Learning from the lagoon: Research in development in Solomon Islands

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CGIAR RESEARCH PROGRAM ON Aquatic Agricultural Systems

LEARNING FROM THE LAGOON: RESEARCH IN DEVELOPMENT IN SOLOMON ISLANDS

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Citation

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

Acknowledgements

We would like to thank all donors who supported this work through their contributions to the CGIAR Fund. For a list of Fund donors please see: http://www.cgiar.org/who-we-are/cgiar-fund/fund-donors-2/

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EXECUTIVE SUMMARY

A major challenge for international agricultural research is to find ways to improve the nutrition and incomes of people left behind by the Green Revolution. To better address the needs of the most marginal and vulnerable people, the CGIAR Research Program on Aquatic Agricultural Systems (AAS) developed the research-in-development (RinD) approach. In 2012, WorldFish started to implement RinD in Solomon Islands. By building people's capacity to analyze and address development problems, actively engaging relevant stakeholders, and linking research to these processes, RinD aims to develop an alternative approach to addressing hunger and poverty. This report describes the key principles and implementation process, and assesses the emergent outcomes of this participatory, systems-oriented and transformative research approach in Solomon Islands.

Fo mekem stori sot

Wanfala big problem lo agrikalsa risets lo plande ples nao hao for mekem gut moa wei wea pua pipol save faendem kaikai an seleni from agrikalsa. For iumi save gut moa hao for helpem oketa pua pipol wea stap en dipen lo solwata or lan for mekem seleni an kaikai, WorldFish kam ap wetem risets-lo-divilopmen (RinD) program for duim risets en semtaem help for mekem gud laef blo oketa pua pipol tu. For helpem pipol luk savve weis for solvem problem ia, iumi mas waka tugeda weitem oketa narafala NGOs an gavmen, for helpem oketa wea no garem chance or save mekem kaikai en seleni. Disfala ripot hem lukluk lo samfala weis wea kam aot from risets program WorldFish waka lo hem.

WorldFish is an international research organization that harnesses the potential of fisheries and aquaculture to reduce hunger and poverty. WorldFish is a member of CGIAR and has worked in Solomon Islands since 1986. WorldFish conducts research under a memorandum of understanding with the Solomon Islands Government, which ensures that research priorities are aligned with the policies of the Ministry of Fisheries and Marine Resources and the Ministry of Environment, Climate, Disaster Management and Meteorology.

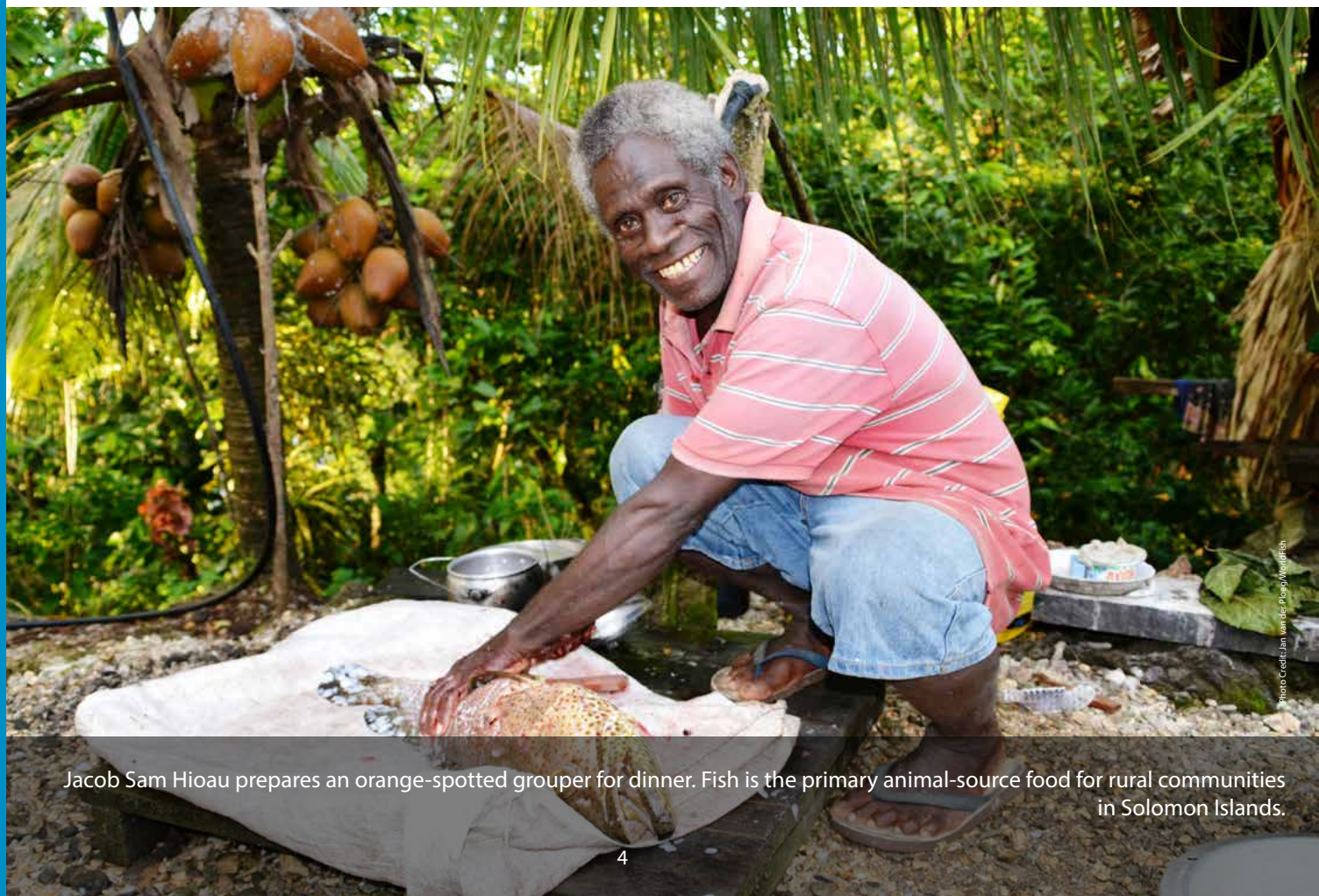


Photo Credit: Jan van der Ploeg/WorldFish

Jacob Sam Hioau prepares an orange-spotted grouper for dinner. Fish is the primary animal-source food for rural communities in Solomon Islands.

INTRODUCTION

International agricultural research has been highly successful in increasing food production, lowering food prices, and improving nutrition and incomes for millions of people, most notably through the development of new seed varieties (Evenson and Gollin 2003). But the benefits of the Green Revolution have been unequally distributed. Resource-poor people, particularly women, in less favorable agro-ecological zones such as mountains, deserts, tropical forests or small islands often suffered actual losses of income (Shiva 1991). A major challenge for international agricultural research in the coming decades is to find ways to reach these resource-poor and vulnerable people (Waters-Bayer et al. 2015).

The CGIAR Research Program on Aquatic Agricultural Systems (AAS) was set up in 2011 to reduce poverty and improve food security for farmers and fishers left behind by the Green Revolution (AAS 2012a). AAS focuses on rivers, lakes and coastal areas in Africa, Asia and the Pacific. These aquatic agricultural systems are characterized by high ecological productivity and, paradoxically, a high prevalence of poverty, vulnerability and inequity. Solomon Islands, which is representative of the small island systems of the Indo-Pacific where most rural people rely directly on fish for nutrition and income, is one of the five target countries of AAS (Govan et al. 2013a). Here, AAS aims to improve the lives of people dependent on aquatic agricultural systems through research that addresses community-defined priorities. Responding to the systemic failure of international agricultural research and extension to improve the lives of the most marginal and vulnerable people, AAS explores alternative pathways to make science more relevant, accessible and effective. Too often "off the shelf" agricultural technology does not meet local needs and is consequently not adopted by resource-poor farmers and fishers (Douthwaite 2002; Pritchett and Woolcock 2004; Sumberg 2005; Kristjanson et al. 2009). In order to overcome this gap between researchers and end users, AAS developed the research-in-development (RinD) approach.

The RinD approach aims to improve the effectiveness of agricultural research in improving the lives of the resource-poor by integrating contemporary social scientific thinking and insights into the design and implementation of research activities (Apgar and Douthwaite 2013; Dugan et al. 2013; Apgar et al. 2015). Figure 1 summarizes the RinD approach visually and highlights how it differs from more conventional forms of agricultural research (Dugan et al. 2013). The four blue boxes show the key principles of RinD. First, *commitment to people and place* signifies the importance of active engagement in a specific place over a longer period of time, in order to avoid what Robert Chambers (1983, 10) called "rural development tourism." Second, *participatory action research* aims to link science more directly with development interventions by adopting a cyclic process of joint identification, analysis, action and reflection at different scales to address social problems (Kemmis and McTaggart 2005; Apgar and Douthwaite 2013). Third, the *gender-transformative approach* aims to empower women and men to challenge inequitable gender norms and power relations that limit their opportunities, not as an afterthought but embedded in all steps of the research process (Kantor 2013; Cole et al. 2014). Fourth, *learning and networking* highlights the need to work closely together with communities, nongovernmental organizations (NGOs) and government on a jointly defined research and development agenda to ensure the application and local ownership of results and to avoid the proverbial scientific ivory tower (van der Ploeg and Persoon 2011; Janssen et al. 2013). Research can only be conducted in this way by investing resources in *partnerships* and *capacity building*, indicated in green boxes in the figure. Ultimately, RinD aims to contribute to poverty alleviation, which is primarily measured using intermediate development outcomes, indicated in the red circle in Figure 1 (Dugan et al. 2013).[1]

Between 2011 and 2015, WorldFish developed and implemented the RinD approach.[2] This report aims to describe the implementation process and assess the outcomes of this strength-based, systems-oriented and transformative research approach in Solomon Islands (Box 1). Does the application of the RinD approach make agricultural research more relevant to the needs of resource-poor and vulnerable communities? Does it improve our understanding of aquatic agricultural systems? Does it succeed in building capacity to innovate? And will it ultimately reduce hunger and poverty?

In the next section, we will describe the methodology used to document the outcomes of the RinD approach. The following section introduces the project areas or hubs: Malaita and Western Province. We then tell the story of the RinD approach in Solomon Islands. The next section revisits the theory of change of the RinD approach and compares desired outcomes with actual outcomes. In the conclusion, we reflect on which elements of the RinD approach are particularly valuable for the research activities of WorldFish in Solomon Islands in the coming years.

Originally, AAS was envisioned as a long-term research initiative running from 2011 to 2022. However, in October 2015 the research program was unexpectedly terminated as a result of competing priorities in the development aid budgets of key CGIAR investors (Rijsberman 2016). This report therefore also marks the end of AAS in Solomon Islands and offers an entry point for those who want to learn more about it.[3]

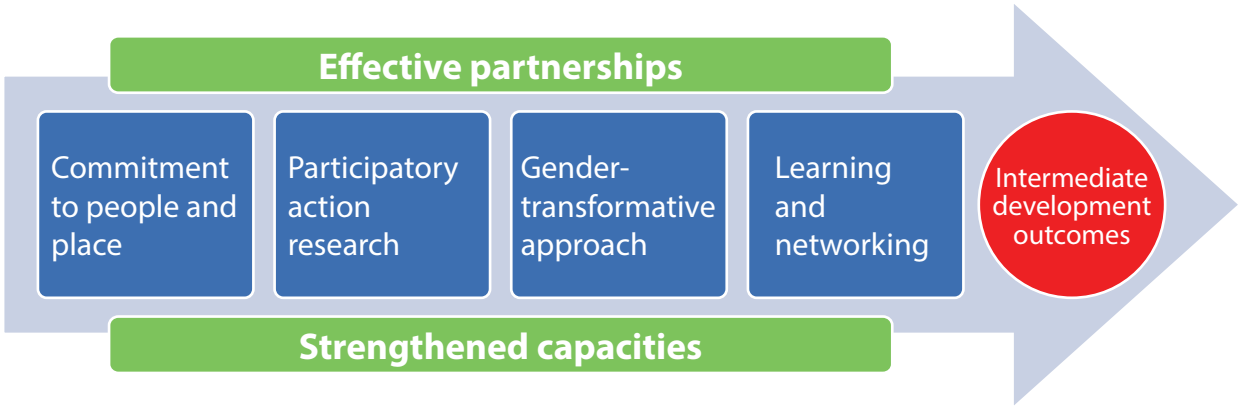


Figure 1. The RinD approach.

Box 1. Towards a transformative research approach

WorldFish has worked in Solomon Islands since 1986. The evolution of the organization's research agenda over the past 30 years is illustrative of the ongoing change in international agricultural research from a top-down linear approach towards a bottom-up transformative approach. The International Center for Living Aquatic Resources Management, as WorldFish was known in the 1980s, first focused on the development of technology to farm giant clams (primarily *Tridacna gigas* and *Tridacna derasa*) in a hatchery in Aruligo near Honiara. It was envisioned that farming clams could provide food and cash for resource-poor communities (Govan 1993; Bell et al. 1997). Typically, giant clam farming technology, being too costly and risky, was poorly adopted outside the walls of the laboratory. An aquaculture commodity development focus prevailed in the early 2000s: from the Nusatupe field station in Western Province researchers studied the distribution and abundance of pearl oyster spat, developed giant clam and coral culture for the international aquarium trade, and undertook biological studies and market feasibility studies of commodities such as sponges (Hawes and Oengpepa 2010). However, it was becoming clear that most small-scale aquaculture enterprises were not economically feasible. In 2007 WorldFish therefore broadened its research strategy towards small-scale fisheries management. In response to the growing recognition that "the single-species yield maximization research paradigm" that has dominated fisheries management since the 1950s was not very feasible for developing countries (Andrew et al. 2007), and in line with global discourses on participatory development, research activities of WorldFish in Solomon Islands focused on community-based natural resource management with an emphasis on learning by doing. Such action research projects resulted in the creation of several locally managed marine areas. However, overall success of these grassroots initiatives was mixed, as communities faced multiple and often conflicting challenges, many outside fisheries (Boso et al. 2010; Govan et al. 2011; Cohen et al. 2014a). AAS builds on these experiences. The RinD approach moved from action research to participatory action research, in which local people have a say in research design and direction, and embedded small-scale fisheries management in the wider development context. This transformative research and development approach engages directly with resource-poor communities and development partners at the provincial level. It specifically aims to change the underlying power structures and gender norms that cause poverty and inequality and to build people's capacity to innovate (Kantor and Apgar 2013).

METHODOLOGY

There are no standard guidelines for assessing the impact of participatory action research approaches such as RinD. RinD specifically aims to promote social change in order to enable agricultural innovation that will ultimately lead to improvements in health, wealth and the environment. Clearly, this is a different pathway to change than conventional agricultural research that focuses on the adoption of new technology. In participatory action research on agricultural innovation systems, the causal chains from intervention to impact are often complex, dynamic and nonlinear, and influenced by factors that cannot be controlled, which makes attributing impact to a single project intervention difficult (Hall et al. 2012). There is the danger of attributing impacts to an intervention when in fact they arose from unrelated processes, or of unexpected impacts being missed altogether. Standard research methods to measure impact, such as randomized control trials, impact assessments or cost-benefit analysis, are therefore of limited value. Moreover, the generalizability of these quantitative methods is low, limiting their potential for collaborative learning, which is an explicit objective of the RinD approach.

Douthwaite et al. (2014) therefore suggest using outcome evidencing: a flexible and pragmatic research methodology that specifically aims to identify the underlying impact pathways that lead to agricultural innovation. It is centered on testing theories of change, a participatory evaluation methodology that is increasingly used in research and development. In essence, a theory of change is an explanation of how and why a specific intervention works (Weiss 1995). A theory of change logically links project activities to outcomes, identifies connections between outcomes, and relates outcomes to impacts, usually in the form of a graphic model in which arrows posit causality (Taplin and Clark 2012).[4] It reflects critically on the assumptions on which an intervention is based and compares the desired outcomes that were envisioned at the start to the actual outcomes (ISPC 2012). A theory of change thus provides an in-depth understanding of how change actually happens and predicts how an intervention might work in a different context.

In outcome evidencing, stakeholders identify expected and unexpected outcomes, and compare these with the original theory of change of an intervention (Wilson-Grau and Brit 2012). Drawing on these principles, WorldFish convened a workshop in Auki in November 2015 at the close of AAS. During the workshop, WorldFish and The World Vegetable Center (AVRDC) staff directly involved in AAS revisited the theory of change of the RinD approach, identified several cases in which the program facilitated social change and innovation, and mapped causal chains using abductive reasoning.[5] In abductive reasoning, or retroduction, researchers seek to identify the simplest and most likely explanation for why and how changes occurred by reasoning logically from effects to causes without making a priori assumptions (Wuisman 2005; Walters and Vayda 2009). The authors subsequently developed these cases using standard methodological procedures for case studies (Yin 1999). To ensure scientific rigor, we used counterfactual reasoning, in which we asked what would have happened without the specific interventions, and aimed to triangulate our findings (Stake 2005). The lead author of the report was not directly involved in the implementation of AAS, which further limited potential biases (Roe et al. 2013).

This qualitative information was complemented and contextualized with a review of the internal project reports and scientific publications of AAS. Internal reports are prepared after field trips, workshops, meetings and other project activities (see the annex for a synopsis of the unpublished WorldFish reports used in the preparation of this report). Scientific publications of AAS include reports and peer-reviewed papers, most of which are accessible on the web (www.worldfishcenter.org).

Solomon Islands

Solomon Islands consists of almost 1000 islands covering a total land area of 28,000 square kilometers (km^2) and is inhabited by approximately 516,000 people (SINSO 2009). Solomon Islands ranks 142 out of 187 countries on the Human Development Index (UNDP 2013). Median per capita expenditure is estimated at SBD 3000 (USD 378) per year, with 50% of the population living on USD 1 per day (SINSO 2006).[6] However, such international poverty standards are generally considered inappropriate for the Pacific (Narsey 2011). In the rural areas, people rely heavily on subsistence horticulture and small-scale fisheries as the main sources of food and income. Here, people have very little cash and lack basic infrastructure services, but manage to secure their basic needs. Nevertheless, it is clear that Solomon Islands is one of the poorest countries of the world, and that many people in the archipelago are vulnerable and lack opportunities to improve their lives.

Fish is the primary animal source of protein in the archipelago and is essential for nutritional wellbeing (Bell et al. 2009).[7] The country boasts one of the most diverse coral reef systems in the world, with 485 coral species and 1019 fish species recorded in its waters (Green et al. 2006; Sulu et al. 2012). But rapid human population growth, climate change and market pressures imply that reef fisheries will not be able to meet future demands (Andrew et al. 2007; SPC 2014). Horticulture is the other main source of food and income for most rural households in Solomon Islands. But growing demand has drastically reduced fallow periods, which is leading to soil degradation, increased pests and diseases, and declining yields (MDPAC 2007). Copra and cocoa are important agricultural commodities. Other sources of income include wage labor, remittances, royalties from extractive industries and government cash handouts. Common staples include sweet potato, cassava, yam and taro. However, people increasingly consume imported food, such as noodles and rice, particularly in the urban centers.

Malnutrition remains a persistent problem in Solomon Islands, particularly in the rural areas. It is estimated that 32% of children under 5 years old are stunted as a result of long-term deficiency of energy and nutrients, caused by infectious diseases and inadequate food intake (SINSO 2009; Andersen et al. 2013). Paradoxically, many adults are obese or overweight, leading to a range of noncommunicable diseases such as diabetes. This combination of under- and overnutrition, often in the same household, places a double burden on the health system (Andersen et al. 2013, 11).

There are marked gender divisions in livelihood activities: the general perception is that in traditional Melanesian society men go fishing, while women mainly tend to the fields. However, such a generalization undervalues the important role of women in collecting, processing, preparing and marketing fish and other marine resources and masks rapid social change (Hilly et al. 2012; Weeratunge et al. 2012). Gender inequality remains prevalent in Solomon Islands and forms a major constraint for agricultural innovation (Schwarz et al. 2014). Women are less educated than men and are often poorly represented in community, provincial and national decision-making bodies (SINSO 2009; Govan et al. 2013b). Indicative of the severe gender inequalities and the vulnerable position of women in Solomon Islands are the high rates of physical and sexual violence against women (SPC 2009).

It is estimated that 87% of the land remains under customary ownership (Ipo 1989; Govan et al. 2013a). Decisions on extractive activities, land use changes or sales are made by the chief or the elders of a clan, almost always exclusively men. But traditional leadership structures and tenure systems are under increasing pressure from internal factors, including changing consumption patterns, education and migration, and external factors such as the demands of logging, mining and fishing companies (Akimichi 1991; Hviding 1998; Aswani 1999).[8]

The national government agencies, such as the Ministry of Agriculture and Livestock, the Ministry of Fisheries and Marine Resources, the Ministry of Rural Development, and the Ministry of Environment, Climate Change, Disaster Management and Meteorology, lack the resources and capacity to provide basic infrastructure and services in most parts of the country (Govan et al. 2013b). From 1999 to 2003, ethnic violence and rioting in and around Honiara led to a breakdown of governance. Since 2004 an Australian-led peacekeeping force, the Regional Assistance Mission to Solomon Islands, has aimed to provide security and re-build the capacity of the central state (Dinnen and Allen 2016). The Solomon Island Constitution and the Provincial Act of 1997 devolve power and authority from the central government to the provinces. However, the resources and capacity of provincial governments remain prohibitively low (Lane 2006). In the 1990s the area councils were abolished, leaving an administrative void at the village level, which customary and church leaders are struggling to fill (Bennett et al. 2014a). At the same time, communities in Solomon Islands are going through an unprecedented social and economic transformation in which traditional norms such as solidarity, reciprocity and collective support are increasingly challenged by modernization (Schwarz et al. 2011).

RinD in Solomon Islands has focused on two hubs: Malaita and Western Province (Figure 2).

Figure 2. Location of the two AAS hubs in Solomon Islands: Malaita and Western Province.

Malaita

Malaita Province covers approximately 4300 km^2. It includes Malaita Island and the directly adjacent islands of Maramasike, Manaoba and Basakana. Administratively, the far-flung islands of Sikaiana, Dai and Otong Java are also part of Malaita Province. Malaita's climate is extremely wet, with up to 6000 millimeters of rainfall annually. The geography of Malaita Island is characterized by rugged mountains, lowland tropical forests and shallow lagoons on the coast. With 137,000 people, the island has the highest population of all Solomon Islands provinces. Most of its tropical forest vegetation has been altered by shifting cultivation.

Sixteen different languages are spoken in the province, a reflection of the cultural heterogeneity of these islands. Historically, the so-called "saltwater people" relied exclusively on marine resources, which were bartered for root crops and vegetables with the "bush people" from the uplands (Molea and Vuki 2008; Sulu et al. 2015). Land rights are generally determined by patrilineal descent, but land disputes are common on Malaita and pose a serious obstacle to rural development (Malaita Province 2006). In colonial times Malaitans were recruited to work on plantations throughout the country, and more recently many Malaitans live, work and study in Honiara. Solomon Islanders of Malaitan descent now make up more than one-third of the country's population.

In 2012, WorldFish established an office in Auki. Malaita was selected as a hub because of its relatively high levels of poverty, high human population pressure, large reef areas, supportive provincial government, and low levels of outside research and development support (Schwarz et al. 2013). The provincial government identified the decline of marine resources as a severe threat to food security and called for urgent action to address these problems (Malaita Province 2006). RinD focused on three communities in the Lau-Mbaelelea constituency in North Malaita: (1) Fumamato'o, (2) Alea and (3) Suafa-Kwai (Figure 3).[9] These remote rural communities are faced with the classic challenge of rapidly growing populations and increasing exposure to the global economy in a context of limited natural resources (Schwarz et al. 2011).[10]

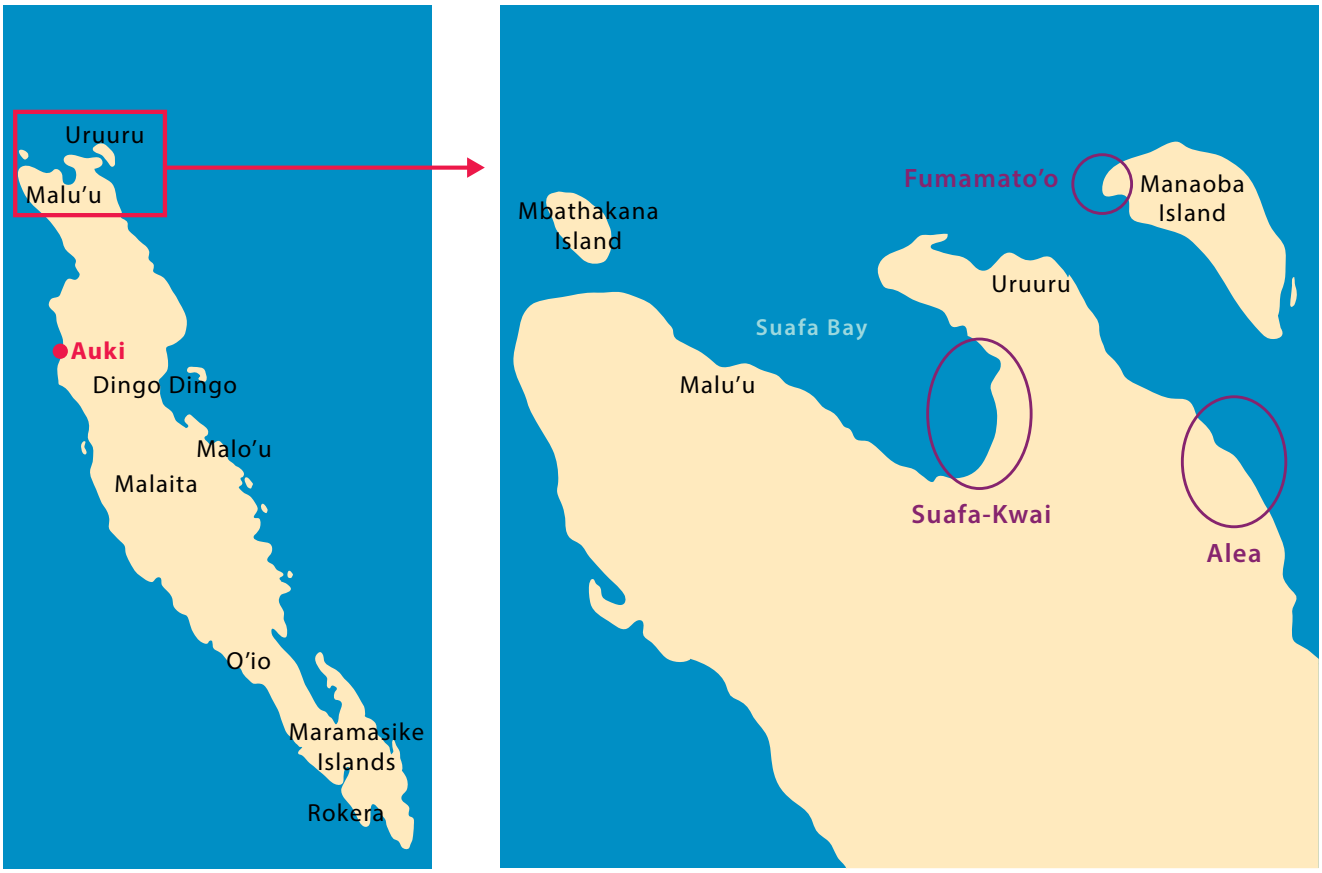


Figure 3. Focal communities in North Malaita.

Fumamato'o

Fumamato'o is located on the western end of Manaoba Island in the Lau Lagoon. The village consists of four hamlets inhabited by approximately 72 households. Most households rely on fishing and horticulture for subsistence. Administratively, Fumamato'o is part of the Foueda Ward. Located 1 hour by boat from the regional town center Malu'u, where basic public services are located, accessibility is a major constraint for rural development. An airstrip was recently constructed on Manaoba Island, but land disputes prevent operations. There is little NGO activity in the area, with the exception of Australian Aid and the Red Cross, which provided water tanks to improve access to safe drinking water. In the absence of a traditional chief, decisions are made collectively by the men of the village.

Alea

Alea is a cluster of seven villages in the Lau Lagoon with more than 125 households. It includes the villages of Lafumasi, Samaria, Niu Kwaloai, Kafoere, Otethamo and Takwa, as well as the artificial islands Niuleni and Funa'afou. Alea itself is a hamlet with only two households. People originally inhabited the artificial coral islands in Lau Lagoon, but have re-settled in the past century on the mainland. On the artificial islands, artisanal fishing remains the main livelihood strategy. In contrast, people in the other villages on the mainland rely increasingly on farming. Watermelon, yam and taro are important cash crops that are marketed in the urban centers of Auki and Honiara. The main coastal road passes through these villages, which facilitates market access. Administratively, these villages are part of Takwa Ward, with the exception of Niuleni and Funa'afou, which belong to Foueda Ward. Most villages have a traditional chief and church leader. The Baetoalau Farmers' Association, a local farmers' organization established by Kastom Gaden Association (KGA), provides agricultural extension services to its members. "Baetoalau" is a contraction of Baelelea, To'abaita and Lau, the three main areas where the members of the association live. KGA is a Solomon Island NGO that is working on sustainable agriculture and

Photo Credit: Jan Van der Ploeg/WorldFish

Women barter fish for root crops in the Takwa market in North Malaita.

nutrition. Other NGOs active in Alea include the Adventist Development and Relief Agency (ADRA), a faith-based organization that is mainly focused on providing microcredit to youth groups. WorldFish engaged communities in Lau Lagoon in integrated coastal resource management in 2009.

Suafa-Kwai

Kwai is a small village with 12 households located along the Kwai River in Suafa Bay. There are strong tribal affiliations with several other villages in Suafa Bay, including Ngorigifau, Kwango, Adaitolo, Aenatefeniu and Faufanea, and traditional leadership structures remain strong. Most people in the area trace their origin to the Ulufera tribe from Faka Island. These saltwater people continue to rely heavily on coastal resources. People in Suafa Bay adhere to different religious groups, including South Sea Evangelical, Catholic, Pentecostal, Seventh Day Adventist, Anglican and Assembly of God. Administratively, the area is part of Takwa Ward. The national government proposed constructing an onshore tuna processing facility in Suafa Bay, but these development plans are on hold for the foreseeable future. Kwai is located along the road, which facilitates access to the market and public services in the government substation Malu'u.

Western Province

With almost 90,000 people, Western Province is the second most populous province of Solomon Islands after Malaita. The province consists of several large volcanic islands, including Vella Lavella, Kolombangara, New Georgia, Vangunu, Ngatokae and Rendova, fringed by extensive lagoon systems and numerous small limestone islands.

People rely heavily on marine and forest resources for food and cash (Kruijssen et al. 2013). In fact, household incomes in Western Province are the highest in Solomon Islands, largely due to the forestry, fishery and tourism industries. The largest tuna fishing and canning company in the country, Soltuna, is based at Noro on New Georgia. A large number of logging concessions are active in the archipelago, which has led to rapid deforestation and social conflicts and threatens coral reef ecosystems (Bennett et al. 2014b). The large-scale conversion of forest into oil palm plantations poses another significant risk to marine ecosystems in the province (Albert et al. 2013).

In 2007, Western Province was significantly affected by an earthquake and tsunami, highlighting the vulnerability of rural communities in Solomon Islands to natural disasters (Schwarz et al. 2007). In contrast to Malaita, a variety of research and development organizations are active in Western Province, particularly focused on marine resource management (Bennett et al. 2014a). Since 1991, WorldFish supported various communities in Western Province in community-based natural resource management approaches (Cohen and Alexander 2013; Cohen et al. 2013). Since 2013, RinD in Western Province has focused on two focal communities: Leona and Paramatta on Vella Lavella Island, and Santupaele on Kolombangara Island (Figure 4).

Leona and Paramatta

Leona and Paramatta are two villages on the west coast of Vella Lavella Island inhabited by approximately 80 households. Marine resources play a central role in local livelihoods: men go out to sea while women fish on the fringing reef. In the early 2000s people were expressing interest in resource management because they perceived a decline in marine resources caused by unsustainable logging activities, the use of destructive fishing practices and overharvesting. Leona and Paramatta were severely affected by the 2007 earthquake and tsunami, after which WorldFish, along with the Natural Resource Development Foundation (a local NGO focused on sustainable forest management), started supporting these communities (Schwarz et al. 2007). This has led to the creation of a terrestrial protected area and a locally managed marine area by the Jorio Marine Resource Management Committee (Cohen et al. 2014b). Administratively, the villages are part of North Vella Lavella constituency, Ward 10. A large number of development NGOs have been active in Vella Lavella, including Save the Children, the Red Cross, World Vision, Oxfam, ADRA, and the European Union-funded Rural Advancement Micro Project.

Santupaele

The Santupaele community consists of seven small hamlets on the west coast of Kolombangara Island inhabited by approximately 30 households. The name Santupaele is a contraction of the names of the two largest villages: Sandfly and Patupaele. The main livelihood activities include gardening, fishing, copra production, timber milling and contracted employment in the two logging companies that operate in the community. Logging has caused frictions in the community, particularly related to revenue sharing. As is the case in many rural areas, religious groups play an important mediating role; in Santupaele, the Seventh Day Adventist and the United Church fill this role. Administratively the community is part of Ward 26 of the Gizo-Kolombangara constituency. Live and Learn, an international conservation NGO, has been working in the community for several years, primarily focused on microcredit and environmental education. More recently, KGA has established a demonstration farm to provide information to farmers on sustainable farming techniques.

Figure 4. Focal communities in Western Province.

Program rollout

RinD activities in Solomon Islands started in 2012 with AAS rollout (AAS 2012b). It began with a detailed analysis of the socioeconomic, ecological and political context of the country: the national situation analysis (Govan et al. 2013a). This was followed by an analysis of aquatic agricultural systems in Malaita: the scoping report (Schwarz et al. 2013). These insights were subsequently used to develop partnerships with stakeholders at the provincial level and facilitate the design of action plans at the community level.

Stakeholder partnerships

Building on the scoping report, representatives from WorldFish, the Malaita Provincial Government, national government ministries and several development NGOs working in Malaita jointly formulated research and development priorities—the so-called hub development challenge—during a stakeholder consultation workshop in Auki in June 2012. The hub development challenge was subsequently refined during a workshop in Auki with representatives from communities in five priority areas in Malaita Province where WorldFish and partners had previous engagements, and ultimately endorsed at the national program design workshop in Honiara in November 2012 (Box 2). At the suggestion of stakeholders at that meeting, the Malaita Province Partnership for Development (MPPD) was asked to function as a steering committee of AAS in Malaita Province.[11] The hub development challenge has guided research activities in Malaita and has enabled collaborative partnerships with government agencies and NGOs.[12]

A different approach was taken in Western Province. The long-term engagement of WorldFish in the province and the large number of other conservation and development NGOs in the province meant that there was a great deal of research to build on (Schwarz and Boso 2013). Western Province was therefore identified as a scaling hub (Box 4). Here the lessons from the implementation of the RinD approach in Malaita were to be applied within existing WorldFish projects. The program rollout in Western Province started in November 2013. A hub development challenge, around which partners could convene and coalitions could be formed, was jointly drafted during a consultation workshop in Gizo with representatives of the Western Province government, ministries and NGOs (Box 3). Improving coordination between the different NGOs working on natural resource management in Western Province was identified as a priority by stakeholders. Activities in Western Province therefore focused on building more effective partnerships.[13]

Community engagement

WorldFish undertook a staged approach to selecting communities in Malaita (AAS 2013; Schwarz et al. 2013). In collaboration with the provincial government, ministries, several NGOs active in Malaita Province (specifically World Vision, ADRA and KGA) and community representatives, the fishing and farming communities of Lau Lagoon in North Malaita were identified as a priority region. The final selection of the three focal communities in North Malaita—Fumamato'o, Alea and Suafa-Kwai—was done in close collaboration with the Malaita Chazon Development Authority and was primarily based on (1) the expressed interest of the community, (2) the presence of community champions that could help facilitate participatory action research initiatives and (3) the support of community leaders.[14] One of the AAS program-wide criteria for community selection was the active presence of NGOs and government agencies as partners (AAS 2012b). In Malaita, however, the provincial government specifically aimed for a geographical spread of NGOs in order to provide development assistance to as many communities as possible. For that reason, a fourth principle was added to the selection criteria: (4) the absence of other NGOs working in the area.

WorldFish then initiated workshops in the three focal communities, using the community life competence process, a participatory methodology adopted by AAS that enables rural communities to sketch a common vision, assess potential barriers and develop an

Box 2. Malaita hub development challenge

"Rural people in the Malaita Hub of Solomon Islands face major challenges from rising population and declining quality and availability of marine and land resources. The development challenge is to improve their lives through more productive, diversified livelihoods that empower communities to be better able to adapt to change and make more effective use of their resources. The research challenge we will address with the people of Malaita Hub is to develop and test alternative approaches to livelihood diversification and resource stewardship that will accelerate development and restore the productivity of their resources" (Govan et al. 2013b, 4).

Box 3. Western hub development challenge

"Western Hub is spread over a wide area of sea and is comprised of small urban centers and many small, often isolated communities. The hub supports major commercial industries including logging, tuna and tourism. These industries bring opportunities for employment but impacts are not universally positive or spread equitably across the hub. Rural people are vulnerable to external shocks and this can be compounded or ameliorated by the degree of isolation. The development challenge is to improve the lives of people in Western Province by empowering communities to increase the benefits they derive from their natural resources, while accounting for the diversity and variability in the way they lead their lives and access resources and services. The research challenge we will address in Western Hub is to work with communities and other partners to improve the management of resources; and to improve equity in value chains to increase benefits and resilience" (Bennett et al. 2014b, 5).

Box 4. Scaling pathways in AAS

AAS identified three scaling pathways. First, the intensive engagement at the grassroots level enabled the program to identify, test and evaluate novel ways to improve livelihoods. It was envisioned that the lessons learned from these experiments would be shared with and replicated in other communities, thereby achieving impact on a much larger scale. The partnerships at the provincial and national levels provided a second potential scaling pathway. It was anticipated that these networks would enable creative and innovative thinking on how to address development issues. Third, the experiences and insights from implementation would be shared at the international level, providing an opportunity to influence national and regional development policies (Kantor and Apgar 2013; Nurick and Apgar 2014).

In Malaita, RinD was focused on the first and second scaling pathways: scaling out to other communities and scaling up to partners at the hub level. In Western Province, where there are many other NGOs working on coastal resource management and nutrition, WorldFish concentrated on the second scaling pathway: sharing lessons with and building capacities of partners. A similar scaling approach was adopted in other communities in Malaita where WorldFish had ongoing research projects. Examples include fishers from the Langalanga Lagoon, inland aquaculture farmers in West Kwara'ae, and mangrove-dependent communities in the Maramasike passage in South Malaita. As a research-based organization WorldFish aims to publish experiences in the international academic literature; this is the third scaling pathway.

action plan (Nurick and Apgar 2014).[15] In these workshops, participants highlighted local development priorities and identified concrete steps that they could undertake themselves to address these issues (Box 5). These action plans were reviewed annually in a workshop in each community, in which progress was reviewed and discussed and new activities were identified.[16] A slightly different approach was taken in Western Province (Box 6).

Clearly, a major challenge in this participatory process is to avoid raising unrealistic expectations in the communities (AAS 2013). To ensure free, prior and informed consent, WorldFish drafted a community research agreement with all focal communities. These signed agreements formalized the partnership between WorldFish and the community and specified the responsibilities of both parties. Intensive communication with community facilitators and community champions, most often in the local language, further enabled the maintenance of good relationships between WorldFish and communities.

Community champion Osanty Luda explains weeding and mulching techniques to women in a watermelon plot in Alea.

Box 5. Community action plans in Malaita

The community action plans in North Malaita were drafted in July 2013 and reviewed in April 2014 and May 2015. The community in Fumamato'o highlighted four development dreams: (1) the conservation of marine resources; (2) improved soil management; (3) improved water supply and sanitation facilities; and (4) a clinic in their village. In Alea, people also identified four priority areas to improve wellbeing: (1) health and sanitation; (2) soil fertility, agricultural production and food security; (3) community cooperation and partnerships with stakeholders; and (4) marine resource management and reforestation of mangroves. The action plan of Kwai included three priorities: (1) the sustainable management of fisheries; (2) sustainable farming; and (3) income-generating activities and marketing. Three main themes emerged from the workshops in these focal communities. First, in all villages people identified sustainable management of fisheries as an important priority, which was perhaps not surprising, as all these communities rely on coastal resources and WorldFish facilitated the workshops (Pritchett and Woolcock 2004). Second, problems related to water, sanitation and hygiene were brought up in all communities, particularly by women. Third, communities in Malaita emphasized problems related to declining agricultural productivity. Fisheries management is clearly the expertise of WorldFish. The other two themes, however, underline the importance of partnerships. Communities in Malaita have worked with AVRDC and KGA on improving soil management and diversifying crops. Initiating partnerships that focused on improving public health, however, proved more difficult, and little progress has been made on this component of the community action plans.

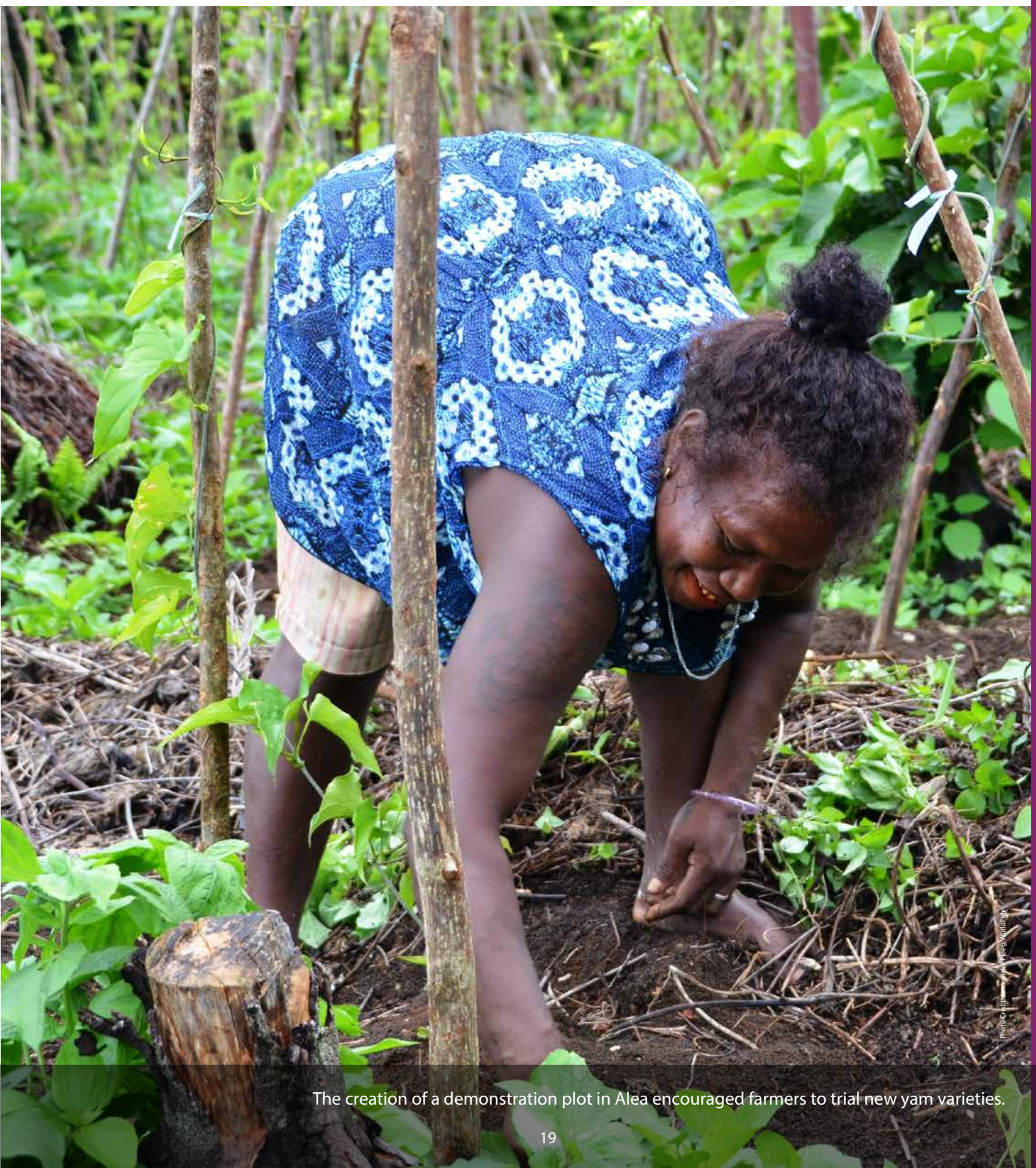
Box 6. Community action plans in Western Province

WorldFish has worked in Leona and Parramatta since 2007, and facilitated the design of a community-based marine resource management plan. Instead of re-engaging the community in an action planning workshop, community leaders were trained in Nusatupe in facilitation skills. The community in Santupaele also already had an action plan from a previous engagement with Live and Learn. However, people here felt that a revision was timely, as the community action plan only focused on natural resource management. In Santupaele, people identified four development goals: (1) improve water supply and sanitation, (2) conserve marine resources, (3) strengthen law and order, and (4) maintain traditional values and customs. This process embedded natural resource management activities firmly in the development priorities of the community.

Research initiatives

The RinD approach aims to *develop the system's capacity to innovate* by using participatory action research (Apgar and Douthwaite 2013; Nurick and Apgar 2014).[17] Participatory action research generally involves a cycle in which people (1) identify a practical problem and plan to do something about it, (2) act on this plan, (3) observe and document how it went, and finally (4) reflect on the results and draw lessons (Apgar and Douthwaite 2013). Ideally, these insights are used to plan a new intervention, leading to a repetitive process of collaborative learning (Kemmis and McTaggart 2005). Figure 5 presents this iterative cycle in which communities try to solve problems that they themselves have identified.

Some of the developmental priorities identified in the community action plans require scientific inquiry and expertise. This provides



The creation of a demonstration plot in Alea encouraged farmers to trial new yam varieties.

an opportunity to embed scientific research in these grassroots development processes. Two main goals that emerged from the community action plans and that fall within the area of expertise of WorldFish are (1) improving management of marine resources and (2) improving the productivity of farming systems. Two research initiatives were designed to support people to address these challenges: (1) resource governance for development and (2) sustainable farming for nutrition and income. In cooperation with stakeholders at the provincial and national levels, a third research initiative was designed that focuses specifically on stakeholder engagement and networking: (3) transformative learning and change. These three research initiatives aim to bolster grassroots development action and address the hub development challenge in Malaita and Western Province (Figure 6).[18]

Resource governance for development

The resource governance for development initiative emerged from concerns at the community and provincial levels in both hubs about the rapid decline of marine resources and built on the research activities of WorldFish over the last decade. The research initiative aims to (1) sustain the benefits people derive from natural resources, (2) identify opportunities to build resilient livelihoods, (3) strengthen coordination and learning among resource management and development partners, and (4) influence policies. In close collaboration with stakeholders, a theory of change was developed for the initiative: "Improvements in natural resource governance, paired with efforts to build resilience and provide market access, will make a major contribution to food security, poverty alleviation and environmental sustainability."

In Malaita, participatory action research primarily focused on supporting the community in Fumamato'o in setting up and managing a 200-hectare locally managed marine area to allow the recovery of fish stocks. A draft management plan was formulated during a training workshop on community-based natural resource management and subsequently discussed during several community meetings. A mangrove replanting training was organized in Alea in October 2013. In April 2014, representatives of the three focal communities made a cross visit—a so-called "look and learn" trip—to Western Province

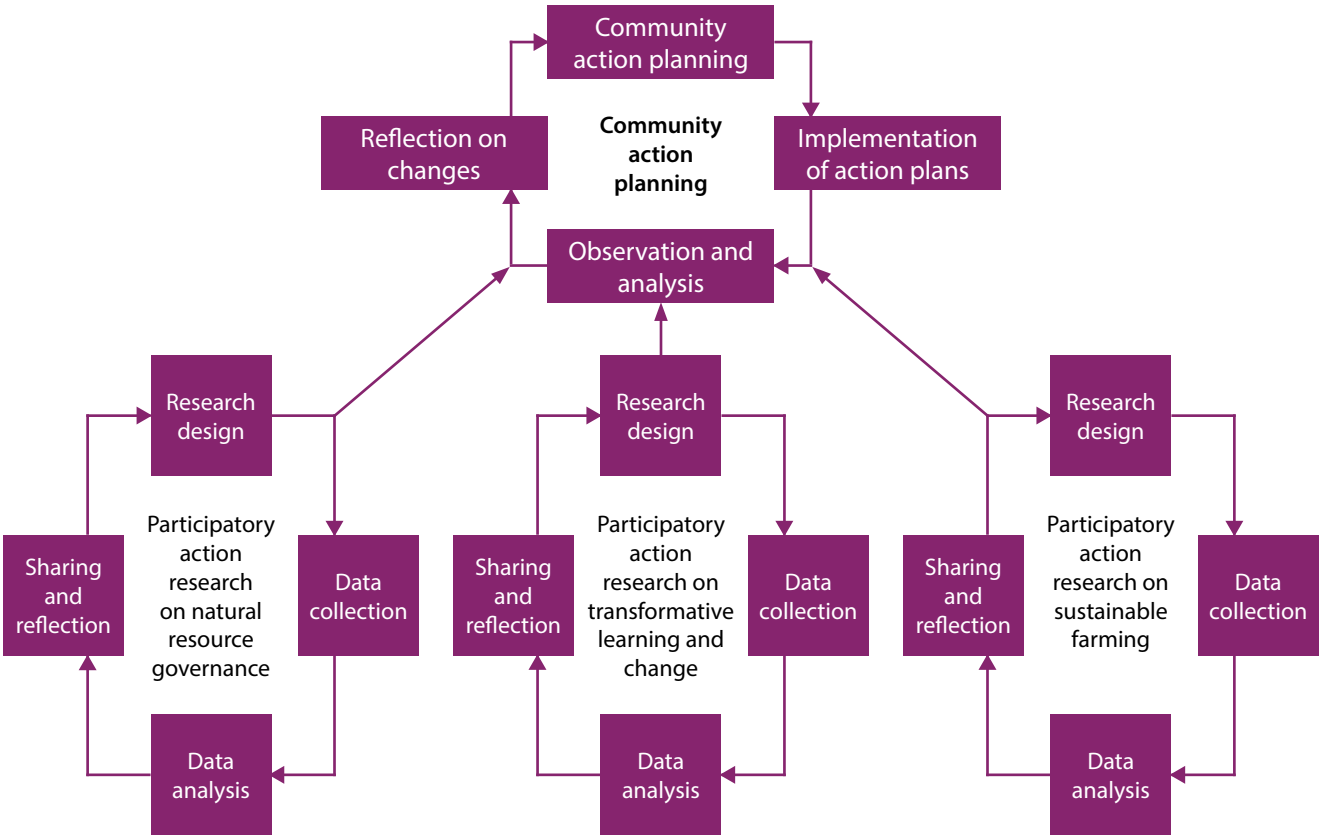


Figure 5. Linking research to community action plans.

to share lessons about community-based resource management. Several projects funded by donors independent of AAS provided additional opportunities to learn from and share lessons with other communities in Malaita and involve stakeholders at the provincial and national levels: scaling out and scaling up in AAS terminology (Box 7). Particularly relevant in this context is the Malaita Provincial Fisheries Ordinance, drafted with WorldFish support, which provides a legal framework for community-based resource management.

In Western Province the research initiative focused on facilitating the design and implementation of a marine resource management plan in Santupaele and supporting adaptive management in Leona and Paramatta. These experiences were documented and shared at the provincial level through the Western Province Fisheries Advisory Committee and the Solomon Islands Community Conservation Program.[19]

Sustainable farming for nutrition and income

The sustainable farming for nutrition and income research initiative aims to improve fish, vegetable and root crop farming technologies of smallholder farmers. The theory of change for this initiative, developed in collaboration with farmers, government officials and NGO representatives, is that the adoption of sustainable farming practices will produce a variety of resilient, good-quality, nutritious foods for consumption and marketing. This will result in women, men and children consuming more diverse, nutrient-rich food that is prepared through efficient ways of cooking, and in households having an increase in income (Albert and Bogard 2015).

Central to the implementation of this initiative is a partnership between WorldFish and AVRDC, and the drawing together of a coalition of partners working on agriculture and nutrition in Malaita. Participatory action research focuses on the three focal communities in North Malaita and on aquaculture farmers in Central Malaita.[20] Training workshops on sustainable farming techniques were organized in Suafa-Kwai in 2013 and in Fumamato'o in 2014 in collaboration with Baetoalau Farmers Association. A participatory rural appraisal identified several constraints for agricultural

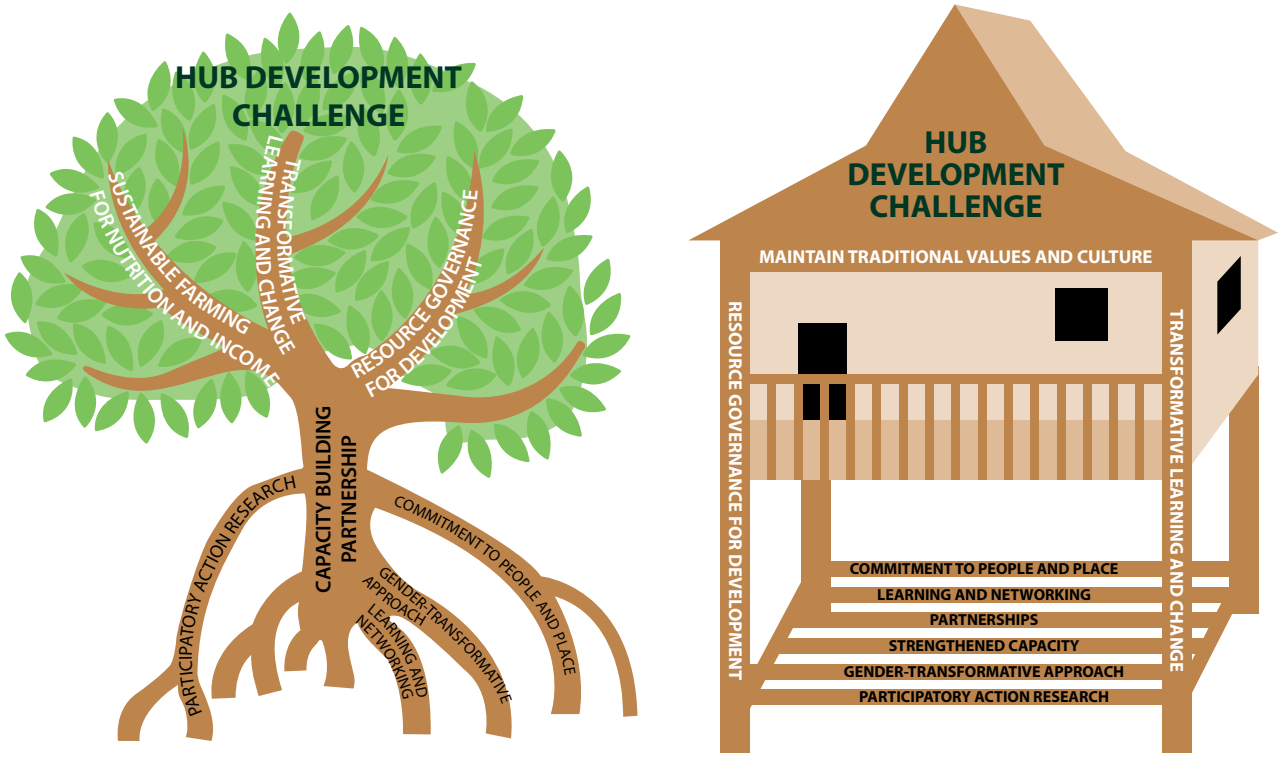


Figure 6. The mangrove tree, the Malaita strategic research framework (left), and the *lif haus*, the Western Province strategic research framework (right).

development in Alea, including limited access to planting materials and declining soil quality (AVRDC 2015). In response, AVRDC and Baetoalau Farmers Association facilitated farmer-led field trials of open-pollinated vegetable varieties, set up demonstration plots and commissioned a soil health assessment. These activities cumulated in a farmers' field day, where experiences with sustainable farming techniques, such as mulching, composting, propagation and seed saving, were shared with more than 80 men and women from the focal communities.

At the national level, the sustainable farming for nutrition and income initiative succeeded in forging a broad coalition of stakeholders around nutrition, including the Ministry of Agriculture and Livestock, the Ministry of Health and Medical Services, the Ministry of Fisheries and Marine Resources, the United Nations Entity for Gender Equality and the Empowerment of Women, Solomon Islands National University, University of Queensland, AVRDC, KGA, and the Malaita Province Fisheries Division. Significantly, many of these organizations are new partners to WorldFish. This new coalition can play an

Box 7. Adopting the RinD approach in other projects

AAS was funded by the CGIAR Fund, a multidonor trust fund administered by the World Bank that finances CGIAR research. It was envisioned that the research activities of AAS would be linked to other donor-funded research projects implemented by WorldFish, thereby significantly increasing the potential impact of RinD (CGIAR-IEA 2015). During the implementation of AAS from 2012 to 2015, WorldFish was, for example, also (1) involved in the Mangrove Ecosystem for Climate Change and Livelihood project of the International Union for Conservation of Nature and the Ministry of Environment, Climate Change, Disaster and Meteorology; (2) carried out a component of the Strengthening Coastal and Marine Resources Management in the Coral Triangle of the Pacific project funded by the Asian Development Bank (ADB); (3) implemented the Ecosystem Approach to Fisheries Management in Tropical Fisheries project funded by the European Union; and (4) carried out the Scaling-out Community-Based Marine Resource Governance in Solomon Islands, Kiribati and Vanuatu project funded by the Australian Centre for International Agricultural Research (ACIAR). These projects secured additional support and resources for community-based resource management initiatives in the research hubs. Representatives from the three focal communities, for example, participated in the resource mapping exercise of the ADB-funded project. Other projects, such as the New Zealand Aid-funded project *Mekem Strong* Solomon Island Fisheries and the Fish in National Development: Contrasting Case Studies in the Asia-Pacific Region and Developing Inland Aquaculture in Solomon Islands projects funded by the ACIAR, contributed significantly in building capacities to implement a nutrition-sensitive research initiative (Albert et al. 2015). These projects thus provided additional support to RinD activities, particularly at the start of AAS. However, the relationship between AAS and other projects gradually shifted such that all WorldFish projects in Solomon Islands now aim to address the hub development challenges. The RinD approach enabled WorldFish to identify a coherent research and development strategy in collaboration with partners at the national, provincial and local levels, instead of being driven by donor priorities. With the termination of AAS it is envisioned that other projects will enable WorldFish to continue contributing to the hub development challenges and supporting the community action plans.

important role in informing and influencing policy on improving nutrition.

Transformative learning and change

The third research initiative, transformative learning and change, focuses specifically on the implementation of the RinD approach. The initiative aims to provide analytical and methodological support to WorldFish staff, partners and communities to conduct participatory action research and systematically document outcomes. The theory of change of this initiative is that by facilitating collective planning, action, analysis and reflection, people will start to question and change their attitudes, values and practices. As a result they will be more capable to increase farm productivity and incomes, improve nutrition, and make better-informed choices about natural resource management.[21] Several training workshops on strength-based approaches provided WorldFish staff, partners at the provincial level and community representatives with practical tools and skills to facilitate community meetings and manage partnerships (Schwarz et al. 2014).

Communities rely heavily on firewood, the harvesting of which is depleting mangrove forests on Malaita.

OUTCOME EVIDENCING

A theory of change describes the assumptions that link an action to a desired outcome. Co-developing and revisiting these causal pathways is central to participatory action research and can provide new insights into how change actually happens (Douthwaite et al. 2013). In this section we contrast the desired outcomes of the RinD approach with the actual outcomes, using the outcome evidencing methodology.

Desired outcomes

Figure 7 visualizes the theory of change of the RinD approach. It is centered on increasing the *system's capacity to innovate*: the ability of people and institutions to identify problems, mobilize resources and design solutions (Walker et al. 2010; World Bank 2012; Leeuwis et al. 2014). This model of how RinD supposedly works assumes that the facilitation of community action plans at the community level and the formulation of a development challenge at the provincial level will create safe spaces for participatory action research. This in turn will contribute to (1) the development of new technology; (2) an increase in social capital, here loosely defined as the relationships among people that enable a society to function effectively; (3) a better understanding of how change happens; and (4) changes in norms about the roles and responsibilities of men and women. Such a gender transformation will contribute to greater control of assets and decision-making processes by women. It is further assumed that these outcomes increase the *capacity to innovate* in the hub. Innovation, particularly in the social, cultural and political domains, is viewed here as the key to improving the livelihoods of the resource-poor.[22]

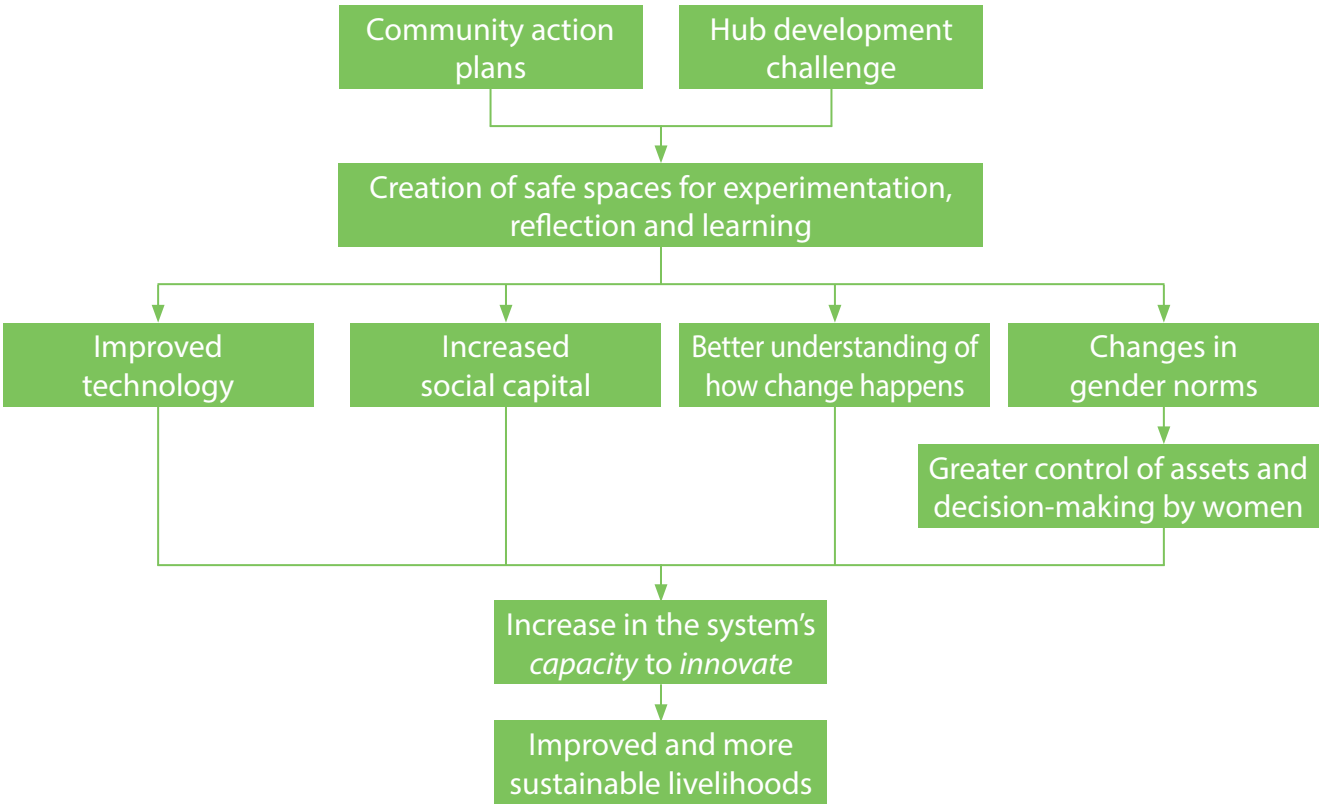


Figure 7. The theory of change of the RinD approach (based on Douthwaite et al. 2015).

Actual outcomes

Outcome evidencing identifies emerging outcomes, expected as well as unexpected, that are taking place in a project area. During a workshop in Auki in November 2015, WorldFish and AVRDC staff identified the three most significant, emergent outcomes of the RinD approach in Solomon Islands (represented in circles in Figure 8). These build upon and extend the three parallel trajectories of positive change that were identified by WorldFish staff during an outcome evidencing workshop in 2014 (represented by the three arrows in Figure 8).

Inclusive leadership

Inclusive leadership at the community level was identified as an emergent outcome of the RinD approach, specifically of the community action planning workshops and the gender-transformative approach. In Solomon Islands, adult men are generally seen as the primary points of contact, especially for garnering information from government officers. This obviously affects the capacity of women and young people to develop social networks (Schwarz et al. 2014; Lawless and Teioli 2015).

Nevertheless, there are several cases in which village leaders have started to stimulate the participation of women and youth in decision-making processes. An example from the Langalanga Lagoon can illustrate this. Here community leaders realized that an exclusionary approach to marine resource management, in which decisions were made by a small group of male leaders with only minimal consultation, has not been very effective in reducing pressure on reefs. During the community life competence process training, which focused strongly on the reflexive processes of participatory action research, community leaders realized that if people understand better why a decision is made they are more likely to respect that decision. This instrumental insight encouraged them to consult men, women and youth of all affected communities in the design of a locally managed marine area in the

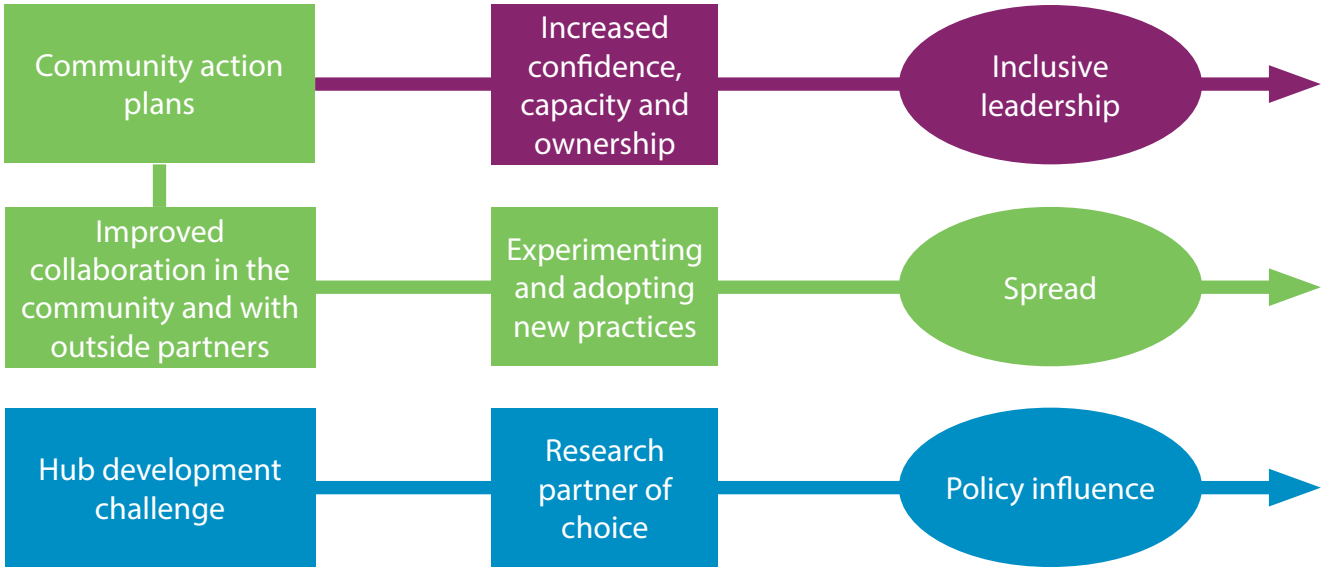


Figure 8. Emergent outcomes identified during outcome evidencing workshops in 2014 and 2015.

Langalanga Lagoon. Another example comes from Alea, where a community champion specifically aimed to inform and assist women on sustainable farming techniques. The community action planning workshops and informal discussions with AVRDC and WorldFish staff encouraged him to make an effort to reach out to women in the community who would normally not attend meetings and trainings. These two examples reflect a broader process of societal change in Solomon Islands, in which different groups in society advocate more democratic decision-making and inclusive leadership (Dinnen and Allen 2016). The RinD approach enabled WorldFish staff to specifically address issues like gender and marginalization, and this in turn influenced community leaders, champions and facilitators.

The community life competence planning process increased the confidence of village leaders, built their capacity and created a feeling of ownership over the development agenda. In several cases this is contributing to more inclusive decision-making processes at the community level, although being aware of those who are being marginalized from this process requires ongoing effort (Davies et al. 2014).[23] This outcome corresponds to the impact pathway of the RinD theory of change that assumes that the creation of safe spaces will lead to an increase in social capital.

Spread

Spread refers to the deliberate or spontaneous replication of activities in other communities. Here we consider spontaneous spread of innovations in communities without direct WorldFish involvement. Evidence for this emergent outcome is derived from three cases. First, in Alea, community champions disseminated information on sustainable farming to relatives, friends, *wantoks* and other informal networks, reaching many people outside the scope of AAS. The farmer field day in August 2015, for example, disseminated information on sustainable farming techniques to a large number of farmers and effectively removed barriers to asking advice from Baetoalau Farmers Association. The association

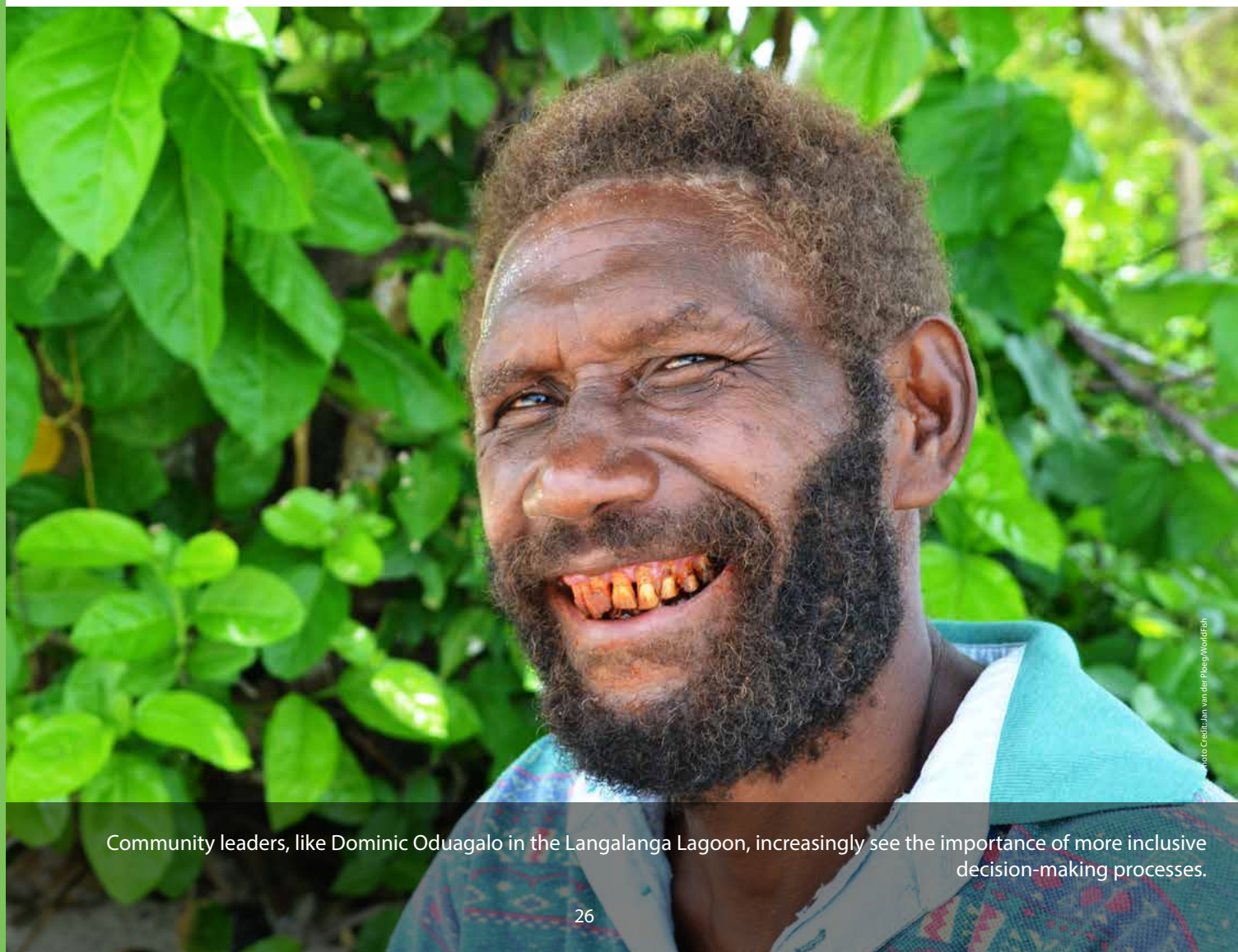
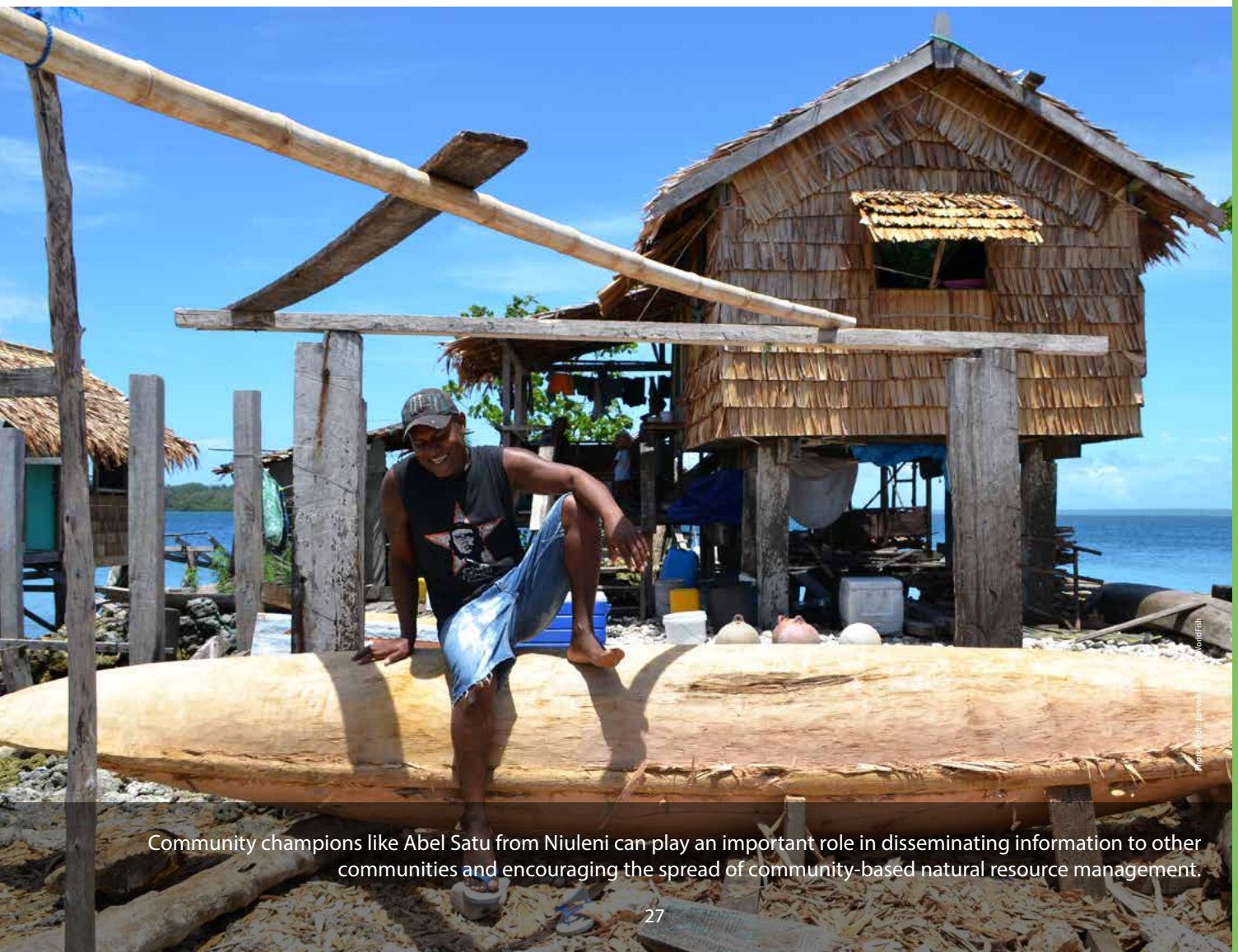


Photo Credit: Jan van der Ploeg/WorldFish

Community leaders, like Dominic Oduagalo in the Langalanga Lagoon, increasingly see the importance of more inclusive decision-making processes.

has since been approached numerous times by farmers from Foueda Ward with questions and requests for support. The positive experiences in Alea with participatory action research, particularly the field trials and the demonstration plots, also encouraged AVRDC to adopt a similar participatory research and extension strategy in other provinces. Second, community-based resource management concepts spread to nontarget communities. Core community-based natural resource management sites, such as Fumamato'o and Mararo in East Malaita, function as a model: community champions from these areas informally share information and knowledge with surrounding communities (Govan et al. 2015). Third, knowledge of tilapia farming is spilling over to other communities. Community champions are sharing knowledge about aquaculture with friends and relatives in other provinces as far as Temotu.[24] Such informal interpersonal contacts prove to be an effective tool to get a message across, particularly in the oral cultures of Melanesia (Rogers and Storey 1987).

These examples highlight the importance of building the capacity of community champions and linking them to relevant networks at the provincial and national levels as a precondition for upscaling and sustainability (Abernethy et al. 2014). In remote rural areas where agricultural extension services are often absent, multistakeholder partnerships might provide an effective channel for providing relevant information to support the spread of agricultural innovations (Dogliotti et al. 2014; Blythe 2015). In order to effectively support development processes, RinD aimed to strengthen communication within communities and between communities and partners at the provincial and national levels. This is particularly important in isolated rural areas, such as North Malaita, where there is relatively little government or NGO presence. AAS has created networks that link government agencies and NGOs with communities. These linkages have the potential to further strengthen the community action plans. The people in Fumamato'o, for example, succeeded in generating funding for the sanitation



Community champions like Abel Satu from Niuleni can play an important role in disseminating information to other communities and encouraging the spread of community-based natural resource management.

component of their action plan from the World Bank-funded Rural Development Program, which was beyond the scope and expertise of WorldFish. This enabled residents to purchase water storage tanks. Also in Mararo, a village in East Malaita where WorldFish facilitated the creation of a locally managed marine area, the community champion succeeded in securing funding from the United Nations Development Program small grant project to implement a climate change adaptation project in the community.

Influencing policy

Several emergent outcomes can also be identified at the hub level. In Malaita, the provincial government has made extensive use of WorldFish expertise in drafting the new Malaita Provincial Fisheries Ordinance and supporting community-based natural resource management and aquaculture. A window of opportunity opened in 2014 when a new provincial government under the leadership of Peter Ramohia, who as a former staff member of the Ministry of Fisheries and Marine Resources and The Nature Conservancy had been involved in natural resource management networks of which WorldFish was also a member, saw the need to develop a grassroots development strategy for Malaita. Contrary to previous top-down policies that prioritized economic growth, the new development strategy recognized the heavy reliance of Malaitans on fisheries and agriculture and the increasing pressure on natural resources, and therefore prioritized the primary production sectors (MART Government 2015). The provincial government included WorldFish in consultations on the design of the fisheries sections of the Malaita Alliance for Reform and Transformation policy, and continues to seek advice from WorldFish staff. The MPPD provides another venue to influence policy and development interventions in the province. The Provincial Fisheries Advisory Committee, of which WorldFish is a member, provides similar opportunities to influence policy.

Photo Credit: Jan van der Hoeven/WorldFish

Pita Tikai from AVRDC discusses pest management techniques with Joe Diau in Fumamato'o. The partnership with AVRDC has enhanced research on food security.

At the national level, the expertise of WorldFish is increasingly recognized. The development NGO Australian People for Health, Education and Development Abroad, for example, requested the support of WorldFish for a project to develop aquaculture on Guadalcanal. Similarly, the Solomon Islands Community Conservation Program included WorldFish as a partner in a project to reduce the vulnerability to climate change of rural communities in Western Province, specifically to train project partners in gender-transformative approaches. The Secretariat for the Pacific Community also works with WorldFish to build the resilience of communities in Malaita and Temotu.
The capacity and expertise developed by AAS, particularly in relation to community engagement processes and participatory action research, is highly valued by partners at the national level. Moreover, the value of the gender-transformative approach is increasingly recognized by partners in the Pacific region.[25]

To a certain extent, these outcomes were anticipated in the original RinD theory of change (see Figure 7). AAS has enhanced the capacity of WorldFish staff and partners in Solomon Islands to implement a transformative research and development agenda, thereby improving the system's capacity to innovate.

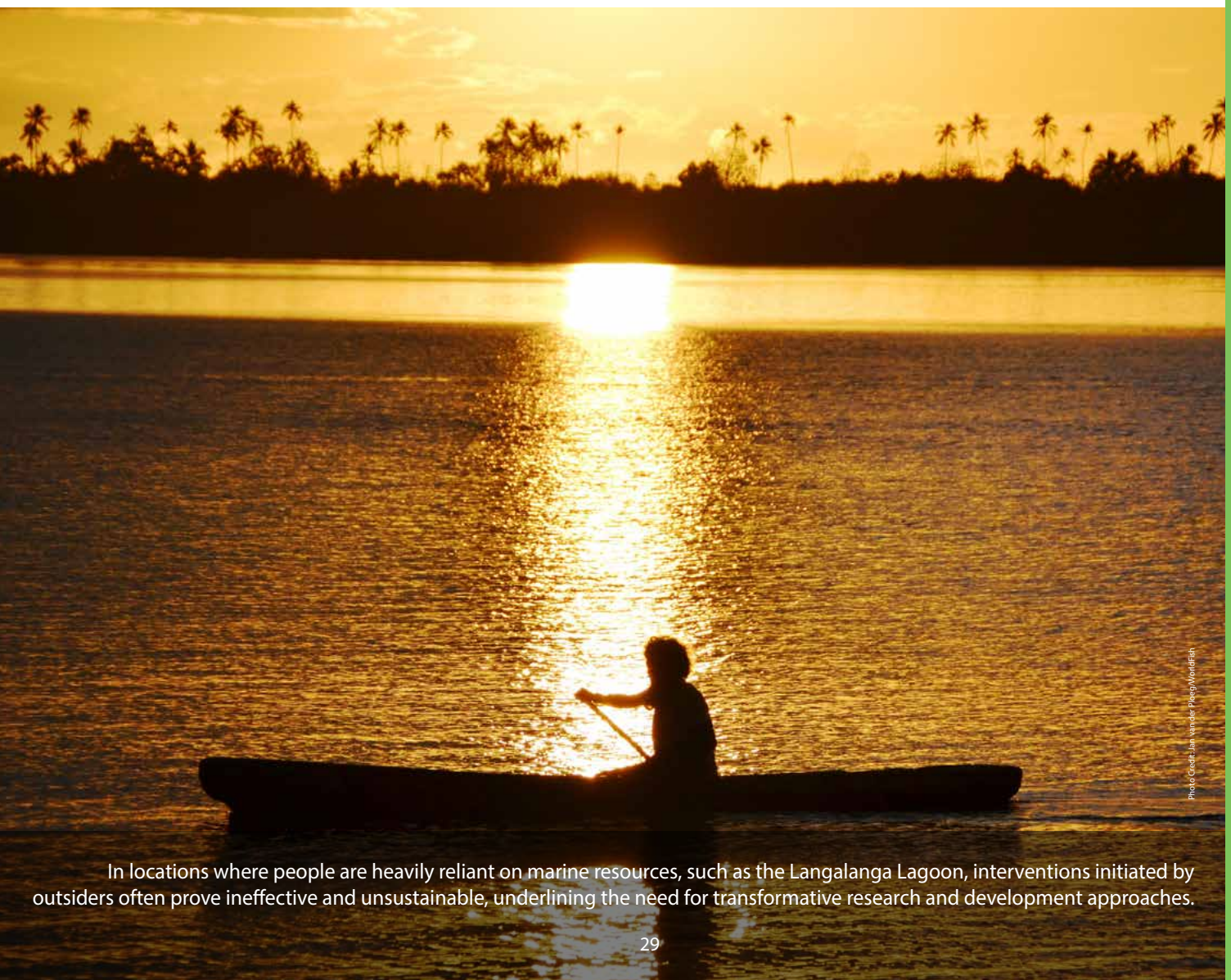


Photo Credit: Jan Hein de Ploeg/WorldFish

In locations where people are heavily reliant on marine resources, such as the Langalanga Lagoon, interventions initiated by outsiders often prove ineffective and unsustainable, underlining the need for transformative research and development approaches.

CONCLUSIONS AND RECOMMENDATIONS

This report sought to investigate whether the RinD approach succeeded in making agricultural research more relevant to the needs of resource-poor and vulnerable communities in Solomon Islands. Obviously, it is unrealistic to expect that a participatory action research program that started in 2012 would already have led to significant improvements in nutrition and incomes. In fact, assessments of agricultural research and development projects suggest that measurable livelihood impacts take at least 15 to 20 years to be realized (Walker 2000). Nevertheless, we identified several emergent outcomes of the RinD approach that foster social change and innovation.

By facilitating community dialogues on what problems people face, enabling communities to address these problems themselves, and bringing in relevant stakeholders and expertise, the RinD approach aimed to build the capacity of fishers and farmers to innovate (Douthwaite et al. 2015).[26] Leaders in the focal communities now see the benefits of broad participation in decision-making processes and are in a better position to liaise with other NGOs and government agencies to mobilize resources to further their own development agenda. People are increasingly experimenting with new technologies and institutions, such as how to construct tilapia ponds or how to design and enforce rules to manage coastal fisheries, and are spreading this newly acquired knowledge, thereby achieving impacts beyond the project areas. A parallel process at the hub level has forged new partnerships between WorldFish, other research and development organizations, and government agencies. The relations with the provincial governments in Malaita and Western Province provide a particular opportunity to share lessons and influence policy. The newly developed expertise of WorldFish on community engagement processes and gender-transformative approaches is increasingly recognized in the region and has the potential to significantly strengthen marine resource management. Taken together these emergent outcomes can eventually provide favorable conditions for nurturing and sustaining agricultural innovations.

Baum et al. (2006, 855) already warned that participatory action research approaches such as RinD are often undervalued in impact assessments of research: "the ability of a researcher to engage with communities and bring about real change to their quality of life and health status rarely counts." In October 2015, AAS was unexpectedly terminated (Rijsberman 2016). This clearly has important consequences for the research program of WorldFish in Solomon Islands and forces us to rethink what elements of RinD should be retained in future activities.

First, the recognition that to better manage fisheries it is essential to adopt a **system perspective** has transformed the research program in Solomon Islands. The notion of aquatic agricultural systems as places where people depend on fishing *and* farming for nutrition and income may seem self-evident. But it has led to a range of new research questions *beyond* fish, most notably around sustainable farming and nutrition. This holistic view obviously raises questions about the institutional mandate and expertise of WorldFish, but ultimately makes research more relevant and effective (see also Andrew et al. 2007; Cohen et al. 2014a; SPC 2014).[27]

Second, the benefits of working in **partnerships** with provincial governments, ministries and NGOs are clear: it makes research better and more relevant and facilitates learning and uptake (Kristjanson et al. 2009). Forging these partnerships requires time, resources and determination, and can, following Pomeroy and Berkes (1997, 465), best be described as a tango: two steps forward, one step back. Nevertheless, substantial progress has been made, particularly at the provincial level: in Malaita, for example, the MPPD plays an increasingly important role in identifying research priorities and disseminating information (Douthwaite et al. 2015). The challenge is to continue listening to and working with other stakeholders, even when resources are limited.

Third, the realization that the main barriers for agricultural innovation are not technical but social has led to the integration of social science into the research program. In particular, the **gender-transformative approach** has the potential to significantly improve small-scale fisheries management (Schwarz et al. 2011) and has led to important scientific outcomes. At the same time, it has become clear that it is not easy to transform these social scientific insights into practical interventions on the ground.[28]

Fourth, AAS invested significant resources in **building capacities** of WorldFish staff, partner organizations and communities. Training workshops, mentoring and on-the-job training enhanced capacity in many areas, including community facilitation, project evaluation, gender and participatory action research. Building the capacity of community leaders, provincial government staff, partner organizations and national staff is arguably the best way to foster social change and sustainable development, although indirect and difficult to measure.[29]

Finally, the systematic efforts that **actively engage communities** in research and development have redefined the research program in Solomon Islands. At the start of the program there were concerns that the community action plans could raise unrealistic expectations and lead to disillusionment (Douthwaite et al. 2015). In fact, these action plans provided a framework that allowed community members, researchers and other stakeholders to work together. RinD fostered several innovations in how WorldFish is working on the ground, such as the signing of a community research agreement and the focus on working with community champions. There is clearly a need to strengthen the link between these community action plans and the research initiatives. One way to do this is to make the research questions much more specific and aligned with the problems identified by communities.

It has not been the intent of this report to suggest that RinD is the only or best approach to conducting agricultural research. Rather, our aim was to present the key principles, emergent outcomes and lessons learned from implementing the RinD approach in Solomon Islands from 2012 to 2015. RinD promises to reduce the problematic research–implementation gap, thereby contributing to reducing hunger and alleviating poverty. RinD is often presented as a radical break with conventional agricultural research. In fact, some of the principles of the RinD approach were integrated into research activities in Solomon Islands before the implementation of AAS. The participatory diagnosis and adaptive management framework, for example, has guided WorldFish research and development projects for several years (Andrew et al. 2007; WorldFish 2013). But some elements of the RinD approach have been truly innovative and have advanced the research agenda, and WorldFish is committed to building upon these elements in the coming years.

The title of this report, *Learning from the Lagoon*, refers to two classic anthropological studies. The first book, *Words of the Lagoon* by Bob Johannes (1981), transformed the way scientists think about fisheries management by documenting the detailed ethno-biological knowledge of fishers in the Pacific. More than 30 years after its publication, its insights are still highly relevant, particularly for community-based natural resource management in Solomon Islands. The second book, *Learning from Gal Oya* by Norman Uphoff (1992), described a successful participatory irrigation project in Sri Lanka. It demonstrated the potential of improving livelihoods through collective action at the grassroots level and highlighted the supportive role of outside scientists. These two books have been a source of inspiration for scientists aiming to make their research more relevant for resource-poor and vulnerable communities in the developing world. The RinD approach aims to reduce hunger and poverty by pursuing an innovative way of conducting agricultural research. It is based, following Johannes and Uphoff, on the premise that rural communities possess the knowledge and capacity to improve their own lives, and that research, if it is to be worth anything, should aim to realize this potential (Dugan et al. 2013). Over the years we have learned to listen to fishers and farmers in the lagoons of Malaita and Western Province, and to use their knowledge, dreams and strengths as the basis for designing research and development projects.

NOTES

[1] The intermediate development outcomes for AAS were an effort to systematically operationalize the ambitious goals of poverty alleviation, improving food security and environmental conservation. They formed a subset of the CGIAR results framework (CGIAR 2015) and included (1) increased and more equitable income from agricultural and natural resources management; (2) improved productivity in farming systems; (3) improved diets of vulnerable people, especially women and children; (4) increased control over resources and participation in decision-making by women and other marginalized groups; (5) increased capacity for innovation within low-income and vulnerable households; (6) increased capacity in low-income communities to adapt to environmental and economic variability, shocks and long-term changes; and (7) greater resilience of aquatic agricultural systems for enhanced ecosystem services (AAS 2014).

[2] From the onset it is important to emphasize that RinD is meant to be a work in progress. The RinD approach is a flexible and context-dependent set of principles for participatory action research, rather than a strict blueprint approach (Douthwaite et al. 2015).

[3] AAS was implemented by WorldFish in collaboration with two other CGIAR centers: the International Water Management Institute and Bioversity International. Of these three centers, only WorldFish has a permanent presence in Solomon Islands. In the remainder of the text, AAS and WorldFish are used interchangeably when referring to specific research activities.

[4] Outcomes are here defined as short-term "changes in knowledge, attitudes, and behavior of key stakeholders" (Douthwaite et al. 2014, 6). Impacts refer to the long-term, cumulative results of an intervention, and may include, somewhat confusingly, the intermediate development outcomes used in the RinD framework (Figure 1).

[5] Outcome evidencing is usually done by multiple stakeholders in a workshop. Wide stakeholder representation proved to be unfeasible for this report. Only AVRDC staff participated in the outcome evidencing workshop in Auki in November 2015.

[6] Using 2016 conversion rates, USD 1 is approximately SBD 8.

[7] Freshwater fisheries provide a source of protein for communities without access to marine resources. Aquaculture is practiced on a small scale, and is focused primarily on Mozambique tilapia (*Oreochromis mossambicus*). The species was introduced in Solomon Islands in the 1950s and has become well established throughout the country (Schwarz et al. 2013; Cleasby et al. 2014; Jones et al. 2014).

[8] Logging is the most important economic sector of the country, contributing 50%–70% of annual government revenues (Katovai et al. 2015). But the industry is poorly regulated, and in many areas logging has resulted in severely degraded watersheds and social conflicts.

[9] There is persistent confusion about the spelling of topographic names in Solomon Islands. Fumamato'o, for example, is regularly spelled as Fumato or Fomamatoo. In this report we follow the spelling of the National Geographical Information Center, except when rural communities explicitly requested us to use an alternative way of writing the name of their place or community, as is the case in Fumamato'o.

[10] In AAS, the term community is loosely used to describe the geographical bounds of a group of households that are often related and have customary entitlements to natural resources.

[11] The MPPD was initiated by World Vision in 2012 with the intention of bringing together government agencies, faith-based organizations and NGOs in the province to better coordinate the different development projects at the grassroots level, align these interventions to the provincial development goals, and strengthen collaboration and information sharing between partners. The partnership consists of different departments of the provincial government, including the premier's office, the police, the livelihood division, the health promotion division, the Malaita Chazon Development Authority, the social welfare division, the women's development division, the rural development program and the youth desk; national government agencies, including the Ministry of Agriculture and Livestock, the Ministry

of Commerce, Industries, Labour and Immigration, the Ministry of Education and Human Resource Development, the Ministry of Fisheries and Marine Resources, and the Ministry of Health and Medical Services; faith-based organizations such as the Church of Melanesia and Mother's Union; and NGOs such as the Malaita Council of Women, Save the Children, Solomon Islands Planned Parenthood Association, KGA, World Vision and WorldFish. In 2013 the MPPD agreed to function as the steering committee for AAS in Malaita Province.

[12] As a research organization, WorldFish is also interested in understanding how the MPPD network can improve natural resource governance. Therefore, WorldFish facilitated several MPPD meetings in which the stakeholders reflected on their activities and formulated a theory of change for the MPPD. It is envisioned that this participatory action research at the hub level can strengthen the MPPD.

[13] Key partners in Western Province include the Western Province Government, American Museum of Natural History, Ecological Solutions – Solomon Islands, World Wide Fund for Nature (WWF), Natural Resources Development Fund, Solomon Islands Community Conservation Partnership, Save the Children, Kolombangara Island Biodiversity Conservation Association, and national agencies such as the Ministry of Fisheries and Marine Resources, the Ministry of Environment, Climate Change, Disaster Management and Meteorology, and the Ministry of Development Planning and Aid Coordination.

[14] Community champions are people in the community who facilitate communication between WorldFish, partner organizations and the community. In many cases these champions also occupy a leadership position in the community, but not necessarily.

[15] The community life competence process methodology was developed by the Belgian NGO Constellation.

[16] WorldFish staff members were trained as community facilitators to lead these workshops. Community champions from the focal communities and village leaders from several other communities where WorldFish was active, such as the Langalanga Lagoon, also participated in this training.

[17] Using something old in new ways, or applying something new to produce a positive social and economic outcome, is *innovation*. An *innovation system* is the network of actors and institutions that facilitates innovation. *Capacity development* is the process whereby people, organizations and society as a whole create and maintain knowledge over time (Bezkorowajnyj and Romney 2006; Leeuwis et al. 2014).

[18] RinD activities initially focused on Malaita Province. Western Province was later identified as a scaling hub where most activities focused on networking and building the capacity of stakeholders. Therefore, only the transformative learning and change initiative and the resource governance for development initiative were implemented in Western Province. No financial resources were available in this hub for the partnerships necessary to support the sustainable farming for nutrition and income initiative.

[19] The Solomon Islands Community Conservation Program is a network of conservation NGOs and community-based organizations with the aim to support community-driven protection of the natural and cultural heritage of the Solomon Islands.

[20] Research activities on technologies for inland aquaculture were developed through an ACIAR-funded research project (see also Box 7).

[21] A qualitative study of gender norms in the focal communities in Malaita and Western Province highlighted that social norms significantly constrain women's capacity to innovate and limit their ability to participate in decision-making processes.

[22] The theories of change formulated by the three research initiatives, the MPPD in Malaita and the stakeholders in Western Province are nested within this overall theory of change; i.e. they share a focus on capacity to innovate.

[23] Participatory action research will not resolve social issues, such as social exclusion and inequality (Israel et al. 1998). Obviously, social inequalities and differences also enter into participatory approaches such as RinD, just as they do in other forms of research. But in RinD explicit efforts are made to address these inequalities, which enhances the potential to effectively address them.

[24] Typically, innovation adopters are older, wealthier and have more diverse livelihoods than non-adopters. This implies that without sustained efforts to support vulnerable and marginalized households, innovations such as tilapia farming are often not adopted by the resource-poor.

[25] The RinD approach also led to new partnerships outside the fisheries realm, such as between WorldFish and the Ministry of Health and Medical Services.

[26] The RinD approach is based on the premise that the resource-poor can transform their own lives, and that the role of outside organizations is to enable people to realize their potential. Clearly, some problems lie beyond the power and capacity of communities and may undermine community efforts to improve their lives. Extractive industries like mining and logging, for example, are often highly disruptive, and despite providing easy money in the short term, may threaten long-term sustainable development (Foale 2001). The RinD approach specifically aims to address large-scale, systemic threats through the engagement of supra-local stakeholders in community-driven development processes (Andrew et al. 2013).

[27] New research questions might require specific expertise and reflect the recognition that WorldFish, as a research organization focused on improving fisheries and aquaculture, does not have all the necessary competencies to effectively support a community-defined development agenda (Douthwaite et al. 2015). Working in collaboration with a range of partners clearly requires new skills and capacities of individuals, teams and organizations (Apgar et al. 2015).

[28] One problem with the RinD approach is that it aims to incorporate a number of theoretical concepts, including social capital, capacity to innovate, gender-transformative approaches and participatory action research. Operationalizing these concepts requires a strong social science background and considerable creativity, which was in practice often lacking on the ground (Douthwaite et al. 2015). The complexity of these concepts risks overwhelming staff and diluting the research agenda. Furthermore, the rather top-down, schematic implementation of AAS, such as in the selection of the communities and the repetitive cycles of participatory action research, sometimes stands in contrast to the participatory philosophy of the program (Douthwaite et al. 2015). On the ground, processes are often more messy, fluid and informal (Kemmis and McTaggart 2005).

[29] Improving linkages with universities at the national, regional and international levels can further strengthen this.

[30] Available upon request from WorldFish Solomon Islands.

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ANNEX: OVERVIEW OF INTERNAL REPORTS[30]

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

About the CGIAR Research Program on Aquatic Agricultural Systems
Approximately 500 million people in Africa, Asia and the Pacific depend on aquatic agricultural systems for their livelihoods; 138 million of these people live in poverty. Occurring along the world's floodplains, deltas and coasts, these systems provide multiple opportunities for growing food and generating income. However, factors like population growth, environmental degradation and climate change are affecting these systems, threatening the livelihoods and well-being of millions of people.

The CGIAR Research Program on Aquatic Agricultural Systems (AAS) seeks to reduce poverty and improve food security for many small-scale fishers and farmers depending on aquatic agriculture systems by partnering with local, national and international partners to achieve large-scale development impact.

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