiled-sea-creature

Eriksson H. (2015) Mongabay Magazine. Research featured. https://news.mongabay.com/2015/11/galapagos-gold-rush-feeds-global-hunger-for-shark-fins-sea-cucumbers/

Eriksson H. (2016) Hakai Magazine. Research featured. https://www.hakaimagazine.com/features/sea-cucumbers-vanishing-act/

Island Sun (2015). Newspaper article, Shifting to more sustainable fishing in Solomon Islands, June 23rd. [FAD deployments in collaboration between WorldFish and WWF]

Island Sun (2016). Newspaper article: Western Province Coalition support workshop, reporting on a lessons learned workshop that brought together stakeholders from various networks and coalitions in Solomon Islands November 11th.

Island Sun (2017). Newspaper article, Networking lessons learned, on a collaborative meeting convened for Western Province stakholders to guide the development of the terms of reference for the Western Province Network for Sustainable Environment, March 9th.

Lawless, S. and Eriksson, H. (2017). Integrating gender in development investments: insights from Solomon Islands and Timor-Leste. Donor newsletter report. http://swed.bio/news/integrating-gender-in-development/

McDougall, C. (2015). Leveraging change: How gender norms matter for development. WorldFish blog. http://blog.worldfishcenter.org/2015/11/leveraging-change-how-gender-norms-matter-for-development/

Radio Happy Lagoon (2013). Weekly radio program focused on community FAD awareness broadcasted on Radio Happy Lagoon (Western Province) for 6 weeks.

Siota, F. (2017). Empowering youth to protect fisheries in Solomon Islands. WorldFish blog. http://blog.worldfishcenter.org/2017/05/-empowering-youth-to-protect-fisheries-in-solomon-islands/

Saeni. B.W. (2016) Newspaper article ‘Malaita, WorldFish ink deal’ on the signing of a MOU with Malaita Provincial Government. Solomon Star p3

Saeni. B.W. (2017) Newspaper article ‘Fumamato'o leads in marine resource management’. *Malaita Star*. p 4-5

Solomon Islands Broadcasting Corporation (2014). Radio presentation: CBFM awareness talk (two 30 mins shows led by WorldFish and MFMR)

Solomon Star (2014). Newspaper article on the CBFM Symposium held in Gizo, Solomon Islands. March, 2014.

Solomon Star (2016). Newspaper article on the MOU signed between Malaita Province and WorldFish on collaborative engagement on CBFM, Auki.

Sukulu, M. (2015) Newspaper article ‘Making clay stoves’ [Langalanga lagoon, Malaita]. p8-9

Van der Ploeg, J. (2017) ‘Who needs a New Song? Moana film highlights real world issues for fishers’ WorldFish blog. http://blog.worldfishcenter.org/2017/05/