



Pacific
Community
Communauté
du Pacifique

ISSN 1028-7752

Issue 26 – December 2015

WOMEN IN FISHERIES

information bulletin

Inside this issue

Guest editorial: Gender in aquaculture
and fisheries – Navigating change
Nikita Gopal et al. p. 3

Pacific invertebrate fisheries and gender
– Key results from PROCFish
Meryl J. Williams p. 12

An ecological study of the sea hare,
Dolabella auricularia, on the south-
eastern coast of Viti Levu, Fiji
Sandeep Singh and Veikila Vuki p. 17

Livelihoods, markets, and gender roles
in Solomon Islands: Case studies from
Western and Isabel Provinces
Froukje Kruijsen et al. p. 24

Editor

Veikila Curu Vuki
Oceania Environment Consultants
PO Box 5214
UOG Station
Mangilao
Guam 96913
Email: vuki61@yahoo.co.uk

Production

Fisheries Information Section,
SPC, BP D5, 98848 Noumea Cedex
New Caledonia
Fax: +687 263818
Email: cfpinfo@spc.int
www.spc.int/coastfish

Produced with financial assistance
from the Australian Government,
the European Union, France and
the New Zealand Aid Programme

Editor's note

Welcome to the 26th issue of the *Women in Fisheries Bulletin*, which highlights gender roles in coastal fisheries and development, and women's fishing activities in urban and rural communities.

The first paper in this edition is a paper from the Asian Fisheries Science journal "Guest editorial: Gender in aquaculture and fisheries – Navigating change" by Nikita Gopal et al. The authors report on the 4th Global Symposium on Gender and Aquaculture and Fisheries (GAF4) held during the 10th Asian Fisheries and Aquaculture Forum in May 2013. The report also includes presentations and posters of the GAF4, which was the sixth women and gender symposium organised by the Asian Fisheries Society.

The paper concludes that there is an increasing awareness and interest in the area of gender research in aquaculture and fisheries. The body of research has grown and certain issues have become much clearer. There is also greater attention to gender integration in projects and, in particular, for projects to look at the gender dimension and its impacts. In addition, the number of practitioners in the field of gender in aquaculture and fisheries is increasing although gaps still exist and this needs to be addressed.

The second paper in this edition is on "Pacific invertebrate fisheries and gender – Key results from PROCFish" by Meryl Williams. Williams highlights the importance of women's exclusive participation in invertebrate fisheries in most Pacific Island countries and territories. A key result of PROCFish's finding on gender and invertebrate fishing showed that women were much more likely than men to be exclusively engaged in invertebrate fishing, despite their cultural groupings. Men, on the other hand, were unlikely to be exclusively engaged in invertebrate fishing.

The results of the PROCFish study also indicated that invertebrate fishing is now equally women's work and men's work because total annual catch from invertebrate fishing was almost equal for women and men. A gender bias in invertebrate fishing indicated that women did not engage in diving for high-valued invertebrates and had less access to boats for transportation than men. Women also had a heavier workload in terms of household duties than men, and opportunities for improving their invertebrate fishing productivity and income were very limited.

The research paper on "An ecological study of the sea hare, *Dolabella auricularia*, on southeastern Viti Levu, Fiji" by Sandeep Singh and Veikila Vuki is an important study because women often collect sea hares and there is

limited information on sea hare population characteristics. This study enhances our knowledge and also provides information that will be useful in managing the sea hare fishery.

The two study sites were at the Veivatulua and Kaba Point mudflats. The study shows that sea hares had a unimodal size structure. There was a noticeable absence of juveniles (<90 mm) in the populations at both study sites, although the Veivatulua population had a larger mean body size than the Kaba Point population. The distribution of *D. auricularia* across the Kaba Point and Veivatulua mudflats was clumped and density was related to the presence of seagrass beds. The amount of seagrass occurrence probably reflects abundance in the collection area, although it cannot be said that the number of *D. auricularia* increase with an increase in seagrass beds.

The key findings of the report on “Livelihoods, markets, and gender roles in Solomon Islands: Case studies from Western and Isabel Provinces” by Froukje Kruijssen et al., showed that livelihoods in both provinces are diverse. The marketing of marine resources through value chain is an important component.

The key findings of the study indicate that men and women have different roles in marine resource value chains. Men are more engaged in reef fishing and utilise a larger number of different fishing methods, while women engage in gleaning other marine resources. Men also dominated the sales of finfish while women dominated the sales of other marine resources.

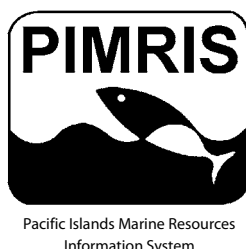
The gender differences in decision-making patterns are related to economic activities, family roles and household daily functions. Decision-making is either done jointly or by either males or females alone, depending on what is needed. At the community level, men dominated decision-making processes.

I welcome any feedback on these articles and encourage you to submit articles on gender and fisheries issues from your country or region.

Veikila Curu Vuki

Cover image: Kids and reef fish – Matokana, Ono-i-Lau, Fiji Islands, November 2014. Photo by Pauliasi Luvu.

PIMRIS is a joint project of five international organisations concerned with fisheries and marine resource development in the Pacific Islands region. The project is executed by the Pacific Community (SPC), the Pacific Islands Forum Fisheries Agency (FFA), the University of the South Pacific (USP) and the Pacific Regional Environment Programme (SPREP). This bulletin is produced by SPC as part of its commitment to PIMRIS. The aim of PIMRIS is to improve the availability of information on marine



resources to users in the region, so as to support their rational development and management. PIMRIS activities include: the active collection, cataloguing and archiving of technical documents, especially ephemera ('grey literature'); evaluation, repackaging and dissemination of information; provision of literature searches, question-and-answer services and bibliographic support; and assistance with the development of in-country reference collections and databases on marine resources.

Guest editorial: Gender in aquaculture and fisheries – Navigating change¹

Nikita Gopal^{2*}, Meryl J. Williams³, Marilyn Porter⁴, Kyoko Kusakabe⁵ and Poh Sze Choo⁶

A Special Issue of Asian Fisheries Science journal has been published, which includes 20 papers and a report based on the presentations and posters of the 4th Global Symposium on Gender in Aquaculture and Fisheries (GAF4) held during the 10th Asian Fisheries and Aquaculture Forum, May 2013. GAF4 was the sixth women/gender Symposium organised by the Asian Fisheries Society. For each event, the proceedings or selected papers have been published (Williams et al. 2001; Williams et al. 2002; Choo et al. 2006; Development 2008; Williams et al. 2012a). Worldwide, this is the longest continuous series documenting women and gender issues by a professional fisheries society.

In this Guest editorial of the Special Issue, we build on our reflections in the Guest editorial of our last Special Issue (Williams et al. 2012b). In that editorial, we identified that gender: (1) was not usually on fisheries and aquaculture policy agendas and action plans and therefore minimal resources were committed; (2) was not amenable to a single epistemology, little conceptual thinking about gender had developed and diverse and sometimes conflictual ideas are held about its role and importance; and (3) required that stronger conceptual foundations be developed, disseminated and applied in the fish sector.

Where are we now?

In our previous Guest editorial, we expressed both optimism and pessimism as to how much progress was being made in efforts to achieve greater gender equity in fisheries and aquaculture. In our present overview, we will continue our discourse on the three issues above, but using a slightly different structure. In the current editorial, first we explore the progress that gender is making on the fisheries/aquaculture policy and action agenda; second we reflect on the quality of work and level of engagement of the Asian Fisheries Society GAF events; and

third we express some views on the development of methods for gender research.

Our first element concerns trends in attention to gender in aquaculture/fisheries. If we start by looking at the broader issue of attention to gender in society, then we note that recent media attention has been given to pronouncements by high profile leaders and news headlines on the importance of gender equality to world and national economic and cultural progress. The topics typically covered have been women in the workplace, safety on the streets, in education, on the sports field, in health, in the home and women's basic human rights. Specific news items have focused on stories about the education of girls, domestic violence, how women's equality will be addressed in the post-2015 development agenda and in the Beijing plus 20 process, the low political representation of women and the plight of women in wars and disease crises such as the Ebola outbreak. While many of these issues resonate with gender and women's issues within fish value chains, most discussions and policy issues take place on more general scales such as those of the community, society or the nation. Thus, they fail to take account of the specific conditions that shape gender relations in fishing and aquaculture sectors.

The more universal gender issues, however, do influence and penetrate sectoral processes. For example, women's greater uptake of tertiary education in general is also happening in professional courses in fisheries and aquaculture (Williams et al. 2012c), which, in turn, questions why more women are not now entering senior professional positions (Egna et al. 2012).

We have seen some signs that development agencies are showing interest in women/gender issues in the fish value chains. For example, Norad

¹ This article was first published as a Guest Editorial in a special issue of the journal *Asian Fisheries Science* [Gopal N., Williams M.J., Porter M., Kusakabe K. and Choo P.S. 2014. Guest editorial: Gender in aquaculture and fisheries – Navigating change. *Asian Fisheries Science* Special Issue 27S:1–14.]. It is reproduced here with their kind authorisation.

² Central Institute of Fisheries Technology, CIFT Jn., Matsyapuri P.O., Cochin – 682 029, Kerala, India

³ 17 Agnew Street, Aspley, Queensland, 4034, Australia

⁴ Department of Sociology, Memorial University, St. John's, Canada NL A1C 2Z1

⁵ Gender and Development Studies, School of Environment, Resources and Development, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand

⁶ 147 Cangkat Delima Satu, Island Glades, 11700 Penang, Malaysia

* Corresponding author: nikiajith@gmail.com

conducted a study in Mozambique with a view to identifying entry points for assistance in two value chains and creating greater opportunities for women (Brugere and Maal 2014). Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2012) released a succinct statement called “Gender and Fisheries & Aquaculture,” expressing the basic premises for the benefits of giving women opportunities, the approaches and constraints to successfully promoting gender equality in German development assistance. USAID aims to “improve the role of women as economic actors and leaders in communities” (R. Bertram quoted in NRC 2014:44), through such projects as the COM-FISH project in Senegal which works to improve the businesses and organisation of women fish processors in Senegal (McCarthy 2014).

In the main, the development assistance donors seem to be linking their gender work closely into existing programs or in carefully chosen priority countries. This carries with it the chance for long term commitments and capacity building, but it may also mean that special steps will be needed to ensure that cross-project and cross-site learning takes place.

In 2012, we were starting to see some signs that more fisheries and aquaculture organisations were paying attention to gender and women’s roles and putting gender into their programmes. We continue to see some steady progress, but still not enough resources and attention committed. As some of the following examples show, however, this slow and steady progress may be a good approach if it leads to deeper institutionalisation in women and gender programs than would fast and less considered growth. For example, in 2012, the Network of Aquaculture Centres in Asia-Pacific (NACA) committed to add gender as a cross-cutting theme in their work plan. At GAF4, the Norad-NACA workshop (see “Gender and change in the spotlight,” this issue) paved the way for new project at NACA, funded by the USAID-MARKET project, namely “Thematic Studies on Gender in Aquaculture in Cambodia, Lao PDR, Thailand and Vietnam.” In due course, similar studies are expected to be conducted in more of NACA’s 18 member countries.

In 2012, the Fisheries and Aquaculture Department of the United Nations Food and Agriculture Organisation (FAO) undertook a gender stocktake (Reantaso 2012). The exercise was based on the question: “To what extent are gender equality and women’s empowerment principles taken into account in fisheries and aquaculture development research, projects and policy support?” The results identified a lack of common understanding among professionals, a lack of information and lack of human and financial resources.

FAO led the development, consultation and adoption in 2014 of the Voluntary International Guidelines on Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication [SSF Guidelines]. Among the guiding principles, the fourth principle states: “Gender equality and equity is fundamental to any development. Recognising the vital role of women in small-scale fisheries, equal rights and opportunities should be promoted.” The sixth addresses equity and equality, including between genders, but also acknowledges differences. Women are mentioned in many parts of the SSF Guidelines, such as in relation to access to resources, management voice, decent work, support services, women’s roles in the post-harvest sector, and their exposure to violence. How these provisions will be taken up in national policies and programmes is a critical next step. In another normative exercise, FAO developed new emergency guidance which contains specific recommendations on gender as a key requirement, e.g. Cattermoul et al. 2014. FAO also has ongoing project in the Philippines targeting gender and fisheries.

One major regional FAO project (the Regional Fisheries Livelihoods Project for South and South-East Asia; see Lentisco and Lee, this volume) that included a gender component ceased in 2014, but in several other regional activities, FAO has included gender. In Asia, the FAO Bay of Bengal Large Marine Ecosystem project undertook a gender audit and aims to follow up with action (Brugere 2014).

In Africa, it prepared “The Pan African Fisheries and Aquaculture Policy Framework and Reform Strategy: Gender and youth in fisheries and aquaculture” which was presented at the Conference of African Ministers of Fisheries & Aquaculture (CAMFA) meeting in May 2014 for integration into the policy framework and reform strategy. This gender policy was developed with inputs from the 2012 Nepad-FAO Fisheries Programme (NFFP) Gender Strategy after FAO and Nepad agreed that a gender strategy to guide Programme implementation was required. The elaboration of the Strategy itself was found to be a useful exercise, creating and reinforcing networks and the Nepad Planning and Coordinating Agency Gender Team.

The FAO project called “Strengthening the Knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries”, generally referred to as the “EAF-Nansen Project,” is currently undertaking a gender audit led by Cecile Brugere.

Another UN report, that by the High Level Panel of Experts on Food Security and Nutrition, “Sustainable fisheries and aquaculture for food security and nutrition,” also contained a substantive section on

gender. The report recommended to the UN Committee on Food Security (CFS) that (paraphrased):

- ✓ States should ensure policies do not create negative impacts on women, enshrine gender equity in all fisheries rights systems;
- ✓ the FAO Committee on Fisheries (COFI) should develop policy guidance on gender equality and economic contributions;
- ✓ the CFS should urge international and national fish sector organisations to fully address the gender dimension of the fishery and aquaculture sectors; and
- ✓ development assistance programmes should be gender-aware and give priority to gendered projects.

Other UN agencies have also engaged in the fisheries/aquaculture sector, such as the UN Industrial Development Organisation (UNIDO) that has projects on compliance with labour laws in fish processing factories (see Nuruzzaman, this volume).

Among prominent fisheries and aquaculture professional associations, several are beginning to programme special sessions on women and gender. In 2012, the International Institute for Fisheries Economics and Trade (IIFET) held gender sessions in its 2012 biennial conference (Anon 2012). Similar sessions were held in the IIFET 2014 conference. In 2014, the World Aquaculture Society's conference, World Aquaculture 2014 also held a session on women in aquaculture. This session included a panel discussion that urged the Society to pay greater attention to gender equity in all their activities including fellows, plenary speakers and awards. Panel members are also leading efforts through the non-government charity, Aquaculture without Frontiers, to create an effective and active Women's and Gender Network.

More broadly in international agricultural research, including fisheries/aquaculture, the CGIAR Consortium has developed a Consortium Gender Strategy, set up a Gender and Agriculture Research Network and requires all CGIAR Research Programs (CRPs) to have gender strategies. Part of the CGIAR approach includes building the Consortium's capacity to address gender in research and development. Part of the outputs from the CGIAR gender work has been methods development, largely targeted to crop agriculture and livestock sectors.

Aquatic Agricultural Systems (AAS) CRP takes a "Research in Development" approach, which embeds research into on-going development processes and through participatory processes identifies research topics that would respond most to the needs of the farmers with a complex set of livelihood

systems. AAS CRP takes gender equality as one of the research themes, and integrates gender perspectives in all its themes. The Gender Strategy of the AAS CRP takes Kabeer's social relations approach (Kabeer 1994), and emphasises investigation on rules (gender norms), activities, people, resources, and power. Control of assets, inputs, decision making and benefits by women and other marginalised groups in aquatic agricultural systems is its intermediate development outcomes.

Our second issue to update is that of the quality of work presented on gender in aquaculture and fisheries, especially at the AFS GAF events, and the level of engagement. Gender and fisheries/aquaculture research of the Gender and Fisheries Symposium has shown development over the years. Initially, the work was more focused on gender roles and access to technology. For example, in GAF3, the technical papers focused more on gender roles. Many studies looked at what women do and what men do. These have been an important series of research papers recognising and describing the differences between women and men in how they are engaged in fisheries/aquaculture. However, although a focus on roles is interesting, it does not lead us to understanding social structures and power relations and the implication of gendered differences.

On the other hand, there has been research that has highlighted the nutrition and food security effect of aquaculture, for example, Goswami (2007), as well as how aquaculture has led to women having improved access to ponds and independent incomes (IFAD 2009). With a growing concern among both scientists and the general public about the issue of climate change, important research is needed to examine the effect of climate change on women and men in fishing communities, building on the work of Nowak (2008) and Bagsit et al. (this volume).

Gender analysis can be done in the spheres of economy, politics, health/nutrition, society, culture and many others. GAF literature has so far focused more on economic and health/nutrition issues. Analysis can also be done at micro/meso/macro level. There have been more studies at the level of households and community, including issues of female headed households, compared to the other two levels. Meso level studies include the impact of privatisation at the organisation and factory level (for example, Gopal et al. 2007), and also the importance of value chains, for example, Kusakabe et al. 2008; Hapke 2012; Sumagaysay in this volume. These studies of value chains are important in providing a useful tool to connect the micro to macro level in its analysis. The macro level includes changes in environment including climate change, as well as macroeconomic changes such as economic crisis.

Although we have had many small scale case studies from various locations, we have less understanding on how these all link together. We still have little understanding of how women's work in fisheries and aquaculture are inter-related with other livelihood activities in the growing economies of many developing countries. How are macro level environment changes such as climate change experienced differently by women and men in different contexts? How are fisheries affected by global economic changes and how do these changes shape women's involvement in fisheries? For example, migration is changing the circumstances and opportunities of fishing communities, but how has that influenced women's engagement? We also have little understanding on how fishing is linked to various markets where the link is predominantly provided by women through trade and fish processing. Linkages to technological changes in aquaculture, as distinct from fishing, have not been studied much – how have the expansion or changes in aquaculture technologies shaped gender roles and women's access to technology and market?

Researchers and others interested in gender in aquaculture and fisheries are connected by various social media such as Facebook, Twitter and e-mail lists, and materials from the Asian Fisheries Society and other events and news are posted on the website Genderaquafish.org (<http://genderaquafish.org>). The number of subscribers to these media continues to mount slowly, but most users see the media as sources of information and news, rather than active platforms for discourse. In many cases, this lack of strong engagement is due to the secondary nature of the users' engagement with gender/women. Their primary jobs are often in technical fields, and gender is a side interest.

Perhaps surprisingly, our third issue focuses on the issues of methods and methodology. Many biotechnical scientists took for granted that the methods they had developed and used in their fisheries research would serve them equally well when they undertook gender research. But significant differences arise both of theory and practice between investigating fish, seaweed and other creatures and plants, that do not "talk back" or think subjectively about how they act and cooperate with one another, and human subjects. While aspects of human behaviour can be counted, the nature of people's experience and particularly their subjective interpretation of their actions and reactions do not respond as well to quantitative methods. Thus the community of gender and fishery researchers has had to turn to qualitative methodology and methods to find appropriate tools for this new research. Feminist research has contributed theoretical and conceptual discussions about why to select particular methods and careful examinations

of what happens in the research context. Feminists have also been strong advocates of developing careful ethical procedures so as to ensure the protection of the participants in the research, who are often economically disadvantaged and with fewer educational skills than the researcher. The interaction between the researcher and the participant in a research interview is a complex social construction. It needs to be carefully and thoughtfully set up, as well as analysed using theoretical as well as the more conventional analytical tools. All this was new to many of the gender and fisheries researchers and GAF has considered how best to develop appropriate methods to investigate the issues of fishers, both men and women, and their fishing communities. The discussions in the Symposia have been lively and have been carried forward in items posted on the GAF webpage.

As more researchers, many of them trained in the biophysical sciences, enter gender research, practical guidance on the basics is being produced, such as the CGIAR standards for collecting sex-disaggregated information in agriculture value chain research (Doss and Kieran 2014). Mutua et al. (2014) is useful review and summary of development and evaluation tools for gender and value chains, including workshop materials, manuals, guidebooks, handbooks, reports, toolkits and working papers.

The special issue

As GAF4, the event, consisted of contributed papers, this Special Issue also is diverse in its content, ranging from reflections and reviews on development lessons, papers that dealt with the gendered impact of change, the details of women's and men's roles, methods and methodology and papers that asked "where to next?" The papers are also diverse in their form, and are classified as: research papers (as defined for regular volumes of Asian Fisheries Science journal), technical papers (containing significant new technical information gathered from original studies), and short communication (on development work, surveys or projects).

Development lessons

Two papers focused on development issues and examined ways to enhance women's empowerment through the various projects funded by development agencies. In their paper, Lentisco and Lee argued that it is necessary to better understand women's access to fisheries resources, to identify their roles and relationships with others, and to acknowledge the benefits of directly involving them in decision-making. Women's access to fisheries were divided into primary, secondary and tertiary access categories and recommendations to enhance women's participation in each of these categories were made.

Using Longwe's empowerment framework (Longwe 2002), Choo and Williams reviewed 20 papers from the AFS women/gender symposia and examined how these development projects have contributed to the process of women's empowerment. They concluded that most projects only achieved empowerment at the lowest levels of welfare and access and sometimes even these gains were fragile. Women are still far from being able to define their own needs and priorities and to control resources which may help them to challenge their subordinate positions. Feminist concepts of empowerment which should have a place at the core of women's empowerment efforts have been avoided in the fisheries sector. Unless women are able to construct a collective self to define and defend their gender needs, the control (highest) level of empowerment will remain far beyond their reach.

Changes

Seven papers analysed how the macro-environment changes have affected women and men's engagement in fisheries/ aquaculture. Soejima analysed the aging oyster farming community in Japan. Oyster shucking was carried out by women and elderly. But with workers aging, their work speed did not make the industry commercially viable. Some farmers started to hire Chinese migrant workers, and with their help, were able to expand their production. On the other hand, those who could not afford to hire Chinese workers had to shrink their production, leading to polarisation of production. Women and elderly workers who used to work in oyster shucking were also affected. The paper showed how the demographic changes impact women's involvement in aquaculture.

In fishing communities in the Philippines, Bagsit et al. analysed how women and men adapt to floods. Climate change has increased the frequency and severity of floods. Bagsit et al. Identified that although women and men have different preferences for adaptation and coping responses, when they actually take action, there is no gender difference. This might suggest that women or men face structural obstacles in pursuing their preferred adaptation strategies, and invites further studies in identifying these obstacles.

Kusakabe analysed the business trajectories of women fish traders at the border between Cambodia and Thailand. Unlike what is normally discussed for women entrepreneurs, different women fish traders faced different obstacles and opportunities that made it difficult to make any generalisation on women's business. Kusakabe described the changes in border trade regulations and how that has affected and shaped women's fish businesses over the years. She emphasised the importance of

context-informed analysis as well as how the fish as a commodity shaped how the business developed.

Gopal et al. studied three different fisheries in the central part of the state of Kerala, India and analysed how women have been marginalised in these fisheries. In the ring seine and clam fisheries, women used to play a role but have been excluded through further commercialisation and changes in technology such as motorised boats. In the stake net fishery, women have never played a large role and were involved only at the shore.

DebRoy et al. conducted a study at a village near the Pichavaram mangroves in the Cuddalore district of the state of Tamil Nadu in India, and found that women are equally willing to pay for mangrove conservation and development as men, highlighting women's important role and awareness in mangrove conservation.

Defiesta and Badayos-Jover described how women and men were affected after the 2006 M/T Solar I oil spill in the coasts off Guimaras Island in the Philippines. They described how women were already economically marginalised even before the oil spill, but the oil spill exacerbated their marginalisation as external aid was more directed towards men.

Analysing the same oil spill from another angle, Badayos-Jover and Defiesta described that after the destructive oil spill, women and men had to make a decision on whether to move out or to change their livelihoods. The study showed that women were marginalised both in the household and in the community in the decision on actions to be taken after the spill.

Methodology

Because this is a relatively new area for GAF symposia there is only one paper in this section. In it, Marilyn Porter tries to lay the groundwork for the process of enabling biotechnical scientists who are interested in integrating gender concerns into their work to understand the background and potential of feminist methodology and methods. She outlines the way in which feminist research has developed, especially over the last 40 years, and looks at the problems feminist researchers encountered when they began to examine the implications of their roles as both women and as researchers. The category of "experience" became key in increasingly theoretical understandings of both the process and the outcome of research by women on women. Apart from sophisticated theoretical considerations, feminist research has brought two key issues to the foreground: that of a sensitive and informed approach to ethical issues in research, and the responsibility to engage with and act on the issues that arise from the participants' experience. The paper suggests the possibilities of applying feminist approaches to the particular

problems of gender in aquaculture and fisheries and the need to both create a knowledge base of the best and most fruitful of the feminist methods.

Contributions and roles of women (and men)

In some depth and detail, seven papers addressed the contributions of women and men, or just those of women alone, drawing out role differentiation, progress and challenges.

Sun-ae Li studied two closely located fishing villages in Miyazaki Prefecture, Kyushu Island, Japan – Meitsu and Odoutsu. She found that the modern fisheries division of labour among women and men could be traced back to different pathways of fisheries development over the past century. Meitsu has a long association with offshore fishing and as resources have declined and become harder and less profitable to access, fishermen have taken to value-adding to local fishery products, with assistance from women in parts of the work. Odoutsu has always relied more on coastal fishing and although the members of its Fisheries Cooperative and the Women's Division are engaged in similar activities to those of Meitsu, women are much more integrated and active in all the post-harvest and value adding activities because of they were always part of the coastal fishing activity that was close to home.

In the Philippines, Alice Ferrer and her colleagues conducted qualitative studies on women and men's roles at eight sites, five in the Visayas and three in Mindanao, as a pre-scoping study for the CGIAR Aquatic Agricultural Systems (AAS) Project. They found that productive, reproductive and community roles were changing under declining productivity in the marginal aquatic systems, exacerbated by changing climate. Women and men were each expanding all their roles in fishing and farming to take advantage, at the household and family level, of any opportunity. In so doing, the people seemed to be gaining greater resilience through diversified livelihoods. As the AAS project develops, this will be tested by research.

Marieta Bañez Sumagaysay studied women's roles throughout the green mussel (*Perna viridis* (Linnaeus 1758)) value chain in Jiabong, Samar, Philippines. She found that women worked in several parts of the value chain but the chain was very male-dominated. Women's work was often unpaid, or poorly paid, acting as an extension of their reproductive work and considered menial and done only in the women's "spare time." This included cleaning, sorting, and cooking mussels. Based on her analysis of the value chain, Sumagaysay presented actions that would help the women of Jiabong meet their practical gender needs, such as providing clean, safe market stalls, and strategic gender needs such as entrepreneurial skills training and capital raising for their businesses.

Sunila Rai and her colleagues built on their earlier paper in the last Special Issue (Rai et al. 2012) of the introduction of polyculture of carp and small indigenous fish in Terai, Nepal and its uptake by women of the Tharu ethnic group, an underprivileged community. The fish farming not only provided income and protein for the families, raising their fish consumption to twice the national level, but also brought the women economic opportunities. Women's fish farmers groups were formed to share technical knowledge and learn new approaches. Women leaders developed from among the ranks of the network members. Two women were included in the team, along with 6 men, who visited Bangladesh to learn and broaden their knowledge of fish farming.

Most West Asian countries are definitely considered to have low women's participation in fisheries and therefore the paper by Khalfan Rashidi and E. McLean about the women invertebrate fishers of Al Wusta Governorate, Oman, exposed a little known but important women's fishery. They interviewed a quarter of the 400 fisherwomen of Oman, and described the methods and products that the women produce, especially molluscs, holothurians and crustaceans, including the snail or "rahas" fishery from which the dried operculums are used in producing frankincense. Despite the obvious value of the women's harvest, they face many challenges and are given little assistance from the government and its services. The authors outline how the women could be helped.

In Bangladesh, where fish exports are the second largest earner after garment exports, Md. Nuruzzaman and his colleagues have been working through a UNIDO project to train fish and shrimp processing factory managers and supervisors to understand and comply with labour laws. They examine all aspects of the labour conditions and treatment of women workers, who, although not well-paid, are saved from the worst of factory safety hazards by the structural upgrades that were made in the late 1990s to meet the HACCP (Hazard Analysis Critical Control Point) requirements for export food standards. Managers often display strong patriarchal views. They believe they are aiding women merely by giving them employment, and give little regard to the conditions of work. The women's conditions can be difficult, with problems from cases of physical abuse through to less opportunity for advancement compared to men. Surveillance of compliance with labour laws is predicated on export market requirements and still faces many challenges in improving women's rights.

Zuzy Anna reported the results of an economic study on women fish sellers from the north coast of Java. She noted that subsidies and credit to fishermen for fishing vessels and gear have been

criticised for having a negative impact on resource sustainability, and credit facilities for women have been studied in terms of loan repayment performance, and income and empowerment. Her study examined the impact on efficiency of the women's fish selling businesses, with loans coming from a public bank, cooperatives and middlemen. A control group of non-recipients was also studied. Loans from cooperatives were found to be most productive to the businesses, due to their efficiency of dispersal, the lower interest rates and the technical and social support also provided.

Feemena Hassan and colleagues studies the uptake by women's Self Help Groups of oyster farming (*Crassostrea madrasensis* (Preston)) and value addition in Vadakkekara Panchayath, Kerala. They found that the enterprises could be profitable, but that they still faced a number of gender and other challenges, such as health problems from the farming work, to social issues such as poaching as harvest time approached.

Where to next?

From looking back and looking forward, two papers examined how the GAF events had developed in the Asian Fisheries Society, and surveyed views of future steps needed.

Looking back in a memorial essay, Meryl Williams examined how Dr M.C. Nandeesha (1957-2012), through his professional interest, vision and ability to get a wide range of experts motivated, stimulated the Asian Fisheries Society to commence and sustain gender in aquaculture and fisheries efforts. One particular focus of his attention was to understand and improve the institutional environment to better support gender equity.

Meryl Williams and Poh Sze Choo surveyed 41 of those engaged in gender in aquaculture and fisheries activities, including academics, students, researchers, non-government organisation staff and development professionals. Whereas most felt that gender inequality issues were better understood now, better communication of strategic messages is needed. Most respondents were not devoted full-time to gender activities, and research is not well connected to grassroots needs. Much more effort is needed to create more champions, leaders and actors so as to have a critical mass for mobilisation. Targeted, dedicated resources, including full time people, institutional support and projects, and are required. The authors concluded that a more revolutionary rather than an evolutionary approach is now needed.

Conclusions

It is evident from all the previous gender events as well as from the GAF4 (that this volume is dedicated to) that awareness, interest and concern are

increasing in this area of research and inquiry. As the body of work on gender in aquaculture and fisheries grows, certain issues have been observed that needs to be put in perspective so that the way forward is clearer.

One of the positive aspects has been that there is a trend to much greater attention to GAF in institutions – both academic and research and development. Also increasingly donors are looking for gender integration or at least insisting that projects look at the gender dimension particularly with regard to the impacts. Specific gender studies are also finding funds. The gender discourse in the policy arena is yet to strengthen, but as international events have shown, gender is now making it onto the centre stage. The next stage will be implementation of the policy aspirations.

As the papers being presented in the GAF events has shown, the number of practitioners in the field is increasing in quality and scope. However actual research work still largely tends to concern micro level studies, with great focus on household and community. This is very important for developing an understanding of the "what is" situation and will be a pointer for the "what should be" as far as specific issues are concerned. However as experts have pointed out, little conceptual thinking about gender has yet been carried out by the practitioners and diverse and sometimes conflicting ideas still prevail about its role and importance, with a focus on the practical, industry-specific gender roles. A great many gaps exist that need to be filled in order to join up existing areas of work. A relatively recent approach through Value Chain Analysis (VCA) is a helpful way to link across micro/meso/macro scales, but there is need for more work on how meso and macro level factors such as privatisation (meso) and climate change (macro) affect women (and men) in the sector.

The lack of or little engagement in development of conceptual frameworks and analyses may be due to the background of the researchers themselves. The experts tend to be scattered, based in many disciplines and often not working full time in the field. This sometimes constrains the development of suitable methods which is very essential to ensure rigour and also ensure replication of studies effectively. On the other hand, it also allows a great diversity of fields from which to choose suitable concepts and methodologies, and prevents single and rigid approaches that would not suit the gender issues that are the focus.

When we wrote the Guest editorial for the GAF3 event (Williams et al. 2012b), we were tending towards pessimism tinged with hope that gender in aquaculture and fisheries was making some progress. In this Guest editorial, we paint a more

optimistic picture of progress. Gender is now more firmly on the policy agenda, is embedded in major normative international documents, such as the Small Scale Fisheries Guidelines, and is receiving early institutional, policy and donor support. Attention is also being given to methodological and methods development as more practitioners engage in gender work. The full institutionalisation of gender into programs and institutions will face implementation challenges such as lack of leadership and resources, and will need to prove its worth to the fish sector. This is a much better position in which to find ourselves, however, than still struggling to get gender on the agenda.

References

- Anon. 2012. Summary: Overcoming gender inequalities in fish supply chains to inform policy and action. International Institute for Fisheries Economics and Trade Conference, 16-20 July 2012, Dar es Salaam, Tanzania. <http://genderaquafish.org/events/iifet-gender-sessions-2012-dar-es-salaam-tanzania>. Accessed 17 September 2014.
- Brugere C. 2014. Mainstreaming gender in trans-boundary natural resources projects – The experience of the Bay of Bengal Large Marine Ecosystem (BOBLME) project. *Environmental Development* 11:84–97.
- Brugere C. and Maal B. 2014. Study of fisheries and aquaculture value chains in Mozambique: How to reduce gender discrimination in the fisheries and aquaculture sectors. Norad Report 04/2014. 64 p.
- Cattermoul B., Brown D. and Poulain F. 2014. Fisheries and aquaculture emergency response guidance. Rome, Italy: Food and Agriculture Organization of the United Nations. 167 p.
- Choo P.S., Hall S.J. and Williams M.J. 2006. Global symposium on gender and fisheries. Seventh Asian Fisheries Forum, 1–2 December 2004. Penang, Malaysia: WorldFish Center and Asian Fisheries Society. 174 p.
- Development. 2008. Gender and fisheries. 51(2) (several papers and articles).
- Doss D. and Kieran C. 2014. CGIAR standards for collecting sex-disaggregated data for gender analysis: A guide for CGIAR researchers. Research program on policies, institutions, and markets and CGIAR gender and agriculture research network. 6 p.
- Egna H., Reifkei L. and Gitonga N. 2012. Improving gender equity in aquaculture education and training: 30 years of experiences in the pond dynamics/aquaculture, aquaculture and aquafish collaborative research support programs. *Asian Fisheries Science* 25S:119–128.
- FAO. 2012. The State of World Fisheries and Aquaculture 2012. Rome, Italy: Food and Agriculture Organization of the United Nations. 209 p.
- FAO. 2013. Mainstreaming gender in fisheries and aquaculture: A stock-taking and planning exercise. Final report. Rome, Italy: Food and Agriculture Organization of the United Nations. 55 p.
- GIZ. 2012. Gender and fisheries and aquaculture. Bonn, Germany: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. 4 p.
- Gopal N., Geethalaksmi V., Unnithan G.R. and Jeyanthi P. 2007. Women in the seafood processing sector in the post globalisation scenario – An analysis. Second Global symposium on Gender in Fisheries, Kochi, India. <http://genderaquafish.files.wordpress.com/2011/06/17-ppt-gaf2-8aff-nikita.pdf>. Accessed 10 July 2014.
- Goswami U. 2007. Vitamin A-deficiency, fish eating status and the consumption of other provitamin A-carotenoids among the women of the fishing community of North East India: An analysis of the gender bias in the family nutrition management. Second Global symposium on Gender in Fisheries, Kochi, India. <http://genderaquafish.files.wordpress.com/2011/06/10-ppt-gaf2-8aff-goswami.pdf>. Accessed 10 July 2014.
- Hapke H.M. 2012. Capturing the complexities of globalisation in fisheries: Gendered divisions of labour and divisions of labour and difference. *Asian Fisheries Science* 25S:75–92.
- HLPE (High Level Panel of Experts). 2014. Sustainable fisheries and aquaculture for food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2014. 118 p.
- IFAD. 2009. Case study Bangladesh: Leasing of ponds for poor fisher groups. Rome, Italy: International Fund for Agricultural Development. <http://www.ifad.org/english/water/innowat/cases/bangladesh.htm>. Accessed 05 October 2014.
- Kabeer N. 1994. *Reversed Realities: Gender hierarchies in development thought*. Verso London, United Kingdom: Institute for Development Studies. 348 p.
- Kusakabe K., Sereyvath P., Suntornratana U. and Sriputinibondh N. 2008. Gendering border spaces: Impact of open border policy between Cambodia-Thailand on small-scale women fish traders. *African and Asian Studies* 1–17.

- Longwe S.H. 2002. Spectacles for seeing gender in project evaluation. Paper presented in understanding Gender Evaluation Methodology (GEM) Africa Workshop, 16 November 2002. http://www.apcwomen.org/gemkit/en/understanding_gem/longwe.htm. Accessed 20 February 2013.
- McCarthy C. 2014. Bridging the gender gap: A stronger role for women in Senegal's fisheries. <http://www.usaid.gov/global-waters/january-2014/bridging-gender-gap>. Accessed 17 September 2014.
- Mutua E., Njuki J. and Waithanji E. 2014. Review of gender and value chain analysis, development and evaluation toolkits. Nairobi, Kenya: International Livestock Research Institute. 30 p.
- NRC (National Research Council). 2014. Culture matters: International research collaboration in a changing world (Summary of a Workshop). Washington DC, United States of America: The National Academies Press. 84 p.
- Nowak B.S. 2008. Environmental degradation and its gendered impact on coastal livelihoods options among Btisi' households of peninsular Malaysia. *Development* 51:186–192.
- Rai S., Thilsted S.H., Shrestha M.K., Wahab M.A. and Gharti K. 2012. Improvement of women's livelihoods, income and nutrition through carp-sis-prawn polyculture in Terai, Nepal. *Asian Fisheries Science* 25S:217–225.
- Reantaso M. 2012. Mainstreaming gender in fisheries and aquaculture: A stock-taking and planning exercise. *FAO Aquaculture Newsletter* 50:10–11.
- Williams M.J., Nandeesha M.C., Corral V.P., Tech E. and Choo P.S. 2001. International symposium on women in Asian fisheries: Fifth Asian Fisheries Forum. Asian Fisheries Society, 13 November 1998, Chiang Mai, Thailand. Penang, Malaysia: WorldFish Centre and Asian Fisheries Society. 181 p.
- Williams M.J., Chao N.H., Choo P.S., Matics K., Nandeesha M.C.N., Shariff M., Tech E. and Wong J.M.C. 2002. Global symposium on women in fisheries: Sixth Asian Fisheries Forum. 29 November 2001, Kaohsiung, Taiwan. Penang, Malaysia: WorldFish Centre and Asian Fisheries Society. 201 p.
- Williams M.J., Porter M., Choo P.S., Kusakabe K., Vuki V., Gopal N. and Bondad-Reantaso M. 2012a. Gender in aquaculture and fisheries: Moving the agenda forward. *Asian Fisheries Science* 25S. 276 p.
- Williams M.J., Porter M., Choo P.S., Kusakabe K., Vuki V., Gopal N. and Bondad-Reantaso M. 2012b. Guest editorial-Gender in aquaculture and fisheries: Moving the agenda forward. *Asian Fisheries Science* 25S:1–13.
- Williams M.J., Agbayani R., Bhujel R., Bondad-Reantaso M.G., Brugere C., Choo P.S., Dhont J., Galmiche-Tejeda A., Ghulam K., Kusakabe K., Little D., Nandeesha M.C., Sorgeloos P., Weeratunge N., Williams S. and Xu P. 2012c. Expert panel review 6.3: Sustaining aquaculture by developing human capacity and enhancing opportunities for women. p. 785–822. In: R.P. Subasinghe, J.R. Arthur, D.M. Bartley, S.S. De Silva, M. Halwart, N. Hishamunda, C. V. Mohan and P. Sorgeloos (eds). *Proceedings of the Global Conference on Aquaculture 2010: Farming the waters for people and food*. FAO, Rome and Network of Aquaculture Centres in Asia-Pacific, Bangkok. 898 p.

Pacific invertebrate fisheries and gender – Key results from PROCFish

Meryl J. Williams¹

Just as women's roles and contributions in fisheries are often under-recognised, so too is the importance of invertebrate fisheries. In the Pacific and other regions, these two aspects of fisheries — women and invertebrates — are related. In this note, I highlight some of the findings on gender and invertebrate fishing in Pacific Island countries and territories that deserve to be better known and explored in more detail. These findings include 1) men glean just as much as women in all Pacific Island cultures, but women are more likely to be exclusively engaged in gleaning and not also in finfishing; and 2) women are not engaged in dive fishing for high-value invertebrates.

Gender and fishery type are often closely related. In many countries, women do little finfishing, but can be equally active or even more active than men in fishing for invertebrates. This is an important structural issue that bedevils the quest for better sex-disaggregated fisheries data and assessments. Both women's fishing and invertebrate harvests are under-reported relative to men's fishing and finfish harvests. Not surprisingly, therefore, invertebrate fisheries receive much less policy and management attention than do finfish fisheries (Kleiber et al. 2014a; Fig. 1).

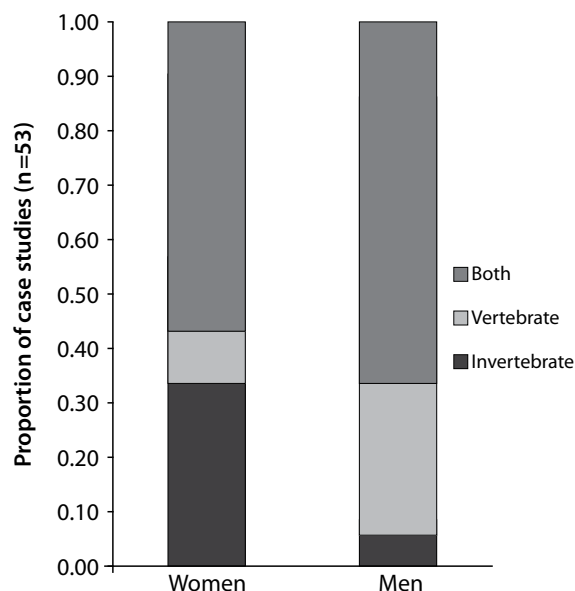


Figure 1. Gender and type of catch. Fisheries divided into vertebrate only (almost entirely fish, but in some cases including mammals and reptiles), invertebrate only (including shells, arthropods, cephalopods and echinoderms), or participation in fishing that targets all animal types. Only gender analysis case studies were included (from 53 case studies examined).

Source: Figure 3 in Kleiber et al. 2014b.

From 2002 to 2009, under the Pacific Regional Oceanic and Coastal Fisheries Development Programme (PROCFish), the Secretariat of the Pacific Community and its member countries conducted a major series of coastal fisheries assessments — biological, social and economic — through fieldwork at 63 sites in 17 Pacific Island countries and territories (Pinca et al. 2010). Thanks to the gender-aware design of the assessments, good sex-disaggregated data were collected (Kronen et al. 2007). At each site, and then in the cultural subregions of Melanesia, Micronesia and Polynesia, the assessment divided much of its work into finfisheries, invertebrate fisheries and socioeconomics. In the socioeconomics section, a short summary was also given of the gender dimension.

A very comprehensive technical report of the results of PROCFish is available (Pinca et al. 2010) and, in the refereed literature, papers have been published on finfisheries (Kronen et al. 2010a), fish community biology (Pinca et al. 2012), and socioeconomic results (Kronen et al. 2010b). In addition, Kronen and Vunisea extracted the gendered results for the finfisheries for the *Women in Fisheries Information Bulletin* (Kronen and Vunisea 2009). In publishing the results of PROCFish for wider audiences, greater attention has been given to finfisheries. Pinca et al. (2010:122), however, indicated that invertebrate fisheries are also important:

Invertebrate fisheries are substantial in PICTs; however, they vary significantly among sites and countries studied. The importance of invertebrate fisheries for food security is supported by the average time spent fishing across all sites studied. The highest share of time spent invertebrate fishing is dedicated to gleaning (60%) rather than commercial diving activities (40%). [See also Table 4.5.]

¹ 17 Agnew Street, Aspley, Queensland 4034, Australia

However, unlike finfisheries, there is a lack of gendered accounts of invertebrate fisheries from the PROCFish project. The full 512 page PROCFish technical report (Pinca et al. 2010), does, however contain some material that I will highlight, especially as these results are very different from those for finfishing.

Key results

The first point to make is that at any location, women were much more likely than men to be exclusively engaged in invertebrate fishing, regardless of cultural grouping (Table 1), and men were rather unlikely to be exclusively engaged in invertebrate fishing.

This leads to a major conclusion:

(r)egionally and within cultural groups, total harvesting time and total annual catch of major invertebrate species groups are generally equally shared by males and females. Today, the major gender difference in invertebrate fisheries is the fact that females do not — or rarely — participate in free-diving fishing activities, resulting in gender-biased access to, participation in, and benefit from commercial export fisheries. (Pinca et al. 2010:188).

This gendered difference between participation in gleaning and diving is made in Figure 2.

Table 1. Percentages of sites having gender participation in any of the fishery groups.

Fishery	Melanesia (n = 24)		Micronesia (n = 17)		Polynesia (n = 22)	
	Men	Women	Men	Women	Men	Women
Exclusive finfish fishing	92	50	100	41	100	55
Exclusive invertebrate fishing	38	88	35	88	36	91
Finfish fishing and invertebrate fishing	100	100	100	65	100	77

Source: Table 1 in Kronen and Vunisea 2010.

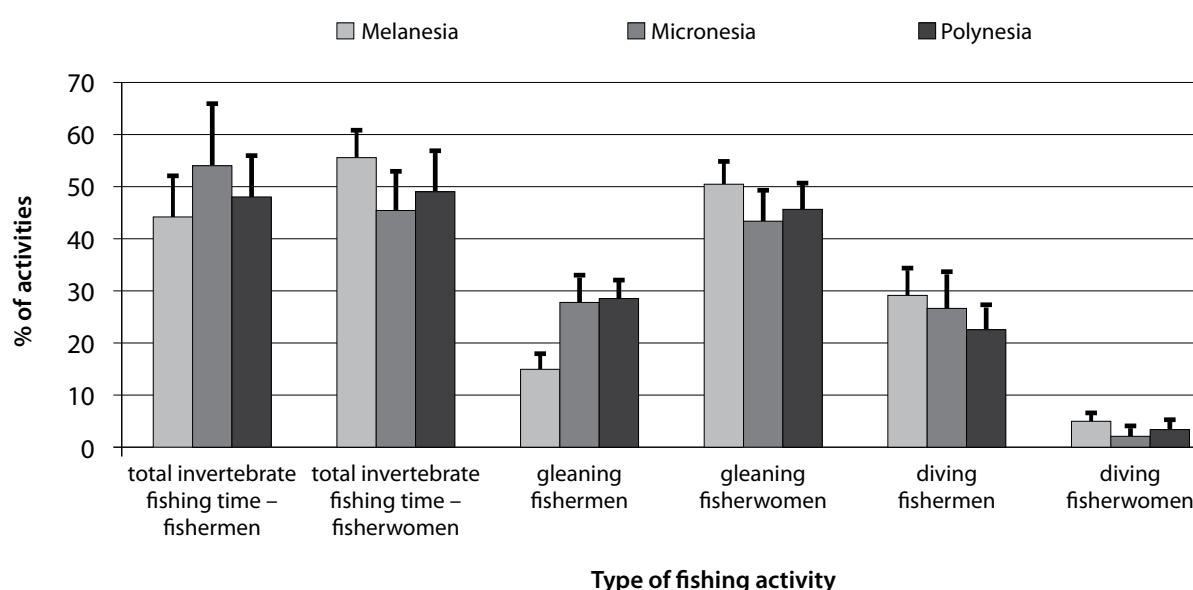


Figure 2. Average proportions (%) of total fishing time spent invertebrate collecting, gleaning and free-diving by gender and cultural groups. Source: Figure 2 in Kronen and Vunisea 2010.

Providing finer detail, by fisheries ecosystem, the gleaning and diving gender divide was demonstrated in all cultural groups by the greater focus by women on fishing for invertebrates in soft benthos ecosystems, mangroves, intertidal, and reeftop habitats; whereas men dominated fishing for beche-de-mer, lobster and trochus (Table 2).

Kronen and Vunisea (2010) reported that, based on computer modelling, whereas women and men had different finfish fishing strategies, women's and men's gleaning strategies were very similar, except in Melanesia where women annually more time gleaning than men. As a result, and again in contrast to the results for finfishing, women's and men's catch rates were very similar and differed little across cultures.

Use of invertebrate catches differed by gender and culture. In Melanesia, women were more likely than men to sell their catches from gleaning locally, and less likely than men to market their catches from commercial fisheries for export (Table 3).

In keeping with the quantitative analysis approach of the whole PROCFish research approach, Kronen and Vunisea (2009) also conducted multivariate quantitative gender analysis by exploring the major "drivers" for fishing, including examining differences among the three cultural groups. With respect to invertebrate fisheries, the exploratory findings included the following points, noting in the analysis an alternative classification of fishing into commercial and subsistence or artisanal. Also, in the following summary, I refer to associations and linkages rather than causation because the data are essentially exploratory rather than inferential or predictive.

- Fishermen's commercial activities were more closely related to national scale socioeconomic factors, but fishermen's and fisherwomen's subsistence and complementary income activities were more closely related to the socioeconomic conditions at the community, and household level.

Table 2: Percentage of fishing times (standard error) spent by gender group for invertebrate fisheries across three cultural groups (n = total number of communities applicable per fishery and cultural group).

Fishery	Melanesia			Micronesia			Polynesia		
	Men	Women	n	Men	Women	n	Men	Women	n
Soft benthos	16.9 (6.0)	83.1 (6.0)	16	40.6 (7.1)	59.4 (7.1)	12	43.8 (10.3)	56.2 (10.3)	12
Mangrove	25.9 (5.5)	74.1 (5.5)	18	43.1 (18.7)	56.9 (18.7)	6	47.8 (18.8)	52.2 (18.8)	6
Intertidal	18.2 (6.1)	81.8 (6.1)	19	28.9 (11.2)	71.1 (11.2)	10	14.6 (5.9)	85.4 (5.9)	11
Reeftop	20.5 (4.2)	79.5 (4.2)	24	50.0 (8.4)	50.0 (8.4)	14	48.2 (6.0)	51.8 (6.0)	22
Beche-de-mer	78.1 (6.1)	21.9 (6.1)	11	100.0 (0.0)	0.0 (0.0)	2	42.1 (n/a)	57.9 (n/a)	1
Lobster	100.0 (0.0)	0.0 (n/a)	17	100.0 (0.0)	0.0 (n/a)	10	100.0 (0.0)	0.0 (n/a)	15
Trochus	100.0 (0.0)	0.0 (n/a)	19	100.0 (0.0)	0.0 (n/a)	2	100.0 (0.0)	0.0 (n/a)	2
Other	86.3 (3.5)	13.7 (3.5)	18	90.7 (6.0)	9.3 (6.0)	10	93.3 (4.5)	6.7 (4.5)	16

Source: Table 5 (condensed) in Kronen and Vunisea 2010.

Table 3. Participation in marketing of invertebrate catches from gleaning and commercial fishery activities by gender in percent of total invertebrate fishermen and fisherwomen.

Culture		Marketing catch from gleaning (SE)	Marketing catch from commercial fisheries (SE)
Melanesia	Fisherwomen	27.99 (±6.29)	6.43 (±1.97)
	Fishermen	12.31 (±3.54)	47.10 (±14.41)
Micronesia	Fisherwomen	6.65 (±3.30)	0
	Fishermen	8.42 (±5.31)	2.13 (±1.13)
Polynesia	Fisherwomen	7.40 (±2.04)	0.34 (±0.34)
	Fishermen	8.36 (±3.07)	2.91 (±0.90)

Source: Table 13 in Kronen and Vunisea 2010.

- Demography and financial factors were related to the size of artisanal fisheries, and access to alternative income.
 - o Melanesia: Fishermen's involvement in artisanal fisheries, especially finfish fishing, was linked to poor national economic conditions and few alternative opportunities. Women's fisheries were linked to a high dependency on marine resources and limited alternative income opportunities.
 - o Polynesia: Men's fishing was mainly associated with population density and the number of boats relative to available reef area; fisherwomen by population density and by dependency on remittances, suggesting that fisherwomen were more active in fishing when they could not cover their living costs from local income.
 - o Micronesia: Fishing communities were very diverse. Artisanal fishing, particularly finfish fishing done by men in rural coastal communities, was associated with national urban population density. Fisherwomen's activities increased with average household size and per capita invertebrate consumption.
- In Melanesia, the highest percentage of fishermen and fisherwomen targeted both finfish and invertebrates; in Micronesia and Polynesia, communities had the highest proportion of fishermen exclusively finfishing and fisherwomen harvesting invertebrates.
- Invertebrate collection is almost equally women's and men's work. Total annual catch for most invertebrate species groups were almost equal for women and men. The whole study revealed a much greater involvement of men in gleaning than was indicated in previous more limited studies, such as those on one or a few sites. Women did not take part in dive invertebrate fisheries, thus missing out on access to more lucrative export products.
- The studies found that women mainly exploited invertebrate resources in readily accessible ecosystems. Also, as they usually had heavy duties in the household, they did not participate in dive fisheries for high value invertebrates, and had less access than men to boats for transport and fishing, the women's opportunities to improve their fishing productivity and income were quite limited.

Some parting remarks

The above efforts to highlight some of the key findings on gender and invertebrate fisheries in Pacific Island countries and territories are based on looking at only the "tip of the iceberg" data collected and results reported. Hopefully, more detail may

be published one day. All PROCFish work used a highly quantitative approach, likely due to the emphasis on biophysical assessments and the desire to match this with the socioeconomic, including gender, work. This meant that important qualitative research, especially on gender, was not highlighted in the overall report. Fortunately, a certain amount of qualitative information is available in some of the *Women in Fisheries Information Bulletin* papers over the course of the PROCFish project (see Annex), and these more theme- and site-specific accounts (e.g. fishing by children) add life to the rather academic overview. I urge researchers to give more attention to qualitative research in social science in similar future endeavours, and recommend reading Marilyn Porter's recent paper as a good introduction (Porter 2014).

References

- Kleiber D., Harris L.M. and Vincent A.C.J. 2014a. Improving fisheries estimates by including women's catch in the central Philippines. *Canadian Journal of Fisheries and Aquatic Sciences* 71:656–664.
- Kleiber D., Harris L.M. and Vincent A.C.J. 2014b. Gender and small-scale fisheries: A case for counting women and beyond. *Fish and Fisheries* doi: 10.1111/faf.12075.
- Kronen M., Stacey N., Holland P., Magron F. and Power M. 2007. Socioeconomic fisheries surveys in Pacific Islands: A manual for the collection of a minimum dataset. Noumea, New Caledonia: Secretariat of the Pacific Community. 129 p.
- 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.
- Kronen M. and Vunisea A. 2010. Gender roles and socioeconomic drivers for artisanal coastal fisheries in Pacific island countries and territories – A cross-cultural and regional analysis. p. 470–505. In: Pinca S., Kronen M., Friedman K., Magron F., Chapman L., Tardy E., Pakoa K., Awira R., Boblin P. and Lasi F. 2010. Regional assessment report: Profiles and results from survey work at 63 sites across 17 Pacific Island Countries and Territories (1 March 2002 to 31 December 2009). Noumea, New Caledonia: Secretariat of the Pacific Community. 512 p.
- Kronen M., Magron F., McArdle B. and Vunisea A. 2010a. Reef finfishing pressure risk model for Pacific Island countries and territories. *Fisheries Research* 101:1–10.

- Kronen M., Vunisea A., Magron F. and McArdle B. 2010b. Socioeconomic drivers and indicators for artisanal coastal fisheries in Pacific island countries and territories and their use for fisheries management strategies. *Marine Policy* 34:1135–1143.
- Pinca S., Kronen M., Friedman K., Magron F., Chapman L., Tardy E., Pakoa K., Awira R., Boblin P. and Lasi F. 2010. Regional assessment report: Profiles and results from survey work at 63 sites across 17 Pacific Island Countries and Territories (1 March 2002 to 31 December 2009). Noumea, New Caledonia: Secretariat of the Pacific Community. 512 p.
- Pinca S., Kronen M., Magron F., McArdil B., Vigliola L., Kulbicki M. and Andréfouët S. 2012. Relative importance of habitat and fishing in influencing reef fish communities across seventeen Pacific Island Countries and Territories. *Fish and Fisheries* 13:361–379.
- Porter M. 2014. What does feminist methodology contribute to gender and fisheries science? *Asian Fisheries Science Special Issue* 27S:119–133.

Annex:

Selection of theme- and case-specific *Women in Fisheries Information Bulletin* articles

The following selection of PROCFish-related studies have an emphasis on qualitative studies and invertebrate fisheries. It does not include many other studies from the Bulletin, but readers are encouraged to use the Bulletin's rich resources.

- Kronen M. 2004. Alu toutai – Na laki qoli – Fun or duty: School children's involvement in subsistence fisheries in Tonga and Fiji. *SPC Women in Fisheries Information Bulletin* 14:9–17.
- Kronen M. 2007. Chasing land crabs on Christmas Island. *SPC Women in Fisheries Information Bulletin* 16:21.
- Kronen M. 2008. Combining traditional and new fishing techniques: Fisherwomen in Niue, Papua New Guinea and Wallis and Futuna. *SPC Women in Fisheries Information Bulletin* 18:11–15.
- Kronen M. and Tafileichig A. 2008. Traditional rights and management of Yap's coastal fisheries and the role of fisherwomen. *SPC Women in Fisheries Information Bulletin* 18:21–25.
- Kronen M. and Malimali S. 2009. The octopus fishery on Lofanga, Kingdom of Tonga. *SPC Women in Fisheries Information Bulletin* 19:11–16.
- Lasi F. and Kronen M. 2008. 'Ungakoa' – Fishing for a rare delicacy in the South Pacific. *SPC Women in Fisheries Information Bulletin* 18:16–20.
- Vunisea A. 2004a. The challenges of seafood marketing in Fiji. *SPC Women in Fisheries Information Bulletin* 14:3–8.
- Vunisea A. 2004b. Communal fishing in Tokelau: The *inati*. *SPC Women in Fisheries Information Bulletin* 14:18–20.
- Vunisea A. 2007. Fishing to sustain livelihoods in Nauru. *SPC Women in Fisheries Information Bulletin* 16:22–23.

An ecological study of the sea hare, *Dolabella auricularia*, on the south-eastern coast of Viti Levu, Fiji

Sandeep K. Singh¹ and Veikila C. Vuki²

Introduction

Gleaning for the sea hare, *Dolabella auricularia*, is an important activity for women throughout the Pacific because this species is an important food source (Singh and Vuki 2009). Women glean sea hares on mudflats during low tides in the afternoons when they are most abundant. Egg masses and the animals are also eaten and sold at municipal markets in urban areas across the Pacific.

Egg masses of *Dolabella auricularia* are eaten in many parts of the world such as the Visaya Islands in the Philippines, Samoa, Tonga and Fiji. In Fiji, the egg masses and the animal are collected mostly by women and are sold in urban markets and eaten raw or cooked. Anti-cancer agents have been isolated from *Dolabella auricularia* (Pettit et al. 1976).

The diet of *D. auricularia* is principally seaweeds and seagrass, and its choice of seaweed and seagrass is generally broad, its eating habits immense, and its growth rate is fast. The majority of its behaviour involves eating, copulating and laying eggs.

All sea hares are herbivorous and are usually associated with seagrass beds. They are most frequently found in shallow waters, where they feed on algae and seagrasses. Members of the genus *Aplysia* feed on large algae, while the genus *Bursatella* consumes large amounts of sand, and *D. auricularia* consumes various seagrasses. Few studies on sea hares have been conducted in the Pacific.

This ecological study of the sea hare, *Dolabella auricularia*, (Lightfoot, 1786) on the southeastern coast of Viti Levu, Fiji, was undertaken at two sites: Kaba Point mudflats and the Veivatuloa mudflats. There is limited information on the biology and population characteristics of the sea hare. Information on its abundance, size, population structure, distribution patterns and association with seagrass beds is needed in order to manage the sea hare fishery in the future.

Therefore, the specific objectives of this research work were to study populations of *Dolabella*

auricularia in two aforementioned sites in Fiji. Population size structure was the focus of the study so that ecological patterns and the factors that influence them could be determined. The second objective of this study was to determine the distribution patterns, estimate abundance, habitats and densities by transect analysis within and between the sites where women collect sea hare in Fiji.

Description of study areas and sampling dates

The sampling sites are located on the southeastern coast of Viti Levu, which is Fiji's main island (Fig. 1). The sites were the Veivatuloa mudflats (site 1) and the Kaba Point mudflats (site 2); both sites are located close to Veivatuloa Village and Dromuna Village, respectively (Figs. 2 and 3).

Both study sites were covered with coarse mud and sand, and seagrass beds, low coral forms, burrowing invertebrate, colonial zoanthids and echinoderms dominated the sites. Tidal pools were also common to both sites.

Sea hare population densities were measured during transect studies for two days on in August 2008 at the Veivatuloa study site. The Kaba Point study site was also surveyed for two days in August 2008.

Methodology

The population density of *D. auricularia* was counted in quadrats measuring 1 m x 1 m, which were set at 10-m intervals along two 250-m transect lines. The transect lines and quadrats were laid at 0-m depth during low tide. The transect lines were laid perpendicular to the shoreline, and the quadrats were placed starting from the shore end of the seagrass bed on the mudflat. Within each quadrat frame, all *D. auricularia* were identified, counted and measured using a ruler. Seagrass was identified to the species level whenever possible.

A brief description of habitats in each quadrat was also made. The percentage of seagrass cover at every 10-m interval was also calculated. The maximum

¹ School of Marine Studies, University of the South Pacific, Private Mail Bag, Suva, Fiji

² Oceania Environment Consultants, PO Box 5214, UOG Station, Mangilao, Guam 96913

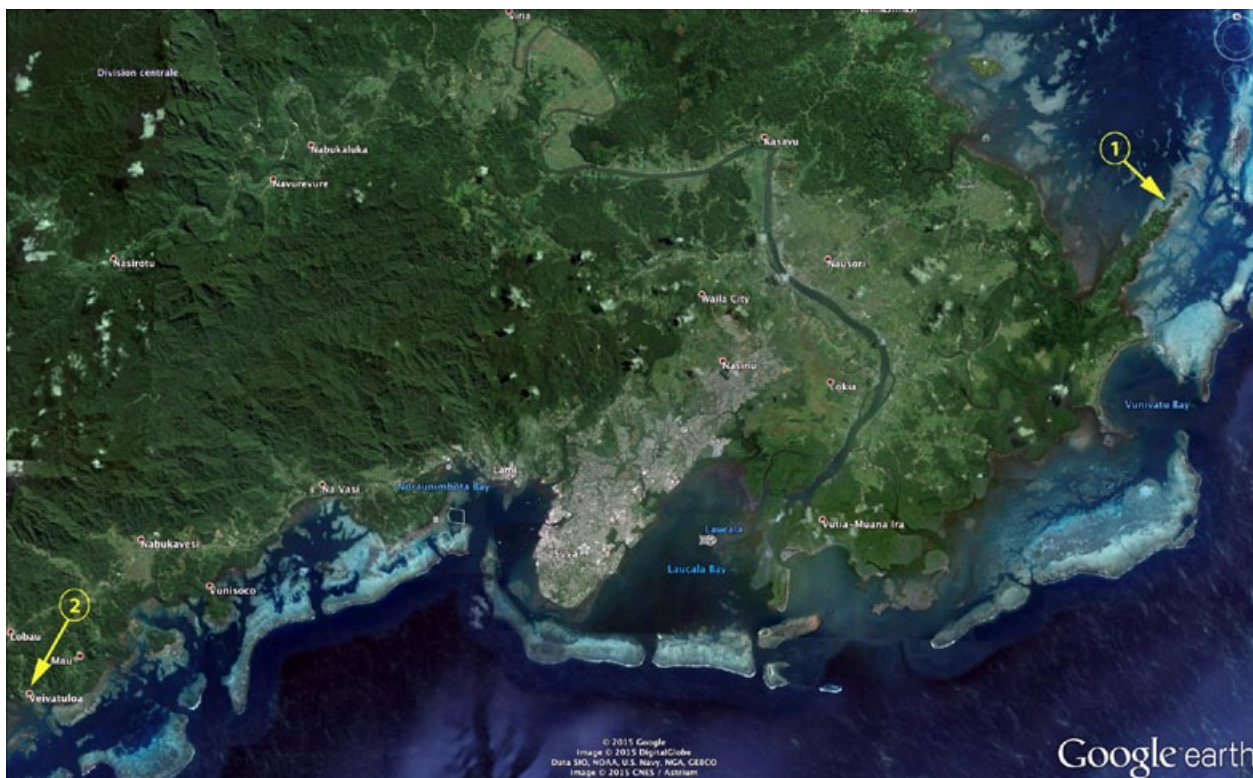


Figure 1. Satellite image of the southeastern coast of Viti Levu showing the locations of Kaba Point near Cautata (1) and Veivatulua near Mau (2) (Source: Google Earth).



Figure 2. Satellite image of Dromuna Village and its mudflats on Kaba Point (Source: Google Earth).



Figure 3. Satellite image of Veivatulua Village and its mudflats (Source: Google Earth).

animal size of sea hare in each quadrat was plotted against the quadrat number to see if larger animals tended to live in certain zones along the mudflats.

After sea hares were collected and their lengths measured, they were returned (live) to the sea. Young juveniles were also searched for from under rocks, in tidal pools, and among seagrass beds on each sampling trip.

Results

A nested ANOVA (analysis of variance) test was used to test the means of distribution, which was found to be not significantly different at both sites ($P < 0.05$) (Table 1). The non-difference may be attributed to the small sample size ($n = 54$).

Despite, the non-difference in the mean sample size, transect data from within each site was pooled in an attempt to investigate certain attributes of the population. Unimodal length–frequency distribution characterised the population at each site (Fig. 4).

Quadrats without similar animals were not included in the analyses. It must be noted that in order to

carry out a nested ANOVA test, two assumptions have to be met:

1. the data needs to be normally distributed; and
2. the data should have equal variances.

In this study, the above requirements were not met, therefore, the data had to be transformed (square root transformed).

The Veivatulua sea hare population had a slightly wider size range (i.e. 134.2–133.0 mm) than the Kaba Point population (125.4–127.9 mm). A small number of very large animals were found on the Veivatulua mudflats. No *D. auricularia* less than 95 mm in length was observed during the study period at either site.

The nested ANOVA was also used to compare the mean body sizes of the two populations based on pooled data. The mean measures of size of *D. auricularia* from the Veivatulua and Kaba Point mudflats are presented in Table 2. From Table 1, the ratio F (between sites) was 3.580/0.661, or 5.416; and, therefore, the null hypothesis (the two populations have the same body means) was $P < 0.05$. There is

Table 1. Data from nested ANOVA test for the mean sizes of the two populations.

Sources of variation	Sum of squares (SS)	Degrees of freedom (df)	Mean square (MS)	Ratio F	Significance
Sites	680.4	1	6,801.4	3.580	0.197
Transects	3,784.3	2	1,892.2	0.661	0.521
Residuals	140,283.9	49	2,862.9		
Total	1.5 x 10⁵	52	1.2 x 10⁴		

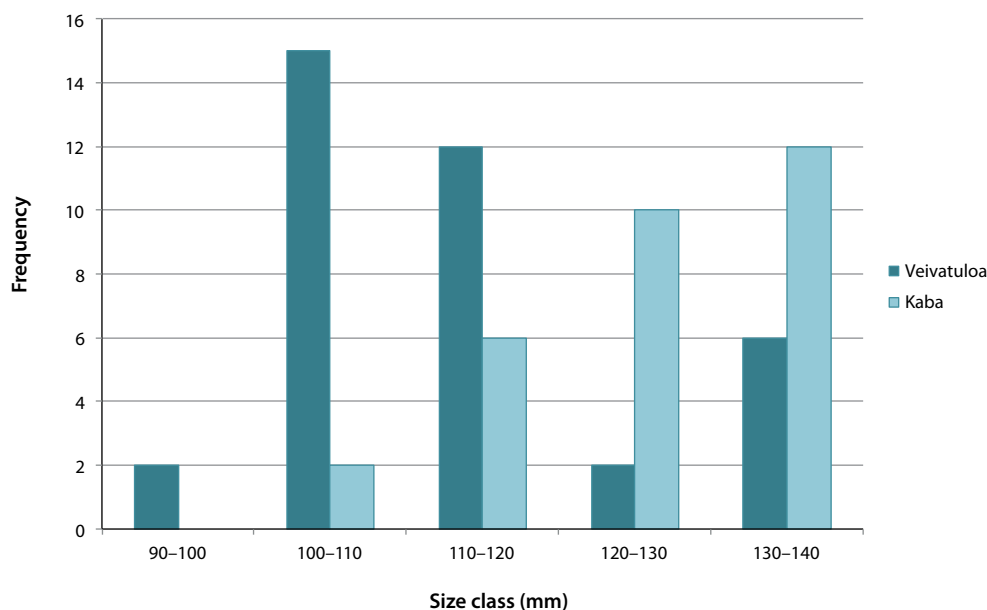


Figure 4. Length-frequency for Kaba Point and Veivatulua sites.

no significant difference between the body means at both sites.

It is evident that the mean body sizes at both sites are quite similar although Veivatulua animals have a larger maximum body size, and have a mean length of 101.1 mm (SD = 52.4, n = 28). Kaba Point animals had a mean length of 101.0 mm (SD = 53.9, n = 25). The size distribution and the mean size length of *D. auricularia* are very similar between the two study sites.

Density and abundance

Distinct zonation patterns were apparent along transects across the Kaba Point and Veivatulua mudflats. The first 130 m from the shoreline consisted of only bare sand with little or no seagrass beds. From 130 m to approximately 310 m, seagrass (*Syringodium* spp., *Halophila* spp., and *Halodule* spp.) was present, with increasing amounts of *Sargassum* spp. The third zone consisted of 310 m⁺, which lacked seagrass beds. These zones along the transect lines did not have sharp discontinuities but a transitional area existed between zones.

In total, 65 *D. auricularia* individuals were collected from 128 quadrats along the transect lines at both sites, giving a mean density of 0.51 individuals per quadrat. Many quadrats were empty while others contained only a small number of animals.

The number of *D. auricularia* fluctuated between 0 and 4 animals per quadrat. The highest densities were found in seagrass beds and tidal pools. Low or no density areas were associated with sandy areas with no seagrass beds. These areas were found mainly at the beginning and towards the end of the transect lines.

The density of sea hare was 0.48 per m² at Veivatulua and 0.56 per m² at Kaba Point (Table 3).

Distribution patterns and habitat descriptions

Data from the transect lines were also tested to see whether the distribution patterns of *D. auricularia* were clumped or random. The variance of the sample was found to be greater than the arithmetic mean, suggesting that the population was clumped (Table 4). From the Table 4, the ratio F (between

Table 2. Vital length statistics for *D. auricularia* from the mudflats at Veivatulua and Kaba Point.

Sites	Sample variance	Sample mean	Standard deviation (SD)	Standard error (SE)	Sum
Veivatulua					
Transect 1	2,104.5	106.2	45.9	12.3	14
Transect 2	3,026.2	95.8	55.0	15.3	13
Kaba Point					
Transect 1	2,789.6	83.5	52.8	13.6	15
Transect 2	3,177.9	70.6	56.4	16.6	11

Table 3. Vital count statistics for *D. auricularia* from Veivatulua and Kaba Point sites.

Sites	Sample variance	Sample mean	Standard deviation (SD)	Standard error (SE)	Sum
Veivatulua					
Transect 1	0.80	1.21	0.92	0.24	17
Transect 2	1.08	0.58	0.75	0.21	14
Kaba Point					
Transect 1	1.69	1.73	1.31	0.36	13
Transect 2	1.27	1.42	1.19	0.36	14

Table 4. Data from nested ANOVA test on mean distributions of the two populations.

Sources of variation	Sum of squares (SS)	Degrees of freedom (df)	Mean square (MS)	Ratio F	Significance
Sites	3.980 x 10 ⁻²	1	3.978	0.955	0.426
Transects	8.090 x 10 ⁻²	2	4.050 x 10 ⁻²	0.105	0.900
Residuals	18.477	48	0.385	-	-
Total	18.56	51	4.4	-	-

sites) was equal to 0.995/0.105, or 9.090, which therefore results in rejecting the premise that the distribution pattern of both populations is clumped ($P < 0.05$). It can, therefore, be concluded that there is no significant difference between the body mean sizes at either study site.

As far as the relationship between the presence of *D. auricularia* and seagrass beds, the correlation coefficient of the relationship was compared to the critical value of r of 0.134 ($P < 0.05$, $n = 65$). From the results obtained using the Pearson correlation test, it can be concluded that there is a weak correlation between the number of *D. auricularia* and the higher percentage cover of seagrass beds.

From Table 5, the ratio F (between sites) equals 11.75/2.05, or 5.73, which results in rejecting the premises that *D. auricularia* 1) populations are associated with seagrass beds, and 2) does not increase in numbers as the percentage cover of seagrass increases. It can, therefore be concluded that *D. auricularia* are associated with seagrass beds but the numbers of *D. auricularia* do not increase with an increase in seagrass beds.

The numbers of *D. auricularia* also varied along the various zones of the transect lines. Although the number of individuals did not increase with an increase in seagrass beds, *D. auricularia* populations were found to be concentrated in seagrass beds, and therefore, the numbers of *D. auricularia* were found to be weakly correlated with the percentage of seagrass cover in the mid-zones along the transects.

Discussion

Similarities were found in the size structure of the two populations at these two study sites. There were significant mean body size similarities between quadrats and between transect lines at each of the sites, and a smaller sample size may be the reason why. More transects should be surveyed to obtain better estimate of abundance on the Veivatulua and Kaba Point mudflats.

The sea hare populations studied had a unimodal size structure. Information on population size structure derived from transects at Kaba Point

and Veivatulua is likely to be less representative due to the number of samples collected. Possible sample bias may also contribute to the lack of representations.

The Veivatulua population was significantly similar in mean body size when compared to the Kaba Point population. The maximum size obtained from the Veivatulua site was notably greater than that collected from Kaba Point site. Generalisations about the population size structure are difficult to make at this point due to the lack of sample representations.

There were no juveniles (very small size) *D. auricularia* observed in this study, which may be due to the seasonal reproduction of *D. auricularia*. The lack of small individuals may also be due to poor recruitment during the months of August to October. In order to be able to make statements on recruitment, reproductive studies need to be undertaken. Only one egg mass was located (at the Kaba Point mudflat). *D. auricularia* lay eggs in jelly-like mass, often arranged in a long, tangled string. Eggs of *D. auricularia* either hatch as free-swimming larvae or as small crawling juveniles (William B. Rudman, Senior Fellow, Australian Museum, pers. comm.).

D. auricularia were found to be less common molluscs on the mudflats in terms of their density and frequency. Their presence in these two areas is strongly correlated with seagrass beds. Generalisations about the population structure of *D. auricularia* were based on pooled data because it was more representative. It was difficult to compare density data between the two sites and to state whether the density estimates of Kaba Point were comparatively higher than those from Veivatulua. In order to gain a better perspective, several more transect lines across the two mudflats should be conducted.

The factors that affect sea hare densities and distribution patterns on the Veivatulua and Kaba Point mudflats were varied and may be related more strongly to habitat types and less strongly to the substratum types. Our findings showed high abundances of sea hare in seagrass bed areas, and this was supported by a study undertaken by Calumpo (1979) who found that the highest numbers

Table 5. Data from nested ANOVA test on two populations' association with seagrass beds.

Sources of variation	Sum of squares (SS)	Degrees of freedom (df)	Mean square (MS)	Ratio F	Significance
Sites	4,508.7	1	4,508.7	11.75	0.75
Transects	769.6	2	384.8	2.05	0.14
Residuals	9,198.2	49	187.7	-	-
Total	1.45×10^4	52	5.08×10^3	-	-

of *D. auricularia* were found in seagrass beds. Table 6 shows variations in densities in *D. auricularia* between Fiji and the Philippines.

It was evident from the statistical tests that the distribution of *D. auricularia* in the Veivatulua and Kaba Point mudflats was clumped. Similar observations were made by Zager et al. (1979) in northern Bais Bay, Philippines. *D. auricularia* normally copulate in pairs and with this clumped distribution, individuals may encounter one another more frequently than they would in a random distribution having the same mean densities (MacArthur and Jones 1966).

The main limiting factor for sea hare distribution is food availability. This is supported by Miller (1969), who found that in temperate parts of the world, food is the dominating influence. Sea hares have special diets and are naturally most common where their food is plentiful.

The usual habitat of *D. auricularia* is the shallow seagrass community. As observed by Calumpong in 1979, *D. auricularia* is also associated with tidal pools. In this preliminary survey of this economically important invertebrate in the Veivatulua and Kaba Point mudflats, *D. auricularia* were more abundant on a substrate of sand with sparse growth of seagrass than on mud or silt with seagrass.

At the Kaba Point and Veivatulua mudflats, *D. auricularia* populations were found only on seagrass beds, and none were observed in adjacent muddy areas near mangroves. Two adults and one freshly laid egg mass were found along transect 1 on the Kaba Point mudflat. These were in the area of sparse seagrass (*Thalassia* spp.). According to Calumpong (1979), *Thalassia* spp. and *Halophila ovalis* constitute the bulk of the sea hare's diet. However, sea hares will exploit whatever available algae there are in the environment, and could easily survive in a laboratory on strictly algal diets.

From the nested ANOVA test it can be concluded that *D. auricularia* were closely associated with the presence of seagrass beds. However, the presence

of seagrass beds alone does indicate the presence of *D. auricularia*. Furthermore, this does not necessarily mean that there is a linear correlation between the numbers of *D. auricularia* and the percentage of seagrass cover in a particular area.

Conclusions

The data obtained indicate that *D. auricularia* is found among seagrass beds of *Thalassia* spp. and *Halophila ovalis*. Although the types of food this sea hare eats may limit its distribution within seagrass communities, factors other than seagrass beds may have limited its distribution on the mudflats at both study sites. *D. auricularia* is less abundant on both the Veivatulua and Kaba Point mudflats than on other sites in Fiji.

Our findings indicate that the population from both study sites had a unimodal size structure (mostly clumped) distribution, with a noticeable absence of juveniles (< 90 mm) in both populations. This clumped distribution may be related to the breeding habits of *D. auricularia*. Populations of *D. auricularia* at the two study sites were significantly similar when comparing mean body sizes, and this similarity is probably due to the small sample size.

Recruitment rates were low for *D. auricularia* at both the Veivatulua and Kaba Point mudflats. The size distribution of *D. auricularia* was significantly similar to that of Veivatulua populations, and this again may be due to the small sample size.

The distribution patterns of *D. auricularia* across the Veivatulua and Kaba Point mudflats were not random and this may be related to habitat types and/or seagrass community types at the study sites. The average sizes of similar animals distributed across both mudflats were fairly even, but generally, larger animals were found on Veivatulua mudflats. The densities of *D. auricularia* encountered in this study were low and were variable between ecological zones.

Acknowledgements

Table 6. Densities of *D. auricularia* based on this study and one from the Philippines.

Density	Area	Reference
0.48 per m ²	Veivatulua, Fiji	This study
0.56 per m ²	Kaba Point, Fiji	This Study
0.18 per m ²	North Bais Bay, Philippines	Calumpong (1979)
0.41 per m ²	Siyt Bay, Philippines	Calumpong (1979)

We would like to thank Dr Bill Rudman of the Australian Museum for his help in connecting us to those working on *D. auricularia*. We would like to thank Dr Valerie Paul, formerly of the University of Guam, Dr Alison Haynes and Dr Milika Sobey of the University of the South Pacific for their assistance in this project.

We are particularly thankful to the late Mr Johnson Seeto for his invaluable contribution in identifying the species. Dr Carefoot Thomas also contributed in providing references to other works on sea hares. We are grateful to the people of Kaba Point and Veivatulua for their help in providing logistical support for this work. In particular, we would like to thank the late Mr Dilo and his wife for providing accommodation at Dromuna village in Kaba Point for the authors.

Last, but not least, we would like to thank Dr Robyn Cumming of the University of the South Pacific for her help in providing statistical support and advice. The Marine Studies Programme of the University of the South Pacific funded this research through its postgraduate diploma programme.

Calumpong H.P. 1979. Some aspects of ecology of sea hare *Dolabella auricularia* (Lightfoot), in the Central Philippines. *Silliman Journal* 26:134–146.

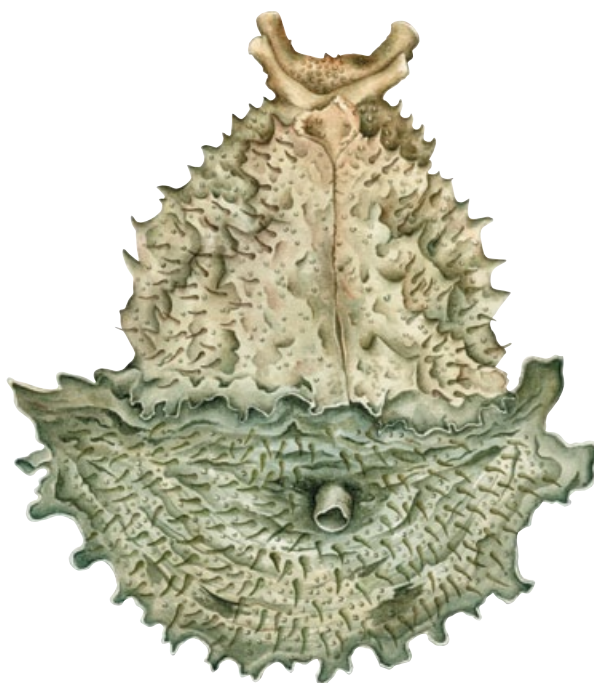
MacArthur R. and Jones C. 1966. The biology of populations. New York, United States of America: John Wiley. 50 p.

Miller M. 1969. The habitat of the opisthobranchs, molluscs of the British Solomon Islands. *Philosophical Transactions of the Royal Society* 255:541–548.

Pettit G.R., Ode R.H., Herald C.L., Von Dreele R.B. and Michel C. 1976. Antineoplastic agents. 46. The isolation and structure of dola-triol. *Journal of American Chemical Society* 98(15):4677–4678.

Zager J., Brian D. and Mark B. 1979. A survey of economically important invertebrates in Bais Bay, Negros Oriental, Philippines. Unpublished Report.

References



The sea hare, *Dolabella auricularia*
(illustration: Rachel O'Shea, © SPC)

Livelihoods, markets, and gender roles in Solomon Islands: Case studies from Western and Isabel Provinces¹

*Froukje Kruijssen, Joelle Albert, Miranda Morgan, Delvene Boso,
Faye Siota, Stephen Sibiti and Anne-Maree Schwarz*

Introduction

In Solomon Islands, the use of sea and land resources referred to here as aquatic agricultural systems (AAS) shape the livelihood choices and opportunities available to rural people and communities that rely on them (Box 1).

Box 1. *Aquatic agricultural systems* (AAS) are farming, fishing, and livestock systems where the annual production dynamics of freshwater and/or coastal ecosystems contribute significantly to total household income.

A diverse range of livelihood activities exists in Solomon Islands. One of the livelihood opportunities is the cash income and goods derived from selling or bartering aquatic agricultural resources through participation in markets. The term “value chain” is often used to describe the activities involved in getting a product from production or collection through different stages of processing and marketing to the final consumer. Value chain analysis aims to understand the actors involved in this chain, the inputs and services provided to chain actors, and the enabling environment of the chain, consisting of policies, rules, and regulations, including informal rules and cultural norms. Usually a value chain analysis is carried out to assess constraints in how well the value chain functions and to identify potential opportunities to improve it. These improvements could be related to the efficiency of how a product is traded between different actors in the chain, equity between value chain actors in terms of income earned from participation in the chain, or the improved participation of specific vulnerable groups of the population; for example, better participation of women.

Box 2. *Gender* refers to the socially constructed roles ascribed to males and females and is something that infuses all aspects of daily life. This means that gender affects how women and men conceive of themselves and their capabilities; how women and men interact within the framework of social expectations; and how opportunities are structured and resources distributed within institutions like the market and the state.

Gender-ascribed roles define the “ideal expected behaviours for men and women in any position they occupy in society or in any activity, overlapping with other expected role behaviour. In other words, gender roles define what is deemed appropriate for women and men, and define what attributes men and women should have and display in any situation. As such, gender roles are norms that women and men comply with all the time, whether in the household or the street, in private or in public” (Muñoz Boudet et al. 2013).

Globally, women form at least half of the labour force in agricultural production and natural resource use, but often their role is poorly recognised. Better inclusion of women in value chains will improve equity and social justice, full participation of women in the economy will contribute to more economic development, and improved gender equity will result in higher efficiency and productivity because resources such as inputs and services can be used more efficiently and effectively if better targeted towards women (KIT, Agri-ProFocus & IIRR 2012). It has been estimated that improving gender equity in agriculture could increase women’s yields on their farms by 20–30 percent, which could raise total agricultural output in developing countries by 2.5–4.0 percent (FAO 2011).

¹ This article was first published as:

Kruijssen F., Albert J.A., Morgan M., Boso D., Siota F., Sibiti S. and Schwarz A.J. 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. 16 p.

It is reproduced here with the kind authorisation of the CGIAR Research Program on Aquatic Agricultural Systems.

Key messages

Livelihoods in Solomon Islands are diverse, composed of a wide range of activities. The marketing of marine resources through value chains is an important component of this livelihood portfolio in many parts of the country. Gendered analysis of marine resource value chains can identify key entry points for equitable improvement of the livelihoods of those participating in these value chains. Case studies of two Solomon Islands communities (one each from Western and Isabel Provinces) provide insight into this issue. Some of the main findings of the value chain study, conducted in 2012, are as follows:

- Men and women fulfill different roles in marine resource value chains. Men are more involved in reef fishing and use a higher number of different fishing methods, while women more often participate in gleaning of other marine resources. Selling fish is more often done by men, while women may dominate the sales of other marine resources, although this depends on the cultural context.
- At the production level (fishing and gleaning), control over income derived from marine resources is most often with the person who is involved in the sales transaction. Thus women's access to financial compensation for their work is linked to their capabilities to bargain with other value chain actors, and this process is shaped by gender norms and power relations. In the case study in Isabel Province, income from fish is more equally divided between husband and wife than income from other marine resources.
- The number of livelihood activities pursued differs between the two communities, but is almost equal for men and women within them. Some activities are more commonly conducted by one of the sexes, but specific division of roles differs between the two case study communities and is dependent on local norms and customs.
- There is a gender-differentiated pattern of decision-making for decisions related to the daily functioning of the household, economic activities, and the family, with some decisions being made by either men or women alone, while others are made jointly. At the community level, however, men tend to dominate decision-making processes. It is posited that women's participation in decision-making will be enhanced by addressing underlying gender norms as well as improving the skills and capabilities of women.

Key recommendations

- When assessing and intervening in marine resource-based livelihoods, it is essential to go beyond identifying the visible differences and to attempt to explain the underlying causes of these disparities.
- Improving the equity of gender and decision-making would need to include building capacity and knowledge of women to be able to contribute to decision-making processes; for example, increasing skills, as well as addressing underlying gender norms influencing both men's and women's roles and responsibilities.
- There are several potential entry points for upgrading marine resource value chains, including exploration of different models of coordination and collective effort among fishers and gleaners, especially for women, and provision of training and awareness on alternative processing options to improve fish and shellfish preservation in order to reduce wastage and increase shelf-life.

A key area for further research is how the performance of marine resource value chains can be improved without increasing pressure on the ecosystems that provide the products marketed through them.



Small-scale fisheries are an important component of the aquatic agricultural systems

Box 3. *Some gender-related facts on Solomon Islands*

- As of 2010, women's share of the economically active population was low (38.7%), and had marginally declined since 1980 relative to men (FAO 2010, as cited in Weeratunge et al. 2012).
- In 2012, over 80% of all economically active women worked in agriculture. Over time, women's share in the agricultural labour force has increased, while the share of women in waged employment in professional and technical jobs has fallen. This indicates that gender inequalities in non-agricultural sectors tend to benefit men rather than women.
- As of 2010, 33% of married women (15–49 years) earned their own cash incomes (ADB/SPC 2010).
- Rural female-headed households are disproportionately represented among the bottom 30% of income deciles (SI-NSO/UNDP 2008).

The purpose of putting a gender lens on value chain analysis is to understand why men and women fulfill certain roles at every level in the chain, which roles provide the most benefits, and who has the access to and control over resources to participate fully in the chain, and thereby to find entry points for improvement. This also means trying to grapple with gender norms, beliefs, and power relations underlying gender-differentiated value chain participation (see Box 5 for information that is required for a gendered value chain analysis).

Box 4. *Commitment to gender equality in Solomon Islands*

In Solomon Islands the importance of addressing gender inequality is reflected in the 2009 national policy on Gender Equality and Women's Development (GEWD), which focuses on improving the economic status of women through improved access to and share of productive resources and the equal participation of women and men in decision-making and leadership (MWYCA 2009). For the benefit of AAS communities specifically, in 2011 the Ministry of Fisheries and Marine Resources (MFMR) developed a strategy for gender mainstreaming in fisheries.

If gender dimensions are ignored, it is likely that not everyone will benefit equally from value chain upgrading, and marginalised groups could even be negatively affected by proposed changes in a value chain. This is a matter of concern not just for marginalised members of the population themselves – typically, women and girls – but also for

their households, communities, and environment, all of which stand to benefit if their capabilities and opportunities are enhanced.

Box 5. *Checklist of information needed for gendered value chain analysis*

- Gender-differentiated roles and responsibilities in the value chain, especially downstream.
- Men and women's time demands and constraints, and possible tensions with new responsibilities.
- Gender-differentiated access to and control over assets, tools, and inputs and services.
- Gender-differentiated benefits derived from value chain participation.
- Underlying gender norms shaping who manages income and makes decisions in the value chain.
- How households distribute and allocate financial resources from participation in value chains.
- Range of factors influencing women's capacity to bargain in value chains.
- Other constraints and opportunities for women's improved participation in value chains.

Marine resources provide a major source of livelihood in Solomon Islands, both in terms of subsistence and for barter or cash income through marketing. In 2012, WorldFish, on behalf of the Ministry of Fisheries and Marine Resources (MFMR) and through the New Zealand-funded "Mekem Strong Solomon Islands Fisheries" (MSSIF) project, conducted preliminary research to begin to identify and explain the gender-differentiated roles, responsibilities, livelihood activities, and participation in value chains of men and women in two case study Solomon Islands communities: one in Western Province, and one in Isabel Province (Fig. 1). This brief presents the results of these cases, focusing on fish and other marine resources marketed both locally and in Honiara. The study focused on opportunities to enhance livelihoods, especially of women and youth, and the evenness of engagement in the value chain of men and women within the same household.

A second objective was to better understand the opportunities and challenges provided by one of the Fisheries Centers (an MFMR initiative to enhance fish markets). The study included key informant interviews and focus group discussions among men and women in the two communities. Topics covered included roles in livelihood activities, decision-making, value chain roles, and species caught/collected.

Key findings

Overview of case studies

Community 1 (Western Province)

Community context:

- Population of about 125 people; 17 households
- Remote, only accessible by sea or foot; access worsened by seasonal rough seas
- Few stores to buy household goods and inputs

Livelihood activities:

- Diverse range of livelihood activities: within a household, 12–17 different activities undertaken
- About 12 different activities per adult household member (both men and women)
- All households involved in reef fishing, gardening, foraging, coconut oil production, and trading marine resources and crops
- Majority of households involved in tourism, migrant labour, coconut production, copra processing and carving (handicrafts)
- On average an individual household grows six different crops; crop species differ across households

Consumption:

- Shellfish are only sold, not consumed, because of religious restrictions on consumption
- Households consume about 2 meals per day
- 30% of meals contain marine resources
- 20 different fish species mentioned as top 5 most commonly consumed fish

Fisheries:

- High diversity in species most commonly caught
- High seasonal variation in fish species caught and consumed



Community 1 located in Western Province, Solomon Islands

Photo: Froukje Kruijsen

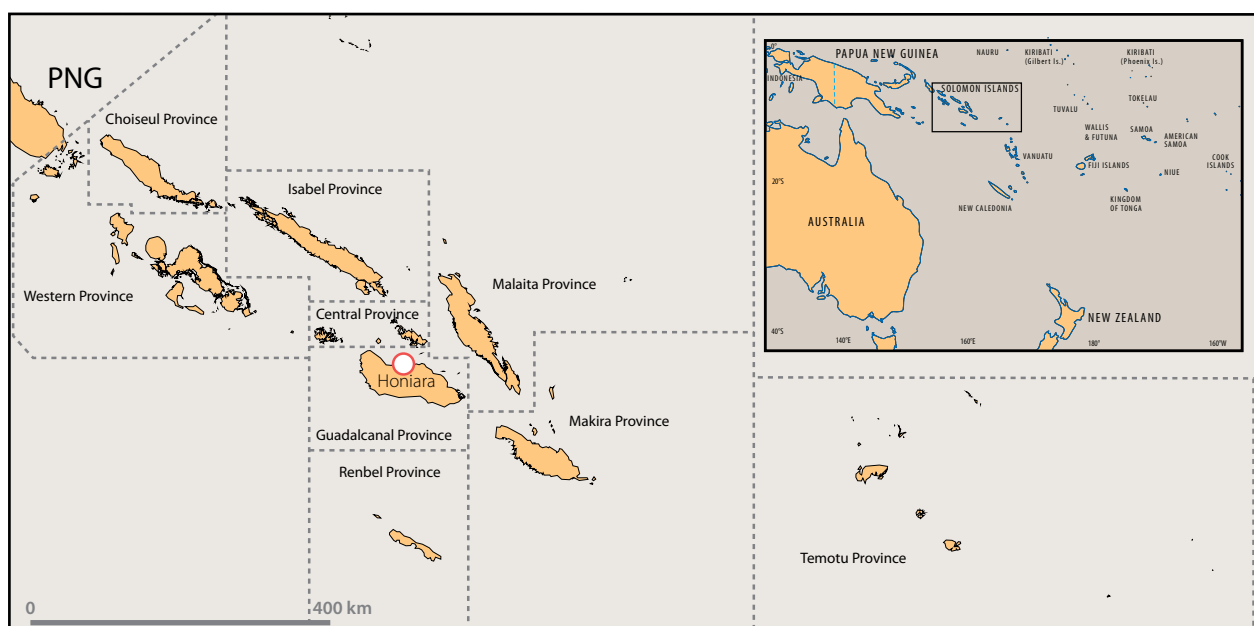


Figure 1. Solomon Islands.

Markets:

- Fish, cassava, sweet potato, and cabbage were ranked as most important products for sales
- Fish and marine resource marketing take place mainly at intra-and inter-village level
- No ice available and limited transport opportunities
- Key constraints: limitations in processing options and storage, limited market access

Community 2 (Isabel Province)

Community context:

- Population of about 3000 people; 420 households
- Better accessibility; on a shipping company's route
- Several local stores for household goods and inputs

Livelihood activities:

- Diverse range of livelihood activities: within a household 6–15 different activities undertaken
- About 8 different activities per adult household member (both men and women)
- All households involved in reef fishing, collection of other marine resources, and agriculture
- More than 75% of households participate in foraging, fish/marine resources marketing, coconut oil production, and tourism
- Home consumption and giving away more frequent uses of marine resources than marketing
- 21 different crops listed; sweet potato, cassava, and cabbage most frequently cultivated
- Individual household grows about 6 different crops

Consumption:

- Households consume about 5 meals with fish per week and 6 meals with other marine resources (e.g. clam shell, mud shell, and mud crab)
- Species most preferred for consumption limited: total 7 fish species and 2 types of shells

Fisheries:

- High diversity in species catch: over 20 species listed, with 9 species only listed by 1 household
- High level of collection of other marine resources e.g., clam shell, mud shell, trochus, and mud crab

Markets:

- Higher market access (outside the village) for marine resources than in community 1, especially through Fisheries Center and agents
- Social limitations to marketing within the village
- Ice available from Fisheries Center
- Key constraints: breakdowns of ice machine, lack of storage for marine resources, limited supply of fuel

Marine resource value chains in Solomon Islands

Solomon Islands is characterised by a widely dispersed population across its many islands. Markets for marine resources in the country are widespread but for a large part highly informal. For that reason, value chains for marine resources are difficult to understand, exacerbated by the complexity of social relations between chain actors that underpin them. In addition, limited data are presently available on volumes and species traded. Market channels into Honiara are characterised by large distances, high costs for transport and ice, and unreliability of shipping. Furthermore, the institutional framework surrounding market chains is limited in the support it provides to improve markets. Value chains of marine resources in the two case study communities differ in terms of the number of potential market channels products can be sold through (Fig. 2). This is a result of accessibility (i.e., distance to the nearest shipping route, availability of motorised boats, and accessibility of the shore for small boats in the village), institutional framework (e.g., the presence of the Fisheries Center in community 2), and the quantity of fish being traded. In both communities, fish catches of several fishers are usually aggregated by an intermediary or a lead fisher to



Community 2 located in Isabel Province

Photo: Froukje Kruijsen

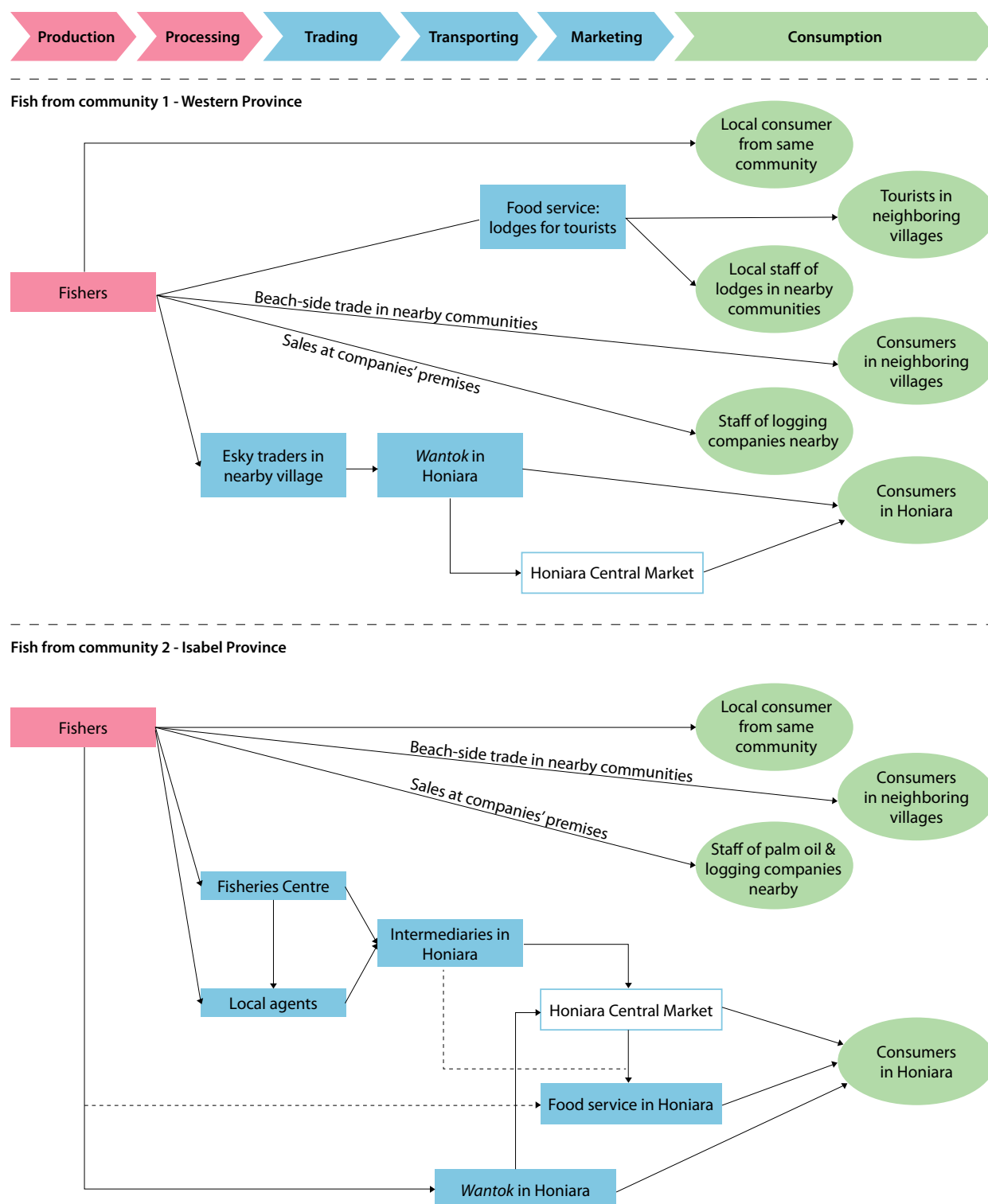


Figure 2. Fish value chains in the two case study communities.

Note: Esky traders are intermediaries who aggregate and pack fish in ice boxes ("esbies") to send to Honiara. Wantok is a term used in Solomon Islands to indicate the set of relationships between individuals with a common language, and /or from a common kinship group or geographical area of origin.

overcome constraints associated with transport distances and costs.

Figure 2 shows the main processes in the value chain at the top (i.e., production, processing, trading, transporting, marketing, and consumption), and the main actors involved in these processes. In reality the value chain is often not as linear as depicted. Certain processes may occur at several points in the chain (e.g., for trochus shells, processing takes place in the community to clean the shell and remove the meat, while processing is also conducted by factories outside the country that transform the shells into other products such as buttons). Some actors may also fulfill several roles simultaneously (e.g., traders may both trade and transport the product). For some products, such as beche-de-mer and trochus shells, the final consumer is abroad, so in that case value chains extend across the border.

To understand the way value chains are structured (i.e., who is involved) and how they operate in Solomon Islands, an understanding of informal

institutions is particularly important. In Solomon Islands these institutions are embodied in the word *wantok*. While more understanding is required of this highly complex system, it is clear that relationships between value chain actors are highly influenced by it, but that this is more apparent between some actors than others. It influences outcomes in the price for which products are sold (sometimes for free or in exchange for an undefined return favour in the future), the terms of a transaction (more likely to happen on credit), and who is involved in a transaction. In addition, other social norms that affect the value chain's performance pervade the chain, depending on the customs in a particular community. An example of this is the dominant perception in community 2 that selling of products within the village is improper.



Women prepare lunch during a community program






Photo: Froukje Kruijsen

Gender-differentiated value chain roles

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 labour 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 1). Thus women's access to financial compensation for their work (e.g., supporting their husbands in several activities related to fishing, processing, and marketing) is linked to their capabilities to bargain with other value chain actors (in this case their husbands), and these capabilities are shaped by gender norms and power relations. It should be noted that value chain roles of men and women differ across Solomon Islands depending on local customs and religious beliefs, as well as the local environment. This is demonstrated, for example, by differences between the two case study communities in terms of which marine resources are considered acceptable to be consumed and sold based on religious beliefs.

Table 1. Gender roles in the value chains of marine resources in case study community 2.

Value chain process	Gender roles (community 2)
Production: fishing and gleaning 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 mud crabs, however vendors interviewed did indicate normally women vendors are present, although they thought that this was possibly declining.
Consumption 	
Inputs and services	<ul style="list-style-type: none"> 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.

Gender-differentiated livelihoods

The case studies found interesting similarities and differences in how households and individuals in the two communities pursue their livelihoods, and in the roles of men and women. While the number of different activities pursued in the two communities differs, the number is equal for men and women within the communities; however, the type of activities differs between the two sexes. It should also be noted that the specific division of roles in livelihoods also differs somewhat between the two case study communities, and these findings cannot be generalised (Table 2).

Agriculture is undertaken by all men and women in both communities; however, there is a differentiation in roles between men and women, and there also may be a difference in the time men and women spend in the garden versus other activities. Producing coconut oil, marketing of gardened/foraged products, and tourism are more female responsibilities in the case study communities, while plantation crops and work outside the village are activities that men participate in more.

In community 1 (Western Province), 10 households were interviewed with a total of 13 male and 15 female economically active household members (age 15 and above). In community 2 (Isabel Province), 21 households were interviewed with a total of 29 male and 31 female household members. The

percentages of men and women indicate the proportion of women out of the total number of women interviewed that participated in the activity. Numbers indicated in bold show the dominant sex for this particular activity in each community.



Preparing a garden for planting

Photo: Wade Fairley

Table 2. Gender disaggregated livelihood activities in the two case studies.

Livelihood activities	Community 1			Community 2		
	% of HHs	% of men	% of women	% of HHs	% of men	% of women
<i>N</i>	10	13	15	21	29	31
Reef fishing	100	100	100	100	93	39
Collecting other marine resources	60	69	33	100	86	100
Gardening	100	100	100	100	100	100
Foraging (collection from the wild)	100	92	100	95	97	90
Plantation (coconut, trees)	80	85	73	67	48	32
Coconut oil	100	85	100	76	31	65
Copra	80	77	73	19	14	16
Selling/bartering of fish/marine resources	100	77	87	86	66	52
Selling/bartering of gardened/foraged products	100	69	87	71	48	61
Selling/bartering of plantation products	70	38	60	52	38	35
Selling/bartering of processed products	100	85	80	57	38	48
Tourism	90	77	93	76	14	55
Carving (handicrafts)	80	77	0	0	0	0
Work outside the village (migrant labour)	90	62	60	48	31	6
Other income generating activities	50	8	40	71	45	39
<i>Mean total number of activities</i>	14.5	11.8	10.9	10.6	7.6	7.5

Gender-differentiated assets

Assets come in a range of forms, including productive, financial, human, natural, and social assets. They are integral to achieving secure livelihoods, yet men and women tend to have different access to or control over assets and different capabilities in using assets in order to achieve improved livelihoods (Weeratunge et al. 2012). Previous studies in Solomon Islands have found that generally men own and have access to a much wider range of fishing gear than women (Prange et al. 2009). In the case study community in Western Province, productive assets for fishing (such as spear guns, hook and line, and goggles/masks) are more commonly owned and used by men. Women tend only to own and use the types of fishing equipment used to fish from the shore, which coincides with the type of fishing activity they are most involved in. Husbands and wives jointly own and use paddle canoes, although women generally use the canoes to access gardens rather than for fishing activities. While there is some indication that there is increased acceptance of women fishing for livelihood purposes, unequal gender relations will affect women's capacity to access proper tools and inputs. To make the most of this new livelihood option, women would need support in accessing these tools and inputs.

In the case study community in Western Province, women do have control over selling products and setting prices of products for sale, processing fish, and purchasing food and household goods. Giving women an opportunity to access more remunerative livelihood activities such as selling a wider variety of agricultural products (by introducing other crops and livestock such as chickens) could therefore have a positive impact on household well-being, as long as this addition does not increase their workload. While the opportunity to participate in income-earning activities is important, the key question relates to whether women have control over the financial resources earned from their work. Assessing this for the case study community in Isabel Province resulted in two main findings: 1) Income from fish is more equally divided between husband and wife than that from other marine resources (in the latter case the income is mostly managed by the person who has sold the resource regardless of sex); and 2) when a woman is involved in the sale of any marine resources she receives a larger share of the responsibility for spending the income. Women's control over financial assets is intimately linked to bargaining capacity, within the household as much as outside it.



Paddle canoes are usually jointly owned by husband and wives

Photo: Froukje Kruijsen

Gender and decision-making

Unequal gender norms and roles inform the different levels of influence that men and women have in decision-making processes within households and communities. Most commonly, women's lower position vis-à-vis their husbands or male community members often makes it difficult for them to influence the key decisions affecting the livelihoods of themselves and their families (Agarwal 1997).

The study in the community in Western Province found that while men and women are responsible for different types of decisions within the household, they also report making joint decisions (Table 3).

At the community level, however, men tend to dominate decision-making processes and spaces, and respondents stated that it is rare to see women involved publically in decision-making. Men often hold most of the leadership positions in the community, due to customary power relations that favour males. Even when land or reef ownership follows the matriline, power may be vested with male kin rather than female family members (Weeratunge et al. 2012). In Malaita Province, Boso and Schwarz (2009) found that all interviewed men said they were always or sometimes involved in decision-making around management of marine resources, while 72% of women said they were never involved.

While the preliminary studies indicate a lack of women's involvement and leadership in community groups and decision-making processes, the causes behind this are not clear. There is a need to go beyond research that looks only at women's deficit of skills or confidence when it comes to participation to consider the gender norms that make it difficult for women to participate regardless of their capabilities. This will involve seeking an understanding of the gender norms that shape women's public roles, as well as norms around men's public versus private responsibilities.

Recommendations

The case studies summarised here draw attention to men's and women's gender-specific roles in marine resource value chains and other livelihood activities in two communities in Solomon Islands. These differences tend to lead to unequal outcomes and opportunities for men and women, with associated consequences for achieving livelihood security and well-being. While more in-depth understanding is still required, some lessons can be learned from this work:

- When assessing and intervening in marine resource-based livelihoods, it is essential to go beyond identifying the visible differences to attempt to explain the underlying causes of these disparities.
- Improving the equity of gender and decision-making would need to include building capacity and knowledge of women to be able to contribute to decision-making processes; for example, increasing skills, as well as addressing underlying gender norms.
- There are several potential entry points for upgrading the marine resource value chain:
 - Opportunity to experiment with new models for horizontal coordination between fishers/gleaners (collective marketing) to reduce marketing costs and costs of inputs, especially for women.
 - Training and awareness on alternative processing options to improve fish and shell preservation in order to reduce wastage and increase shelf-life.
 - Diversification of agricultural products for marketing.

Table 3. Decision-making in households in case study community 1.

	Men	Women	Joint
When and where to fish	X		
Household gardening and marketing of products	X		
Fish processing		X	
Selling price of fish		X	
Purchase of food & household goods		X	
Spending income from selling fish			X
Purchase of clothes, children's education, family health care			X
Birth, marriage, funerals, religious			X



Selling reef catch at the market

Photo: Fred Olivier

Further information and research needs

In the above we have highlighted some of the key areas of inquiry when trying to improve value chains, especially for women and other vulnerable groups. However, there is one additional area of research that has received less attention in this brief but that is important for the future sustainability of marine resource value chains. While a lot of work is taking place on community-based resources management and other conservation efforts, there may be less understanding of how this interrelates with consumer demands in the final market. There is therefore a need to further assess the interplay of market demands and marine resource conservation, including the impact of policies in both of these areas. There may be options to promote and develop alternative markets for particular products that encourage the catch of more sustainable resources and increase

participation of women in these markets. While improving livelihoods through value chain interventions has high potential, this should not be done to the detriment of marine resources and the future generations that depend on them.

Acknowledgment

The authors gratefully acknowledge all our key informants in the two study sites who were interviewed, participated in focus groups, or contributed in any other way, for spending their valuable time to assist us to carry out the study described in this brief. We are also grateful for helpful comments received from Ranjitha Puskur. This project was funded by New Zealand through the Ministry of Fisheries and Marine Resources, Mekem Strong Solomon Islands Fisheries (MSSIF) Programme.

References

- ADB/SPC. 2010. Solomon Islands: demographic and health survey 2006–2007. Honiara, Solomon Islands: Asian Development Bank and Suva, Fiji: Secretariat of the Pacific Community.
- Agarwal B. 1997. 'Bargaining' and gender relations: Within and beyond the household. *Feminist Economics* 3(1):1–51.
- Boso D. and Schwarz A. 2009. Livelihoods and resilience analysis in two community clusters: The Funa'afou and Foueda artificial island communities, Lau lagoon, Malaita Province, Solomon Islands. Penang, Malaysia: WorldFish Center.
- KIT, Agri-ProFocus and IIRR. 2012. Challenging chains to change: Gender equity in agricultural value chain development. Amsterdam, Netherlands: KIT Publishers, Royal Tropical Institute.
- FAO. 2011. The state of food and agriculture 2010–11: Women in agriculture: closing the gender gap for development. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Muñoz Boudet A.M., Petesch P., Turk C. and Thumala A. 2013. On norms and agency: Conversations about gender equality with women and men in 20 countries. *Directions in Development*. Washington, DC, United States of America: World Bank.
- MWYCA. 2009. Solomon Islands national policy on gender equality and women's development. Honiara, Solomon Islands: Ministry of Women, Youth, and Children Affairs.
- Prange J.A., Schwarz A. and Tewfik A. 2009. Assessing needs and management options for improved resilience of fisheries-dependent communities in the earthquake/tsunami-impacted Western Solomon Islands. Community needs, resource status, and recover response to the disaster synthesis. Report to Force of Nature Aid Foundation.
- SI-NSO/UNDP. 2008. Solomon Islands: Analysis of the 2005/06 household income and expenditure survey. Honiara, Solomon Islands: Solomon Islands National Statistics Office and Suva, Fiji: Pacific Center, United Nations Development Program.
- Weeratunge N., Chiuta T.M., Choudhury A., Ferrer A., Hüskens S.M.C., Kura Y., Kusakabe K., Madzudzo E., Maetala R., Naved R., Schwarz A. and Kantor P. 2012. Transforming aquatic agricultural systems towards gender equality: A five-country review. Penang, Malaysia: CGIAR Research Program on Aquatic Agricultural Systems. Working Paper: AAS-2012-21.

Photo credits:

- Wade Fairley: page 32;
- Froukje Kruijssen: pages 27, 28, 30 & 33;
- Fred Olivier: page 35;
- Anne-Maree Schwarz: page 25.

© Copyright Pacific Community (SPC), 2015

All rights for commercial / for profit reproduction or translation, in any form, reserved. SPC authorises the partial reproduction or translation of this newsletter for scientific, educational or research purposes, provided that SPC and the source document are properly acknowledged. Permission to reproduce the document and/or translate in whole, in any form, whether for commercial / for profit or non-profit purposes, must be requested in writing.

Original SPC artwork may not be altered or separately published without permission.

The views expressed in this Bulletin are those of the authors and are not necessarily shared by the Pacific Community.

Original text: English

Pacific Community, Fisheries Information Section, BP D5, 98848 Noumea Cedex, New Caledonia
Telephone: +687 262000; Fax: +687 263818; cfpinfo@spc.int; <http://www.spc.int/fame>