Appendix 1

Situation analysis, livelihoods analysis and gender research

The detailed reports included within this Appendix refer to some of the research activities undertaken within Objective 1 of the project. Each Activity Report is structured in the format of a scientific report where possible, with an introduction, description of the methods used, findings, and conclusions and/or recommendations. The specific Activity Reports contained within this Appendix include,

Activity 1.3. Participatory appraisal of cattle production systems in East Santo Area Council

Prepared by: Simon Quigley

Introduction

The East Santo Area Council (60,700 ha) on the island of Espiritu Santo (Santo; 407,000 ha) in SANMA province (comprising the islands of Santo, Malo and Aore) of Vanuatu was selected as the broad study location for the research, demonstration, and capacity building activities within the current project. The study location was selected by the project team based on census data available at the time (VNSO, 2016), which indicated the East Santo Area Council had a large number of smallholder households (686; ~75% of all households in East Santo Area Council) rearing cattle within biophysical systems that were likely to be reflected elsewhere in Vanuatu [i.e. cattle under copra plantations, cattle in (semi-cleared or improved) bush]. Approximately 37% of the national cattle population are located in SANMA province with approximately 8% of the national cattle herd located in the East Santo Area Council (9450; ~14 cattle/household) (VNSO, 2016). In addition to the relatively large numbers of households and cattle, smallholders in the East Santo Area Council have access to many market options (two abattoirs, urban and rural butcheries, inter-island trade, large-holder farmers, and a large ceremonial market) with large total areas of land classified as “Good” available for agriculture production (food and cash crops), plantations (copra and timber), and pastures (Quantin, 1982; Simeon and Lebot, 2012).

Materials and methods

An assessment of the prevailing production systems in East Santo Area Council was conducted to identify the constraints to productivity as perceived by farmers and their priority training needs. A combination of one-on-one interviews, farm walks, and quantitative surveys with between 30 and 50 (predominately male) farmers were conducted, with secondary data sources accessed where relevant (VNSO 2008, 2016; NZ MFAT, 2017). Information was collected in conjunction with other component researchers (Livelihoods, Economics, and Productivity) and as such may be duplicated in different sections of the main report and across Appendices.

Results and discussion

The important role of cattle in livelihoods and the economics of cattle systems are not included in this report. That information is reported in detail in other sections of the final report and within this (Activity 1.5) and other Appendices (Appendix 3).

Ownership

All farmers indicated they had customary tenure over there land, with some indicating a shared customary arrangement with other family members (15%). Very few farmers indicated their land was under dispute (<5%) or that this was a problem or constraint to their cattle farming practices; farmers felt any disputes were adequately resolved by local chiefs. Increasingly farmers were fencing perimeters of customary land to ensure boundaries were clearly marked. The project only worked within these fenced areas. Farmers had been responsible for this land for an average of 20 years (i.e. since 1997), however this ranged from 4 (2016) to 60 (1960) years. This would suggest that over 60% of farmers interviewed acquired ownership of their land after the previous Vanuatu Pasture Improvement Program, and may not have been exposed to research, development, and extension activities undertaken within that highly successful program.

Infrastructure

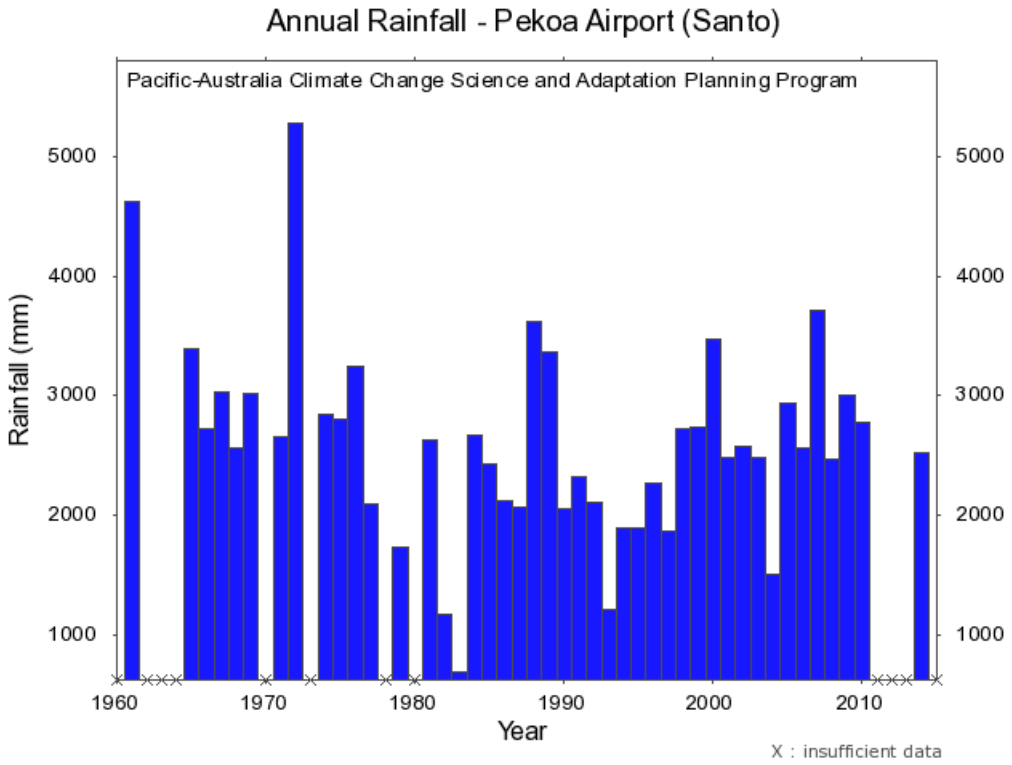
Most farms had perimeter fencing that consisted of living trees (Burao; *Hibiscus tiliaceous*) and four strands of barbed wire attached by staples. The average lifespan of this was estimated at approximately five years as tree's typically grow over the wire and breaking it at initial attachment points. Over half the farms had no drinking water access for cattle and no farms had water pumps, pipes, or troughs. When water infrastructure (rainwater tank) or water (well, swamp) was available it was not necessarily available for cattle. For example, a water tank with no associated infrastructure would not supply drinking water for cattle, whilst swamps often ran dry. Copra driers are common on most farms or adjacent farms but are often in poor condition, and would not capture rainfall for conservation without upgrading to roof sheeting and the installation of guttering (which could be constructed using locally available materials such as palm fronds and bamboo if solely for water collection).

Rainfall, land types, and cropping

The drier months of the year were July, August, and September in all villages, although it was suggested that Port Olry was drier than other areas with the dry season persisting through to December. Data from the nearest meteorological station (Pekoa) would support that July to September are the driest months of the year, however above 50 mm of rainfall was recorded in each of these months (Figure A1.1). Rainfall is unlikely to limit pasture growth in a normal year, however, farmers did suggest that the dry season was becoming increasingly variable with longer and drier dry seasons occurring with greater frequency (e.g. the post tropical cyclone Pam drought of 2015).

Whilst all farmers indicated the household maintained a garden for subsistence purposes, only 20% indicated that these were linked with land used for cattle raising. Most families managed gardens in close proximity to the household while cattle rearing activities tended to be some distance away from the household (0.1 to 10 km). This distance from the household often placed constraints on the intensity of management (e.g. rotational grazing), condition of land and infrastructure (e.g. weeds, fencing), and which household members physically contributed to cattle rearing (predominately the domain of men).

The majority of households (90%) had copra plantations on land used for cattle rearing, whilst 45% indicated this land also included some bush which potentially could be available for future farm improvements (e.g. targeted pasture improvement, segregation of herd). Approximately 40% of farmers indicated they cleared some land each month, while 30% indicated they never cleared new land. A small proportion (15%) of farmers indicated they had some unproductive land on their farm, and they left this fallow to allow it to recover, with an average fallow time of 1.2 years reported. Whilst copra is the main tree in plantations, farmers also grew Whitewood, Sandalwood and Mahogany but not in association with cattle grazing.



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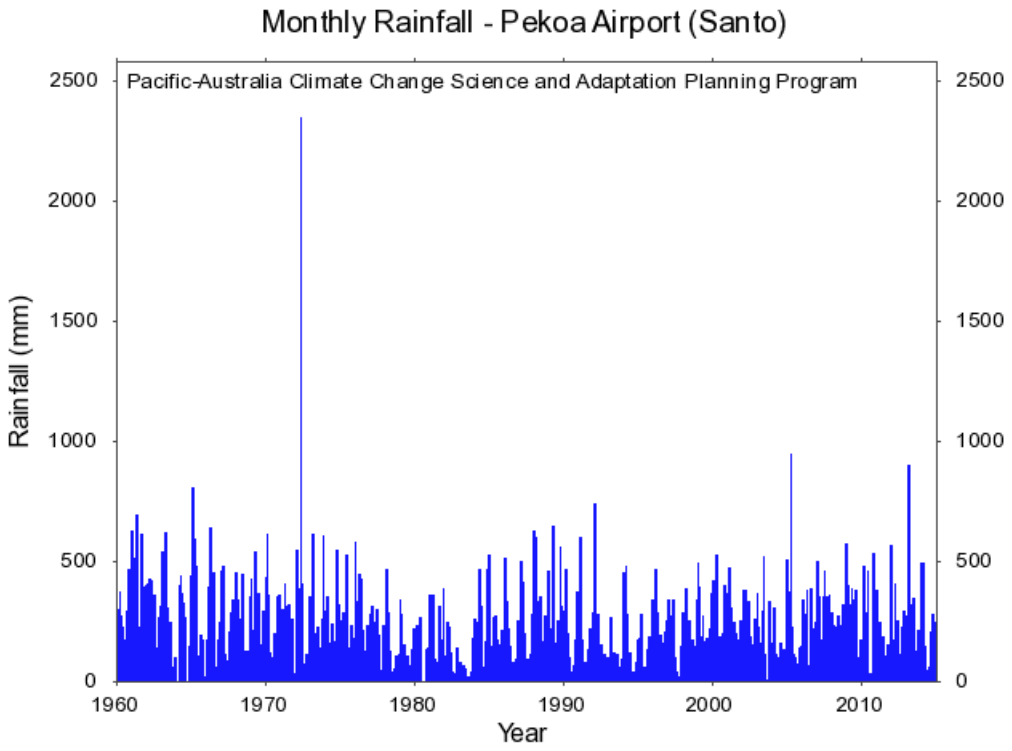

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Figure A1.1. Rainfall data collected from the Pekoa meteorological station, southeast Santo. (PCCDP 2020).

Feeding, weeds, and water

Nearly all cattle graze behind fences on custom owned land in the East Santo Area Council. A portion (20%) of farmers indicated that their cattle graze improved pastures but there was very little evidence of smallholder cattle grazing on improved pastures with the vast majority of pastures based on Buffalo grass (*Stenotaphrum secundatum*). There may be a problem with the pasture base descriptions within various surveys, as some farmers refer to Buffalo grass as an improved pasture [i.e. compared to Carpet grass (*Axonopus compressus*)] which tends to dominate in over-grazed and heavily shaded uncleared areas. Similarly, in areas where overstocking was not evident, naturalised legumes (*Centrosema* spp, *Desmodium heterophyllum*) persisted well in the Buffalo grass based pastures, particularly under shaded plantations. MacFarlane and Shelton (1986) estimated that carpet grass accounted for between 30 to 40% of the cattle pasture area in Vanuatu, with Buffalo grass pastures under plantations or shade accounting for between 45 to 60% of the pasture base; they estimated approximately 2% of the pastures were improved species (*Brachiaria decumbens* and *Neonotonia wightii*). Whilst most farmers were aware of rotational grazing practices and understood the benefits (in terms of pasture quality, weed control) the lack of internal fencing on most farms would suggest it was not commonly practiced. Investments in internal fencing would likely allow for more controlled grazing management, segregation of different classes of animals, improved animal husbandry, reduced weed burdens, and increased productivity (liveweight gain, calf survival and growth). While the majority of farmers did not identify feed shortage as a problem at any stage of the year, a small number did provide cattle with additional feeds including Burao, and residues from corn, sweet potato, and cassava (leaves) crops. This appeared less to do with nutritional management and more to do with cattle handling.

The significant labour costs appear to be the major constraint to large-scale pasture improvement programs. This includes establishment and ongoing maintenance (weed control) labour requirements. In addition, good fencing is required to manage this resource to avoid over-grazing and allow for spelling and recovery. Buffalo grass with a persistent legume remains the likely entry level pasture system for smallholder farmers wishing to upgrade their pastures, particularly under shaded environments, due to its ease of establishment, the cost and accessibility of vegetative materials, its resilience under heavy grazing, and its compatibility with a number of legumes, including locally adapted herbaceous and browse legumes. Such a system would be well suited to cow-calf production, with weaners directed to smaller areas of improved pastures that require lower labour inputs to maintain than wide scale upgrading of the entire farm.

Approximately half of the farmers surveyed estimated between one- to two-thirds of their farm were covered by weeds. The main weeds identified by farmers were pico (*Solanum torvum*), sensitive plant (*Mimosa pudica*) and hibiscus burr (*Urena lobata*). Interestingly, wild peanut (*Senna tora*) was not considered a major weed issue and visits to many smallholder farmers would support this, wild peanut tends to be more of a problem on larger cattle holdings at this stage. Throughout the life of the project there was an obvious increase in the establishment of hibiscus burr, particularly under coconuts and this is a weed that will require additional research on control strategies. Whilst farmers expressed reservations about leucaena (locally known as kasis) becoming a weed it was never raised unless the research team enquired. Leucaena is commonly observed on roadsides on Santo but less frequently behind wire (this is in contrast to Malekula where it was commonly observed behind wire, and in Efate where it is widespread). A visibly similar *Acacia* spp is encroaching on grazing lands and this is also given the name (white-flower) kasis and may create some confusion amongst farmers. The majority of farmers (90%) indicated they practiced weed control with the main method being manual control (i.e. slashing with a bush knife) sometimes in conjunction with grazing by cattle. Only one farmer indicated the use of herbicide to control weeds. Those that did not control weeds indicated it was because they

were unaware of what methods to use. Weed control was undertaken all year round or only in the early dry-season and was a major labour requirement.

Farmers suggested that drinking (surface) water was available throughout the wet season but it was considered unavailable in the early- and late-dry season by most farmers (<10% and <5% respectively indicated access at these times). Given that rainfall events occur throughout the year it is acknowledged that significant water will be available in the plant materials (grasses, legumes, succulent tree's) consumed by cattle throughout the year. Local data would suggest that water content of *Panicum* based pastures and a browse legume (leucaena) is approximately 70%, even during the dry season. Under such conditions, animals would obtain a large proportion of their water requirements from pastures, if available in sufficient quantities. This is likely to explain how cattle survive in Vanuatu in a normal dry season but is still likely to have a negative impact on productivity (decreased ME intake, decreased milk production for young calves). A lack of water therefore becomes an issue when feed supply is also limited due to over-grazing, as the total quantitative amount of plant-derived water would be limited even though the moisture content of plants remains high.

Cattle herd and management

Most smallholder cattle are described as the local breed which is essentially a random cross between previously introduced European cattle breeds (Shorthorn, Limousin, Charolaise, Simmental) with some *Bos indicus* content, apparent in some herds. Bulls are usually retained on the farm of origin or sourced from neighbours, likely resulting in high rates of inbreeding. The local cattle are smaller than purebred animals but whether this a result of inadequate nutrition throughout their life or inbreeding is unclear.

Whilst most cattle free graze pastures in East Santo, a small number of young cattle are tethered for a period of weeks to months during the weaning process. Tethered animals are typically shifted every two to three days to a new area of pasture, drinking water was never observed but, on some occasions Burao was provided which would provide additional moisture in the feed. This tethering is time consuming, but farmers believe animals become accustomed to the closer and more frequent handling which contributes to quieter temperaments in the future. Cattle are not used for draught in Vanuatu, although in many cases cattle serve the dual purpose of controlling grass and weed regrowth under copra plantations to allow for ease of coconut collection. In cases where farmers have multiple blocks of land (copra and bush), segregation of herds may occur where weaner steers are relocated to bush blocks whilst cows and heifers (and breeding bulls) are retained under coconut plantations. Stall feeding, feedlotting, and supplementation are not practiced by smallholder cattle farmers in East Santo Area Council.

Peak calving is at the start of the dry season (July to August each year) and weaning and castration is practiced by 80% of farmers when calves are approximately 6 months of age. Dehorning is conducted by fewer farmers (45%) at an average age of 7 months but there are many older cattle with long horns. There is limited segregation of classes within a herd, unless more than one block of land is owned by the farmer. If farmers owned a second bush block, they would typically move steers there after weaning (either by their own transport or walked on the weaning rope). Segregation within the farm was often a challenge due to the costs and the rapid deterioration of fences. This latter issue also contributes to a lack of rotational grazing practiced.

Cattle are largely considered to be pest and disease free in Vanuatu. Brucellosis and tuberculosis were detected in the late 1960s and early 1970s with successful eradication of tuberculosis conducted in the 1970 and 1980s (Schandevyl and Deleu, 1985). Brucellosis has not been reported since the early 1990s (Brioudes, 2016), whether this is due to eradication or a lack of testing is unknown. Struthers and Troost (1998) reported a high incidence of leptospirosis but

otherwise there is a relatively free disease and parasite status amongst the cattle herd. Ticks occur at a very low incidence and tick-borne diseases are absent. Internal parasites are often locally associated with cattle in low body condition or low liveweight gain, however there is little evidence to support this. Brioudes (2016) indicated reports of Bovine venereal campylobacter (Vibrio) and various sources suggested that an AusAID funded vaccination program was undertaken during the 2000s with some success. However, no reports or data has been accessible regarding either the impetus for or impact of this program. Local information suggests that vaccination all but ceased once the program, and hence the funding, concluded with the exception of possibly one large commercial operator.

Cattle grazing condition description

Assessment across the East Coast resulted in the development of a description of grazing conditions by which productivity indicators would attempt to be assessed against (Figure A1.2).

Cattle grazing under copra – weed ingress

Increasing the productivity and market options of smallholder beef cattle farmers in Vanuatu

Cattle grazing under copra - overgrazed

Cattle grazing under copra – well managed

Cattle grazing unimproved/semi-open bush

Cattle grazing improved/open bush (Buffalo grass)

Figure A1.2. Cattle farming system classification used by project.

Problems and training

The majority of farmers identified lack of capital, lack of water, and insufficient labour as issues on their farm (Figure A1.3), with damage from pigs and others pests also significant. Largely farmers sought assistance from family members when required.

Almost 60% of farmers surveyed identified lack of access to capital as the main constraint to improving the productivity of their cattle farms. Of the remaining 40% of farmers, 71% of farmers identified the lack of drinking water as their main constraint. Other minor issues included labour requirements, access to breeding bulls and feed supply.

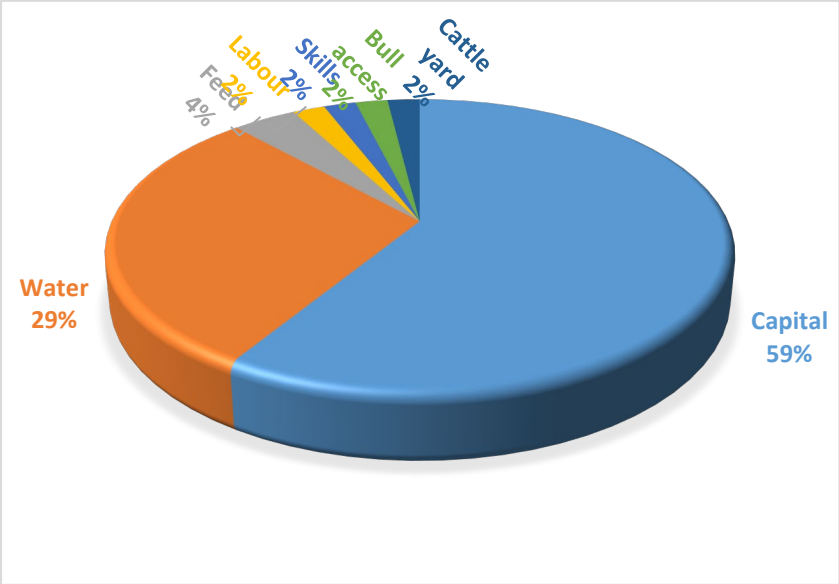


Figure A1.3. Priority constraints to increasing cattle productivity, as identified by farmers.

The majority of households identified business management, pasture and grazing management, and market access requirements as priority areas for training (Figure A1.4). Farmers overwhelmingly preferred to receive training via one-on-one mentoring or from other farmers through farm and demonstration site visits.

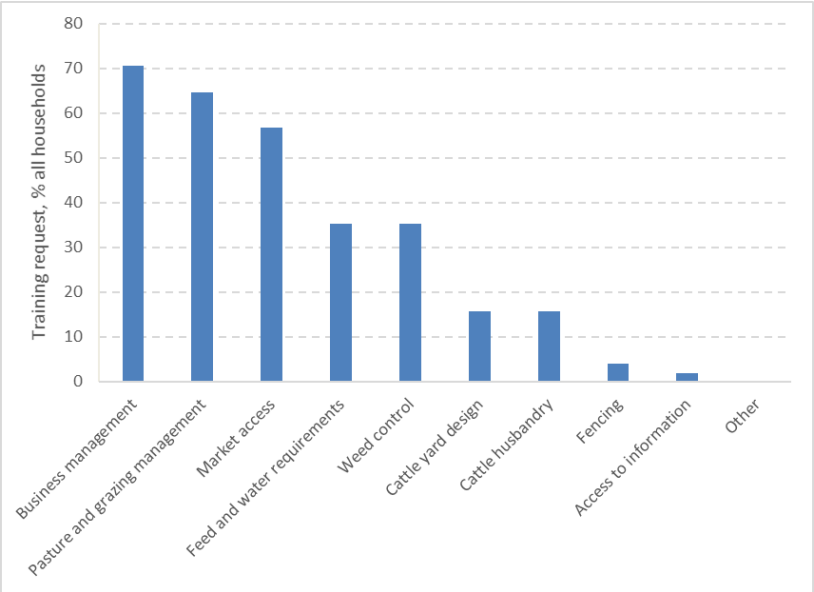


Figure A1.4. Training requested by households.

Conclusions and recommendations

This assessment of the cattle farming practices of smallholder farmers is in general agreement with other reports (NZ MFAT, 2017; Cardno, 2014; Cole et al., 2019; MacFarlane and Shelton, 1986). Potential exists for smallholders to increase productivity through increased weaning rates and increased growth rates. The main farm level constraints appear to be high weed ingress (a result of overstocking), limited drinking water, and low biomass and nutritive value of the available pastures. The opportunities to increase productivity largely require increased capacity of farmers to develop and implement farm plans, strategic approaches to management (grazing management, weaner management, culling of unproductive females), and additional inputs (labour, fencing, water conservation and distribution). To address this a structured farm and business development plan is required to prioritise investments in management practices and farm improvements within the broader context of the households overarching objectives. This would require training in the areas identified by the farmers – farm planning and business management skills, grazing management skills, and the requirements to access different cattle markets.

Activity 1.5. Livelihoods analysis

Prepared by: Cherise Addinsall

Base-line analysis

Introduction

This report presents the outcomes of mixed methods within a baseline livelihoods analysis of different household types within the project catchment area, which the project team will monitor over the course of the project. The baseline study was conceptualised as part of participatory research and development, which seeks to provide an inclusive and collaborative learning exchange between the participants and local and international researchers. The decision to use a combination of methods was based on a desire to achieve engagement and leaning for the participants and project team.

The overarching researchable issues for the project were to identify what on-farm production and marketing strategies would more effectively improve returns and livelihood outcomes for smallholder cattle farmers in Vanuatu. The project aimed to achieve this by initially defining constraints including social barriers to adoption, and identifying research priorities through a situation analysis, livelihood analysis, and participatory appraisals with households, followed by the implementation of a range of participatory on-farm production, business development and marketing interventions that aimed to increase returns to smallholder households.

The aim of this report was to provide a baseline livelihoods assessment of participating farming households with which the project worked closely with to enable greater clarity on how best to address the projects objectives. This baseline livelihoods analysis took place over 12 months from January-2017 to January-2018.

Addressing the research issues for the project required an understanding of the livelihood objectives of smallholder cattle producing households and cattle production systems. The livelihoods analysis sought to provide an in-depth understanding of the context of participating households to aid in the determination of the opportunities (and risks) to improving the livelihoods of smallholder cattle farming households through increased cattle enterprise productivity. A livelihoods analysis can aid in recognising a wide range of indirect and direct livelihood impacts that matter to smallholder households, moving beyond national priority strategies, and placing a focus on generating cash and employment. Particularly when considering livestock, there are trade-offs in livelihood strategies which must be considered due to competition for land and water in addition to the role of custom and community. A livelihoods approach shifts the focus from sectorial perspectives (economic, social equity, agriculture) to a more holistic approach that considers peoples livelihoods as consisting of a number of strategies and priorities and places people's concerns (regardless of their relevance to the project objectives) at the centre.

Study context

Vanuatu's islands are of volcanic origin, located in the South West Pacific, 2300 km north-east of Sydney. The total population of Vanuatu is 250,000 comprising mainly of Ni-Vanuatu who are concentrated on 16 main islands. The density of languages spoken in Vanuatu is the highest of any nation in the world with over 113 Indigenous languages spoken and a unifying language 'Bislama' as well as French and English (Fontenay, 2010). In 1980, Vanuatu gained independence and has since been classed as a Least Developed Country by the United Nations (AusAID, 2011) with few economic resources, remoteness, isolation, and inaccessibility affecting the economic development of the country.

While it has been widely documented that subsistence activities are no longer able to meet the modern livelihood needs of most rural landholders, subsistence (traditional) agriculture, and access to land through customary ownership continues to guarantee over 80% of Vanuatu's population a safety net from hunger, homelessness, and unemployment (Simo, 2010). Yet the contribution of the subsistence economy or what Regenvanu (2010) terms the traditional economy is seriously undervalued as the current measurements for development are too focused on economic growth rather than the reality of how majority of Ni-Vanuatu live (Daley, 2010).

Vanuatu has a total land area of 12,190 km^2 which is divided into six provinces (Table A1.1) and two main urban centres. Luganville, the administrative centre of SANMA province, is located Espiritu Santo (Santo) and has the second largest population after Port Vila. Santo, the nation's largest island (Figure A1.5) with an area of 4248 km^2, is located in the northern part of Vanuatu and has a population of approximately 48,000 (VNSO, 2016).

Table A1.1. Provincial populations.

Province	Area (km^2)	Population
TORBA (Torres Islands, Banks, Islands)	882	10,161
SANMA (Santo, Malo)	4248	54,184
PENAMA (Pentecost, Ambae, Maewo)	1198	32,534
MALAMPA (Malakula, Ambrym, Paama)	2779	40,928
SHEFA (Shepards group, Efate)	1455	97,602
TAFEEA (Tanna, Anlwa, Futuna, Erromango, Aneltyum)	1628	37,050
VNSO, 2016		

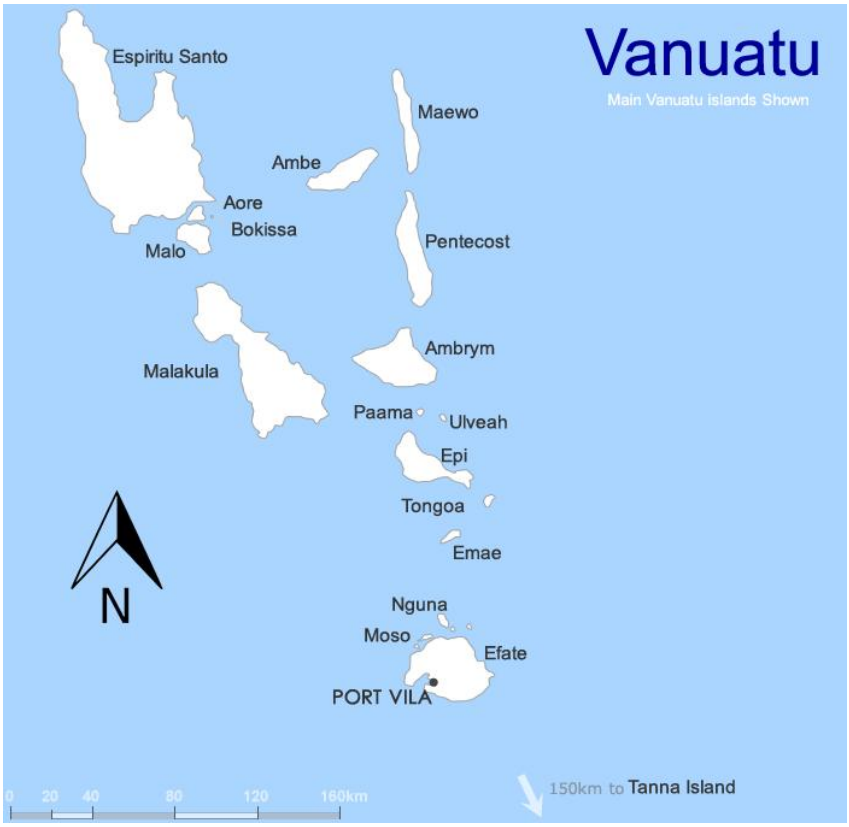


Figure A1.5. Map of Vanuatu (Source: https://www.tourismvanuatu.com/vanuatu-map.html)

Within SANMA province 73.4% of households are engaged in livestock production. Of the 115,540 cattle in Vanuatu, the majority are located in SANMA (Cole et al., 2019). In addition, of the 13,424 households that own cattle, 3,704 households are located in SANMA. Mobile phone is the dominant method of communication, with around 46,865 people relying on this as their primary source of communication, however network access in rural areas remains poor.

Households with different types of smallholder farmers within East Santo Area Council participated in the baseline livelihoods analysis. The area was selected due to its large cattle population and a high density of smallholder cattle farmers, with access to a large number of cattle market options and accessibility to Luganville. It was believed that working in this location would provide a high likelihood of uptake of the project outputs by farmers and would facilitate access by project staff from Luganville to support project activities. The project worked with farmers of different types within the catchment (scale, farming systems, cattle production systems, current level of commercialisation) who had some form of recognised ownership and security over their land (either customary or government registered). By working with several types of farmers it was expected that a broad range of interventions could be tested, and successful interventions would be applicable to farmers of similar types in other parts of Vanuatu.

Methodology

This report provides a baseline livelihoods assessment of the 45 households that participated in the project. The project worked with catchment area groups in Khole, Sara, and Port Orly villages and involved participating and non-participating but interested farmers, local chiefs, provincial staff, and area secretaries. A variety of different household types were selected to register with the project in late 2016 through consultation in each community with local chiefs, community members, the commercial sector (i.e. stakeholders who buy cattle from smallholder farmers), and the households themselves.

Qualitative and quantitative data collected from 45 male and 26 female participants through the baseline livelihoods analysis sought to provide an understanding of the risks and vulnerability context that impacts on rural landholders and their households, influencing structures and processes (such as societal norms, gender roles and relations, organisations, and traditional policies), access to and control of resources, choice and success of livelihood activities, priorities for livelihood outcomes, and incentives that individuals respond to. By enabling rural landholders and their households to be key actors in identifying and addressing their livelihood priorities, the project was able to implement processes to respond flexibly to smallholders needs (Addinsall et al., 2015).

The project team conducted storian sessions (focus group discussions), semi-structured household discussions, household labour diaries, and ranking exercises coupled with more quantitative surveys through mobile acquired data (MAD: Commcare, Dimagi) to develop an understanding of the households livelihood strategies. This involved a baseline assessment of the households to enable the project to determine the (positive or negative) impacts the project may have had on livelihoods. Gender disaggregated data was collected through on-farm monitoring, household interviews, and storian sessions to provide an understanding of the roles and responsibilities of women in cattle management and other on-farm activities. The collection of gender disaggregated data also enabled the project team to understand and evaluate the impacts of project activities on the livelihoods of women through the longitudinal monitoring of these households over the duration of the project. Research and communication activities targeted towards females would be implemented if access to the proposed methods were constrained. An experienced female, Ni-Vanuatu social scientist was engaged to assist with this work to overcome some of the language and cultural issues involved in engaging with these communities.

Household interviews: mobile acquired data

The project team (made up of both male and female, local and foreign researchers, and assistants) used a MAD app (Commcare, Dimagi) to describe household typologies and conduct the livelihood analysis for the project.

Commcare provided baseline data which allowed a longitudinal analysis of households in the project. However, the project team found that conducting a livelihoods analysis in a rural context in Vanuatu required methods beyond the use of quantitative tools such as mobile applications. The benefits of using this technology over paper-based systems eliminates the requirement for Excel data entry which can give rise to additional mistakes. Commcare provided the project with a platform where data could be uploaded, stored, and accessed from a central, secure server. It could also scan livestock RFID tags, provide GPS location, capture and annotate videos and photo's, and play audio files.

The process of a baseline livelihoods analysis commenced with the registration of villages, and households, and household members. The initial steps of data collection with the tablets was to register villages and interview key community representatives such as Chiefs, area secretaries and male and female heads of committees to gain an understanding of how the village operated and access to services. Interviews were conducted at the household level via household registration, which allowed an understanding of the households' access to extension services and information. The design of the household member forms enabled the project team to collect gender disaggregated data. The project team would use household member forms to register individual heads of households so collection of gender disaggregated data could be gathered to understand the roles and responsibilities of both men and women in cattle management and other on- and off-farm activities.

Given the lack of familiarity with the technology, considerable lead time was required to attain familiarity with the platform and development of the surveys. This included initial technology training in Canberra, training of the in-country project team, and then taking the tablets into the field to pilot test the surveys (Figure A1.6). Surveys were tested in the field and refined numerous times as the project team continued to find ways to condense the number of questions asked or improve on how questions were posed. The in-country project team members and participants contributed invaluable feedback to this process and played a key role in refining the digital surveys.

Figure A1.6. Capacity building of project team and implementation of CommCare surveys with participating households in East Santo Area Council.

Participatory storian sessions and labour diaries

Quantitative data collected on CommCare was complemented by qualitative data collected through participatory storian sessions. CommCare was limited in its scope for the collection of qualitative data which is vital for an intersectional approach to social research and development (Krieken et al., 2000). To better understand how to engage household members in the project and the impact of custom and community on decision making in household and farm management (Addinsall et al. 2019) alternative research methods were required. The project team conducted participatory storian sessions with both male and female participants in the project over a 12 month duration. The project team found the most effective way to run these sessions was to segregate men and women, as women were reluctant to speak in meetings when men were present.

The project team held participatory storian sessions with male and female participants between February 2017 and February 2018 (Table A1.2). Additional meetings were held with female participants as the project team received feedback that little information had been filtering through the household from men to women.

Table A1.2. List of participatory storian sessions undertaken in the project.

Date	Location	Purpose	Attendees	Gender
Feb 2017	VARTC[1]	Participatory storian session focused on uncovering the roles and responsibilities of females in cattle management	4	Female
May 2017	Port Orly	Participatory storian session focused on uncovering the roles and responsibilities of females in cattle management	2	Female
May 2017	Port Orly	Participatory storian session seeking approval from Chief and community leaders to participate in women's group meetings	2	Male
June 2017	Khole	Participatory storian session seeking approval from Chief and community leaders to participate in women's group meetings	3	Male
June 2017	Khole	Participatory storian sessions disseminating project information to women's community groups	11	Female
June 2017	Sara	Participatory storian session seeking approval from Chief and community leaders to participate in women's group meetings	3	Male
June 2017	Sara	Participatory storian sessions disseminating project information to women's community groups	14	Female
June 2017	Port Orly	Participatory storian sessions disseminating project information to women's community groups	17	Female
July 2017	Port Orly	First Bisnis Blong Buluk women's group meeting, Participatory storian session on challenges for women to engage in the project and cattle farming	6	Female
Feb 2018	Port Orly	Participatory Storian session focused on key impediments to increasing cattle herd	3	Male
Feb 2018	Port Orly	BBB women's training, labour diaries	6	Female
March 2018	Port Orly	BBB women's training, labour diaries	3	Female
April 2018	Port Orly	BBB Women's training, labour diaries	4	Female

[1]Vanuatu Agricultural Research and Technical Centre.

Initially the first participatory storian women's group session took place at the projects first training day held at the Vanuatu Agriculture Research and Technical Centre (VARTC) in Santo. Nine men and four women attended the training. It became apparent during the training that the women were not fully engaging in the training, preferring to stand in the outer peripheral and not participate or ask questions. The project team used this opportunity to sit with the female participants and discuss with them their thoughts on how the project could best engage women. The outcome of this storian session was to arrange participatory storian women's group meetings in Khole, Port Orly, and Sara that were open to all women from the community, whether they were registered with the project or not (Figure A1.7). This was to ensure all women in the community were informed of the projects activities and could make an informed decision if they wanted to be further involved in the project. During these discussions, questions were asked to uncover the roles and responsibilities of females in cattle management and other on farm activities to provide much needed information to support research and communication activities targeted at females.

These discussions also provided valuable information to assess the impacts of project activities on the livelihoods of females over the duration of the project. These discussions provided much needed information for the development of a gender strategy for the project that supported female participation in the research and communication activities.

a.

b.

Figure A1.7. Women's meetings at Khole (a.) and Port Olry (b.) villages, East Santo Area Council.

While we have already uncovered some significant challenges for engaging women in the project and cattle farming generally, there were some interesting engagement methods suggested by female participants that the project implemented. These included the development of the Bisnis Blong Buluk women's group that met on a monthly basis with the project team and consisted of five registered female representatives from Khole, Sara, and Port Orly. These representatives then disseminated this information within their community meetings, acting as a key point of information exchange from the project to the wider community. This method encouraged women to work together to achieve common development needs which was also key to addressing key priority targets for Australia's new policy and performance framework for international development (DFAT, 2014) such as Target 4 – Empowering women and girls, and Goal 5 of the Sustainable Development Goals: Achieving gender equality and empowering women. Addressing these targets can only be realised by gaining an increased understanding of gender relations and

dynamics to uncover the complexity in which rural women operate (CARE, 2002). As part of the Bisnis Blong Buluk women's group monthly meetings (Figure A1.8) the project team continued to collect information from the participants through activities such as storian sessions, labour diaries, and evaluation surveys. At the request of the participants of this group, the project team included the group in a number of activities such as:

- Forage research trials,
- Rain gauge collection and transcribing results with local schools,
- Farm management,
- Household and farm budgeting and financial management,
- Grazing management,
- Water source solutions,
- Husbandry practices in cattle, and
- Composting/mulching.

Figure A1.8. Bisnis Blong Buluk womens group training.

Results

Demographics

Figure A1.9 summarises the demographic information of participating households in Khole, Sara, and Port Orly. The total number of respondents was 71. While the majority of the respondents for the baseline livelihoods survey were men, the project team addressed this imbalance in the participatory storian sessions by recruiting more women than men. Figure A1.10 summarises the education level of the participants by village and gender. Only one male participant from Khole had completed studies post-secondary level. While majority of respondents from Khole and Sara had completed primary level only. Interestingly women ranked quite well in each of the villages for attending secondary level education. Figure A1.11 shows a higher number of men than women in each of the three villages surveyed that are originally from the village where their households are residing now. This is a common occurrence in rural areas of Vanuatu as women are required to relocate to their husbands' communities upon marriage due to customary land tenure systems. Some female respondents suggested that the obligation to relocate is often an isolating

experience at first due to leaving their leaving family and community. It can often take some time to build up these social support systems after relocating.

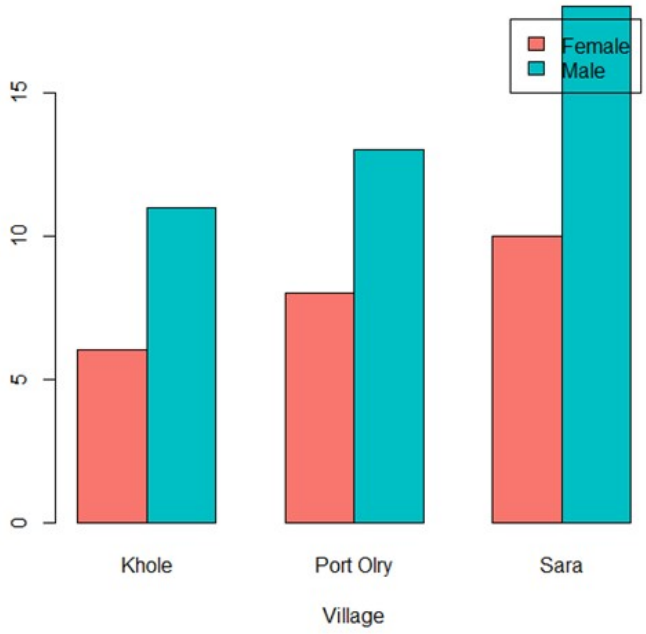


Figure A1.9. Total number of participants by village and gender.

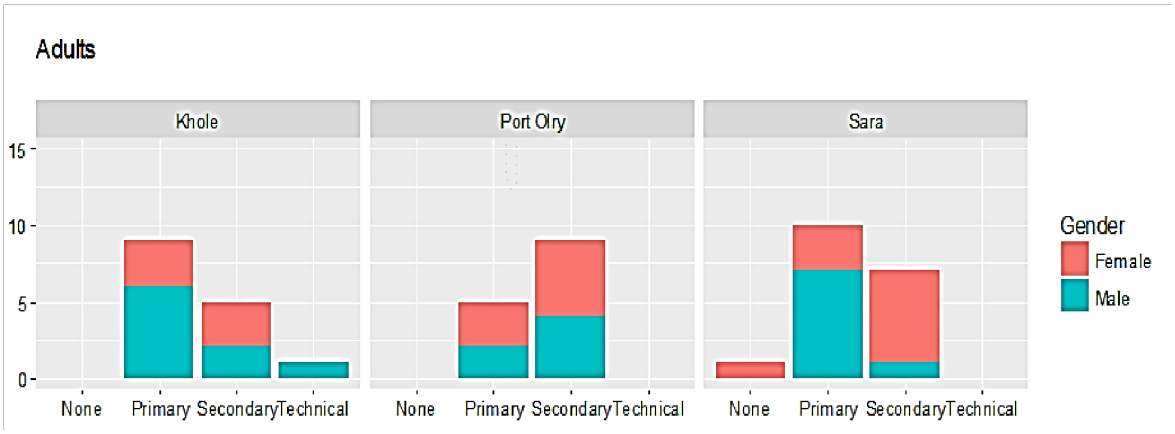


Figure A1.10. Education level of participants by village and gender.

Figure A1.11. Number of male and female respondents originally from Khole, Port Olry or Sara villages.

Food type consumed

Figure A1.12 shows that majority of households within the three villages surveyed suggested that they either consume over half or majority of their food from subsistence (food grown to meet the needs of a household). When explored in more detail, on average across the three villages the highest consumed food type is island kakai (root crops), followed by fresh fruit and vegetables, fresh meat, tinned meat, rice and noodles, with sweet packaged food on average being consumed the least (Figure A1.13).

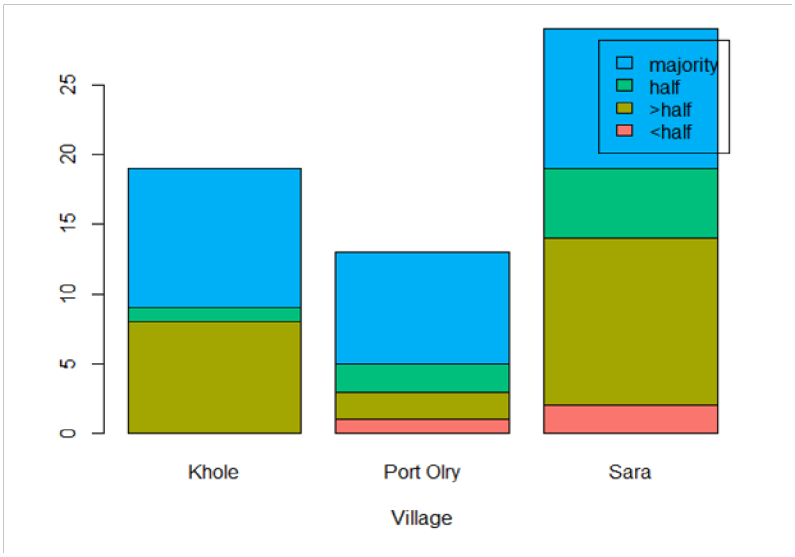
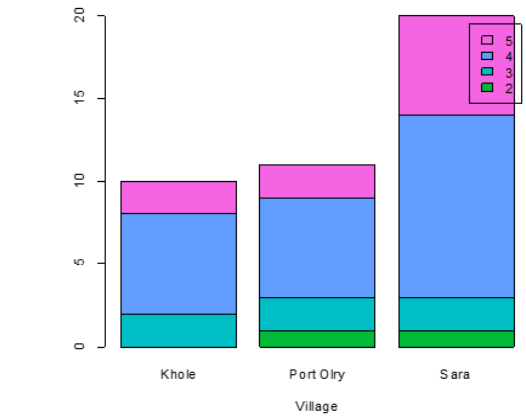


Figure A1.12. Percentage of subsistence food consumed by households.



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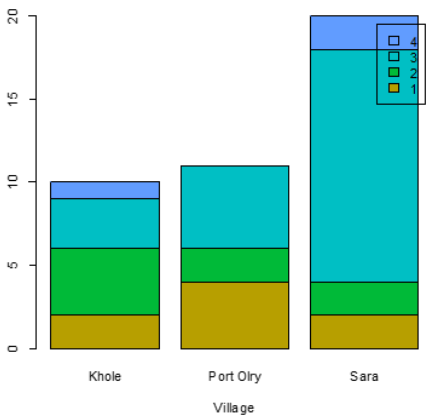

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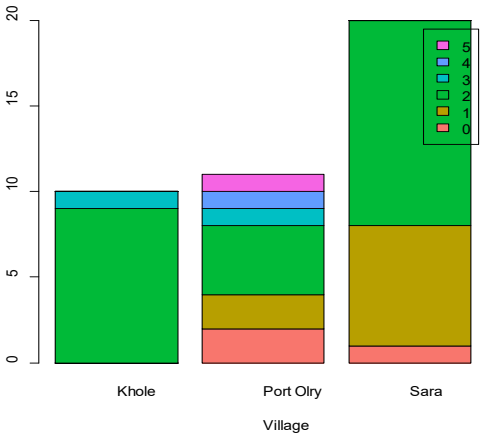

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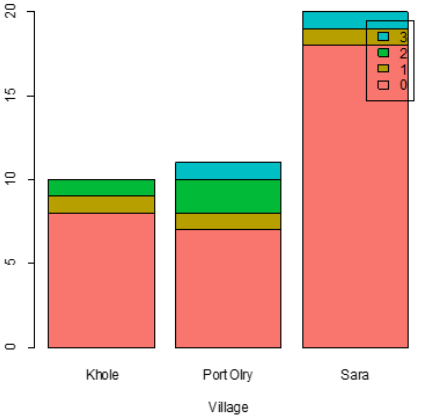

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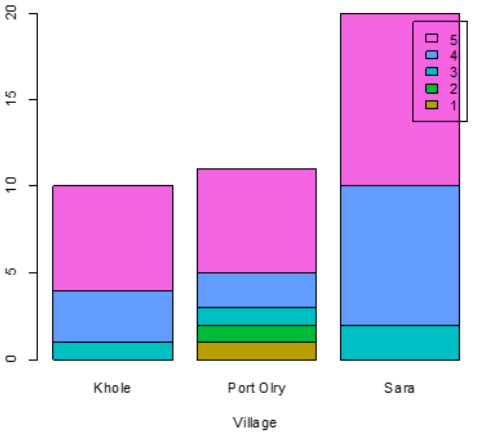

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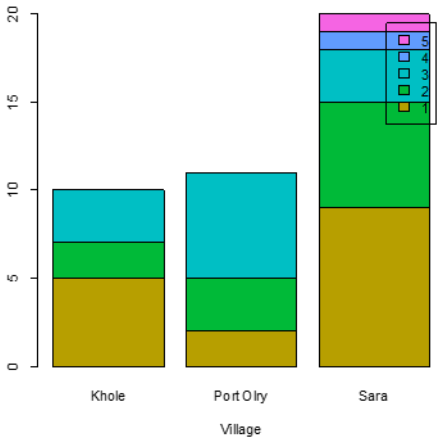


f.

Figure A1.13**. Food type consumption ranking (0-5, 0 being least, 5 the most) by food type and village.** (a. fresh fruit and vegetables; b. tinned meat c. island kakai; d. fresh meat; e. sweet packaged; f. rice and noodles).

Financial capital

Income

Figure A1.14 shows that majority of respondents across the three villages surveyed (particularly women) do not receive any off-farm income or remittance. In Sara a higher number of female respondents than men receive financial assistance from family living outside of the community. This may be attributed to the earlier findings which showed the majority of women relocating to the villages surveyed, therefore their families would be living in other communities. A higher proportion of respondents in both Khole and Sara had not taken out any loans in the last few years, yet in Port Orly an even representation of respondents had taken out a loan in the last few years. Majority of the loans were short term loans <24 months taken out with the National Bank of Vanuatu (Table A1.3). All female respondents suggested that they didn't have difficulty with repayments, while 3 out of the 5 male respondents had experienced difficulty. Female respondents' reasons for taking out a loan included household expenses, new business (business loan taken with VANWODS), debts, or cattle infrastructure. While male respondents took out loans for cattle infrastructure, cattle purchase, house renovations, or a second hand car.

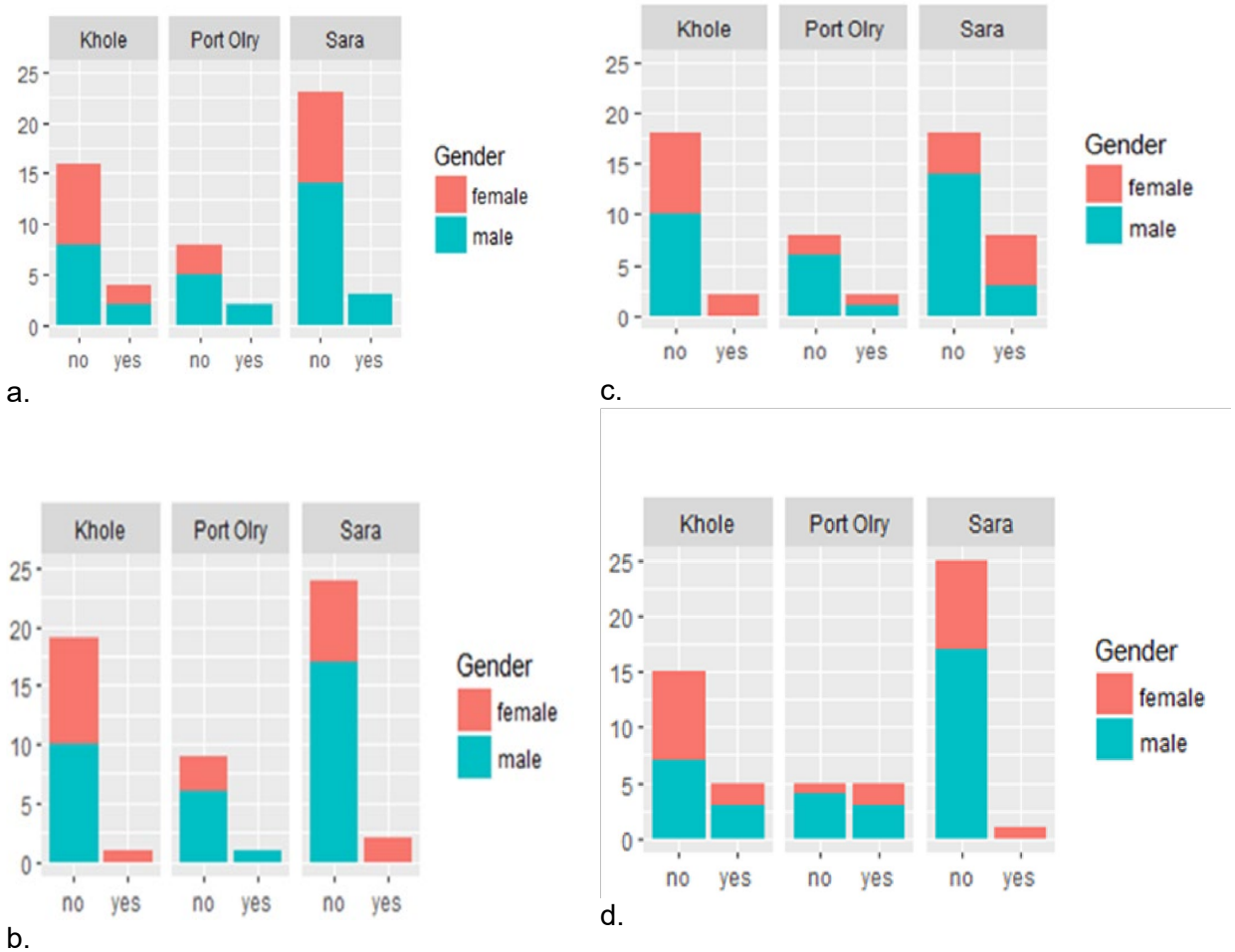


Figure A1.14. Number of household members that receive off-farm income (a.), off-farm remittances (b.), financial assistance from outside the immediate village community (c.) and accessed loans in recent years (d.).

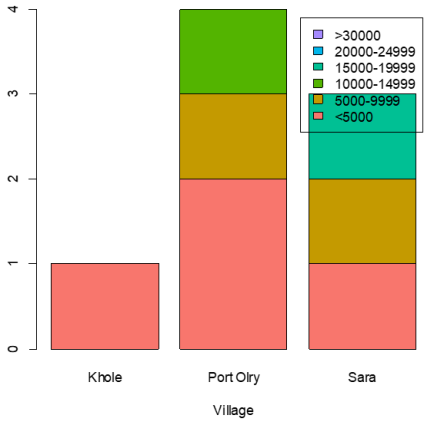
Table A1.3. Description of loans accessed in recent years.

Lender	Amount, vatu	Commencement	Purpose	Loan term (months)	Repayments	Repayment difficulty	Village	Gender
NBV	100,000	2014	Household expenses	12	14,000	No	Khole	Female
NBV	150,000	2016	Cattle infrastructure	24	8,000	No	Port Olry	Male
VWD	10,000	2016	New business			No	Port Olry	Female
NBV	100,000	2015	Cattle infrastructure	24	6,800	No	Port Olry	Female
NBV	100,000	2015	Cattle infrastructure	24	6,800	No	Port Olry	Female
NBV	800,000	2015	House renovations		20,000	Yes	Port Olry	Male
Co-op	20,000	2015	Cattle infrastructure	1	20,000	Yes	Khole	Male
Co-op	10,000	2015	Household expenses	3	3,250	No	Khole	Female
NBV	80,000	2014	Cattle infrastructure and cattle	24	40,000	Yes	Khole	Male
AFIC	1,300,000	2015	Second hand car	24	31,000	No	Khole	Male

NBV, National Bank of Vanuatu; VWD, VANWODS; Co-op, co-operative; AFIC, Apma Financial Investment Centre.

Expenses

The average monthly spend on utilities was approximately 2000 to 5000 vatu, with most respondents particularly from Khole suggesting that they do not spend anything on utilities (Figure A1.15). This is due to many households not being connected to the grid. The average household spend per month on mobile phone credit was between 1500 and 5000 vatu per month. The average monthly household spend on health costs varied considerably ranging from 500 to 25,000 per month, with most households suggesting they spend around 2000 to 10,000 vatu per month. These figures would vary widely as circumstances change within the household. The average monthly spend per household on transporting people was between 20,000 and 100,000 vatu with the highest number of households across the villages suggesting they spend on average around 10,000 to 15,000 vatu/month (Figure A1.16). The average household spend on transporting produce was much lower with majority of households spending between 3000 to 5000 vatu per month. The average spend on alcohol, cigarettes, and kava per month by village was between 5000 to 10,000 vatu but was variable due to the low number of responses recorded (Figure A1.17). The average household yearly spend on social obligations was between 10,000 and 20,000 vatu with households in Sara on average contributing the most to social obligations (Figure A1.18). These obligations consist of bride price, funeral costs, donations to church, fundraising events, and community projects and activities. Education costs in Vanuatu continue to be a considerable financial burden to rural households in Vanuatu and were described by many respondents as key influencing factors when making decisions determining when to harvest produce, sell livestock, or take out loans. The average household yearly spend on school fees is around 50,000 vatu.



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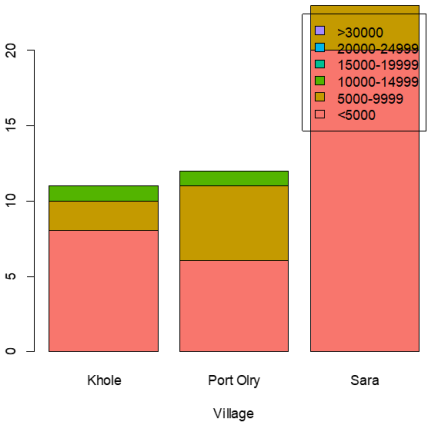

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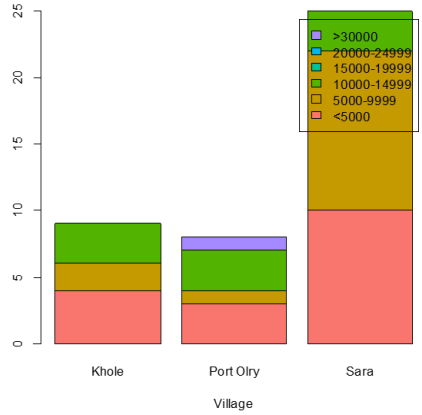

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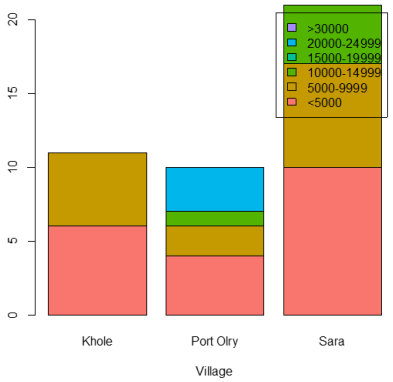
Figure A1.15. Average monthly expenditure on utilities (a.), phone credit (b.) and health (c.) by households.



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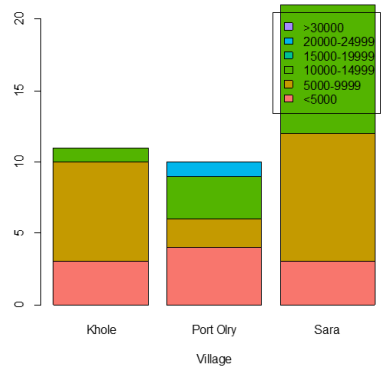

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Figure A1.16. Average monthly expenditure on transport of people (a.) and produce (b.) by households.

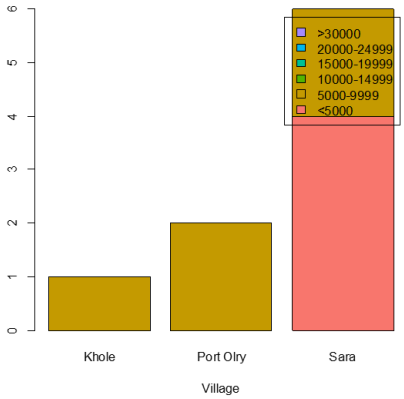
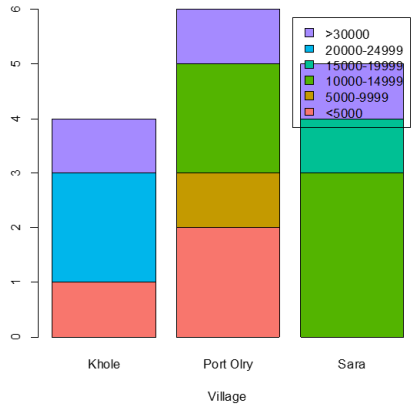


Figure A1.17. Average monthly expenditure on kava, alcohol and cigarettes by households.



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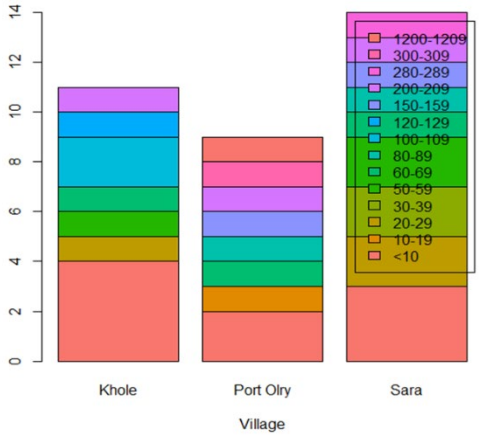

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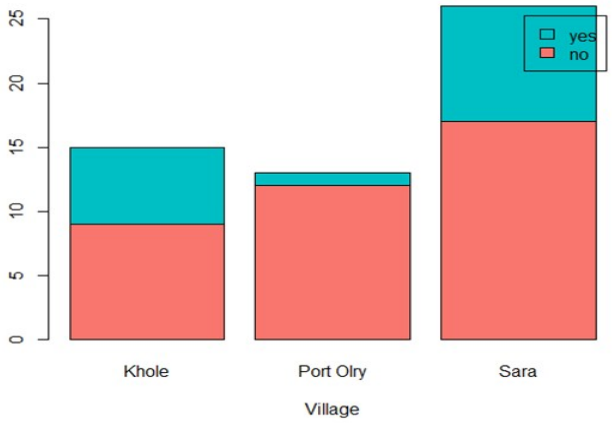
Figure A1.18. Average yearly expenditure on social obligations (a.) and education (b.) by households.

The majority of households suggested that they did not experience difficulty meeting their expenses (Figure A1.19), which could be attributed to the high number of households with no loans or debt, consuming predominately from subsistence and the few households paying utilities. There was also evidence of households trading goods and services to meet household expenses particularly in Sara where there was also a larger number of households that had sold cattle to meet expenses compared to households in Khole and Port Olry.



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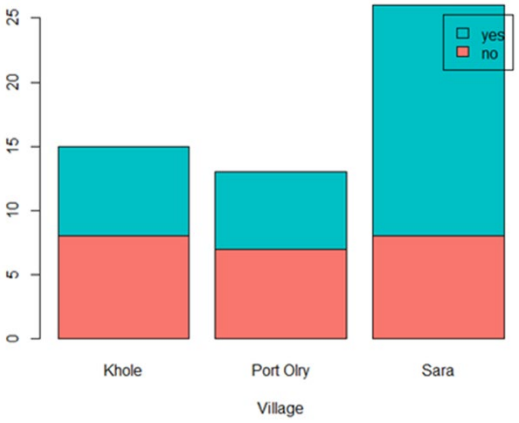

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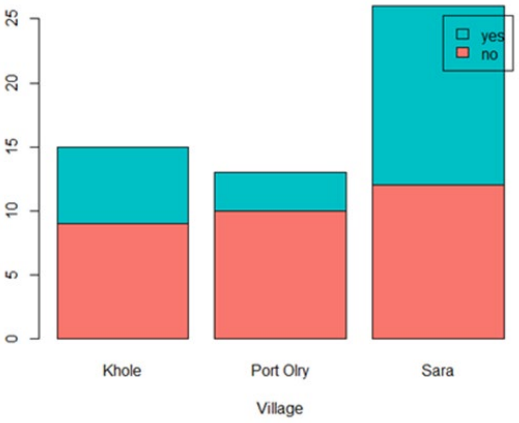
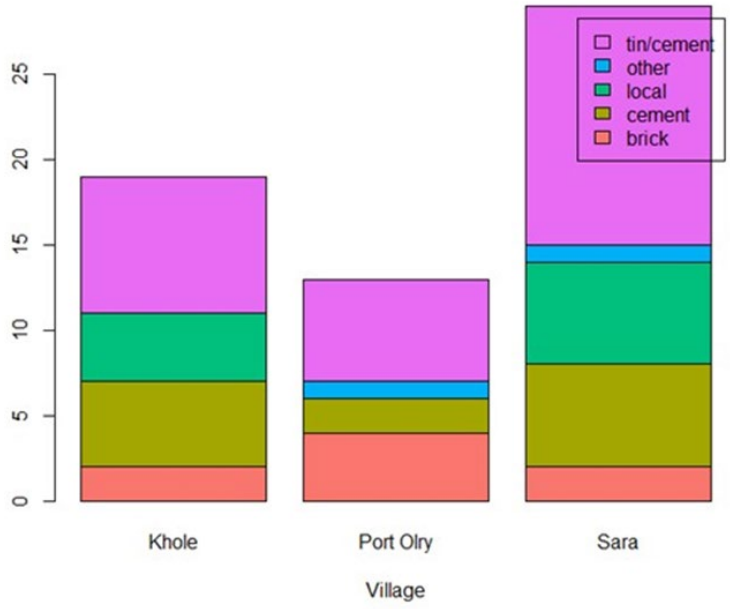


c.

Figure A1.19. Number of households that have difficulty in meeting expenses (a.) and sell cattle (b.) or trade goods or services to pay for expenses (c.).

Physical capital

Majority of the homes in each of the villages were constructed with a mixture of tin and cement or cement with thatch as can be seen in Figure A1.20. Figure A1.20 shows the key water sources for the majority of the households were household water tanks or a well.



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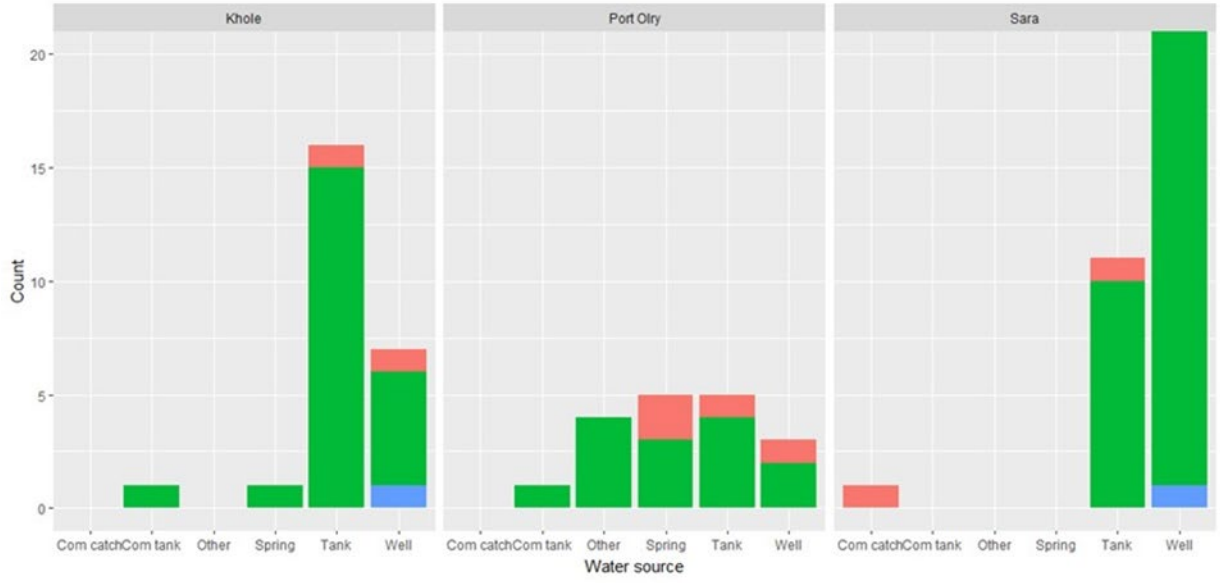
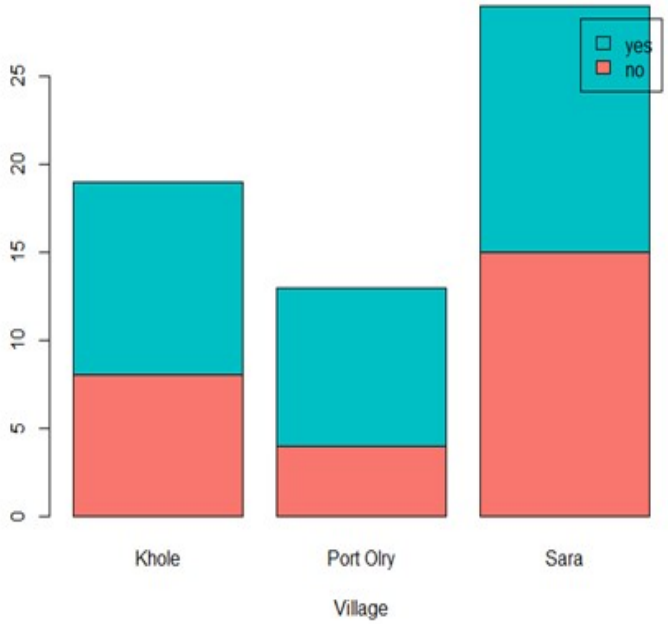


b.

Figure A1.20. Number of households by construction type (a.) and condition and source of household water (b.). (Com catch = community catchment, Com tank = community water tank, Tank = household water tank).

Figure A1.21 demonstrates a higher number of households selling cattle to purchase household items compared to home improvements, although in Port Orly they were relatively similar. Indeed, when visiting the three villages there was notable home construction and improvements in Port Olry compared to Sara and Khole.



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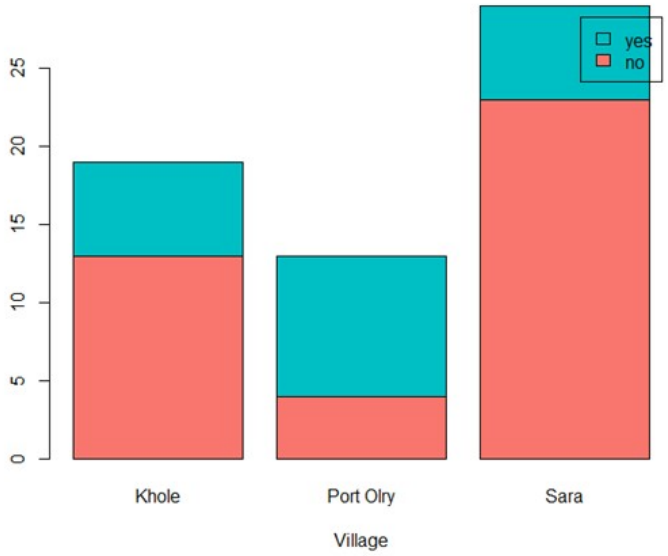


b.

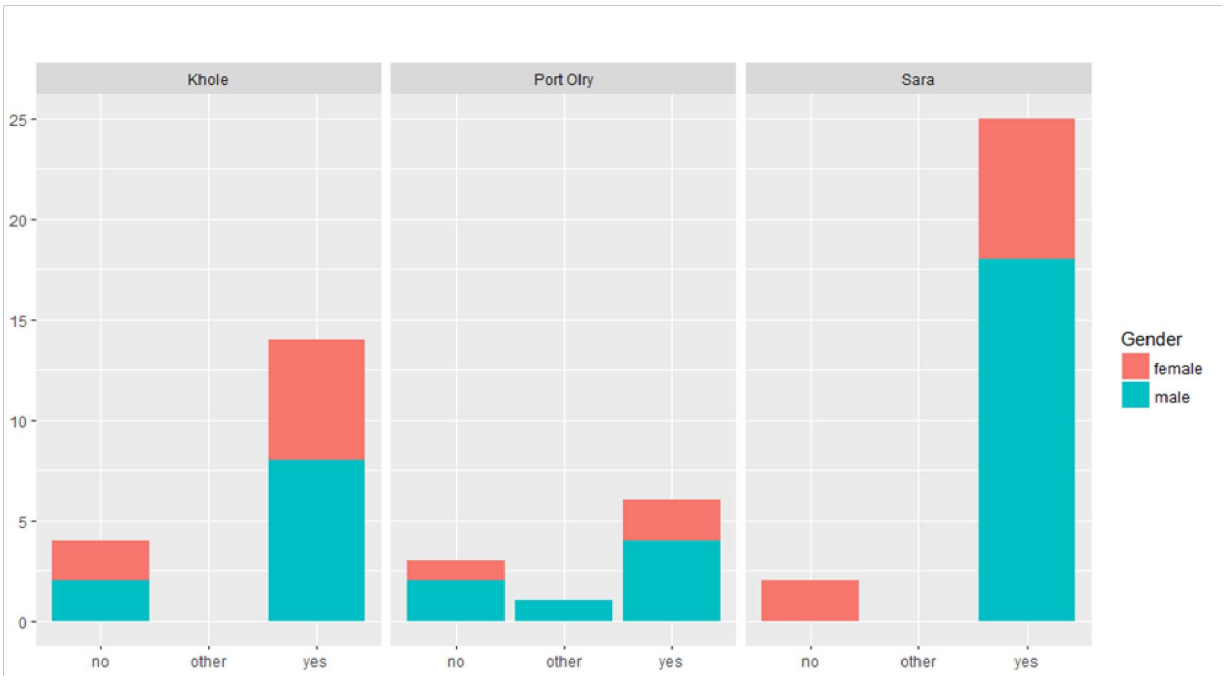
Figure A1.21. Number of households who have sold cattle for household construction and/or improvements (a.) or for household items (b.).

Table A1.4. Description of household items purchased form cattle sales.

Participants description of household items purchased from cattle sales	Village
Farm tools and other items	Khole
Water tank	Khole
Green coconut	Khole
School fees	Khole
Household items and school fees	Khole
Fencing and buy more cattle	Port Olry
Generator, ice box, water tank and chainsaw	Port Olry
Household items	Port Olry
Vehicle - Ford Ranger	Port Olry
Wire for fencing	Port Olry
Fencing wire and labour	Port Olry
Household items	Port Olry
Latest iPhone	Port Olry
Solar panels and vehicle maintenance	Sara
Carry out the work in the farm	Sara
Television and solar	Sara
Solar panel	Sara

Human and social capital

The majority of respondents (both male and female) suggested that they receive support from people within their communities (Figure A1.22). During storian sessions, examples were given of the types of support they had received such as: community fundraising to help their households in time of need (sickness, school fees), repairing homes, fencing (post natural disasters), minding children, and transport. Khole was the only village where households had suggested this community support had decreased in the last few years with many households suggesting the support had increased. Storian sessions revealed that support increased considerably post cyclone Pam. A majority of both male and female respondents also suggested that they give and receive volunteer assistance to and from community members to assist with daily livelihood activities (Figure A1.23).



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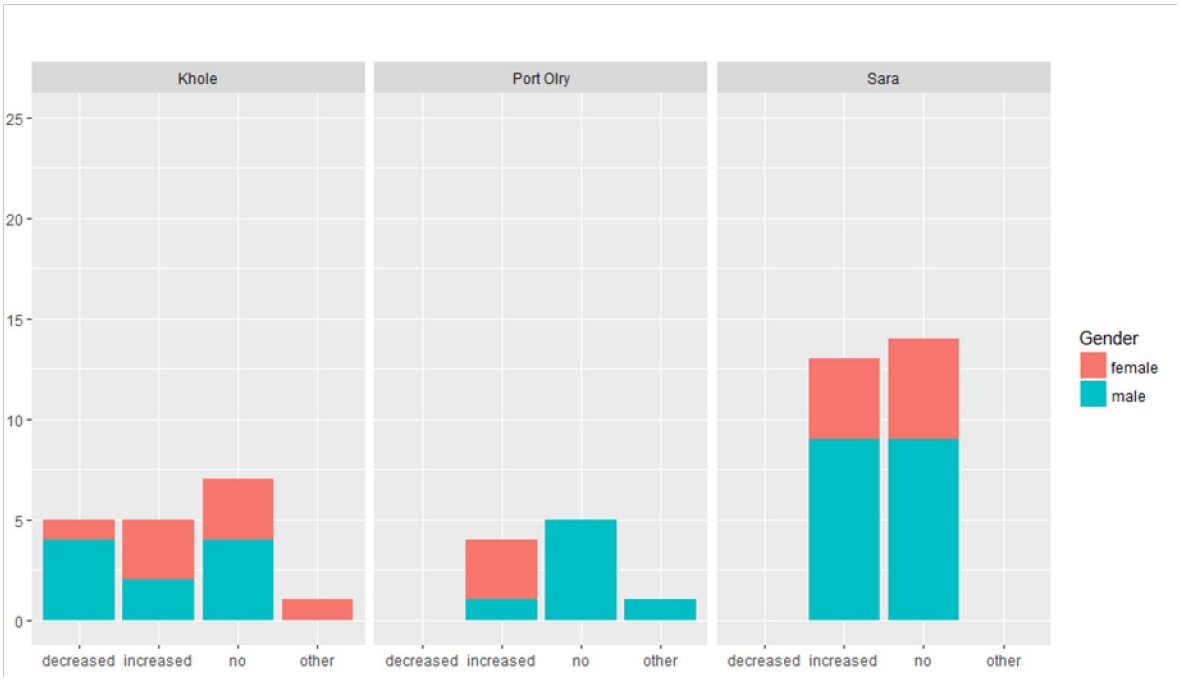

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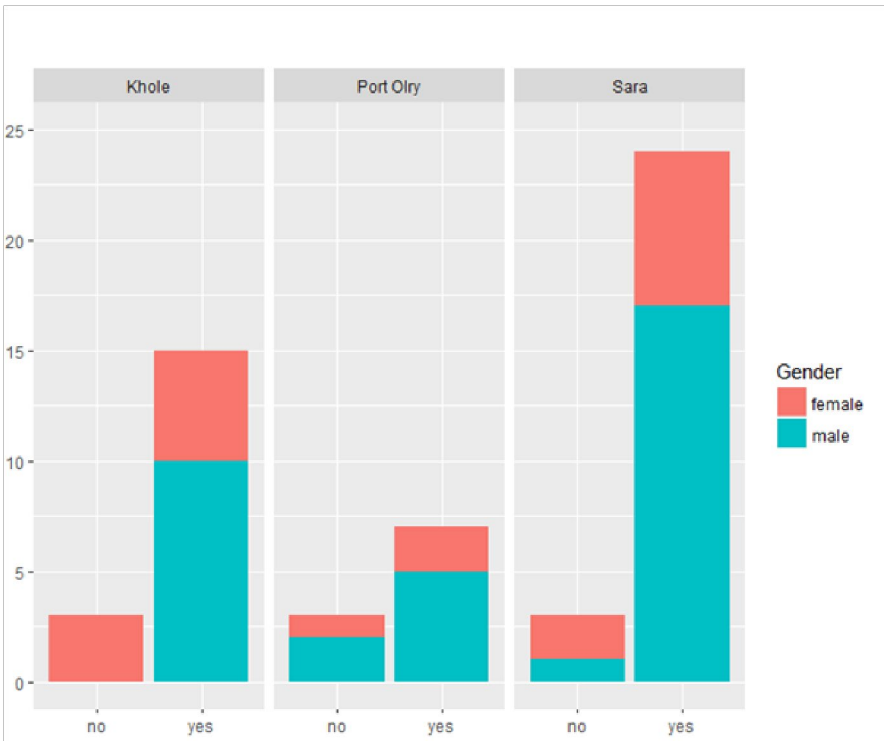
Figure A1.22. Number of respondents who receive support within the community (a.) and their perceptions if that support has changed within the last three years (b.).



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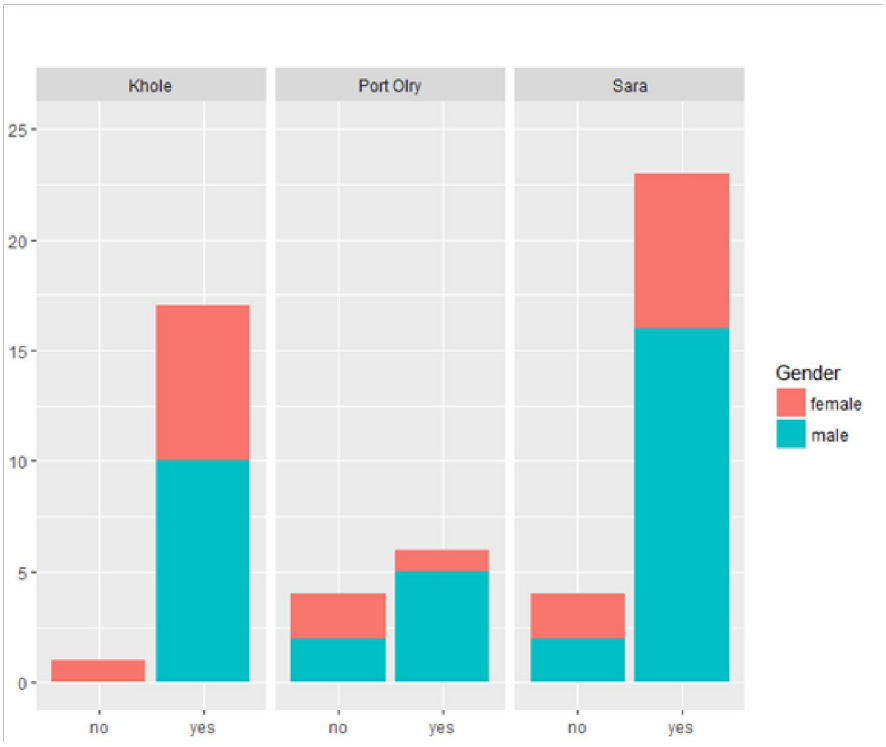

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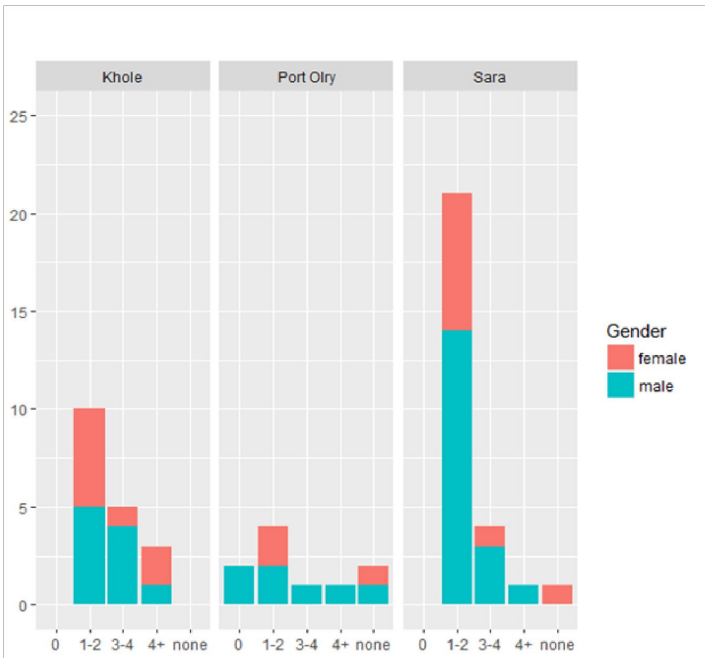
Figure A1.23. Number of respondents that receive volunteer assistance for livelihood activities (a.) and volunteer their time to other community members' livelihood activities (b.).

The frequency of attendance at custom ceremonies in the last 12 months was mostly one to two times with only two respondents suggesting that they had not attended a custom ceremony

within the previous 12 months (Figure A1.24). A majority of respondents, both male and female, suggested it was 'important' to attend custom ceremonies. Community meeting attendance was also high with the majority of respondents suggesting that they attended scheduled community meetings (Figure A1.25). On average these meetings were held monthly. The majority of respondents suggested that they mostly listen at community meetings and occasionally speak. Men out numbered women in all three communities when asked of the likelihood of speaking at community meetings. Only one female respondent from Khole suggested that they will consistently speak at community meetings. During storian sessions female respondents suggested that they feel more comfortable to speak in meetings where only women were present.



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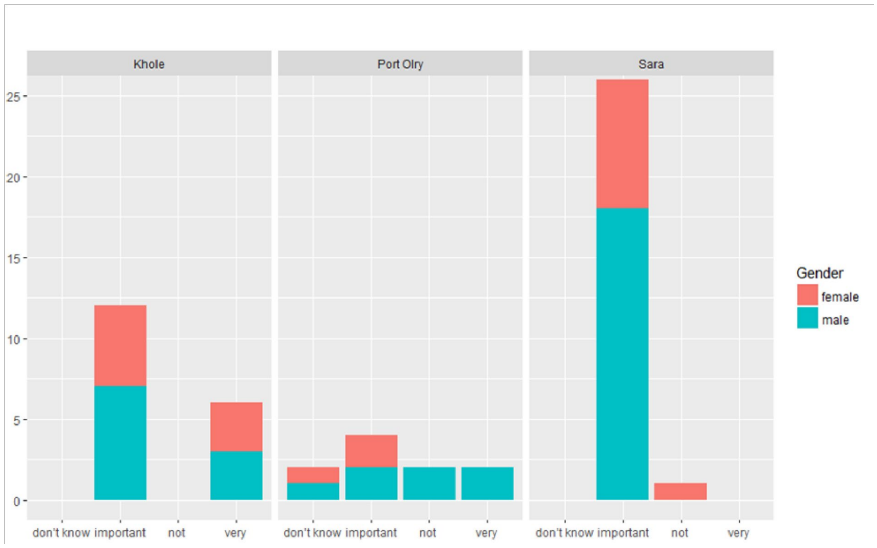

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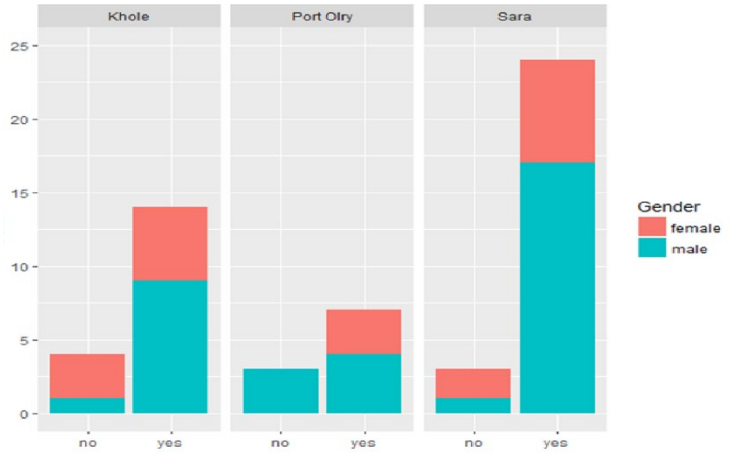
Figure A1.24. The number of custom ceremonies respondents have attended within the last 12 months (a.) and the importance of custom ceremonies to respondents (b.).



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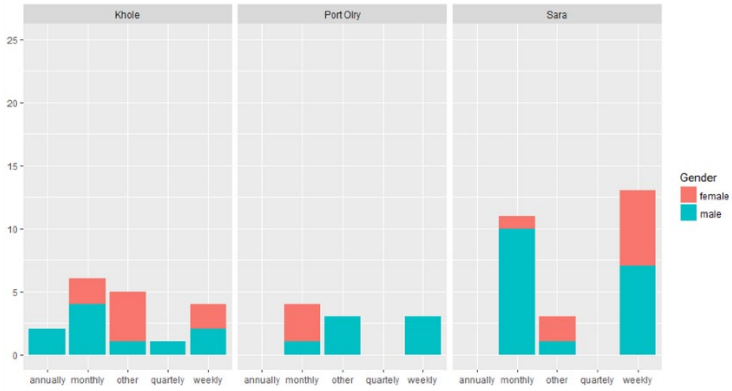

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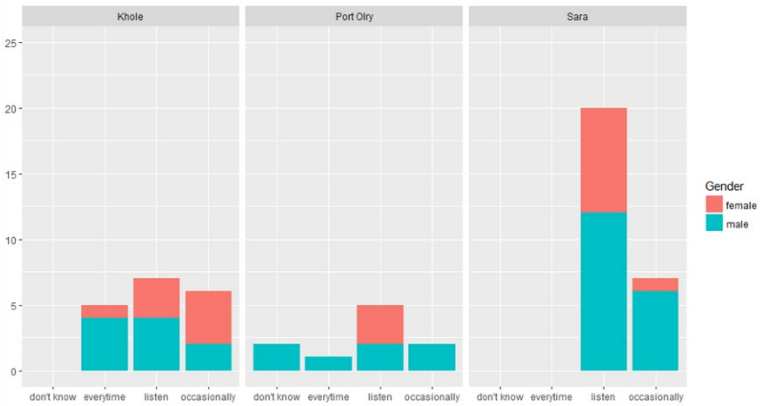


c.

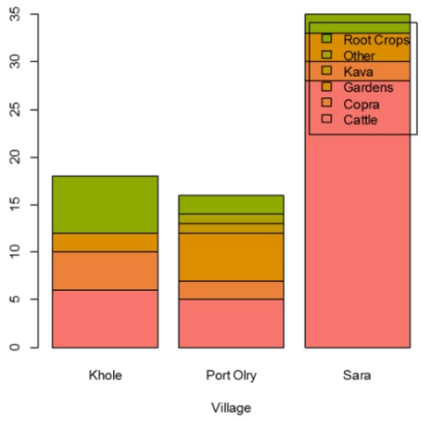
Figure A1.25. The number of respondents that attend community meetings (a.), frequency of attending community meetings (b.) and likelihood of speaking at a community meeting (c.).

Natural capital

As part of the baseline livelihoods analysis households were given a number of commodities and asked to rank them in order of importance to their livelihoods. From this list of commodities, households were asked to identify which of these commodities were specifically used for income

generation. While the most common measurement of livelihoods is based on improvement in one's income, studies have shown this may not represent the reality in the context of rural Vanuatu (Addinsall et al., 2015; Cahn, 2006). Therefore, the baseline livelihoods analysis discusses the importance of these commodities to formal and informal household activities.

There was a notable difference between the most important commodity to a households livelihood (Figure A1.26) compared to the household income (Figure A1.27). Particularly in Sara, where cattle were seen as the most important commodity in relation to a household's livelihood. While copra, kava and root crops were selected more than cattle as the most important to a household's income. Information collected from storian sessions with participants suggested that many respondents keep cattle to meet custom obligations. Cattle were also described as savings accounts to pay for school fees. Root crops were particularly important for income generation among female respondents while kava and copra were seen among male respondents as important commodities for income generation.



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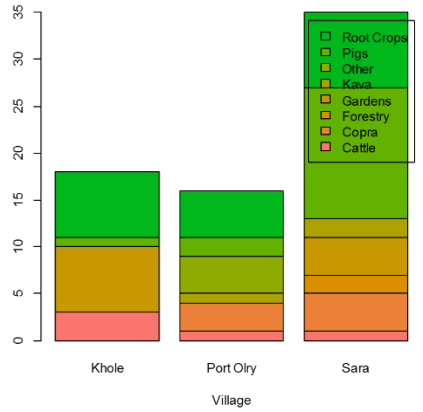

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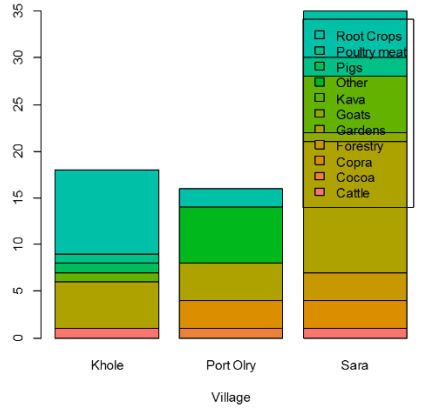

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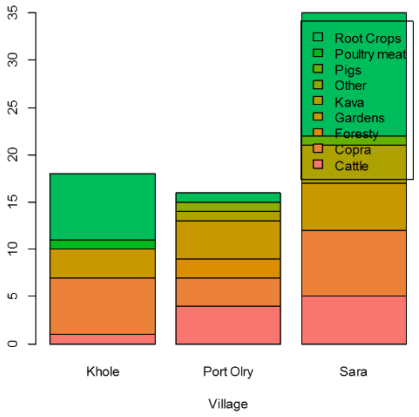
Figure A1.26. The first (a.), second (b.) and third (c.) most important commodity to the livelihoods of household members.



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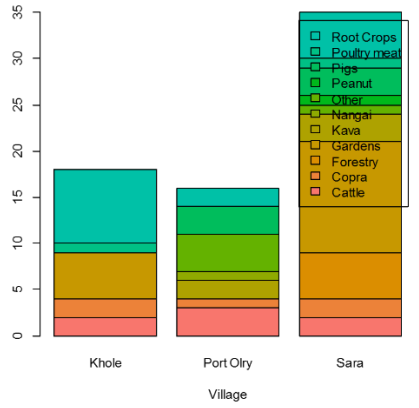

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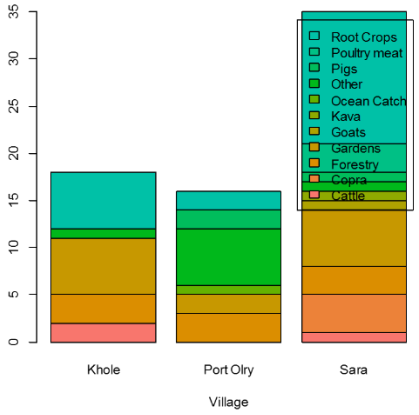

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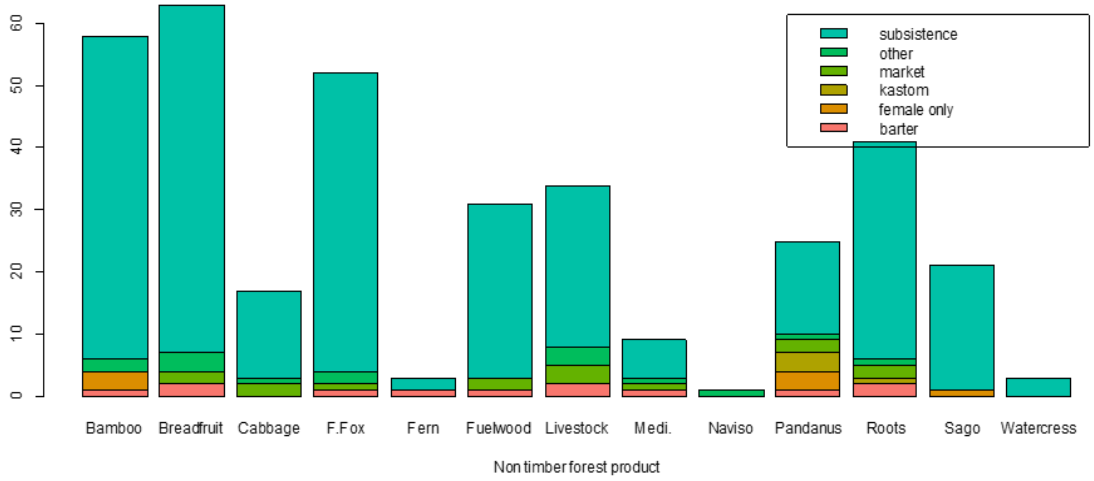
Figure A1.27. The first (a.), second (b.) and third (c.) most important commodity to the incomes of household members.

Households were asked a number of questions on the role or importance of non-timber forest resources (NTFR) to their livelihoods. Figure A1.28 shows an overwhelming response for the importance of NTFR meeting subsistence livelihood priorities over income generation, bartering. Bamboo, breadfruit, flying fox, wild root crops (yams and taro), fuelwood, wild livestock, and pandanus were the most important NTFR within households. While nearly all of the NTFR have shown some decline, pandanus has shown the most obvious decline with over 90% of responses suggesting that they had seen decline of this resource. Within the qualitative statements collected on the decline of pandanus (Table A1.5), it was suggested this was due to over harvesting for weaving mats, bags. for household use and to sell as handicrafts, cattle grazing on the pandanus, and little replanting. As pandanus is an important NTFR to the livelihoods of women in particular, it is important that measures are taken to reduce and reverse this decline.



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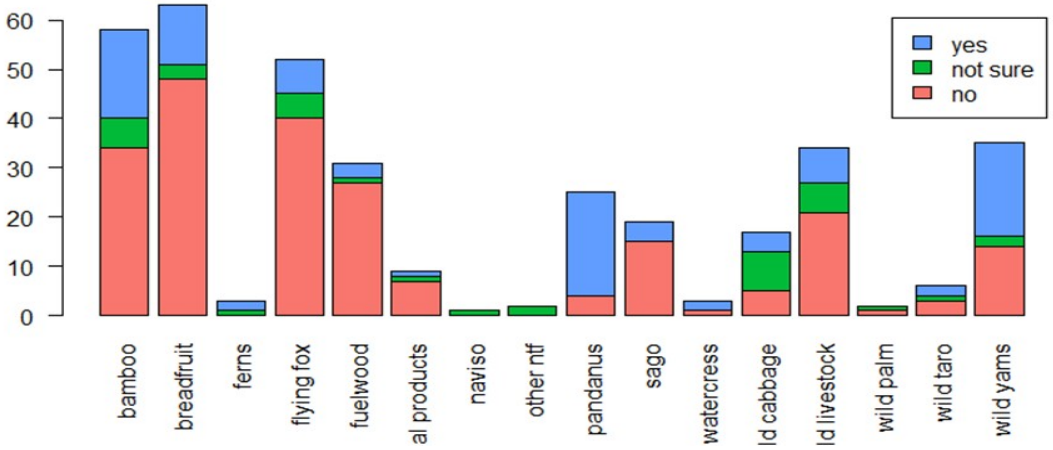

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Figure A1.28. Households purposes for collecting non-timber forest resources (a.) and households perceptions on the change in availability of non-timber forest resources over time (b.).

Table A1.5. Description of non-timber forest resource (NTFR) decline.

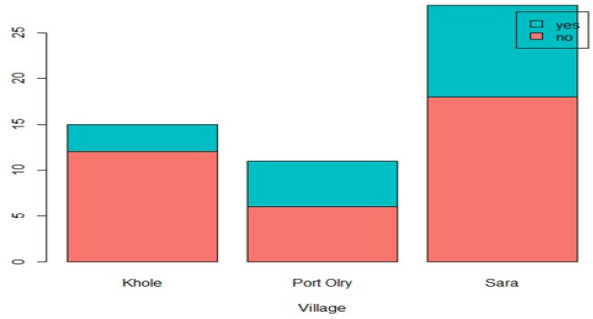
NTFR	Purpose	Respondents reason for decline
Bamboo	Subsistence Barter	• high usage, • many people using bamboo as well, • dying out because we did not clean it, • over harvested but no replanting, • more and more members in the village are using bamboo as the main source of housing, and • increase in population.
Breadfruit	Subsistence Market Barter	• continuous harvest but no replanting, • climate change could be a reason, • damage by cyclone, • over harvested no replanting, and • high consumption.
Ferns	Subsistence Barter	• high population.
Flying fox	Subsistence Market Barter	• dry season. • less feed and high consumption, and • over-harvest.
Fuel wood	Subsistence	• continuous harvest no replanting of fuelwood.
Medicinal products	Subsistence	• high usage.
Pandanus	Subsistence Female only Market Barter Custom	• people are busy planting other crops and not planting pandanus, • high usage, • high population, • eaten by cattle, • no replanting, • over harvest, and • other family members use it.
Sago	Subsistence	• over harvested and no replanting.
Watercress	Subsistence	• drought / dry season.
Wild cabbage	Subsistence Market	• high usage, • drought, and • high population.
Wild livestock	Subsistence Market Barter	• high consumption, and • over harvest.
Wild taro	Subsistence	• high consumption, and • cutting by villages.
Wild yams	Subsistence Market Custom Barter	• high consumption and usage, • less replanting, • over harvested, and • damaged by wild pig.

Vulnerability context

The most common household shocks experienced by households were crop failure and natural hazards (Table A1.6). Sara had particularly high numbers for experiencing crop failure. The majority of households suggested that they did not sell cattle in response to these household shocks (slightly more in Sara) (Figure A1.29). While Sara had an even response, the majority of households from Port Orly and Khole suggested that they received community support to help them to respond to household shocks. This demonstration of social capital was seen in the household responses to how they respond to household shocks.

Table A1.6. Household shocks experienced by households in last few years.

Shock	Khole	Port Olry	Sara
Crop fail	17	4	25
Damaged house	1	1	2
Death/illness	4	7	2
Income decrease	2	0	5
Land dispute	4	1	2
Land eviction	0	1	0
Decrease of community support	1	0	1
Natural hazards	10	4	7
Theft/vandalism	2	1	1
Violent attack	2	0	1
None	2	2	1



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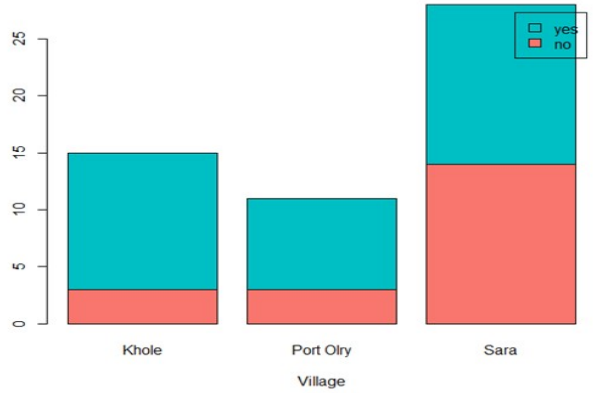
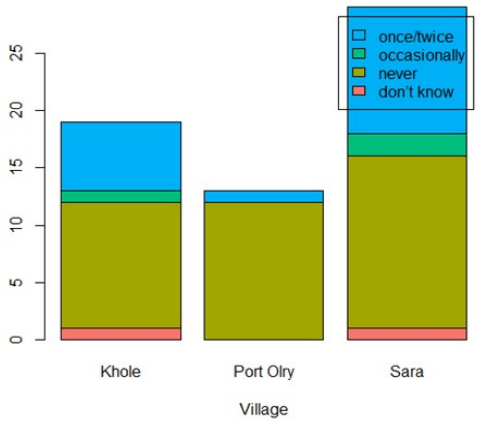


b.

Figure A1.29. Number of respondents that sold cattle (a.) or received support from the community (b.) in response to a household shock.

While a large majority of households suggested they had never experienced issues with food security (Figure A1.30) more than five households had experienced food security issues in Khole and Sara. During storian sessions with households in Port Orly, they suggested that the close proximity to deep sea fishing and the number of cooperative stores and butchery contributed to food security. A large number of households provide food for people in their community in times of need (100%) and a majority had received food in times of need. In addition, close to half of households suggested that they would sell cattle to address food shortages.



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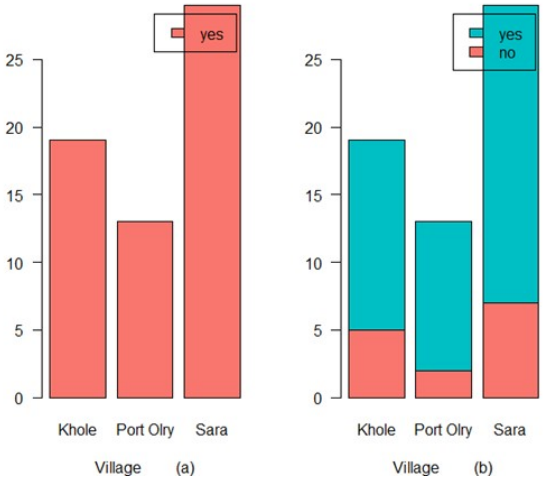

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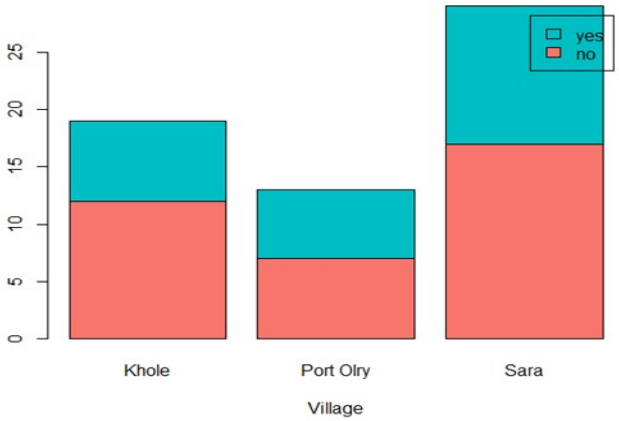

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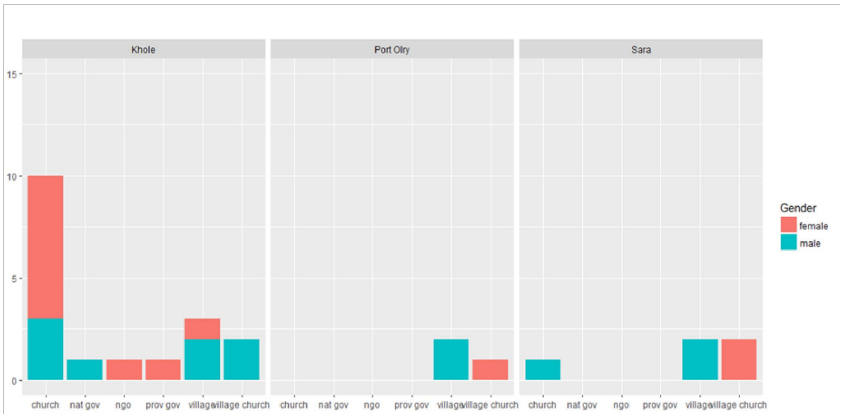
Figure A1.30. Number of households that have experienced food insecurity (a.), that have provided food to or received food from other village members (b.) and sold cattle to address food shortages (c.).

Institutional processes and structures

More women than men suggested that they were part of an organisation or institution, with the majority of these being initiated by the church (Figure A1.31). These groups were voluntary in structure and only required people to donate time predominately for fundraising. During storian sessions female respondents suggested that the women's church groups can be an effective way to disseminate information to women as they meet on a regular basis and have a high attendance within the community.



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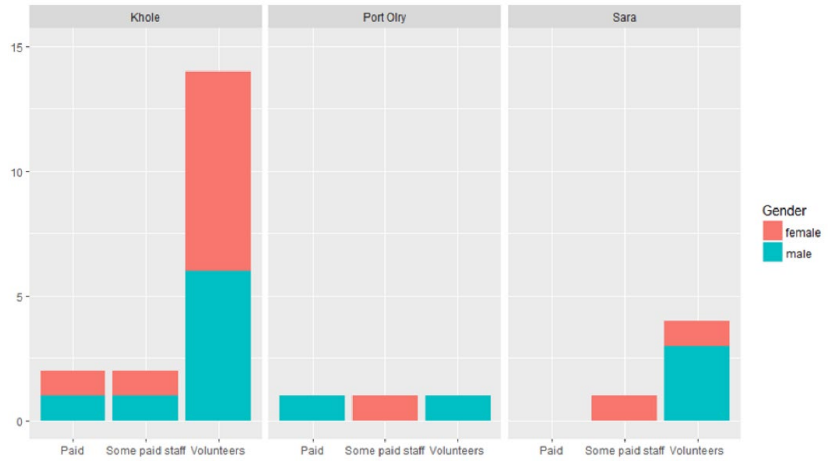

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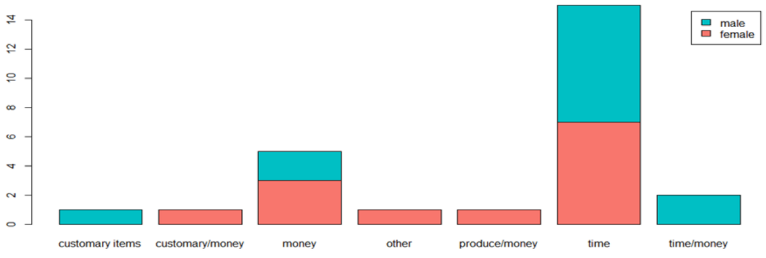

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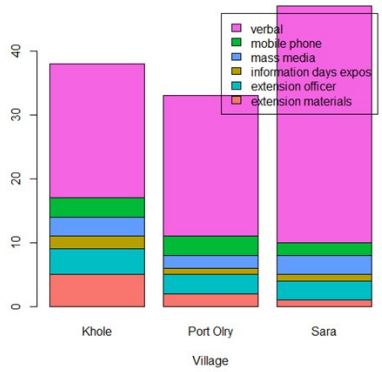
Figure A1.31. Institution affiliation (a.), management structure (b.) and contribution of respondents (c.)

Communication methods and quality

An overwhelming number of households prefer verbal farmer to farmer information exchange over participating in workshops or training days with project and government staff/extension workers (Figure A1.32). When this was explored further in storian sessions many participants suggested they have had little, if no contact from government employees delivering extension or information exchange. They also suggested they preferred to see working examples from other farmers through demonstration sites to give them confidence that it was a good option for them.



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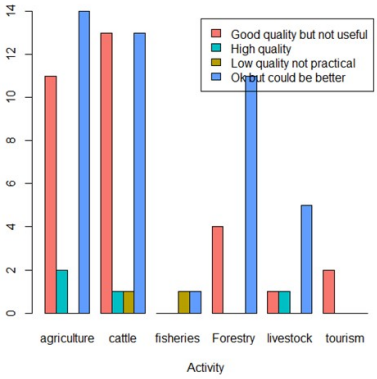

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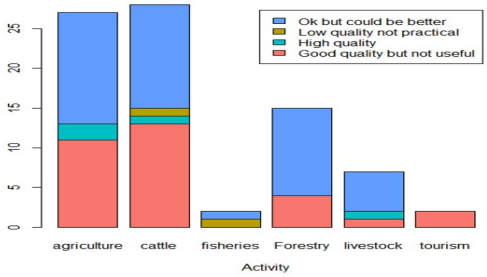

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Figure A1.32. Households preferred method of communication and extension (a.), and the perception of households of the quality of communication and extension services in the past (b.) and at present (c.).

Discussion

Role of cattle in the livelihoods of households

As part of the baseline livelihoods analysis both qualitative and quantitative approaches took an alternative view to the more dominant ways of measuring livelihoods. Livelihood measurement frameworks often do not consider subsistence (traditional economic, cultural, and custom) activities directly when determining the capacity of households to participate in the formal economy. It is also common that non-monetary benefits (brought about through the traditional economy) can be undervalued giving a strong reliance on the measurement of financial wealth within the literature (Addinsall et al., 2015).

Many case studies have found the relationships between rural livelihoods, traditional economy, and the cash economy to be dynamic, complex, and locally specific with no existing framework adequate to address these significant global concerns (Ashley, 2000; Salafsky and Wollenberg, 2000; Cattarinich, 2001; Brown, 2002; Adams et al., 2004; Nyaupane and Thapa, 2004; Hall, 2007; Ollenburg and Buckley, 2007; Croes and Vanegas, 2008; Harrison, 2008; Upton et al., 2008). Addinsall et al. (2015) responded to this and developed the agroecology and sustainable rural livelihoods framework (ASRL framework) that recognises the traditional economy, culture, and custom as influencing sustainable livelihoods through beliefs, tradition, identity, language, sacred sites, ceremonies, and festivals in addition to the influence of these factors on social networks and social capital through reciprocity, redistribution, and exchange as well as attachment to land. The traditional economy encourages sustainable economic activity at the individual and household level, while operating within reciprocal networks of exchange and obligation at the community level. In response to the desire for many Pacific countries to see a strengthening and recognition of the traditional economy (Regenvanu, 2010), the ASRL framework recognises the traditional economy as a values based livelihood activity and outcome that may not generate income per se but is extremely important in contributing to a person's well-being. While entering into the cash economy is seen as an important strategy for rural areas in the Pacific, focusing solely on economic growth may undermine development goals essential for well-being, equity, and sustainability (Scheyvens and Russell, 2013).

In response to this, various livelihood assets and activities such as commodities were measured in importance to livelihoods through the traditional economy and income separately. Households were given a number of commodities and asked to rank them in order of importance to their livelihoods and to their income. Interestingly there was a notable difference between the most important commodities to a households' livelihood compared to the households' income. Particularly in Sara where cattle were overwhelmingly seen as the most important commodity in relation to a household's livelihood. While copra, kava, and root crops were selected more than cattle as the most important commodity to a household's income. Information collected from storian sessions with participants showed that many respondents keep cattle to meet custom requirements rather than making a significant contribution to household income. Cattle were also described as savings accounts to pay for school fees. Root crops were particularly important for income generation among female respondents, while kava and copra were seen among male respondents as important commodities for income generation.

During the storian sessions participants suggested a key reason for having cattle was to meet subsistence and custom needs as it was too expensive for households to buy cattle for custom ceremonies. Many participants offered a number of reasons why they remained smallholder farmers, a key reason being the larger the herd, the more you were called upon by the community and family to donate cattle for custom ceremonies if community members (particularly family) did not have the money to purchase them. This social obligation for farmers with larger herds to contribute more to custom ceremonies appears to act as a deterrence for many smallholders to

increase their herds. While participants did not feel particularly burdened by community and custom commitments of donating cattle, they did suggest that they did not have the time or investment to expand and then to be seen as a dominant farmer within the community. It was suggested by many participants that it was best to either have a small herd (that just meets your immediate household and custom needs with a few cattle for surplus) or a very large one to account for the loss of cattle to custom, community, drought, and family obligations.

When asked how households felt about the custom commitment to supply two to three cattle for custom ceremonies it was felt that while this can place strain on some households, they could not see this custom changing. Yet many younger farmers (particularly from Sara) suggested that this commitment to custom was starting to change with less cattle being expected at custom ceremonies. It was also suggested that the custom obligation of donating cattle was a way of bringing an entire extended family, community, together in time of need or celebration and was important for community cohesion and ensuring the community had access to a source of protein. Cattle were also seen as a key strategy for ensuing food security with a number of households suggesting they had slaughtered cattle in times of food shortages (crop failure).

The Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016) describes the importance of cattle as a major contributor to the cultural and socio-economical livelihoods of Vanuatu. While the demand for Vanuatu livestock products outstrips supply in both the local and external market, it is crucial that works to remedy this do not impact on the availability of cattle for meeting custom and local markets.

Cooperative abattoirs such as the LMS cooperative in Port Orly provide an important source of income and food security to many of the communities north of Suranda (meat from the cooperative cannot be sold past Suranda due to the *Meat Act*). Hog Harbour, Sara, and Khole do not have co-operative butcheries therefore LMS will often deliver meat to these communities if people order it (as it is often cheaper than purchasing in Luganville). Findings from storian sessions with members of the LMS cooperative showed the cooperative to be gender inclusive with both genders being able to be members. At present there are 400 members, with membership as a one-off payment of 2000 vatu. There are two prices paid to the farmer depending on whether they take cash or intend to invest this back into their share of the cooperative. LMS will buy cattle from outside of the Port Orly area if they have a shortage as the demand for meat from the cooperative requires one cattle to be butchered per day. Smallholders will engage with the LMS cooperative if they need small amounts of cash quickly while they will sell to abattoirs in Luganville if selling large quantities of cattle. If the cattle are needed for custom ceremonies it does not come through the co-operative. This structure shows an example of local demand for meat consumption being met while keeping profits within the community. Such structures are likely to play an essential role in the development of the cattle sector across Vanuatu in the future.

Key constraints experienced by smallholder cattle farmers

The storian sessions helped to fill in some of the gaps that occurred in the baseline livelihoods analysis as a consequence of using structured methods. This shows the importance of using combined methods when conducting baseline livelihoods analysis. The Vanuatu Financial Services Commission (2016) lists the key limitations to raising smallholder cattle numbers as poor transport, lack of access to credit, and limited extension programs. While these factors were mentioned by participants as limitations, the key limitation to raising cattle herd numbers appeared to be the high occurrence of cattle mortality from lack of water in the dry season and the expense of transporting water to the farm.

Water is an essential element to cattle farming, yet 48.4% of households in SANMA have no access to alternative sources of drinking water and lack proper water storage for animals (VNSO, 2016). From the data in both the baseline livelihoods analysis and storian sessions we can see

this is one of the constraints to the expansion of the smallholder cattle farmer industry as transporting water is too expensive to warrant increasing numbers of cattle and many households were experiencing water shortages in their homes let alone for livestock. Indeed, there were examples of smallholder farmers who had attempted to increase their numbers in 2016 only to lose over half of their calves to dehydration. They attributed this to a longer than usual dry season, lack of storage facilities, and the sheer expense of transporting water (many doing this in small breakfast cracker containers). Accessing reliable and affordable transport is a major logistical constraint for new activities and scaling up. The Vanuatu National Livestock Policy 2015-2030 highlights the need for access to water to be addressed and states that the "government will ensure farmers have enough portable water to supply their animals" (MALFFB, 2016). Yet there was no evidence in the households surveyed of receiving support from government for this initiative.

There was an overwhelming consensus from farmers that if they had access to better forage and sufficient water storage then they would have the ability to expand their numbers of cattle. At present many farmers carry 5 to 20 cattle. Then there is quite a significant jump with a small number of farmers (or cooperatives) carrying over 100. To have more than 20 cattle presents many risks for farmers as they suggested there are high instances of theft, the cost of fencing, water shortages, and insufficient forage. Therefore, it appears many farmers are at carrying capacity without significant investment, and extension support to increase their herd size significantly to make it profitable for them. The National target of 500,000 head of cattle may be placing the "horse before the cart". It may be that the government focus should be on the productivity of smallholder farmers rather than quantity in the short term.

Access to extension, awareness, and communication strategies

The data from the baseline livelihoods survey shows that participants were unanimous in their preference for farmer to farmer information exchange and demonstration sites over participating in workshops or training days at institutions. It also shows that many participants have had little if no contact from government employees delivering extension or information exchange. Particularly the government's lack of delivery for the support for transport costs, impedes the capacity of government staff to implement work programmes, supply extension material, and provide management and supervision. These impediments severely impact on the potential for any policy recommendations to come to fruition. To address these shortcomings, extension which encompasses all providers (government, NGO, and the private sector), that suits the conditions in Vanuatu (remoteness of islands from main centre, diverse population, and high transport and logistical costs), and most importantly incorporates an understanding of mixed farming systems is advised.

There is a need to prioritise social science approaches if rural organisations and movements are to draw information and principles to design collective processes. Top down conventional agricultural research and extension services have shown negligible large-scale adoption, while social movements appear to have significant advantages (Rosset et al. 2011). Groups that use a successful methodology for promoting farmer to farmer innovation and horizontal sharing and learning such as Campesino-a-Campesino (CAC) (farmer to farmer) training (Figure A1.33), which is a "participatory method, based on local peasant needs, culture, and environmental conditions that unleashes knowledge, enthusiasm, and protagonism as a way of discovering, recognising, taking advantage of, and socialising the rich pool of family and community agricultural knowledge which is linked to their specific historical conditions and identities" (Rosset et al., 2011 page 16). However, when farmer trainers are burdened with bureaucracy and reporting the knowledge exchange is not as successful. Therefore, Rossett et al. (2011) suggests there is still a role for the technical/academic staff as an extension officer that facilitates and supports farmer exchanges rather than delivering knowledge that may be difficult to transfer.

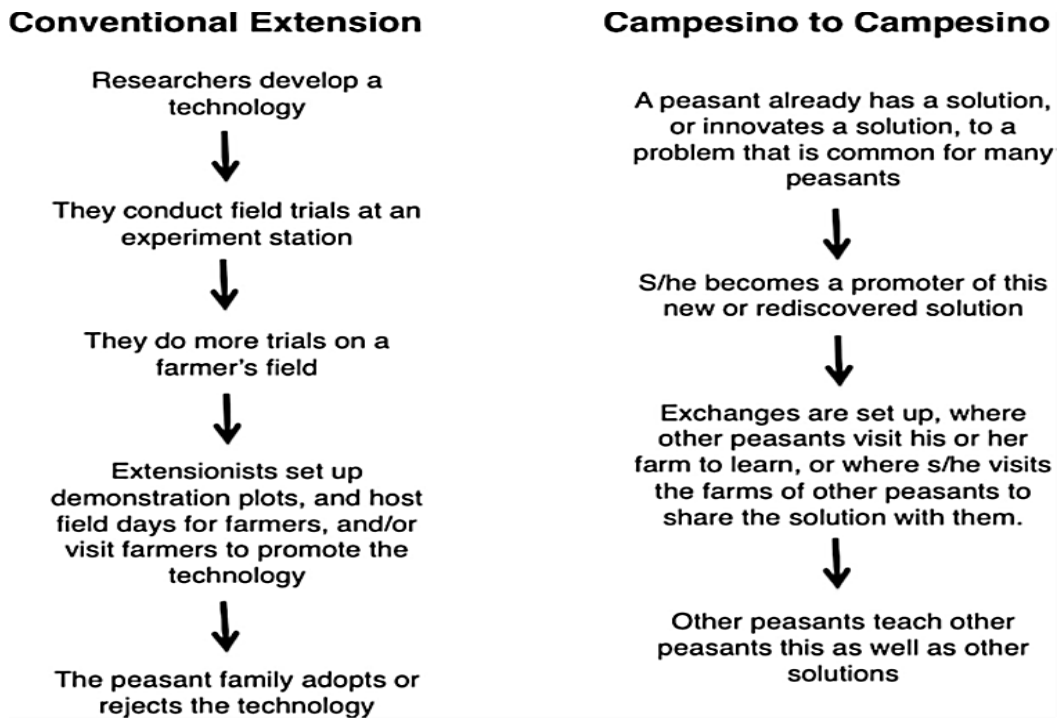


Figure A1.33. Conventional agricultural extension versus Campesino-to-Campesino. (Machı´n Sosa et al., 2010).

While the Vanuatu Agricultural Research and Technical Centre is the main government institution mandated to carry out agricultural research, it is not as well integrated with extension or training services due to lack of government coordination and resource constraints (MALFFB, 2016). This is a common scenario with many rural development projects where research and innovation achieved during the life of the project do not continue to be utilised once the funding ceases (Rosset et al., 2011). Typically, there is often an abundance of research outcomes and technical material that is not widely adopted due to a lack of effective social processes that could encourage and drive adoption. Further, even effective social processes experience blockades if there are structural barriers to overcome. There is a formal educational role here for the Vanuatu Agricultural College, as well as an extension function that connects directly with farmers and promotes dissemination through farmer to farmer contact. Radio and mobile phones are an obvious candidate for wide scale communication given the absence of television and newspapers for the more remote people, and access to radio is widespread.

Finance and access to credit

Another key constraint for smallholder cattle farmers was access to affordable credit, with current lending rates being prohibitive to growth. Data from the baseline livelihoods analysis shows that only a very small number of participants have taken out loans for farm improvements. Participants preferred to either take on off farm work such as the Recognised Seasonal Employer program or sell cattle if they required large sums of money for farm upkeep and investment.

Access to credit and microfinance can protect households and empower women to establish small businesses, and cope with economic stress and shocks. The access to financial resources can also help to get the best economic return from livestock, agricultural, or agroforestry production by avoiding selling at low-price points especially when school fees are due. The baseline livelihoods analysis shows transport costs (of people and produce) to be a significant financial burden on households. Having better access to credit to purchase vehicles or the coordination of

farmers to purchase vehicles in a cooperative arrangement would help to address these issues. Again, while this is part of the livestock policy to address access to credit there was no evidence from the baseline livelihoods analysis or storian sessions that any programmes or plans had benefited farmers.

That a considerable portion of the household budget was spent on phone credit also warrants an investigation into the telecommunication companies operating in Vanuatu. When compared to the amounts these companies are charging for phone and internet services in neighbouring countries, such as Fiji, there is a significant disparity with Vanuatu being considerably more expensive. As mobile phones are an essential service for operating any form of business in rural areas of Vanuatu, this finical burden requires further investigation.

Land disputes

An ever-increasing shortage of useable land for livestock and agriculture on many islands in Vanuatu is resulting in disputes which impact on the ability of many smallholders to significantly invest in their farms. The competition for land and resources particularly on the more developed islands of Santo and Efate are placing increasing pressure on rural communities. Land disputes were a major concern among many of project participants in the baseline livelihoods analysis and storian sessions. The high level of land disputes in these areas may be attributed to the land becoming increasingly valuable due to proximity to markets, particularly tourism development. Participants also suggested that the likelihood of a land dispute occurring increased if you were seen to be expanding your farming activities and income generation. This is a key disincentive to increasing the farm herd. The quantitative data also supported this factor and identified that many households were less inclined to spend their earnings from cattle to improve their land as this would attract unwanted attention from extended family and other community members.

The Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016) suggests that land ownership in Vanuatu is not conducive to farming business growth suggesting for government to encourage landowners to register their lands and be prepared to work with investors. Yet maintaining the customary land tenure in Vanuatu as the basis for food security is one of the key objectives of the National Sustainable Development Plan 2016-2030 (NSDP, 2016). It is crucial that all government policy is consistent, therefore amendments may be needed to allow the Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016) to align more closely with the NSDP 2016-2030 (NSDP, 2016).

Livelihoods trade-offs

Parts of Melanesia are amongst the last remaining countries in the world where the traditional economy (also known as the subsistence or custom economy) takes precedence over the cash economy in terms of providing livelihoods (Regenvanu, 2010). The traditional economy is seen to encourage sustainable economic activity at the individual and household level, while operating within reciprocal networks of exchange and obligation at the community level (Addinsall et al., 2015). Findings from a pilot study, which sought to provide a livelihoods analysis of peoples wellbeing in Vanuatu found a positive correlation between full or partial access to customary lands (along with forest and marine resources) and perceived happiness (VNSO, 2012).

While the importance of the traditional economy and custom to the livelihoods of the participants was expressed in many participatory discussions, the results of the baseline livelihoods data demonstrates that the traditional economy is no longer able to meet the needs of most participants such as mobile phones, school fees, health costs, and transport. Studies have shown that increasing participation in the formal economy is showing a shift in consumption patterns leading to Vanuatu becoming increasingly dependent on imported foods, while the consumption and availability of local, fresh food is decreasing (FAO, 2015). These transitions are also attributed to

the increased prominence of non-communicable diseases, with over 20% of the adult population suffering from diabetes (IICA, 2015), soaring food import bills, land tenure disputes, and a breakdown in social reciprocal systems. Findings from the baseline livelihoods analysis support these findings with many participants showing a high dependence on imported and packaged food and a movement to a more individualised lifestyle with many participants stating that there has been some decline in the time and investment into their social reciprocal systems.

In the face of increasing impacts from climate change, Adger (2003) suggests the communities' strength to adapt to climate change is in their ability to act collectively with local institutions (both formal and informal) playing a pivotal role in reducing vulnerability to climate change (Berman et al., 2012). Findings from the baseline livelihoods analysis demonstrate the majority of households did not experience difficulty meeting their expenses, which could be attributed to the high number of households with no loans or debt, with consumption predominately based on subsistence, and very few households paying utilities. Land tenure and strong social safety nets in Vanuatu have been attributed to the relatively low incidence of absolute poverty and malnutrition. While an increasing number of households in Vanuatu are engaging more in the cash economy, it is important that these social safety nets and the role of the traditional economy (subsistence) are also supported.

Results of this study show that the majority of respondents (both male and female) consider it important to actively attend weekly or monthly community meetings. Respondents also suggested that they both volunteer to assist other members of their community and receive volunteer assistance. Yet while households were suggesting in storian sessions that their time spent engaging in community activities and assisting other households in the community was slightly lessening, they also suggested the influence of community and custom was still apparent in household decision making.

Migration has been characterised as a component of livelihood diversification (Chambers and Conway, 1992), yet it can also contribute to vulnerability through available labour supply, food security, and institutional variability that can limit the ability of communities to maintain their social reciprocal systems impacting on resilience, livelihoods, and wellbeing (Fazey et al., 2011). The Recognised Seasonal Employer program in both New Zealand and Australia was a well-known and sought-after program among the majority of the participants. While this program provides significant economic benefits for Vanuatu, the indicator-based evaluation does little to address the multifaceted nature of vulnerability (Craven, 2015). Indeed, the data showed that on farm investments were predominately paid for by Recognised Seasonal Employer earnings with many participants choosing to participate in the program when significant investments were required, such as fencing.

While women were seen to be spending far more time growing subsistence produce for their households, competing livelihood priorities brought about by increased engagement in the cash economy appeared to be leaving less time for women to manage home gardens. The labour diaries that were conducted with the Bisnis Blong Buluk women's group showed a high level of labour commitments for female participants in subsistence farming, household duties, community obligations, and income earning activities such as formal employment or the selling of excess market produce and handicrafts. When the head of the household participates in the Recognised Seasonal Employer program this places additional strain on the household to take on additional farm activities.

Through participatory storian sessions with female participants it appears that women are providing the household with increased resilience and lower vulnerability through their roles in informal institutions, yet the dominance of men in formal institutions and labour markets can directly impact on women and their levels of resilience and vulnerability. This demonstrates a

need to support women to maintain informal structures while also supporting them to access formal systems.

Participatory storian sessions showed households with the most diverse livelihood opportunities were those that balanced formal and informal activities and had good access to land, services (such as roads, regional and international markets, medical centres and education), and social support networks. This research highlights the importance of informal community and culturally based social protection systems in supporting successful livelihood strategies in a rural Melanesian context.

Traditional agricultural systems often exhibit high levels of diversity, as communities rely on a broad range of integrated systems to provide them with food, water, fuel, and medicine. These systems are inspired by cultural practices and the interaction between people and their environments which have taken place over generations. Information collected on the consumption of NTFRs shows that participants are still reliant on these products and services derived from forests and traditional gardening systems, yet there is evidence of overharvesting and less replating of these NTFRs and traditional food crops. In particular, pandanus (which is a key livelihood resource particularly for women) is being over harvested and there is also evidence of cattle eating this important resource. As government measures are being taken to reduce the quantity of imported items sold at handicraft stalls, the availability of pandanus to make handicrafts will become even more important to women's livelihoods.

Anderson (2011) identified traditional Melanesian land systems as "vehicles for food security, housing, widespread employment, social security, biodiversity protection and ecological stability; they are also a store of natural medicines, as well as a source of social cohesion, inclusion and cultural reproduction". In this light, it is crucial that the cattle herd growth targets are met with an understanding of the importance of encouraging a diversified farming system that allows for a number of livelihood strategies that are gender inclusive.

Gender inclusivity

Gender differs to one's sex as it is not biologically determined, it is rather a result of socialisation into a male or female role. Gender differences in developing countries become clearer when you look at women's overall workloads, particularly in rural areas (Lanjouw and Lanjouw, 2001). Agricultural policy has inherently excluded women because the social role of the farmer is seen as male, resulting in rural women being less significant in most social and economic criteria and confirms Boserup's (1965) conclusions. What is further concerning is that little improvement in the economic or social status of rural women in Melanesia has occurred since these conclusions were drawn.

The reports of the International Assessment of Agricultural Knowledge, Science and Technology (2016) put forward the idea of the "feminisation of agriculture" which is seeing women now constitute over 43% of the global agricultural labour force in developing countries, yet women only have accesses to 13% of agricultural land. These figures mask considerable variation and due to the overall labour burden of rural women (which exceeds that of men) and in reality the percentage of unpaid agricultural related duties undertaken by women makes it impossible to verify empirically (FAO, 2011). Rural women often pursue multiple livelihood strategies which are quite complex. While these activities such as: producing agricultural crop for subsistence and markets, processing and preparing food, collecting fuel and water, caring for family members, and maintaining the house are not defined as economically active employment activities, they are regarded as essential to the well-being of households.

This is fuelled by the recognition of women's involvement in agriculture which sees women as:

- Being the majority of all farmers in developing countries,

- Have a longer work day than men, with many reaching their limits,
- Harbouring specialised knowledge representing a highly skilled pool of labour in agriculture,
- Contributing the most income to their household expenses and communities,
- Productivity is severely constrained by the fragmentation of their time from competing responsibilities, and
- Becoming more responsible for households in rural areas as men leave for remunerated work.

Understanding the world views and ontologies of these communities and individuals is crucial for rural development. Feminist theory in particular, highlights the marginalisation of females, while post colonialism takes this a step further by highlighting the significant influence colonial administrators (guided by their own (male) gender values) demonstrating prejudices on rural farming women (Boserup, 1965). Boserup (1965) also suggested that the modernisation of farming that came as a consequence of colonialism and globalisation, severely disadvantages women as men were given the training, cash crops, and equipment.

International Assessment of Agricultural Knowledge, Science and Technology (2008) suggested that supporting women in agriculture has the greatest potential to raise total agricultural output while meeting sustainable development goals and sustaining resources. However, the majority of agricultural extension still largely ignores the concerns of rural women such as: storage and small scale processing, household food security, and access to finance and small business management (Stephens, 2004), there is a growing movement occurring in some agricultural research and development agencies (ACIAR, World Bank, FAO), NGO's, and governments to mainstream gender issues in their programs and activities.

For Melanesian governments to meet to their commitments to the UN Sustainable Development Goals there will need to be more emphasis on developing policy and programs to end all forms of discrimination against women, enabling equal rights to economic resources, addressing nutritional needs, offering qualification opportunities, extension services and agricultural training to women, to own land, to have access to water, livestock, and machinery, to self-organise, and take part in community decision making. Yet given the gender variability in agricultural roles, policy should be based on studies that are specific to a geographical and cultural context. Again this leads back to the issue of policy, customary land laws, and patrilineal and matrilineal systems. Through patrilineal succession, property devolves through the male line, where with matrilineal systems, property is traced through the mothers line, therefore often giving women greater rights than patrilineal systems (yet even through matrilineal system's, land is still generally owned and controlled by men) (Cotula, 2006). The *Constitution of the Republic of Vanuatu (1980)* prohibits discrimination against women, yet actual enforcement of this when it intersects custom is unclear (Bowan et al., 2009). Reforms of the legal frameworks in place ensure gender equality are required with distinction made between formal and customary law (Bowan et al., 2009).

Gender patterns of control over income are largely influenced by land tenure systems, the type of crops and characteristics of households. Within some households in Melanesia, cash income belongs to whoever produces the goods for sale, while in other households' men control all household income. The baseline livelihoods analysis and storian sessions suggested that within participating households men are predominately the decision makers on the farm and within the household, although female participants were able to make decisions about how income was spent that was directly earnt by them through their market gardens and other activies. There were some examples of households sharing household and farm decision making. When we spoke to these households they suggested this was quite rare in the rural areas, although they felt that women were starting to push for more influence in decision making and were seeking educational support to learn how to manage household/farm budgeting.

Mikhailovich et al. (2016) also found that the distribution of labour between women and men was not equal with women having a much greater share of responsibilities and greater working hours. Indeed, this was clearly apparent from the baseline livelihoods, analysis, storian sessions, and labour diaries which demonstrated women's daily activities to almost double those of men, particularly unpaid household duties and participating in community activities.

Traditionally female smallholder agricultural input is focused on food crops (and the selling of surplus in local markets), while men focus on cash crops and the formal commercial sector (such as cocoa, kava, copra, and livestock). As a consequence, many policy makers and agricultural development projects do not recognise the importance of the subsistence and informal sectors and much of the capacity building and training is targeted to the formal commercial sector where men dominate. Household priorities can also inhibit women from attending agricultural extension and training. These constraints for women to participate in capacity building limits their potential as economic agents (Koczberski, 2007; Manchón and Macleod, 2010).

There was an overall sentiment that cattle farming in general is perceived as men's work. While women were in charge of the gardens and selling produce. Gardening was described as the domain of women, with income made from selling produce also predominately managed by women. When we spoke of farming activities other than cattle such as forestry and livestock, the women suggested these areas were co-managed by men and women. It was suggested that women played an important role in planting trees, caring for seedlings and weeding, while men were responsible for harvesting the trees. Women were responsible for livestock such as poultry while men were often responsible for caring for pigs. When asked why cattle was perceived as predominately managed by men, participants suggested that cattle farming often required physical strength beyond their abilities to manage and was therefore seen as the work of men. Cattle farming also often required men to walk, drive or ride horseback distances from the household, while women's activities often centred in close proximity to the household such as their gardens.

Female participants in the baseline livelihoods analysis unanimously felt that they knew very little about the project and the role their households would be playing. When asked why this was so, female participants suggested there were many factors, such as a lack of time for the household to sit together and relay information from the male head of household to other members of the household. Also often kava would be a contributing factor to this lack of communication time, tendering to children was also suggested as a reason, and some of the household members registered in the project don't actually live in the same villages (due to the male head of household needing to be close to their farm which is often located great distances from the community). It was also reinforced that due to cattle work being predominately seen as men's work, many farmers felt there was no need to relay this information down to the female head of households.

Engaging women in agriculture and livestock projects

There are many factors that continue to make it a challenge to engage women in ACIAR projects. At the beginning of projects when first engaging with rural communities, cultural protocols are followed, such as meeting with the chief and village heads of the community to gain permission to engage with the wider community. This often occurs over a few visits before there is an opportunity to sit and talk with women. While these meetings are particularly important for long term engagement with communities, it appears the information exchanged in these meetings has not been disseminated with the women of the community. As such it has been found that an essential next step once cultural protocols have taken place is to find effective strategies to properly engage women and not assume information is being passed on.

In order to develop a gender strategy for the project, a number of storian sessions took place with female participants in each of the project communities. When asked what could be done to

address the lack of engagement, it was suggested by the female participants that the project team break down the components of the project into a list of activities and enable women registered in the project to assess which activities they feel they would like to (or could physically) engage with. They felt this could be a very useful way to break activities down between male and female heads of households and change the presumption that cattle work is predominately men's work. Suggested activities that the female participants were interested in consisted of:

- Forage research trials,
- Rain gauge collection and transcribing results with local schools,
- Farm productivity,
- Household and farm budgeting and financial management,
- Grazing management,
- Water source solutions,
- Husbandry practices in cattle, and
- Composting/mulching.

In particular the female participants suggested pasture trials may actually be better suited to women as they are more likely than men to spend the time looking after them if they are located in close proximity to their gardens. It was also suggested that the project could attend the women's group meetings that are held weekly in communities (mostly to discuss church matters). These meetings have a high attendance rate among the women and could provide a good avenue to disseminate project information to women within the community.

A key issue is also the lack of female staff working on ACIAR projects in the South Pacific, particularly in technical roles. For ACIAR projects to demonstrate that they are committed to engaging women in the countries they are working in, there must be a commitment from ACIAR to encourage women to take these roles. During this project the use of interdisciplinary teams that encouraged project team members to experience different roles within their teams, such as the social scientist doing GPS work or the agricultural scientist sitting in on participatory group sessions provided opportunities to challenge stereotypes and demonstrate flexibility to project participants. Female participants suggested it was encouraging to see female staff on the project as a result of actively recruiting female research assistants and seeking out female government employees to attend field work.

The inclusion of Ni-Vanuatu women in the project research teams, has also further encouraged the involvement of female household members to participate in project activities (Figure A1.34). Strengths-based and interactive training has been a useful tool to further engage women by enabling women to recognise their existing skills and leadership roles they already have in the community and identify other possible leadership pathways such as the development of women's leadership teams.

Figure A1.34. Project team attending project women's group meetings.

Women's leadership teams may help to build agricultural and business acumen to improve agricultural productivity through:

- Agricultural/livestock extension,
- Improved banking, saving and skills in financial management for agricultural/livestock,
- Small business activities,
- Increased capability to access micro-finance, and
- Building gender inclusive decision making capacity within the family and community through the family teams training approach.

Through the Bisnis Blong Buluk women's group, women's leadership teams will be developed in each of the project communities using our group members as community leaders once they have finished their interactive training with the project team.

Sustainability and productivity

The Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016) claims to recognise the impact of livestock activities on the environment and the availability of other natural resources such as land, water and wildlife/livestock interaction. However, without thorough environmental and social impact assessments, the national cattle herd target of 500,000 by year 2025 could potentially have environmental and social impacts. Particularly taking into consideration the current trajectory of climate change attributed predominately to agricultural production from farming for meat consumption, rising greenhouse gas emissions from burning fossil fuels, and deforestation (Hansen et al., 2013; Keenan et al., 2015; Ripple et al., 2014).

An important component of a livelihoods analysis is the sustainable use of resources. Therefore, it is important to ensure environmental and economic feasibility assessments are conducted with each farmer considering expansion. While this is part of the livestock policy, data coming from the baseline livelihoods surveys and storian sessions there is little evidence to suggest that farmers understand the impacts of livestock farming on the environment if not properly managed or understanding value of losses when the environment cannot sustain high stocking rates.

Agriculture (including crops, livestock, forestry, and fisheries) and tourism are the largest contributors to the Vanuatu economy, however, the contribution of the subsistence economy to the livelihoods and resilience of these countries is often underestimated. Many studies and policies continue to evaluate customary land systems by focusing on economically profitable activities while discrediting subsistence and traditional activities. Traditional farming systems have long played a vital role in achieving food security, social security, biodiversity protection and ecological stability, in addition to providing natural medicines, and cultural reproduction (Anderson, 2011). McMichael (2010) argues that measuring shifts in agricultural practices to unsustainable methods as livelihood improvements is an ecological blind spot in development theory. The majority of people in Melanesia live in rural areas and secure their subsistence and cash income from traditional farming and fishing systems (PIFON, 2016). These traditional farming systems act as safety nets providing resilience against external shocks as well as safeguarding food security and maintaining economic stability.

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAAKSTD) recognised that the loss of traditional knowledge together with a lack of up to date knowledge and the changing livelihood priorities of smallholder subsistence farmers are contributing to the hardships many are facing. The IAAKSTD suggests the value in modernising traditional farming systems by offering a clear and detailed description of the problems smallholder farmers frequently face in terms of productivity and efficiency, as well as the practices they use which are hazardous to human health and the environment. If smallholder farmers have sufficient access to technical and traditional knowledge, land, water, credit, and equipment, their production requires considerably fewer external inputs and causes minor damages to the environment in comparison to large scale intensive agriculture (IAAKSTD, 2009).

There was limited understanding of productivity as a concept from many project participants. Translating this concept from English to Bislama proved particularly difficult. As we explored this concept, women in particular were intrigued by the concept of productivity which could be attributed to the significant time burdens many women face, therefore wanting to make the best use of their time. Through discussions some female participants gave examples of their home gardens reducing in productivity which they felt was due to longer dry periods and changing seasons. Strengths-based and interactive training with the Bisnis Blong Buluk women's group on farm and household management has been an effective way to encourage participants to think about farm and household productivity from an economic, social, and environmental perspective.

The baseline livelihoods analysis was part of an ongoing study that will continue on through the life of the project. More time will be spent with communities and households to delve further into the research questions and to ensure that project activities lead to long term positive outcomes for the communities in question. This report will link to other project activities and in the project with case studies to be reported in local media and extension material. The gender disaggregated data collected in this report has aided in the development of a gender strategy to better engage women from participating households in the project through the Bisnis Blong Buluk women's group.

End-line analysis

The aim of this report was to present the outcomes of the end of project livelihoods analysis assessment of participating households within the project and determine any significant changes in households' livelihoods over the duration of the project. Addressing the research issues for the project required an understanding of the livelihood objectives of smallholder cattle producing households and cattle production systems. The livelihoods analysis sought to provide a more in-depth understanding of the context of participating households to aid in determining the opportunities (and risks) to improving the livelihoods of smallholder cattle farming households through increased cattle enterprise productivity.

Methodology

This report provides an end of project livelihoods analysis of participants involved in the baseline livelihoods analysis in 2017 and who were closely engaged in the project from its conception. A total of 48 participants (22 male and 26 female) were surveyed over a 6 month period from July 2019 to December 2019. The initial baseline livelihoods analysis conducted in 2017 provided insights on how best to address the projects objectives. The baseline study was conceptualised as part of participatory research and development which seeks to provide an inclusive and collaborative learning exchange between the participants and local and international researchers. The decision to use a combination of methods was based on achieving the greatest possible engagement and leaning outcomes for the participants and project team.

The end of project livelihoods analysis focused on a number of key questions (both structured and semi structured) that could enable the project team to see what if any changes had occurred in relation to participants livelihood strategies, living conditions, employment and other factors, as well as participants overall sentiments towards the project. As part of the baseline and end of project livelihoods analysis both qualitative and quantitative approaches took an alternative view to the more dominant ways of measuring livelihoods. Livelihood measurement frameworks often do not consider subsistence (traditional economic, cultural and custom) activities directly when determining household resilience. This pervading view often undervalues the non-monetary benefits that can be brought about through the traditional economy due to a focus on financial wealth measurement (Addinsall et al., 2015).

Many case studies have found the relationship between rural livelihoods, the traditional economy, and the cash economy to be dynamic, complex, and locally specific with no existing framework adequate to address these global concerns (Cater, 1994; Salafsky and Wollenberg, 2000; Cattarinich, 2001; Brown, 2002; Adams et al., 2004; Upton et al., 2008). Addinsall et el. (2015) responded to this and developed the agroecology and sustainable rural livelihoods framework (ASRL framework) to recognise the traditional economy, culture, and custom as influencing sustainable livelihoods through beliefs, traditional, identity, language, sacred site, ceremonies, and festivals; in addition to the influence of these factors on social networks and social capital through reciprocity, redistribution, and exchange as well as attachment to land.

The traditional economy encourages sustainable economic activity at the individual and household level while operating within reciprocal networks of exchange and obligation at the community level. In response to the desire by many Pacific countries to see a strengthening and recognition of the traditional economy (Regenvanu, 2010), the ASRL framework recognises the traditional economy as a values based livelihood activity and outcome that may not generate income per se but is extremely important in contributing to a person's well-being. While entering into the cash economy is seen as an important strategy for rural areas in the Pacific, focusing solely on economic growth may undermine development goals essential for well-being, equity, and sustainability (Scheyvens and Russell, 2013).

The project team engaged with catchment area groups in Khole, Sara, and Port Orly involving participating and non-participating interested farmers, local chiefs, provincial staff, and area secretaries. A variety of different household types were selected to register with the project in early 2017 through consultation in each community with local chiefs, community members, the commercial sector (i.e. stakeholders who buy cattle from smallholder farmers), and the households themselves.

Qualitative and quantitative data collected from 45 male and 26 female participants through the baseline livelihoods analysis sought to provide an understanding of the risks and vulnerability context that impacts on rural landholders and their households, influencing structures and processes (such as societal norms, gender roles and relations, and organisational and traditional policies), access to and control of resources, choice and success of livelihood activities, priorities for livelihood outcomes, and incentives for change. By enabling rural landholders and their households to be key actors in identifying and addressing their livelihood priorities, this project was able to implement processes to respond flexibly to smallholders needs (Addinsall et al., 2016).

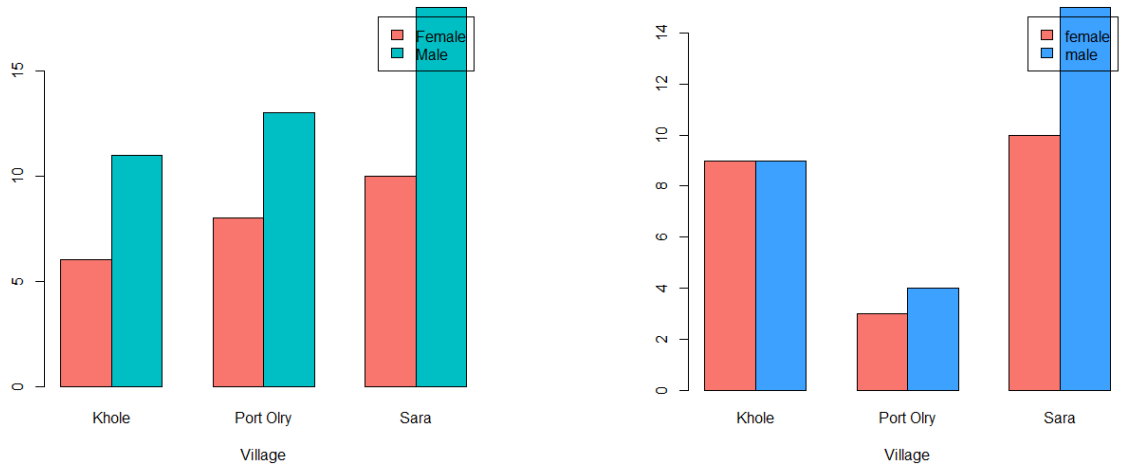
The project team conducted storian sessions (focus group discussions), semi-structured household discussions, household labour diaries, and ranking exercises coupled with quantitative surveys via Commcare to develop an understanding of the livelihood strategies of households and a baseline assessment of households to enable the project to determine the (positive or negative) impacts the project had on livelihoods. Gender disaggregated data was collected through on-farm monitoring, household interviews, and storian sessions to provide an understanding of the roles and responsibilities of women in cattle management and other on-farm activities.

The collection of gender disaggregated data also enabled the project team to understand and evaluate the impacts of project activities on the livelihoods of women through the longitudinal monitoring of these households over the duration of the project. Research and communication activities targeted towards women were implemented to address constraints caused by the design of project interventions. An experienced female, Ni-Vanuatu social scientist was engaged to assist with this work to assist with language and cultural matters to effectively engage with the communities.

Results

Demographics

The total number of respondents in the baseline survey was 65 (43 male and 22 female) (Figure A1.35). While the majority of the respondents for the baseline livelihoods survey were men the project team addressed this imbalance in the participatory storian sessions by recruiting more women than men. The total number of respondents for the end-line survey was 48 participants (22 male and 26 female).



a. b.

Figure A1.35. Total number of respondents in livelihoods surveys in 2017 (a.) and 2019 (b.).

Food type consumed

The majority of households within the three villages surveyed in the baseline livelihoods analysis suggested that they either consume over half or the majority of their food from subsistence (Figure A1.36). Across the three villages the highest consumed food type is island kakai (root crops), followed by fresh fruit and vegetables, fresh meat, tinned meat, rice and noodles, with sweet packaged food on average being consumed the least (Figure A1.37). The results from the end-line livelihoods analysis shows a significant decline in the proportion of food consumed from subsistence, with an increasingly number of respondents (particularly from Sara) suggesting that they consume less than half of their food from subsistence. Subsistence food appeared to be replaced by sweet packaged food, followed by fresh fruit and vegetables, tinned meat, fresh meat, rice and noodles, with island kakai (root crops) being consumed the least.

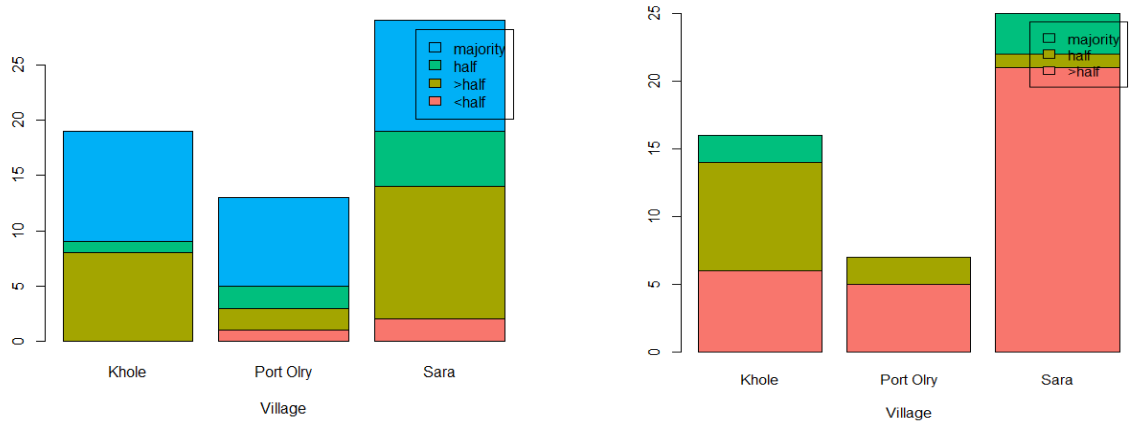


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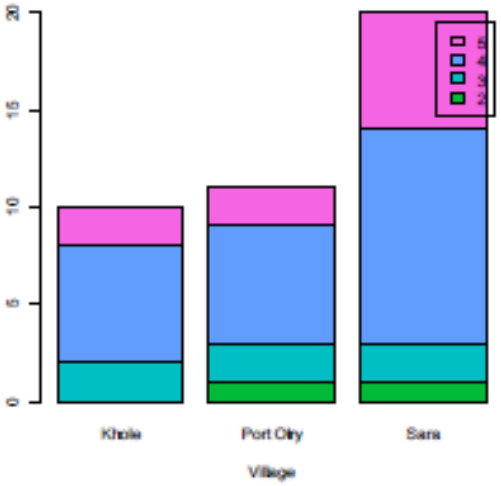
Figure A1.36. Subsistence food consumption by households in livelihoods surveys in 2017 (a.) and 2019 (b.).

Increasing the productivity and market options of smallholder beef cattle farmers in Vanuatu



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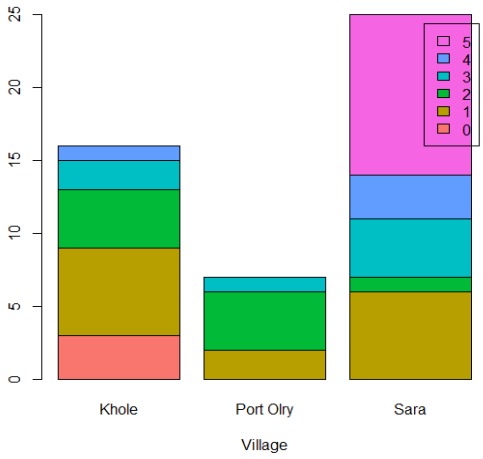

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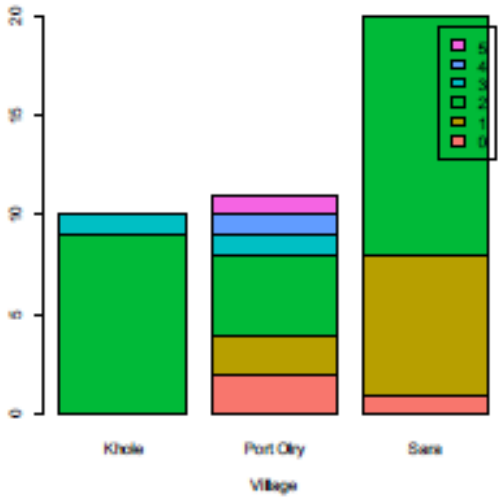

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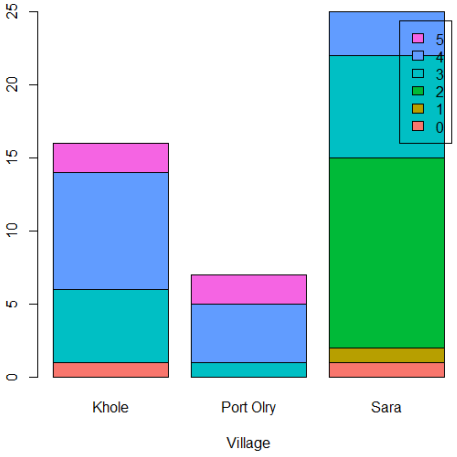

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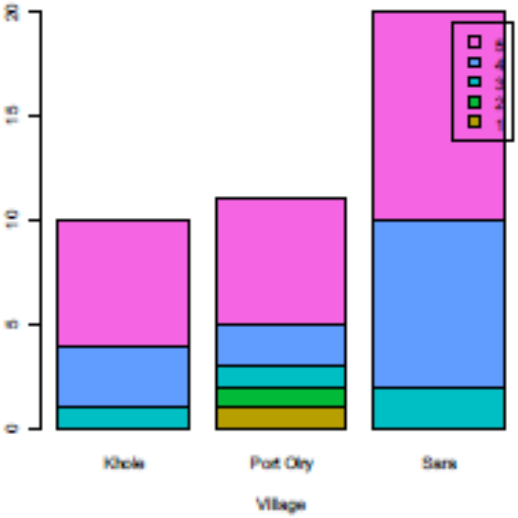

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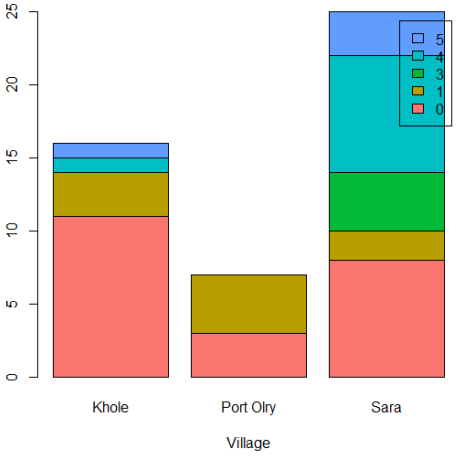

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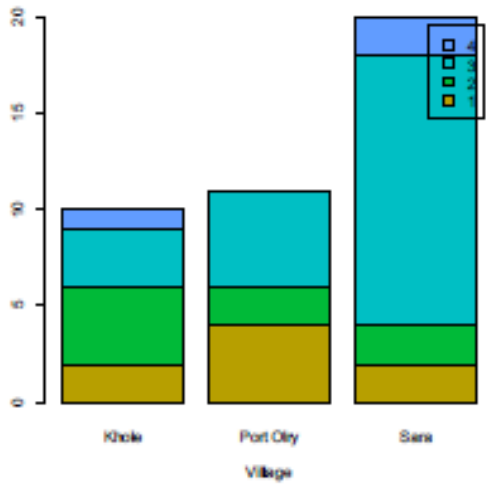

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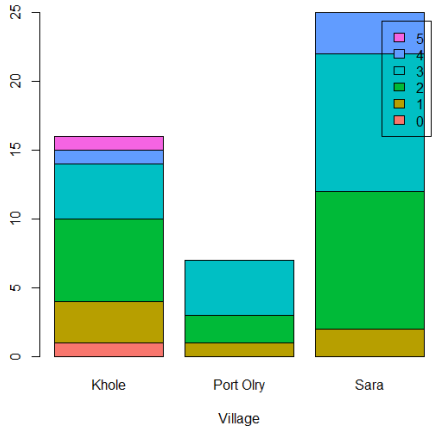

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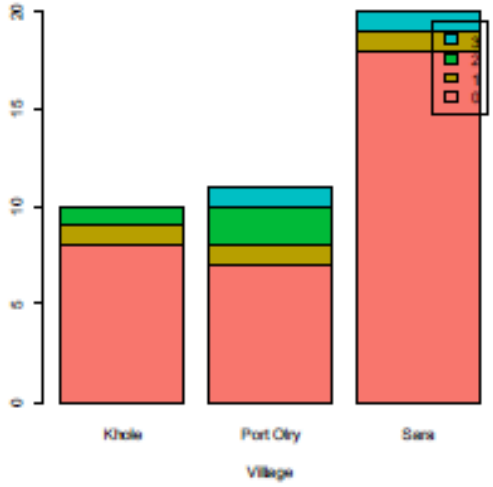

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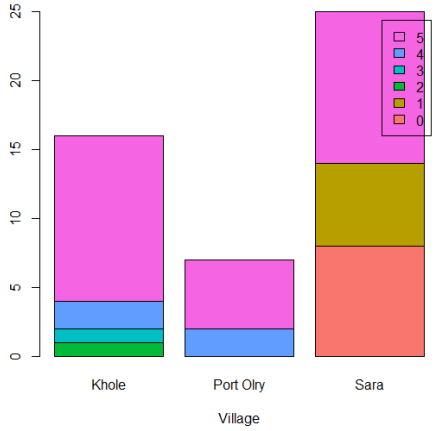

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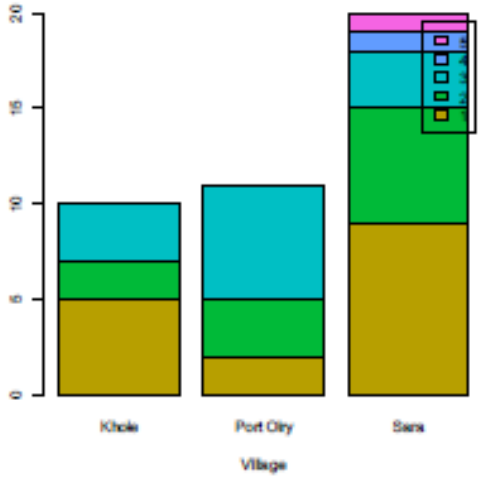

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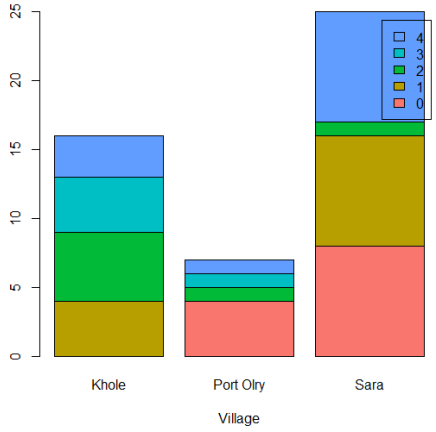


f.2.

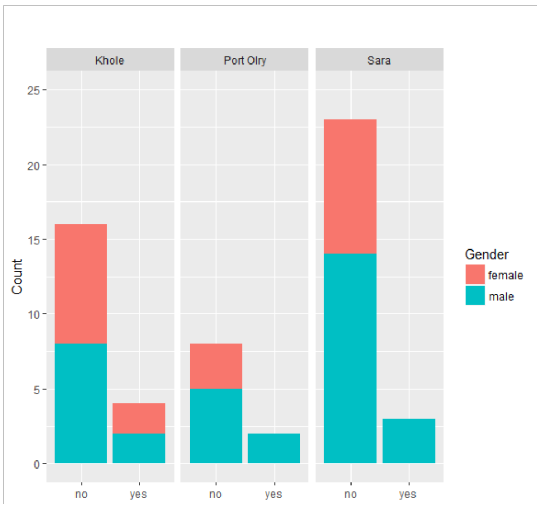
Figure A1.37. Food type consumption ranking (0-5, 0 being least, 5 the most) by food type and village. (a. fresh fruit and vegetables, b. tinned meat, c. island kakai, d. fresh meat, e. sweet packaged, f. rice and noodles. 1 denotes 2017 data, 2 denotes 2019 data).

Financial capital

The majority of respondents across the three villages surveyed in the baseline livelihoods analysis (particularly women) did not receive any off-farm income or remittance (Figure A1.38). Yet in Sara a higher number of female respondents than men received financial assistance from family living outside of the community. There has been very little change in off farm income or remittance in comparison to the baseline livelihoods analysis. However, respondents from Sara had a significant drop in financial assistance from family outside of the community, particularly female respondents.

A higher proportion of respondents from the baseline livelihoods analysis in both Khole and Sara had not taken out any loans in the few years prior to 2017, yet Port Orly had an even representation of respondents who had taken out a loan during this time (Figure A1. 39). The majority of the loans were short term loans <24 months taken out with the National Bank of Vanuatu. All female respondents suggested that they did not have difficulty with repayments, while 3 out of the 5 male respondents had experienced difficulty. Female respondents' reasons for taking out a loan was for household expenses, new business (business loan taken with VANWODS) debts, or cattle infrastructure. While male respondents' reasons for taking out loans was for cattle infrastructure, cattle purchase, house renovations, or second-hand vehicles. There was a drop in the number of loans taken out between 2017 and 2019 across all three communities with Khole and Sara having no respondents that have taken out loans in the last three years.

Overall there was a slight decline in the number of households that had sold cattle to purchase household construction/improvements and household items since 2017 (Figure A1.40). However, there was a slight increase in the number of cattle sold for household construction or improvements in Sara.



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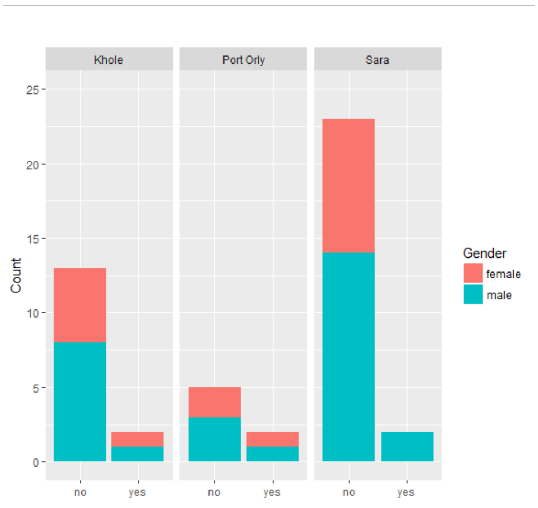

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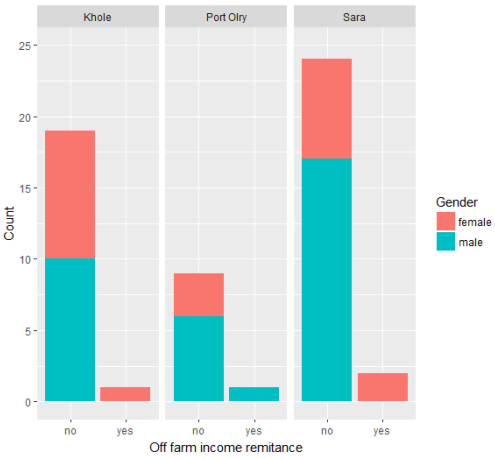

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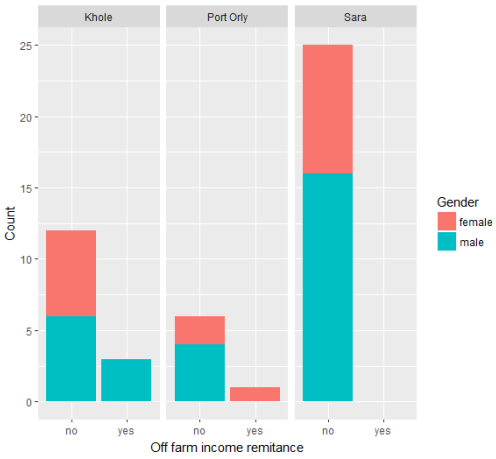

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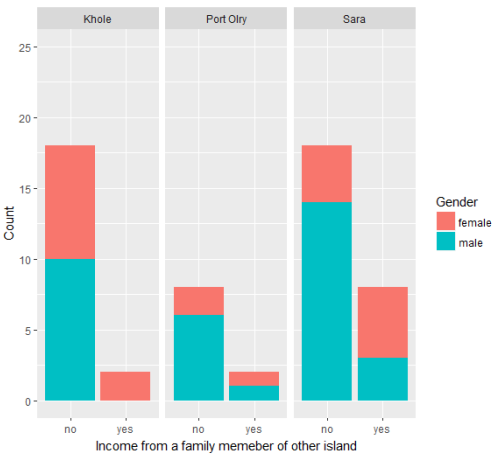

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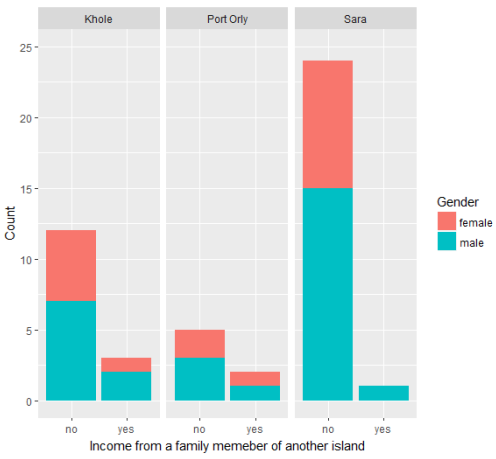

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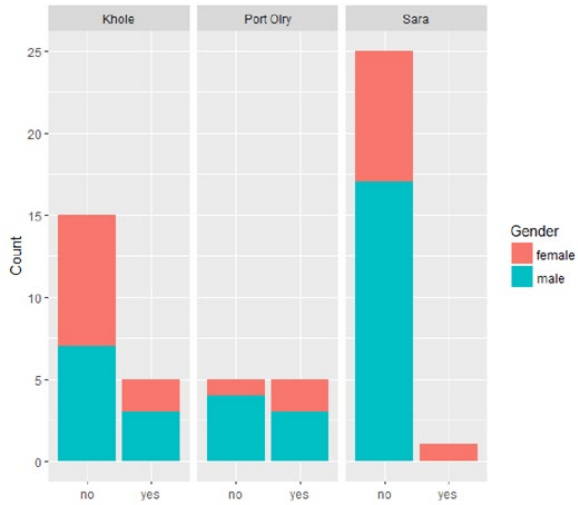
Figure A1.38. Number of household members that receive off-farm income (a.), off-farm remittances (b.), and financial assistance from outside the immediate village community (c.). (1 denotes 2017 data, 2 denotes 2019 data).



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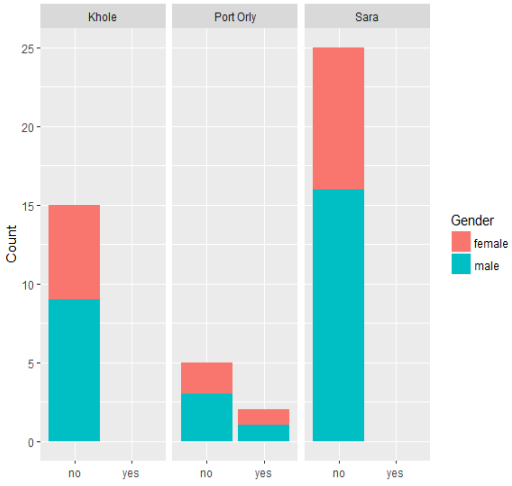

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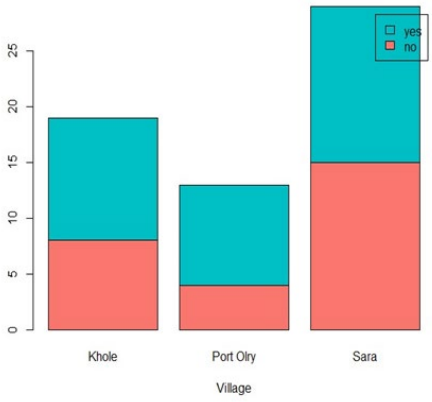
Figure A1.39. Number of respondents that received a loan in the previous three years. (1 denotes 2017 data, 2 denotes 2019 data).



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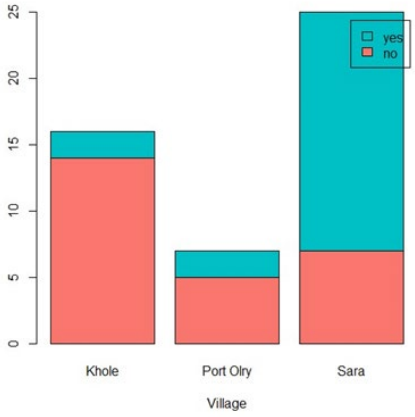

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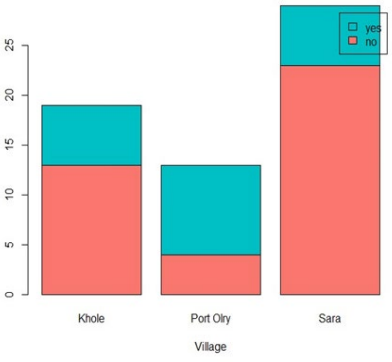

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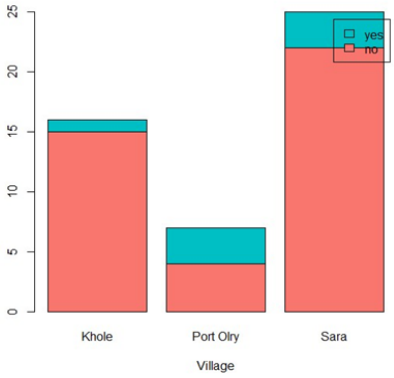


b.2.

Figure A1.40. Number of households that have sold cattle for household construction or improvements (a.) and to purchase household items (b.). (1 denotes 2017 data, 2 denotes 2019 data).

Human and social capital

The majority of respondents (both male and female) in the baseline livelihoods analysis suggested that they had received support from people within their communities (Figure A1.41). During storian sessions, examples were given of the types of support they had received such as:

- Community fundraising to help their households in time of need (sickness, school fees),
- Repairing homes,
- Fencing (post natural disasters),
- Minding children, and
- Transport.

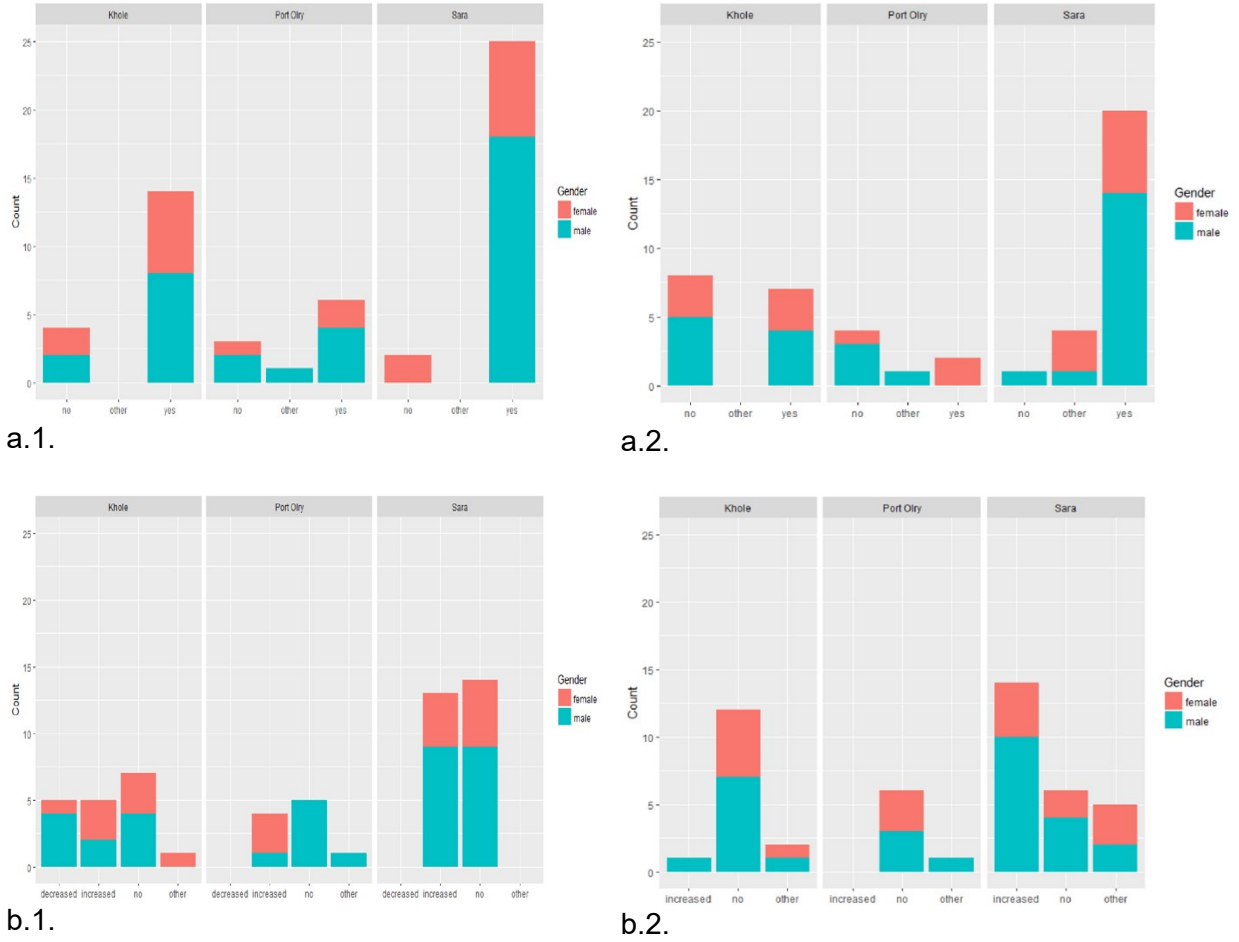


Figure A1.41. Number of respondents who receive support within the community (a.) and their perceptions if that support has changed within the last three years (b.). (1 denotes 2017 data, 2 denotes 2019 data).

Khole was the only village where households had suggested this community support had decreased prior to 2017 with many households suggesting the support had increased. While Sara was the only village where households suggested that community support had increased in the last three years. Storian sessions revealed that support increased considerably post Tropical Cyclone Pam. The majority of both male and female respondents also suggested that they give and receive volunteer assistance to and from community members to assist with daily livelihood

activities (Figure A1.42). The support given to participants from people within their communities remained relatively the same over the last three years, although male respondents from Port Orly suggested that they had not received support.

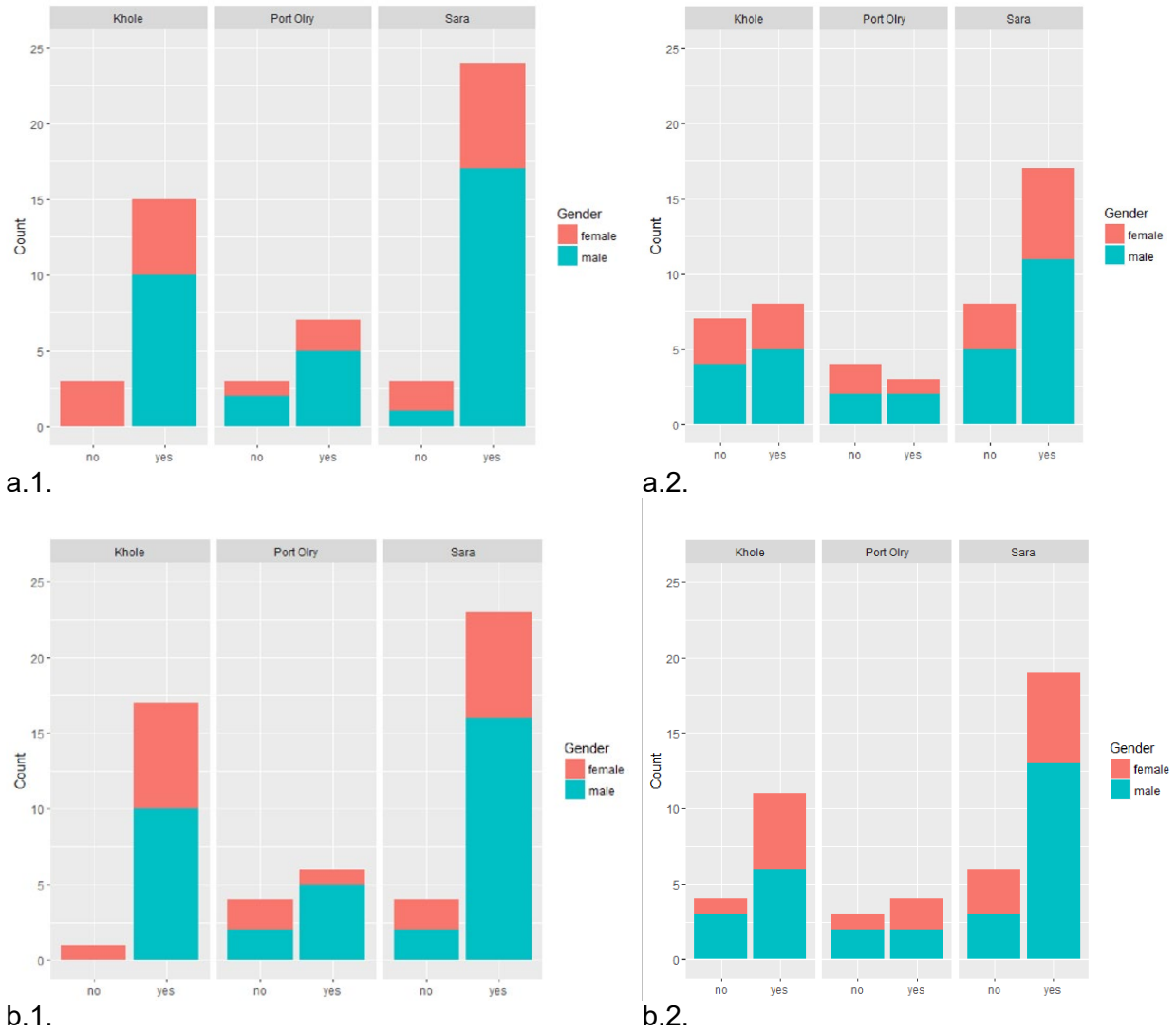
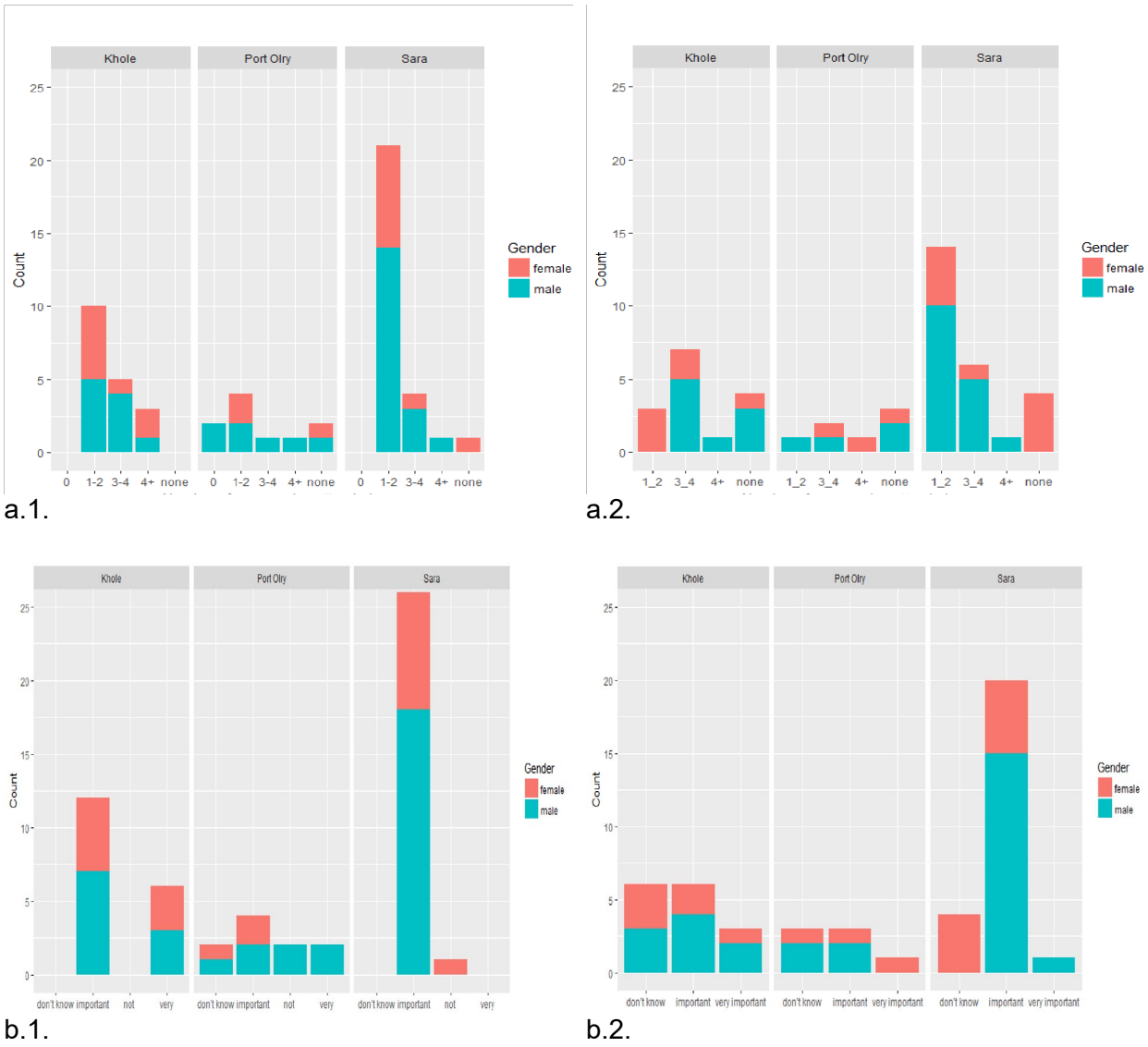


Figure A1.42. Number of respondents who receive volunteer assistance for livelihood activities (a.) and volunteer their time to other community members' livelihood activities (b.). (1 denotes 2017 data, 2 denotes 2019 data).

The frequency of attendance at custom ceremonies prior to 2018 was mostly one to two times/year with only two respondents suggesting that they had not attended a custom ceremony (Figure A1.43). Attendance at custom ceremonies remained relatively constant since 2017 with only a small decline in Khole. The majority of both male and female respondents selected 'important' out of the responses for attending custom ceremonies. This remained relatively the same in the last 12 months, however there were some new respondents from Port Orly that selected 'not important'.



a.1. a.2.

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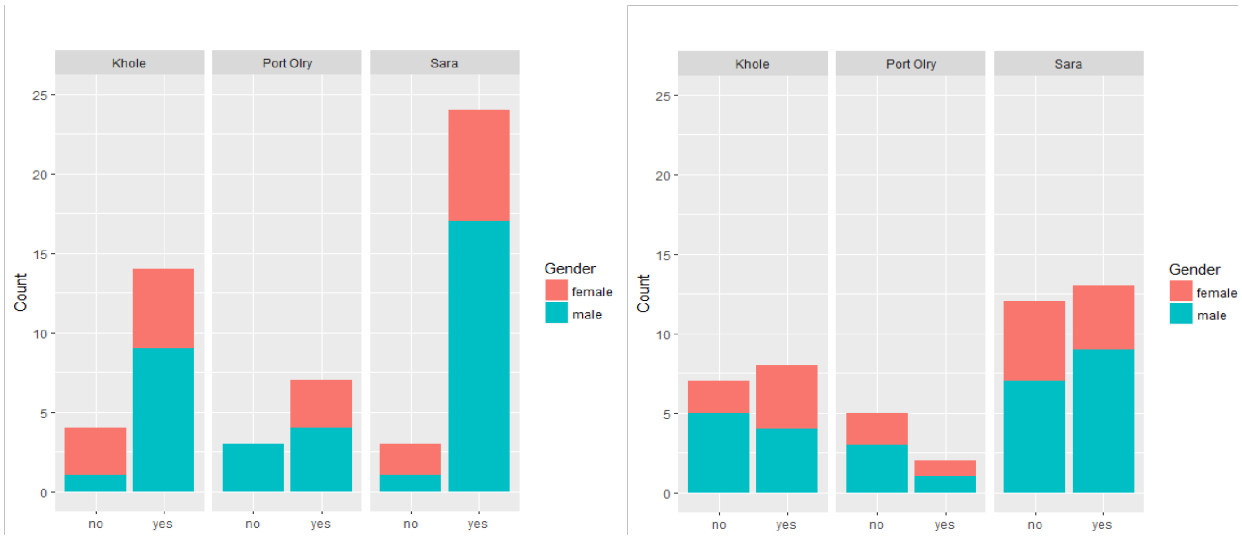
Figure A1.43. The number of custom ceremonies respondents have attended within the last 12 months (a.) and the importance of customs ceremonies to respondents (b.). (1 denotes 2017 data, 2 denotes 2019 data).

Community meetings attendance was high with majority of respondents prior to 2018, however, there was a rise in respondents not attending community meetings in Sara and Port Orly since 2018 (Figure A1.44). On average meetings held prior to 2018 were monthly while more respondents selected 'other' for meeting frequency in the past 12 months. The majority of respondents suggested that in meetings held prior to 2018, they mostly listened and occasionally spoke with no change between the baseline and end-line surveys. During storian sessions female respondents suggested that they feel more comfortable to speak in meetings with woman only present.



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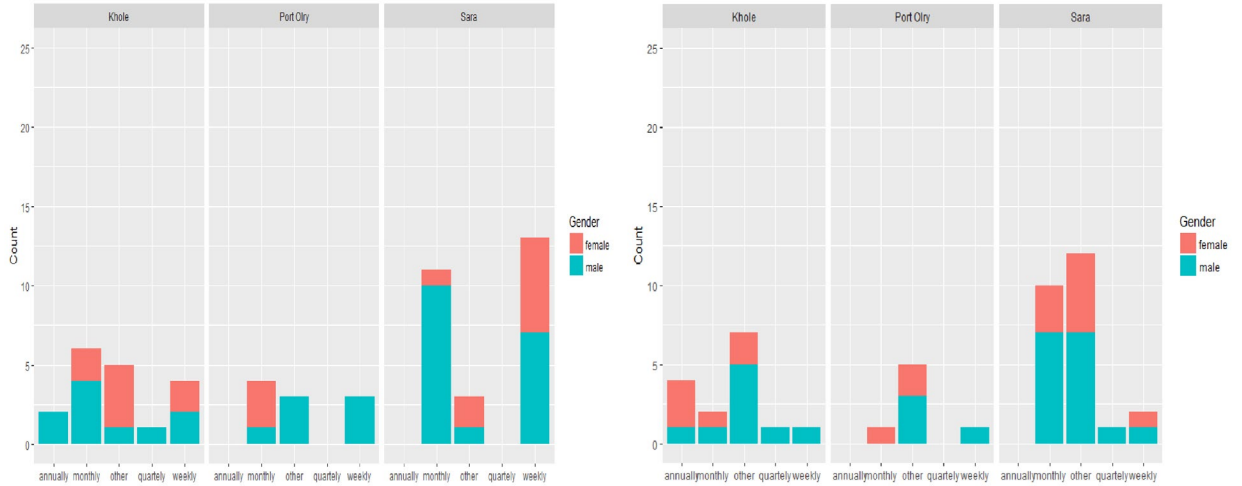
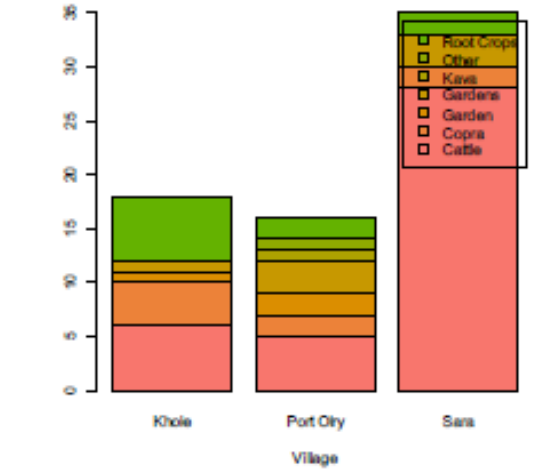


b.1. b.2.

Figure A1.44. The number of respondents that attend community meetings (a.) and the frequency of attending community meetings (b.). (1 denotes 2017 data, 2 denotes 2019 data).

Natural capital

As part of the baseline and end of project livelihoods analysis, households were given a number of commodities and asked to rank them in order of importance to their livelihoods, and to then rank those selected commodities in order of importance to income. While the most common measurement of livelihoods was based on an improvement in income, studies have shown this may not represent the reality of the rural Vanuatu context (Addinsall et al., 2015; Cahn, 2006). Therefore, the livelihoods analysis discusses the importance of these commodities to formal income generating activities and the resilience of the households. Results from the baseline livelihoods analysis showed a notable difference between the most important commodity to a household's livelihood compared to the household income (Figure A1.45 and Figure A1.46). Particularly in Sara where prior to 2018, cattle were seen as the most important commodity in relation to the household's livelihood. While copra, kava, and root crops were selected more than cattle as the most important to a household's income. Results from the end of project livelihoods analysis show a notable drop in the importance of cattle in relation to the respondents' livelihoods, while home gardens had increased in importance, these findings are worthy of further investigation. Information collected prior to 2018 from storian sessions with participants showed that many respondents keep cattle to meet custom requirements rather than adding to household income. Cattle were also described as savings accounts to pay for school fees. Results from the end of project livelihoods analysis shows that there was a notable difference in the importance of cattle since 2018, particularly in Sara and Khole. These results also showed a decline in the importance of root crops in relation to income generation.



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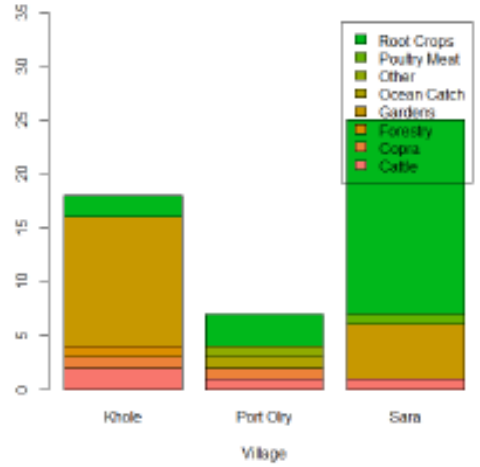

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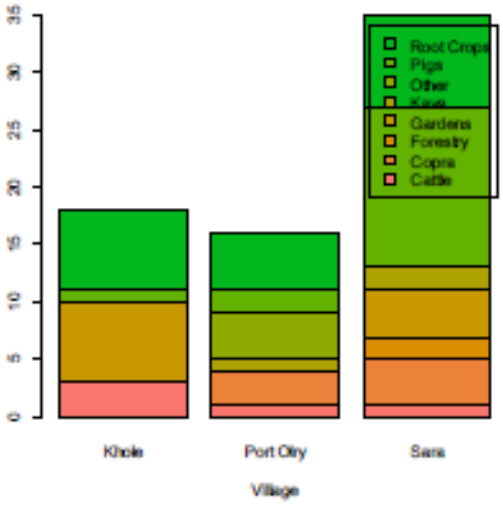

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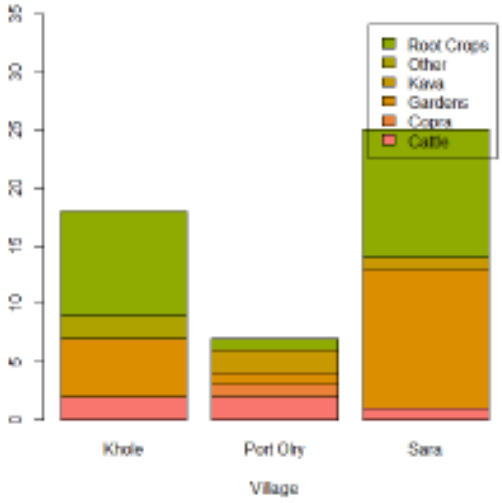

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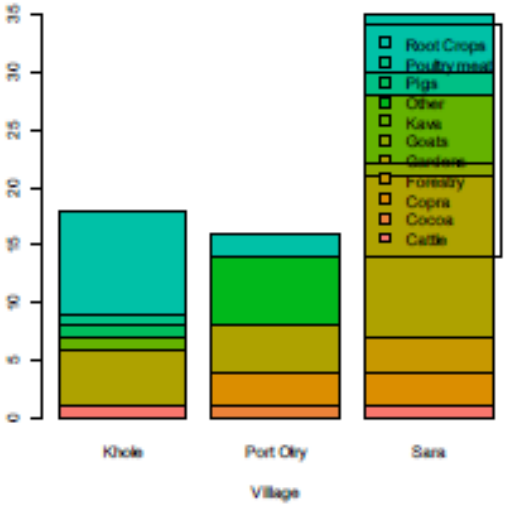

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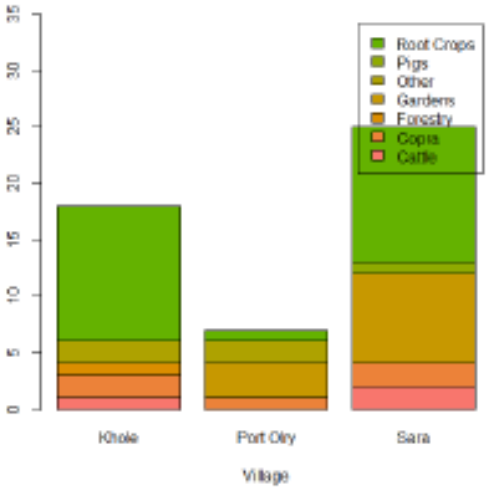

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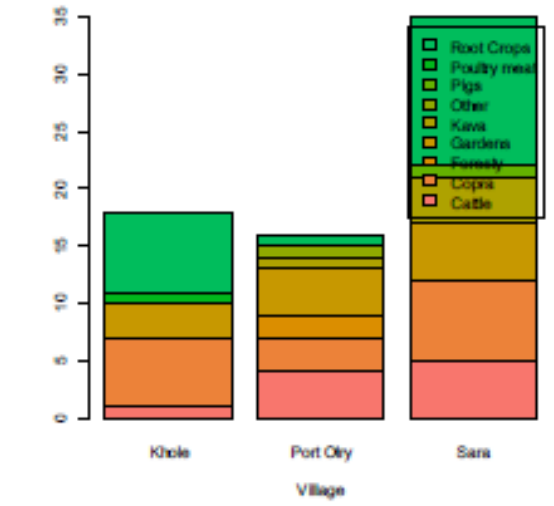
Figure A1.45. The first (a.), second (b.), and third (c.) most important commodity to the livelihoods of household members. (1 denotes 2017 data, 2 denotes 2019 data).



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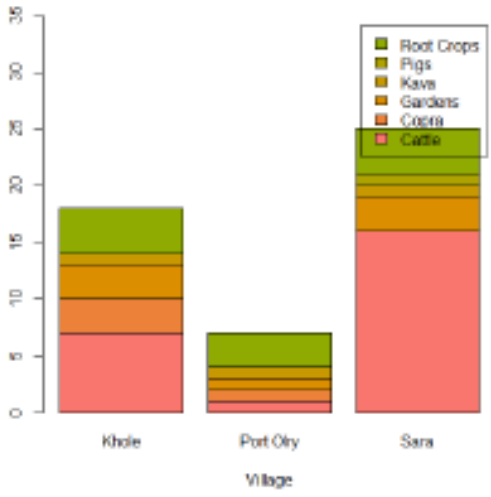

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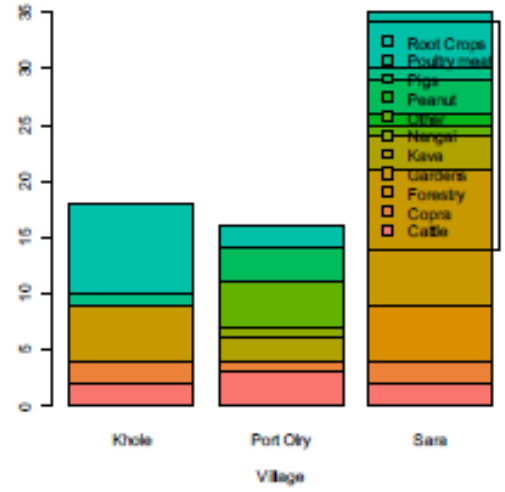

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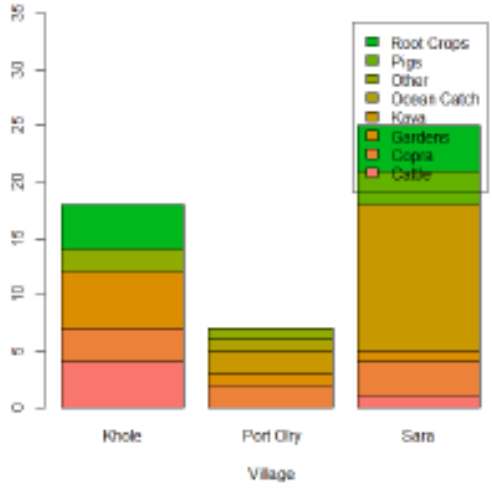

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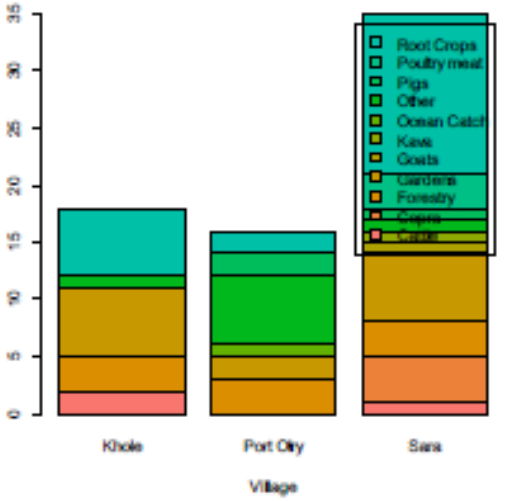

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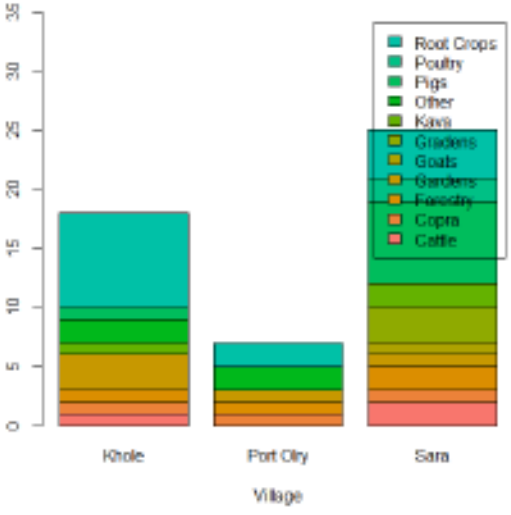


c.2.

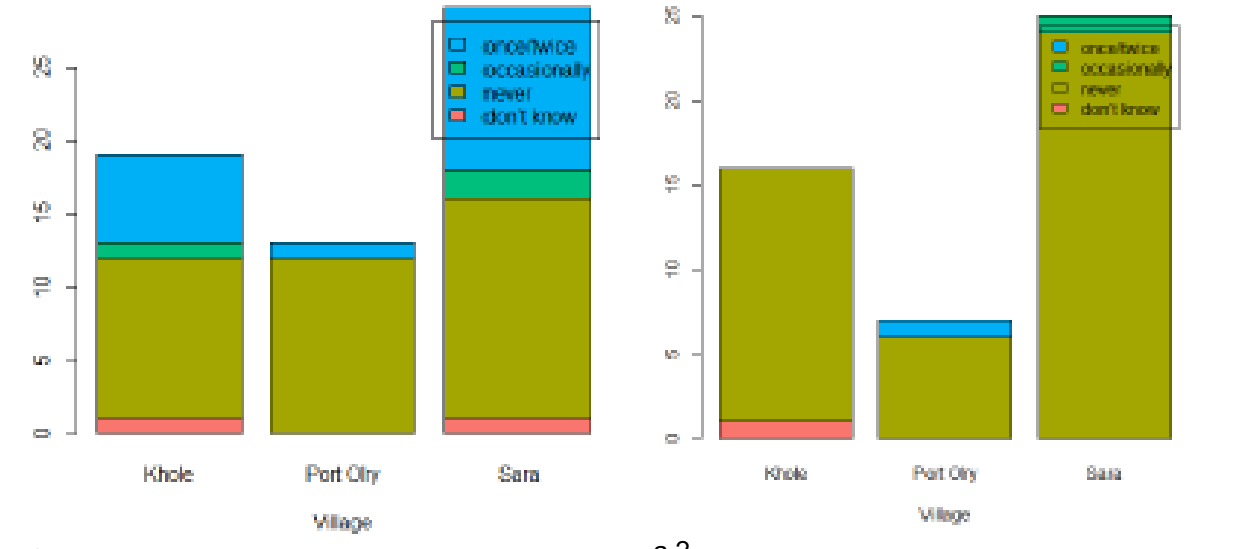
Figure A1.46. The first (a.), second (b.), and third (c.) most important commodity to the incomes of household members. (1 denotes 2017 data, 2 denotes 2019 data).

Vulnerability context

The most common household shocks experienced by households prior to 2018 were crop failure and natural hazards (Table A1.8). Sara had particularly high numbers of crop failure. Results from the end of project livelihoods analysis showed an increase in land disputes, particularly in Sara. There was also a decrease in the number of respondents experiencing an income shortfall in Sara compared to the baseline analysis. Results from the end of project livelihoods analysis also showed a decrease in crop failure across all three villages. While a large majority of households surveyed in the baseline livelihoods analysis suggested they had never experienced issues with food security (Figure A1.47), more than five households had experienced food security issues in Khole and Sara. Results from the end of project livelihoods analysis suggested that the number of households that had experience food shortages had dropped. During storian sessions with households in Port Orly, it was suggested that close proximity to deep sea fishing and the number of cooperative stores and butchery contributed to food security.

Table A1.7. Household shocks experienced by households in the last 12 months.

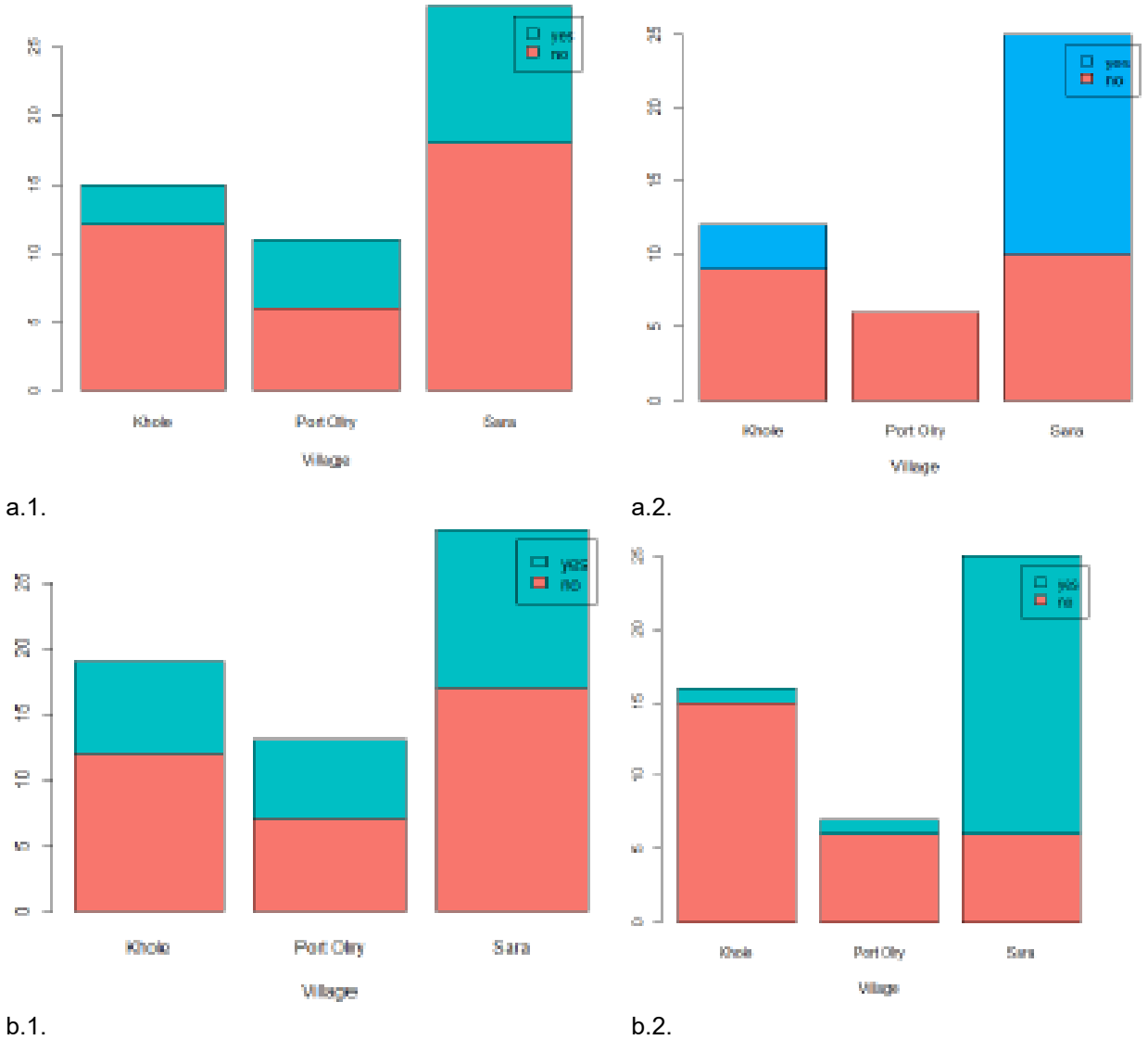
Shock	Khole		Port Olry		Sara	
	2017	2019	2017	2019	2017	2019
Crop failure	17	2	4	5	25	6
Damaged house	1	0	1	0	2	1
Death/illness	4	7	7	3	2	9
Decreased community support	2	1	0	2	5	1
Income decrease	4	2	1	1	2	18
Land dispute	0	3	1	2	0	5
Natural hazards	1	3	0	2	1	7
None	10	4	4	1	7	0
Theft or vandalism	2	2	1	3	1	2
Violent attack	2	2	0	2	1	1



a.1. a.2.

Figure A1.47. The number of households that experienced food insecurity in the last 12 months. (1 denotes 2017 data, 2 denotes 2019 data).

The majority of households suggested that they did not sell cattle in response to these household shocks (slightly more in Sara) (Figure A1.48). There was a slight increase in the sale of cattle to respond to household shocks in Sara, while there was a decrease in Port Orly. Close to half of households surveyed in the baseline livelihoods analysis suggested that they would sell cattle to address food shortages. There was a slight decrease in the sale of cattle to address food shortages in Khole and Port Orly, while Sara had shown an increase.



a.1. a.2.

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Figure A1.48. The number of respondents who sold cattle in response to a household shock (a.) and to address food shortages (b.). (1 denotes 2017 data, 2 denotes 2019 data).

The majority of households from Port Orly and Khole suggested that they received community support to help them to respond to the household shock (Figure A1.49). While results from the end of project livelihoods analysis demonstrated a slight decrease in community support given to respondents from Port Orly. The majority of households provided food for people in their community in times of need and a large majority had received food in times of need (Figure A1.50). Results from the end of project livelihoods analysis showed an increase in the number of households not providing food for people in their community in need and this is likely due to

the greater food security experienced in these communities in the 12 months prior to the end line survey (Figure A1.47).

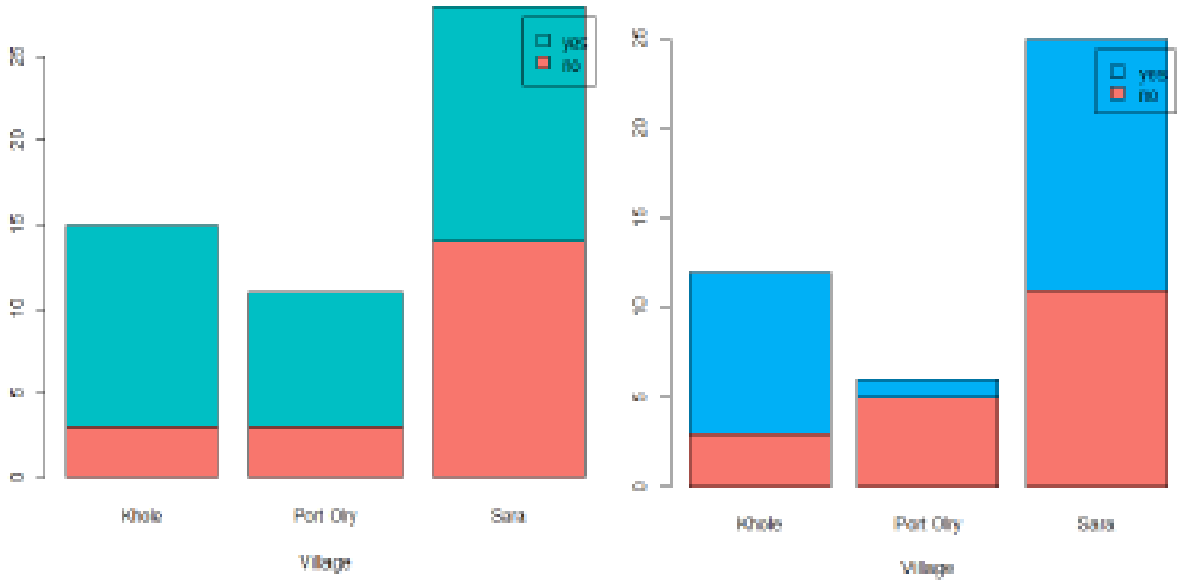

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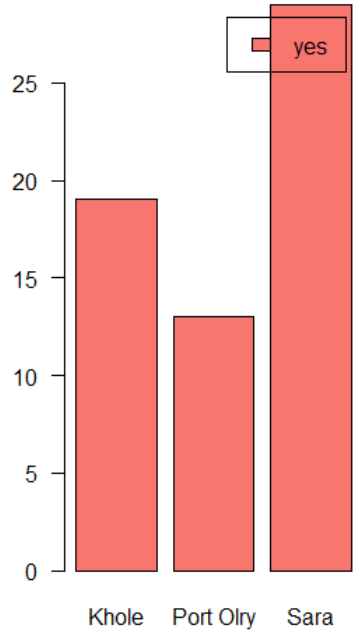
Figure A1.49. The number of respondents that received support from the community in response to a household shock in the last 12 months. (1 denotes 2017 data, 2 denotes 2019 data).



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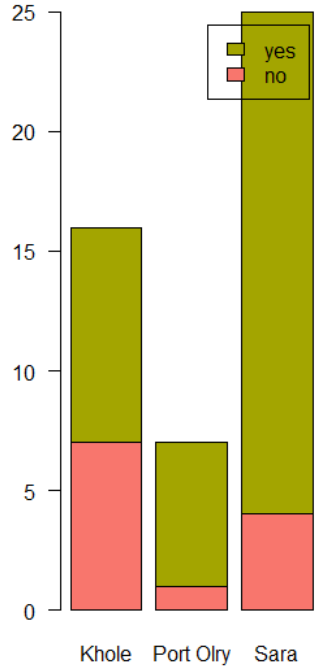

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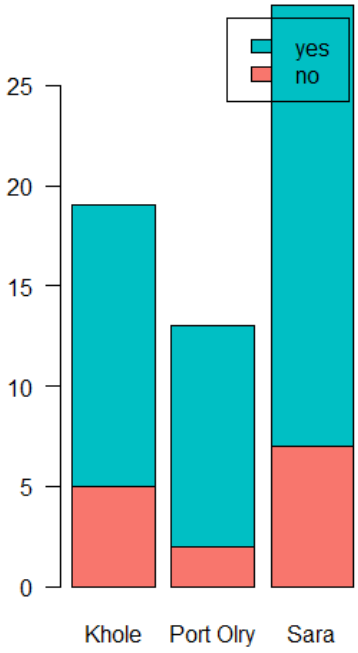

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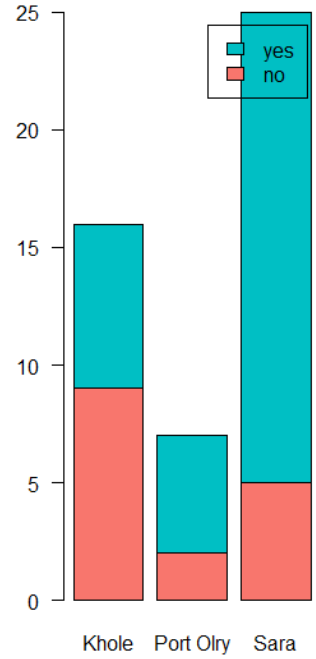


b.2.

Figure A1.50. Number of households that have provided food for others in need (a.) and have received food from others in times of need (b.). (1 denotes 2017 data, 2 denotes 2019 data).

Discussion

Measuring the importance of commodities to household income and resilience

In response to the need for a holistic approach to measuring wellbeing, various livelihood assets and activities such as commodities were measured in importance to livelihoods and household resilience through the traditional economy and income separately. Households were given a number of commodities and asked to rank them in order of importance to their livelihoods and to their income. Results from the baseline livelihoods analysis showed notable differences between the most important commodities to a household's livelihood compared to the households' income. Particularly in Sara where cattle were overwhelmingly seen as the most important commodity to a household's livelihood. While copra, kava, and root crops were selected more than cattle as the most important commodity to a household's income. Information collected from storian sessions suggested that many respondents keep cattle to meet custom requirements rather than making a contribution to household income. Cattle were also described as a savings accounts to pay for school fees.

Results from the end of project livelihoods analysis showed a notable drop in the importance of cattle to the household livelihoods, going from the most important commodity to the least in three years. Cattle also became the most important commodity to household's income generation in Khole and Sara, while home gardens become the most important commodity to respondents' livelihoods in these villages. These results also suggested a decline in the importance of root crops to the respondent's income generation. These findings are worthy of further study to investigate the causes and ramifications for this decline in importance of cattle to households' livelihoods and increased importance in relation to household income generation.

Financial and social security

Land tenure and strong social safety nets in Vanuatu have been attributed to the relatively low incidence of absolute poverty and malnutrition. While an increasing number of households in Vanuatu are engaging more in the cash economy, it is important that these social safety nets and the role of the traditional economy (subsistence) are also supported. Results from the end of project livelihoods analysis showed a rise in income generation particularly for households in Sara. This also corresponds with a decrease in loans taken out in the last three years. There was also a significant decrease in crop failure.

Results from the baseline livelihoods analysis showed that the majority of respondents (both male and female) considered it important to actively attend weekly or monthly community meetings. Respondents also suggested that they both volunteered to assist other members of their community and received volunteer assistance. The results also suggested that attendance at community meetings prior to 2018 was high. However, there had been a slight decline in attendance since 2018 in Sara and Port Orly. On average meetings held prior to 2018 were monthly, while more respondents selected 'other' for meeting frequency in the past 12 months.

Food security and non-communicable diseases

Results from the end of project livelihoods analysis demonstrated a changing dietary trend away from the consumption of root crops and fresh meat to packaged food and tinned meat compared to baseline results. This was a significant change over 3 years and may have implications for an increase in non-communicable diseases, especially in a population where over 20% of the adult population has diabetes (IICA, 2015). Research is needed to investigate if the rise in the importance of cattle to household income has led to less fresh meat being consumed in the villages. The end of project results suggest that the drop in the number of loans taken out between 2017 and 2020 across all three communities could represent more disposable income within households involved in the project which may influence an increase in store brought packaged

food. An increasing importance of cattle to household income generation could also lead to less consumption of meat within the villages.

Traditional agricultural systems often exhibit high levels of diversity, as communities rely on a broad range of integrated systems to provide them with food, water, fuel, and medicine. These systems are inspired by cultural practices and the interaction between people and their environments which have taken place over generations. Anderson (2011) identifies traditional Melanesian land systems as "vehicles for food security, housing, widespread employment, social security, biodiversity protection and ecological stability; they are also a store of natural medicines, as well as a source of social cohesion, inclusion and cultural reproduction". In this light, it is crucial that cattle herd growth targets are balanced by also encouraging a diversified farming system that allows for a variety of livelihood strategies that are gender inclusive.

The Vanuatu National Livestock Policy 2015-2030 argues the importance of cattle as a major contributor to the cultural and socio-economical livelihoods of Vanuatu. While demand for Vanuatu livestock products outstrips supply in both local and external markets (Livestock policy, 20152030), it is crucial that works to remedy this do not impact on the availability of cattle for meeting custom and local markets. If the move to increase cattle farming in Vanuatu focuses on larger commercialisation of the industry to supply foreign abattoirs for Port Vila and export markets, this may risk affordable local supply in the outer islands.

Land disputes

The increasing shortage of useable land for livestock and agriculture on many islands in Vanuatu has resulted in disputes which impact on the ability of many smallholders to invest in their farms. The competition for land and resources, particularly on the more developed islands of Santo and Efate, are placing pressure on rural communities. Results from the end of project livelihoods analysis demonstrated a rise in land disputes, which may be attributed to the land becoming increasingly valuable. Participants suggested that the likelihood of a land dispute occurring increased if you were seen to be expanding your farming activities and income generation.

The Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016) puts forward the notion that land ownership in Vanuatu is not conducive to farming business growth suggesting to remedy the situation, "the government and landowners must register their lands and be prepared to work with investors to develop their lands" (p. 19). Yet maintaining the customary land tenure in Vanuatu as the basis for food security is one of the key objectives of the National Sustainable Development Plan (NSDP, 2016). Parts of Melanesia are amongst the last remaining countries in the world where the traditional economy (also known as the subsistence or custom economy) takes precedence over the cash economy in terms of providing for livelihoods (Regenvanu, 2010).

The traditional economy is seen to "encourage sustainable economic activity at the individual and household level, while operating within reciprocal networks of exchange and obligation at the community level" (Addinsall et al., 2015). Findings from a pilot study, which sought to provide a livelihoods analysis of people's wellbeing in Vanuatu found a positive correlation between full or partial access to customary lands (along with forest and marine resources) and perceived happiness (VNSO, 2012). It is crucial that consistency between government policies suggesting that there may be a need for some amendments to the Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016) to ensure it aligns with the National Sustainable Development Plan 2016-2030.

Conclusions

The findings from this report show that the importance of cattle to households' livelihoods, resilience and the informal economy, (which ensures food security as well as an important part of

cultural, religious, and community-based activities) has significantly decreased since the baseline analysis was conducted. While the importance of cattle to household income generation has significantly increased. The report also found a transition from the consumption of root crops and fresh meat to packaged food and tinned meat over the last 3 years. This change may lead to an increased incidence of non-communicable diseases within the community.

An important component of livelihoods analysis is the sustainable use of resources. Therefore, it is important to ensure environmental and economic feasibility assessments are conducted with each farmer wishing to expand. Agriculture (including crops, livestock, forestry, and fisheries) and tourism are the largest contributors to the economy, however, the contribution of the traditional economy to the livelihoods and resilience of Vanuatu is often underestimated. Many studies and policies continue to evaluate customary land systems by focusing on economic activities and disregard the contributions of subsistence and traditional activities.

Gender strategy

Introduction

This case study presents a strategy for engaging rural women in agricultural capacity building and extension through a gender-sensitive training programme. The gender-sensitive training programme was developed from the findings of a gender livelihoods analysis conducted with 45 participating households in East Coast Santo, Vanuatu.

Haverhals et al. (2014) reported an absence of gender disaggregated data on male and female activities and a lack of monitoring of gender focused chain interventions with minimal baseline studies. It was also recommended that future studies on gender and agricultural value chains do not just focus on women's involvement but also consider the impacts of interventions on both women and men and how they interact (Haverhals et al., 2014). The gender livelihoods analysis responds to the absence of gender disaggregated data, by providing an understanding of the risks and vulnerability context that impacts on rural households, influencing structures and processes (such as societal norms, gender roles and relations, organisations and traditional policies), access to and control of resources, choice and success of livelihood activities, priorities for livelihood outcomes, and the incentives that people respond to (Addinsall et al., 2019). This case study presents a gender strategy which is informed from the findings of the gender livelihoods analysis.

Findings from the gender livelihoods analysis, demonstrated women's daily activities almost double those of men. Female participants showed a high level of labour commitments in the informal economy such as: subsistence farming, household duties, such as washing or cleaning, community obligations, and helping other women in the community with childcare. The study also revealed that gender patterns of control over income were seen to be largely influenced by land tenure systems, the type of crops, and the characteristics of the households. Within some households, cash income belonged to whoever produced the goods for sale, while in other households, men controlled all household income. Men were predominantly seen to be the decision makers on the farm and within the household, although, a small number of female participants suggested they were able to make decisions about how income was spent that was directly earnt by them through their market gardens.

In Melanesia, women are predominately segregated into low-technology occupations and concentrated in certain phases of the supply chain, such as the selling of produce at local markets, packaging, and post processing, which can limit the opportunities to gain new skills and capabilities (FAO, 2011). Women are also overrepresented in lower wage jobs and experience generally poorer labour standards. The combination of limited decision making within the household and lower access to resources and household income can lead women to accept lower wages and conditions. While wage segregations are common in Melanesia, there are new forms of organisation in agricultural supply chains for export-orientated crops and agro-processing which have wages that are typically higher and better working conditions than traditional agricultural employment (FAO, 2011).

FAO (2011) associate the underperformance of the agricultural sector in many developing countries to the severe constraints women face in access to productive resources, which in turn reduces their productivity. This is fuelled by the recognition of women's involvement in agriculture which sees women as:

- Being the majority of all farmers in developing countries,
- Having a longer work day than men, with many reaching their limits,
- Possessing specialised knowledge representing a highly skilled pool of labour in agriculture,

- Contributing the most income to their household expenses and communities,
- Productivity is severely constrained by the fragmentation of their time from competing responsibilities, and
- Becoming more responsible for households in rural areas as men leave for remunerated work.

Across Melanesia women are critical in achieving food security through their various roles throughout the agricultural value chain, from primary production, to food preparation, and food security within the household, in addition to the supply of produce to local markets (ADB, 2013). However, while women make up the bulk of labour in agricultural value chains their roles are generally undervalued and constrained by a number of factors largely influenced by social norms and practices that determine the gendered division of labour. The underreporting of women's activities in agriculture has caused disagreements among scholars as to the extent of the feminisation of agriculture (de Brauw et al., 2008; de Brauw et al., 2012; Chang et al., 2011; Mu and van de Walle, 2011). This is largely due to the fact that women's activities occur within the informal economy (traditional economy). Addinsall et al. (2015) found that rural women in Vanuatu play a key role in maintaining traditional economic systems that are vital for the reduction of vulnerability, providing resilience (to disasters such as cyclones, droughts), and supporting livelihoods, which is in line with research undertaken in Vanuatu and Solomon Islands by Feeny et al. (2013).

Gender differences in Vanuatu are evident when evaluating women's overall workloads, particularly in rural areas. Rural Ni-Vanuatu women often pursue multiple livelihood strategies which are quite complex. The workload of Ni-Vanuatu women is increasing with the need to find additional income, alongside maintaining their traditional gendered responsibilities. While these traditional gendered responsibilities such as: producing agricultural crops for subsistence and markets; processing and preparing food, collecting fuel and water, caring for family members, maintaining houses among others, are not defined as economically active employment activities, they are regarded as essential to the well-being of households (Addinsall et al., 2015).

Gender inequality with female smallholders in Melanesia results in a number of constraints to generating income from participating in the agricultural value chain. Women in Melanesia experience limited access to productive resources and the business knowledge and acumen to improve access (Chambers et al., 2012). Yet, Chambers et al. (2012) found empowering female smallholders as being one of the most effective ways to improve household livelihoods as women are more likely to invest additional resources (such as income and food) back into their families and communities.

Findings from the gender livelihoods analysis showed that both male and female participants were unanimous in their preference for farmer to farmer information exchange over participation in workshops or training days at institutions. However, majority of the female participants suggested that due to cultural and custom considerations they would be more comfortable participating in training with women only. In fact, Buchy and Rai (2008) argues that these women-only spaces "allow women to ascertain their power to act, mobilizing the power from within", especially in agricultural and forestry-management settings. Indeed, the sense of acceptance and comfort that is created in these settings is productive, empowering, and collaborative (Buchy and Rai, 2008; Chambers et al., 2012). These spaces allow for the rejection of the patriarchal, colonist domination that often influences community relations and systems, as the women are in charge of the trajectory.

Materials and methods

Based on these findings the study developed a gender-sensitive training programme grounded in a female farmer to farmer strengths-based and interactive training approach as a strategy to better engage women in agriculture and build their capacity based on their priorities (Figure A1.51). The gender-sensitive training programme was based on the concept of women only storian sessions. The central feature of storian is relationship building between the members of the group which enables a collaborative environment to address a research problem (Warrick, 2009), and which is key to empowering communities (Beeton, 2006). This style of research is also known as Talanoa groups in Fiji (Nabobo-Baba, 2008). Storian sessions and Talanoa groups are seen as culturally appropriate Oceanic research methods. Nabobo (2008) described these methods as a movement towards the decolonisation of the "western ideology of subjective empathy to an inter-subjective empathy". These storian sessions enable female participants to express thoughts in a non-threatening way.

Figure A1.51. Women farmers facilitating storian and peer-to-peer learning activities on Santo.

The gender-sensitive training programme was conducted with six female Ni-Vanuatu farmers over 12 months, meeting once a month for three hours. The training used peer-to-peer, activity-based learning methods with no role for teachers, experts, or external consultants specialised in this skill

area. Instead, participants worked together through a series of activities and discussions based on the priorities of the participants. New knowledge, skills, and competencies were developed through the interactions between participants and the sharing of local knowledge and experience. In this way the programme is a low cost, sustainable option for any organisation or community. Participants were trained in a participatory manner in topics that they had requested such as:

- Agricultural/livestock extension,
- Compost training,
- Improved banking, saving and skills in financial management for agricultural/livestock,
- Small business activities,
- Increased capability to access microfinance, and
- Building gender inclusive decision-making capacity within the family and community.

While improved knowledge on these topics was important, the priority for the training was to increase female participant's self-esteem to participate in household and community discussion around the management of farm activities and finances. Part of this self-esteem building was based on the farmer to farmer information exchange. Recipients of the gender-sensitive training programme developed capacity to become facilitators of the programme in neighbouring communities. The training took place in October 2018 between six members of a women's group in East Santo Area Council and 14 female Ni-Vanuatu farmers from Malo.[1]

Mixed gender farmer to farmer training also took place in February 2019 with four Ni-Vanuatu female farmers from the East Santo group, three Ni-Vanuatu female farmers from the Malo group and seven male farmers from East Santo Area Council. The study conducted an evaluation of the gender-sensitive training program conducted with women only present and the mixed gender group to provide a comparison. The evaluation of the female only training consisted of a structured quantitative survey, open structured questions, and four storian sessions with 19 female Ni-Vanuatu participants. The storian sessions were conducted in English and Bislama with the support of two Ni-Vanuatu research assistants. An evaluation of the mixed gender training was conducted with both male and female participants. The evaluation consisted of a structured quantitative survey, open structured questions, and four storian sessions with Ni-Vanuatu female farmers. All questions presented in the quantitative survey were in Bislama.

Results and discussion

The storian sessions with the female Ni-Vanuatu participants uncovered a number of issues between the mixed gender and female only training. The sessions indicated an overwhelming preference by both the female participants and trainers for the female only training. Comments such as the following indicate a reluctance to participate in discussions when men are present:

> *When it was just women in the training I enjoyed participating in discussions, asking questions and I wasn't very nervous when presenting, but with men present I didn't feel as confident.*

This demonstrates the participation pull, as women feel more welcome, comfortable, and less intimidated surrounded by other women in similar circumstances. Indeed, women felt more

[1]The farmer to farmer training and evaluation was part of the ACIAR project FST-2016-154: "Enhancing returns from high-value agroforestry species in Vanuatu".

inclined to join these groups if it is only women, unlike the mixed gender training where the men may "take over" or "complain" as one woman expressed:

> *During household level training or mixed gender training the men take over, they complain, they take charge and don't let the women contribute properly, it's better to have training with women only and allow us to gain the skills to feel confident in a group, then we have more confidence to speak at home in the household.*

Some female Ni-Vanuatu participants suggested that due to custom obligations and an overall shyness to talk in public places, having all women training enabled greater participation by women. There were also comments made in relation to heightened intimidation to present and contribute in discussions due to well-established and respected male farmers being present. When asked to explain the reasoning behind this, one female Ni-Vanuatu participant commented that:

> *The mixed gender training had some very well-respected male farmers, I felt like they didn't think they could learn anything from me when I presented and this made me feel intimidated.*

However, three of the Ni-Vanuatu female participants presented on the training they had received at the end of project field day in front of over 115 male Ni-Vanuatu farmers demonstrating a substantial increase in confidence by the women. Ni-Vanuatu female participants in this project were particularly responsive to the model of horizontal sharing, suggesting it was less intimidating than top down, conventional methods they had experienced in the past. One woman reported:

> *Teaching other women how to manage their household budgeting is the most important thing you can teach if you want them to improve their livelihoods, you can increase productivity but if are not managing the income properly it's just a waste. I've made lots of new connections with other women from this project, this makes me happy (alluding to the increase in financial control and household well-being achieved through the training).*

Participants also suggested how the gender sensitive training program had enabled them greater confidence to approach their husbands about their spending and how they could manage their finances better. For example:

> *By keeping a record of my income and spending it helps as a supporting document to take to the bank to prove that I can manage money. By keeping a record, I can also take this to my husband and show him look you have overspent on kava, alcohol and cigarettes this month you need to cut down next month or we won't be able to pay school fees, he was so shocked, he said that he could have brought a boat for us with the amount he has spent on alcohol, kava and cigarettes.*

This sense of empowerment and control in the household is essential for the representation and equality of women in the community and region. These training sessions provide a space where women can openly communicate and discuss new ideas and avenues, for either the household or community, while getting support and encouragement from other women.

As part of the ACIAR Project LPS/2014/037: 'Increasing the productivity and market options of smallholder beef cattle farmers in Vanuatu' male project team members piloted a household farm

productivity training package with a Ni-Vanuatu female farmer (who had participated in the gender sensitive training programme previously) and her husband. The study conducted a storian session with the Ni-Vanuatu female farmer after she had participated in the household level training. The female Ni-Vanuatu farmer suggested:

> *I would have felt scared to participate in the household training if I hadn't had all the training with the women first and taught the Malo women. My husband has actually been really happy about how much I've learnt. I know I'm a good strong farmer and I have lots of knowledge to share. If the project had of just worked with my husband to improve the fence, and pasture this would not have made big changes to our household, both my husband and I agree that the women's training group and storian sessions have made big changes to our household.*

A key finding from the evaluations conducted on the household level training found that mixed gender household level training is unlikely to engage Ni-Vanuatu women in a meaningful way if they haven't first been empowered to feel confident in public speaking and it is important that this is achieved in a non-threatening environment.

Conclusions and recommendations

Based on the results, the following key principles for a gender-sensitive training programme established within this case study are:

1. Training in mixed gender groups or at the household level be unlikely to engage women if they are not empowered and confident, with the training taking place in a non-threatening environment,
2. Building skills up slowly and do not underestimate the women's capacity to teach other farming women, this can build self-esteem and enhance an understanding of the subject,
3. Create an empathetic environment that is not focused solely on the project objectives, listen an incorporate this understanding into the design of the project and training materials, and
4. Ensure the training is family friendly and enables women to meet their other livelihood priorities.

It is also recommended that the above strategies be scaled-out and tested by other projects and programs implemented within Vanuatu and more broadly in smallholder households across the Pacific.

Activity 1.7. Malekula situation analysis

Prepared by: Simon Quigley

Introduction

In 2015, the Australian Centre for International Agricultural Research commissioned a research project to identify the constraints and opportunities to improve the productivity and profitability of smallholder cattle farmers in Vanuatu. *Increasing the productivity and market options of smallholder cattle farmers in Vanuatu* (LPS/2014/037), locally known as 'Bisnis Blong Buluk', will conclude in June 2020. The Bisnis Blong Buluk project collected baseline data on livelihoods, farm activities, cattle productivity, and the economics of smallholder cattle farmers and farming systems in East Santo Area Council on the island of Espiritu Santo, Vanuatu.

As Bisnis Blong Buluk focussed its research efforts in East Santo Area Council, it was considered important to evaluate the extent to which research findings and recommendations would be transferable to another geographic location in Vanuatu where cattle production was currently important to the livelihoods of rural households, or would likely become so in the future. It was recommended that a Situation Analysis be conducted on Malekula island, MALAMPA province (comprising of the islands of Malekula, Ambrym, and Paama). Malekula was selected as a target for this situation analysis due to its:

1. Relatively large cattle population distributed amongst a large number of households, the majority of which are smallholders, and
2. Identification by the Government of Vanuatu as a priority location for the expansion of the cattle herd under its aspirational goal of attaining a national cattle population of 500,000 by 2025.

The objectives of this situation analysis were to:

1. Describe the policy, socio-economic, market and agro-environmental settings of smallholder cattle producing households on Malekula,
2. Determine if recommendations made by the Bisnis Blong Buluk project from research conducted in East Santo Area Council would be applicable to Malekula, and
3. Identify researchable issues specific to smallholder cattle farming households on Malekula.

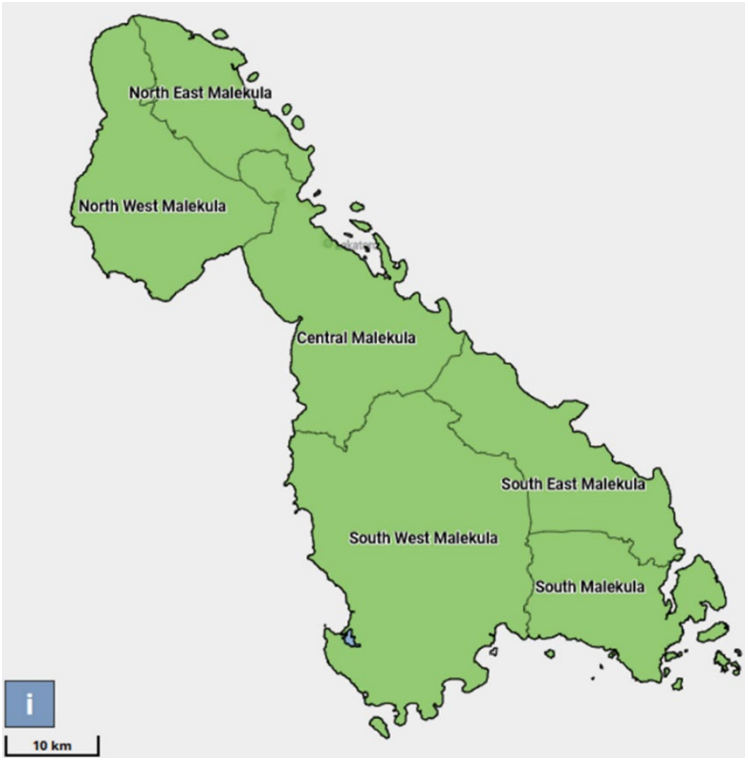
Materials and methods

A field trip to Malekula was undertaken in June-2019 by researchers from the Bisnis Blong Buluk project with expertise in cattle economics and marketing (Scott Waldron; SW), livelihoods and gender engagement (Norah Rihai; NR) and cattle production systems (Simon Quigley; SQ). The field trip was co-ordinated by Charles Tari (CT; Provincial Livestock Officer, Department of Livestock, Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity). Information included in this report was derived from key informant interviews on Malekula (Table A1.9), separate focus group discussions with male and female smallholder farmers from Northwest Malekula Area Council, field and market visits in Southeast, Central, Northwest and Northeast Malekula (Figure A1.52), and secondary data sources (Vanuatu National Statistics Office).

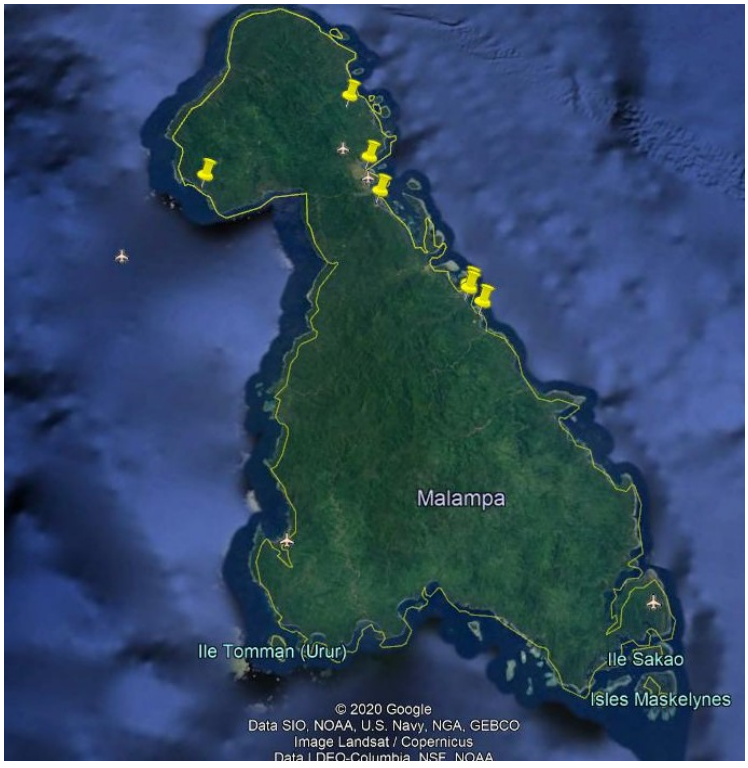
Table A1.8. Itinerary and list of interviews and interviewees'

Date	Interviewer[1]	Interviewee
17-June-2019	CT, SW, SQ	Secretary General MALAMPA province
17-June-2019	CT, SW, SQ	Nuts'n'Oil, Lakatoro
17-June-2019	CT, SW, SQ	Manager, VCCE MALAMPA
17-June-2019	CT, SW, SQ	Mapbest Co-operative and farm, Southeast Malekula
17-June-2019	CT, SW, SQ	Smallholder farmers, Southeast Malekula
17-June-2019	CT, SW, SQ	Smallholder farmer, Southeast Malekula
17-June-2019	SW, SQ	Department of Livestock, Provincial Livestock Officer
18-June-2019	CT, NR, SW, SQ	MALAMPA Butcher, Lakatoro
19-June-2019	CT, NR, SW, SQ	15 male farmers, Northwest Malekula
19-June-2019	CT, NR, SW, SQ	George Lintamat Agricultural extension officer
19-June-2019	CT, NR, SW, SQ	PRV Norsup Manager (Plantations Réunies de Vanuatu)
20-June-2019	CT, NR, SW, SQ	Northeast Malekula, Dept. Livestock office
	CT, NR, SW, SQ	7 female farmers

[1]Charles Tari, CT; Scott Waldron, SW; Simon Quigley, SQ; Norah Riha, NR.



a.



b.

Figure A1.52. Area Councils on Malekula, MALAMPA province (a. Binkhoff, 2020) and location of field visits and interviews (b. GoogleEarth).

Results and discussion

Policy and regulatory setting

The policies (and strategic programs) relevant to smallholder cattle producers and the cattle sector on Malekula include the Overarching Productive Sector Policy 2012-2017 (Prime Minister's Office, 2012) and the Vanuatu National Livestock Policy 2015-2030 (MALFFB, 2016). The Vanuatu National Livestock Policy provides a framework for the achievement of the Government of Vanuatu's aspirational goal for a national cattle population of 500,000 by 2025. To support this goal the Government of Vanuatu approved the *Female Cattle (Prohibition of Slaughter and Spaying) Regulations (Amendment) Order No. 53 of 2017* and introduced the Cattle Restocking Program. The former regulation places restrictions on the slaughter of productive female cattle in an attempt to increase cow numbers available for breeding, the latter program distributes cattle (of improved genetics) from larger, commercial cattle farms to smallholders looking to expand their cattle herds. Other relevant laws include the *Meat Industry Act*, the *Animal Welfare Act*, the *Animal Diseases Act,* the *Animal Importation and Quarantine Act* and the *Livestock Management Act* (Kalo, unpublished data).

Smallholder cattle farmers on Malekula are subject to the same policy environment as those in East Santo, and elsewhere in Vanuatu. There were no provincial policies specific to smallholder cattle producers on Malekula and there was no evidence that policy was required specifically for smallholder cattle producers on Malekula. Malekula has been identified as a priority island for the expansion of cattle numbers to achieve the aspirational goal of a national cattle population of 500,000 by 2025. As such Malekula has received cattle under the Cattle Restocking Program, however the impacts of the program on the size or productivity of the existing herd on Malekula are unknown at this stage. Similarly, the policy restricting the culling of productive female cattle is only enforceable through the formal markets (i.e. MALAMPA Butchery and Fish Market) and as such is likely to be of little significance to those smallholder farmers who trade cattle through informal market channels that are predominant on Malekula.

Socio-economic setting

Infrastructure

Malekula is served by regular AirVanuatu flights at three airports (Norsup, Lamap, and Southwest Bay), with most flights transiting through Pekoa (Santo) or Bauerfield (Port Vila). The main wharf on Malekula is at LitzLitz, located 3 km south of Lakatoro, while other wharves exist at Lamap (South Malekula) and in Southwest Malekula. Barges have access to many other points around the island.

Roads travelled during the field studies were in excellent condition for the start of the dry season and included roads extending south and north from Lakatoro and west to Northwest Area Council. Development of the road to the south is under contract and is expected to be sealed in the near future. These roads are in far better condition that those on Santo (excluding the East Coast highway). The south, west, and southwest are more inaccessible than the southeast, northeast, and northwest parts of the island.

Inputs

Most inputs (wire, herbicide) are available on Malekula and are imported from Santo by ferry. Generally, farms have some area fenced with cattle behind wire. Wire is relatively expensive on Malekula (13,000 vatu/500 m roll) compared with prices on Santo (7000, 14000, 18000 vatu for equivalent rolls sourced from China, Fiji, and Australia respectively). On the coastal fringes wire has a working lifespan of three to four years before it requires replacement due to corrosion. Few

other inputs are accessed by smallholder cattle farmers on Malekula for the purposes of cattle farming.

Electricity and mobile communication were available in Lakatoro and Norsup. Other areas rely on generators and solar for power. Diesel was available in Lakatoro at 154 vatu/L at the time of the visit of the research team and was the largest energy source consumed in the province, with copra oil and solar also used for energy (VNSO, 2018).

Agribusiness

The economy of Malekula is largely based on agriculture and is dominated by the copra and cocoa industries and as such the local economy is sensitive to international commodity prices, as well as climatic conditions and natural disasters. The main actors in these industries on Malekula are Vanuatu Copra and Cocoa Exporters Ltd (VCCE; main office is on Santo) as the main purchaser of both commodities on the island, Plantations Réunies de Vanuatu as the main copra producer and C-Corp as the main cocoa producer on the island. The VCCE conduct no processing of copra or cocoa on the island with both products purchased dry and transported to Santo where they undergo packaging by VCCE prior to shipping to the Philippines and Malaysia respectively.

Nuts-n-Oils is a small private business specialising in Nangai and Tamarind oil production. They purchase nuts from local rural communities with a price schedule including incentives for sun drying prior to purchase. Nuts-n-Oils currently purchases approximately 30 T of Nangai nuts per year but there is considerable potential to increase this. In the off-season the business uses by-products and other local and imported ingredients to manufacture rations for monogastrics. These rations include a mixture of Nangai meal, banana meal, cassava powder, and blood and bone and fish meal (imported from the Solomon Islands). These rations are available for purchase by smallholder poultry and pig farmers at a lower price than imported products.

The MALAMPA Butchery and Fish Market in Lakatoro is overviewed below. In 2018, there were 70 active co-operatives in MALAMPA province of which 42 were on Malekula. The co-operatives (MALAMPA level) were classified as savings and loans (32), retail (33) and producers (5; copra, cocoa, cattle) (VNSO, 2018).

Gender and human capacity

As was shown in Santo there is significant gender inequality particularly in the livestock sector on Malekula. Customary land tenure arrangements in Malekula are similar to Santo in that there is a mix of patrilineal or matrilineal depending on the geographic region. However, these land tenure systems have been influenced as a result of colonisation to be inherently patriarchal. This is apparent even in matrilineal systems in Malekula, which limits equitable resources to land, credit, and decision making over land use. As a result, women tend to prioritise activities that are conducted close to the home, such as home gardens, harvesting nuts, and managing smaller livestock such as chickens and pigs. The men are seen to be responsible for more land intensive commodities such as cattle, and cash crops such as kava, cocoa, and copra.

While land tenure disputes in Malekula are not as common as in Santo, they are increasing with the rise in population. Land tenure disputes are predominately managed at the village level by men. Female participants suggested there were some instances where land tenure disputes escalated to a point where families were forced to relocate.

A key concern expressed by the female participants was the decline in crop yield particularly of their key staple crops such as yam. There was also suggestion that the supply of staple crops to the local marketplaces was also declining. This caused concern among female participants as they saw market gardens as their key strategy to provide investment into the cattle, coconut, and cocoa production. There was also the suggestion that the younger generation were not seeing

the value of hard work and many were not interested in farm activities, leading to high rates of rural to urban migration among the youth. Smallholder households are also increasingly concerned with engaging youth in farming in general, suggesting there is an urgent need to capacity build young people and better engage women in managing custom agricultural land or there could be high rates of prime agricultural land leased to foreign players. It was suggested by participants that while the Vanuatu Skills Partnership (VSP) was seen as an effective instrument for capacity building farmers it does not engage the youth, nor does it encourage more women into the formal agricultural sector.

Support agencies

Lakatoro is the main administrative centre of MALAMPA province and is the seat of the provincial office. Government of Vanuatu has a presence in Lakatoro through the location of Livestock, Extension, Industry Development, and Co-operatives. Customs and Livestock officers are based in Lakatoro and Southwest Bay (and on Ambrym).

Market setting

Sales channels and cattle prices

MALAMPA Butchery and Fish Market has been operating since 2007 and is the sole formal cattle buyer and processor on Malekula. Between 2010 and 2018 (Table A1.10) the butchery processed an average of 34 T beef/year from 165 cattle/year with the average carcass weight increasing from 180 kg in 2010 to 223 kg in 2018 (VNSO, 2015; VNSO, 2018). The decline in processed numbers was due to ongoing mechanical issues with the chillers, which constrained processing capacity.

Table A1.9. Cattle and beef throughput of the MALAMPA Butchery and Fish Market, 2008 to 2018.

Year	No. cattle processed	Total CWT, T	Average CWT, kg
2008	21	4	190
2009	85	15	177
2010	156	28	180
2011	171	33	193
2012	187	38	203
2013	153	33	216
2014	168	36	214
2015	167	35	210
2016	180	35	194
2017	168	37	220
2018	139	31	223

Carcass weight, CWT;

VNSO, 2015; VNSO, 2019.

The butchery is owned by the MALAMPA Provincial government with a board (Provincial Planner, Co-operatives Officer, Livestock Officer, Industry Officer, Fisheries Officer, and the Butchery Manager) and employs five permanent staff. The butchery buys carcasses mostly from smallholders and sells solely to the local population in Lakatoro and nearby villages. Smallholders contact the butchery manager when they have animals for sale, a date is agreed to and the smallholders slaughter, quarter, and transport the carcass to Lakatoro where they receive

payment on a hot carcass weight basis (head and hide removed). Smallholders are responsible for transport costs which may be 4000 vatu/carcass (from Southeast Area Council). On occasions where smallholders do not deliver booked carcasses, carcasses are purchased on demand from Plantations Réunies de Vanuatu at 230 vatu/kg HCWT. Most received carcasses are in the 180 to 280 kg HCWT range, with larger bullocks coming from the Northwest Area Council. Animals must be slaughtered the morning of delivery to the butchery and be received prior to 1100 am. Product is often sold the same day it is received. The butchery would normally butcher and sell four carcasses/week however due to facility breakdowns (chiller) at the time of the study it only handled two carcasses each week (one each on Monday and Wednesday). There is a formal price schedule (Table A1.11) with prices considerably lower than the equivalent carcass purchased by SMP on Santo for heavier carcasses but higher for lighter carcasses. Despite local challenges with transport (costs), access, and communication, the relationship between the MALAMPA Butchery and its suppliers (including smallholders) appears to be well organised and agile enough to ensure the consistent supply of fresh product.

Table A1.10. Prices paid for cattle by the MALAMPA Butchery and Fish Market.

Hot carcass weight, kg	June-2012 vatu/kg HCWT	June-2019 vatu/kg HCWT	SMP (steers) June-2019 vatu/kg HCWT
< 180	140	150	120
180 - 280	160	170	190
> 280	180	190	255

HCWT, hot carcass weight; SMP, Santo Meat Packers, Luganville, Santo

There are a number of co-operatives on Malekula which manage and butcher cattle for members and non-members (schools, ceremonies, other nearby households). For example, the Mapbest co-operative in Southeast Malekula has approximately 30 members and runs approximately 250 cattle on 100 ha of land. They were not slaughtering cattle at the time of the visit but previously butchered two to three cattle (mainly old cows or young bulls)/week form their own farm. There are no formal rural butcheries on Malekula (in contrast to other parts of Vanuatu, such as Port Olry) however it was suggested that the large number of households and the large population of cattle in Northeast Malekula may support a butchery.

As with East Santo Area Council there is a vibrant beef trade in the informal sector. This involves both ceremonial and general nutrition demands, and the requirements of sellers for cash. Households routinely retain animals for ceremonies, if animals need to be purchased for ceremonies prices may be as high as 60,000 vatu/animal. Farmers who require cash can inform community members that they will be selling beef, farmers then butcher their own animals and sell beef for 300 to 350 vatu/kg; this price would include labour costs. A high demand for beef exists in these communities with a carcass selling within a day of slaughter. Some households purchase an entire carcass, storing it in solar-refrigeration, and then on selling the product to other households, demonstrating local entrepreneurship in some communities.

Plantations Réunies de Vanuatu transport their own cattle from Malekula to Efate, and in some instances from Santo to Malekula on their own barge. However, there were no reports of buyers or traders actively purchasing cattle from smallholders on Malekula for interisland trade to Efate or elsewhere in order to fill a consignment or enable smallholders to utilise existing transport facilities.

Retail beef prices

The MALAMPA Butchery and Fish Market sells product to the general public with most buyers located in Lakatoro and nearby communities. The butchery operates on a 65% mark-up on

carcass payments to cover operating costs. The retail prices for beef products at the MALAMPA butchery are generally cheaper than those of the butchers in Luganville on Santo (Table A1.12).

Table A1.11. Prices of retail beef cuts sold by the MALAMPA butchery and Luganville butchers.

Product	MALAMPA Butchery, vatu/kg	Luganville butchers[1], vatu/kg
Soup	500	-
Soup meat	600	-
Stew	750	733
Stew mince	800	-
Mince1	800	903
Mince2	700	703
Plate steak	750	-
Palerong	750	-
Stir-fry	800	903
Top side	800	960
Silver side	800	937
Round steak	800	920
Rump steak	900	1010
Sirloin	1000	1260
Entrecote	1200	-
Fillet	1200	-
Eye fillet	1500	2353
Sara	750	-
Bavette steak	750	893
Dog meat	100	106
Bones	150	400
Liver	400	423
Kidney	400	467
Tongue	500	613
Heart	600	483
Tail	400	500

[1]Mean value of Paradise, Daming and Wong Sze Sing butchers in Luganville (Kalo, unpublished)

Agro-environmental setting

Location, geography, and climate

Malekula is the second largest island in Vanuatu (204,100 ha) and the largest island of MALAMPA province. The northwest point of Malekula is only 33 km from the southern point of Santo (67 km between Pekoa and Norsup airfields) suggesting similar geological influences and climatic conditions. The island features a rugged, mountainous interior of volcanic origin surrounded by a limestone plateau, feeding down to a narrow coastal alluvial plain. Rivers drain from the interior uplands to the coastal fringes. The interior soils are deep fertile clays of volcanic origin from ash

deposits transported by southerly winds from Ambrym over millennia. Whilst fertile, these soils would be sensitive to nutrient depletion if sustainable farming methods were not practiced.

The climatic conditions of Malekula are similar to those of Santo. Average annual rainfall at Lamap airport station is 2036 mm (years 1982-2012) with a distinct wet season between December and May each year (Figure A1.53), although even during the dry season average monthly rainfall exceeds 50 mm and is often above 100 mm. Like Santo, the southeast portion of the island (windward) is reported to have a higher than average annual rainfall than the northwest area (leeward), although no data was available to support this. Given the high annual rainfall and the abundance of rivers draining the interior of the island, water is not as limiting on Malekula as on Santo and is supported by survey data collected by NZ MFAT (2017).

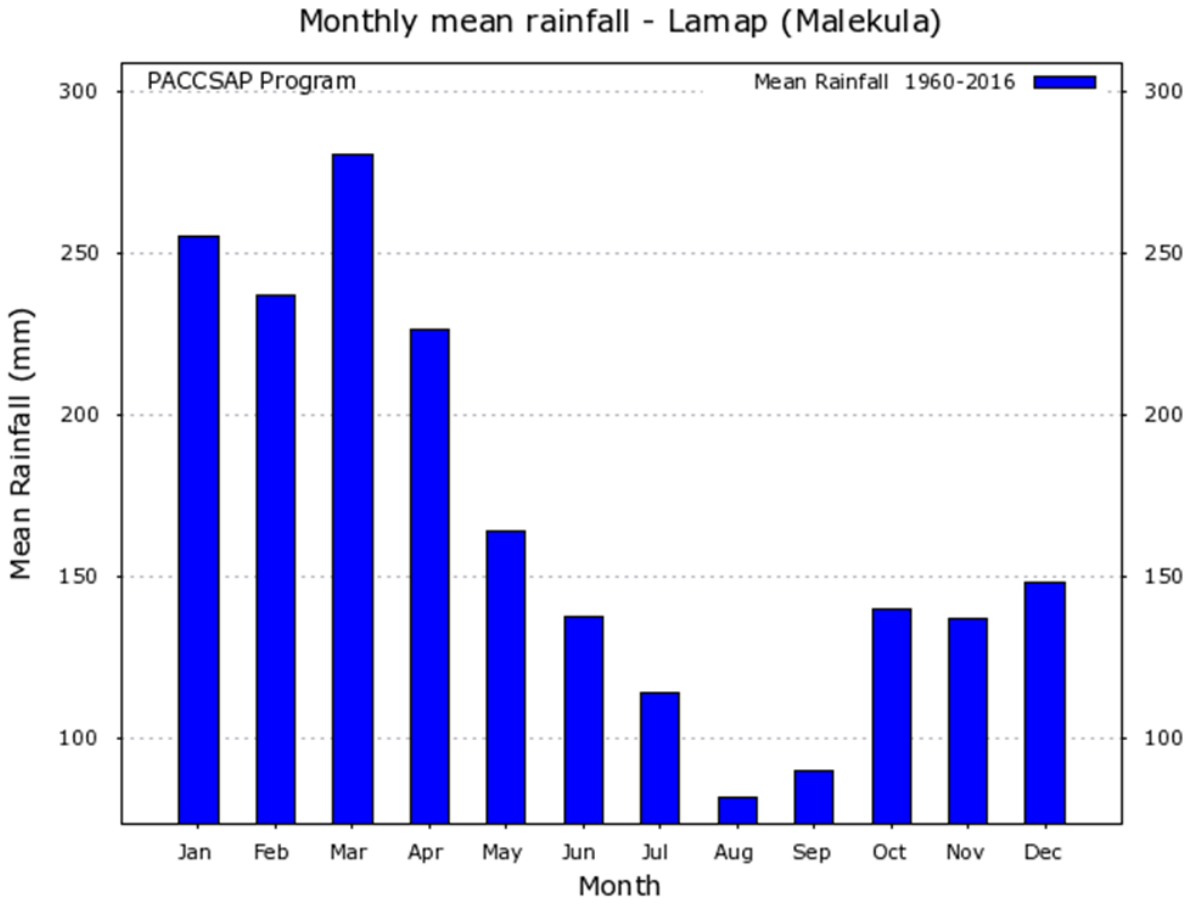


Figure A1.53. Annual rainfall distribution, Lamap airport weather station, Malekula.

(PCCDP 2020).

Land use on Malekula is dominated by dense thickets and low-level forests with closed canopies in the interior (Figure A1.54). Agriculture activities are largely focussed on the coastal fringes where coconut and cocoa plantations dominate, with livestock integrated within and adjacent to these areas. Farm areas ranged from 1 to 50 ha (450 ha at the Mapbest co-operative) however, similar to Santo, it is expected that most farmers are unlikely to know the exact land area of their farms and this critical information could be an easy engagement tool for any future work in Malekula. Most farmers had 2 to 4 ha of copra plantations, regardless of the total land area owned.

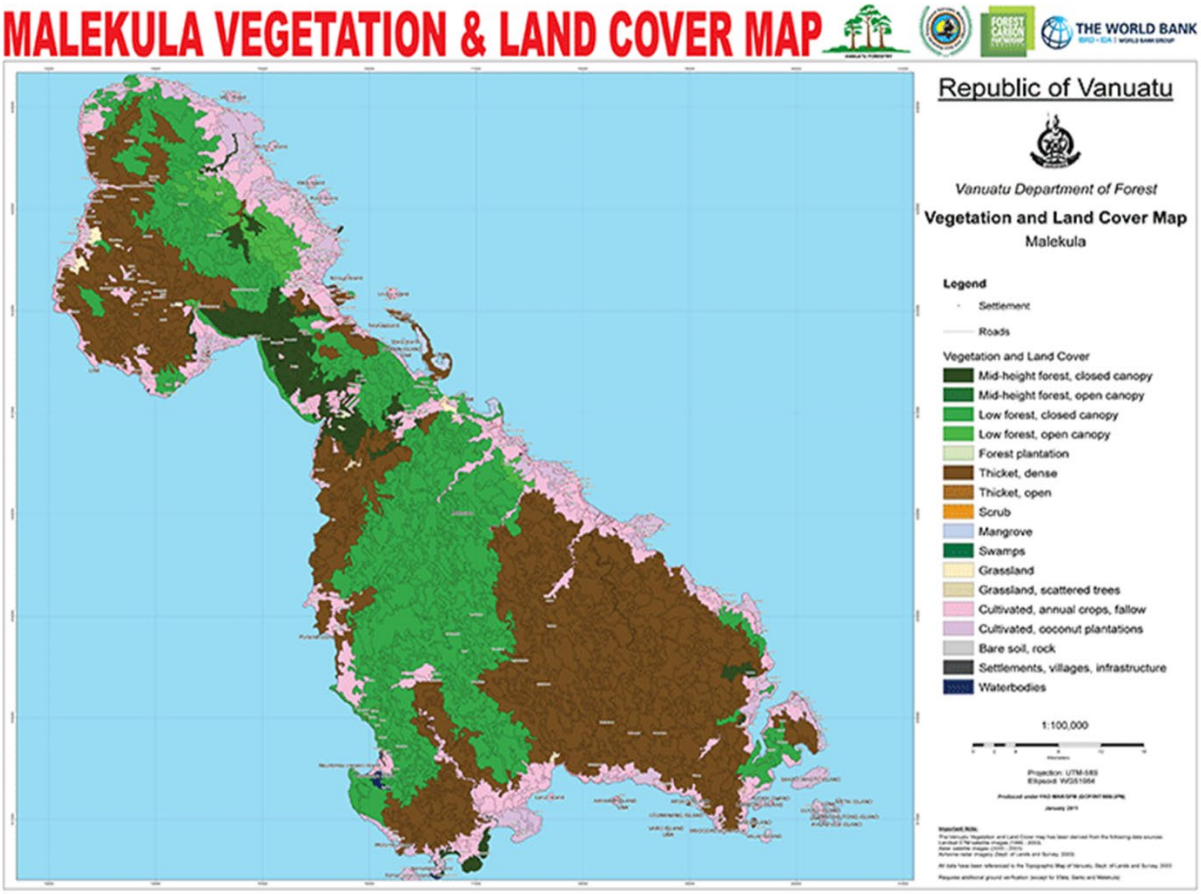


Figure A1.54. Vegetation and land cover map of Malekula. (REDD+ 2020)

Cropping

Copra and cocoa were the main cash crops grown by households on Malekula. Between 85% to 90% of all households in the Northeast and Southwest Malekula Area Councils grew cocoa and/or copra (VNSO, 2016). In contrast, approximately 50% of all households grew these crops in the Central and South Area Councils presumably due the more rugged terrain. Malekula is the largest cocoa producing island in Vanuatu, whilst it is also home to the single largest producer of copra in the country (Plantations Réunies de Vanuatu). The two crops are integrated on Malekula with cocoa commonly planted under copra plantations. Overall, 28% of households grew kava on Malekula but this was higher in the Southwest (70% of households) and Southeast (50% of households) Area Councils. Over 90% of households in Malekula grew island cabbage, bananas, and cassava, while over 70% of households grew taro, yams, papaya, and corn. Sweet potato were grown by over 80% of all households in the south of the island (Southeast, Southwest and South Malekula Area Councils) but by less than 50% of households in the Central and Northern Area Councils. The involvement of households in the above plantation and garden crops was similar between Santo and Malekula, with the exception of the higher proportion of households growing cocoa in Malekula (70%) compared with Santo (17%), with a similar trend reported for copra (70% Malekula and 50% Santo) (VNSO, 2016). It is likely that the proportion of households growing kava has increased in both regions since the Tropical Cyclone Pam mini-census of 2016 (VNSO) due to the increase in kava prices. More households participated in forestry/timber production on Malekula than on Santo, with sandalwood the most commonly grown tree on both

islands. In addition, more households on Malekula grew mahogany, nangai, and natapoa trees than on Santo.

The main difference in the cropping systems on Malekula and East Santo is the integration of cocoa within copra plantations. This system of growing cocoa under copra trees has implications for cattle production systems as copra plantations are rarely fenced on Malekula compared to East Santo Area Council where cattle graze within the plantations behind wire. Whilst cattle and cocoa are not complementary the utilisation of the available feed around the permitter of cocoa plantations presents at least one novel research question for consideration in any follow-on research on Malekula. The higher proportion of households participating in forestry activities is unlikely to impact significantly on recommendations made with respect to cattle production from East Santo, as the Bisnis Blong Buluk project has not worked in these systems as they contribute an insignificant amount of land potentially of use for cattle farming.

Cattle numbers, distribution, and management

Malekula had the second highest cattle population (~12,000) behind Santo (~39,000) of all the islands in Vanuatu (VNSO, 2016), with approximately 2,500 households rearing cattle. Northwest, Northeast and Southeast Malekula have the highest proportion of households with cattle ownership (>40%) and account for 60% of the total cattle population on the island. Cattle rearing was more common in East Santo (70% of households) with this Area Council accounting for 24% of the cattle on Santo. The average number of cattle reared per (cattle rearing) household on Malekula (4.7) was lower than that of Santo (12) and East Santo Area Council (14). There was little difference in the number of cattle per (cattle rearing) household across the Area Councils on Malekula (ranging from three in Central Malekula to seven in Southwest Malekula). On both Malekula (97%) and Santo (89%) the majority of household cattle herds were raised by households with less than 20 cattle. Whilst cattle rearing was not as common and herds were not as large on Malekula compared to East Santo, it was an activity that a significant proportion of households participated in within certain Area Councils.

The Plantations Réunies de Vanuatu is the dominant cattle producer on Malekula raising over 1,000 head, across two farms (located at Norsup and in the Southeast Area Council), mainly under copra plantations. Cattle are mustered each month and a count, husbandry practices, and segregation is undertaken. Pregnancy testing and culling is conducted every second year. The cattle unit is integrated with other units elsewhere in Vanuatu. For example, (Charolaise) bulls are supplied from an artificial insemination program conducted on Efate, and vealers are shipped to Efate each month for slaughter or further backgrounding. The plantation has little direct interaction with smallholder farmers on Malekula, although it does on occasion supply carcasses to the MALAMPA Butchery and Fish Market if the supply from smallholders is limited. In the past they would generate their own bulls and sell some to smallholders, but this is no longer part of their business. This is a relatively sophisticated and well-resourced operation and would account for almost 10% of the total cattle herd on Malekula.

Cattle breeds were similar to those present on Santo with a mix of Charolaise, Limousin, and other European breeds possibly with some minor *Bos indicus* content. Apart from Plantations Réunies de Vanuatu, most farmers reported no castration or dehorning and raised inbreeding as a concern as no replacement bulls were used. Whilst the majority of cattle visited were behind wire (mostly in small bush blocks) tethering of cattle was observed on roadsides, with higher numbers observed closer to Lakatoro. Similar to East Santo farmers used tethering of young animals for one to two months as a means to quieten animals. Tethering in itself is not a problem, provided feed and water are available, and cows have exposure to fertile bulls when cycling. However, it is labour intensive to shift cattle every one to three days. The majority of farmers

indicated their stockyards were in disrepair, and this was provided as justification for the lack of cattle husbandry practices. There was no evidence or mention of animal health issues.

There appear to be limited cases of theft of cattle on Malekula. However, cattle security is an important issue to owners, in that significant financial penalties are imposed on cattle owners to compensate other farmers when cattle escape and damage the crops (e.g. sandalwood) of other farmers. Such events are mediated by local government officers (e.g. Department of Agriculture or Department of Livestock). Land disputes are also less of a concern for smallholders in Malekula compared with Santo, however increasing land shortages (partly due to dividing land amongst children) are leading to intensification of the land and overgrazing in some instances.

Other livestock

Pigs and poultry were common across all Area Councils, while goats were reported in low numbers (900 in total, with 60% in Northwest and Northeast Area Councils) (VNSO, 2016). Poultry were reared by 75% of all households and were often sold for immediate cash income. The participation of households in the rearing of small livestock and the number of animals per household were similar in Malekula and Santo and are of little consequence to cattle farming activities.

Pastures, weeds, and water

Pastures observed on Malekula were similar to those on Santo with buffalo grass dominant under copra plantations (where cocoa was not integrated) and around the perimeter of plantations were cocoa was integrated. Signal grass was observed, and cuttings were available locally for smallholders to improve their pastures through vegetative transplant. However, some farmers indicated a preference for buffalo grass over signal grass due to dry season persistence of the former. Naturalised glycine, siratro, centrosema, and hetero were all observed on roadsides and in paddocks. Local leucaena (kasis) was abundant with a weedy potential due to a lack of management, farmers acknowledged that cattle would graze younger leucaena and that it persisted in the dry season. Gliricidia was also present and baroa was used as living posts on fence-lines. There is potentially a need to evaluate some improved grass species for dry season persistence in the Northwest Malekula Area Council, whilst the introduction of improved leucaena varieties with a management plan may increase protein availability in the dry season whilst managing the weed potential.

The weeds observed on Malekula were similar to those observed on Santo. Devils fig, giant sensitive weed, hibiscus burr, big leaf, mile-a-minute, wild peanut, and wild guava were all present. Herbicides were available (imported from Santo) but rarely used. There was little evidence to suggest that recommendations made for weed control in East Santo Area Council would not be applicable to Malekula.

While total rainfall and the yearly rainfall distribution are similar between Santo (Pekoa) and Malekula (Lamap) interviews conducted during the trip indicated that a shortage of drinking water was less of a problem on Malekula compared to East Santo Area Council. Farmers from the Northwest Area Council identified lack of drinking water as more of a constraint than those from the Southeast Area Council, presumably due to the lower rainfall and fewer rivers in the northwest of the island. While no water reticulation systems were observed on smallholder farms the higher numbers of running rivers and streams provided a continuous supply of drinking water for cattle throughout most years. However, the larger Plantations Réunies de Vanuatu plantation supplied drinking water to cattle through troughs and bores suggesting this may be warranted in cases where cattle are managed exclusively behind wire and capital for water infrastructure exists. Demonstration of water catchment and storage systems in the northwest of the island may be warranted using similar approaches recommended for East Santo Area Council.

Overall, the systems visited were similar to those of the East Santo Area Council, with the exception of the integration of cocoa under the copra plantations and the smaller herd sizes. The farmers themselves indicated that their major constraints to increasing productivity at the herd level were dry season feed availability (and water in the northwest), weed ingress, lack of fencing (due to wire cost), road access and transport costs, and the prices paid for cattle. Many of the proposed recommendations and future research activities planned for East Santo would be directly applicable on Malekula.

Conclusions and recommendations

In conclusion, the climatic and biophysical conditions and the strong local demand for beef are all favourable for cattle production on Malekula. The settings for smallholder cattle farming on Malekula are largely similar to those of East Santo. The exceptions to this would be the smaller number of formal market channels for cattle and the integration of cocoa under copra plantations on Malekula. The recommendations and strategies generated in Bisnis Blong Buluk and planned for subsequent research on East Santo are likely to be applicable to smallholder farmers on Malekula.

The following recommendations are made to guide future engagement and capacity building of smallholder cattle farmers on Malekula:

1. Farm mapping is encouraged to engage smallholder cattle farmers in project activities on Malekula and it provides households with essential information for farm planning and management.
2. Recommendations on cattle management and farm improvement made on East Santo will be relevant to smallholder cattle farmers on Malekula. Therefore, demonstration sites rather than specific research activities are recommended. These demonstration sites might include:
    - Dry season production of improved grasses,
    - Introduction and management of improved leucaena varieties,
    - Weed control, and
    - Water catchment and conservation for cattle drinking.
3. The exception to the above would be to undertake new research specific to the integration of cattle within the existing copra-cocoa systems to utilise the valuable feed available surrounding these areas.
4. Farm planning skills are largely absent and require development using gender sensitive approaches developed in Bisnis Blong Buluk. The involvement of children in this process appears extremely relevant to Malekula. This would be a key capacity building requirement. Practical training on cattle husbandry, cattle yard design, and cattle marketing assessments.
5. More in-depth investigation of the local value chain, particularly the community and ceremonial beef markets, may be warranted. Research on the potential to aggregate cattle lines for inter-island trade (e.g. Tanna, Santo or Efate) may also be warranted.
6. Demonstration and training (and new research) activities should focus on the more accessible Area Councils with the highest cattle population and the highest proportion of households raising cattle (Southeast and Northwest Malekula are recommended). Cross visits from other Area Councils could be supported without a need to be actively working in all Area Councils.
7. Upgrading of the MALAMPA butchery to facilitate an increase in processing throughput (under larger development program funding) may be warranted to increase the opportunity for smallholder access to this channel.

References

Adams W, Aveling M, Brockington R, Dickson D, Elliott B and Hutton J. 2004. Biodiversity conservation and the eradication of poverty. *Science*, **306**, 1146-1149.

Asian Development Bank. 2013. *Gender equality and food security-women's empowerment as a tool against hunger*, Asian Development Bank, Mandaluyong City, Philippines.

Addinsall C, Glencross K, Rihai N, Kalomor L, Palmer G, Nichols D and Smith G. 2015. Enhancing agroforestry in Vanuatu: striking the balance between individual entrepreneurship and community development. *Forests, Trees and Livelihoods*. **25**, 78-96.

Addinsall C, Glencross K, Scherrer P, Weiler B and Nichols D. 2015. Agroecology and sustainable rural livelihoods: a conceptual framework to guide development projects in the Pacific Islands. *Agroecology and Sustainable Food Systems*. **39**, 691-723.

Addinsall C. Rihai N and Nasse A. 2019. Agroecology and sustainable livelihoods as a framework to empower rural Ni-Vanuatu women. Singh-Peterson L. and Carnegie M (eds.) *Integrating Gender in Agricultural Development*. Emerald.

Adger WN. 2003. Social capital, collective action, and adaptation to climate change. *Economic Geography*. **79**, 387-404.

Anderson T. 2011. Melanesian land: the impact of markets and modernisation. *The Journal of Australian Political Economy*. **68**, 86-107.

AusAID. 2011. *Australia and the least developed countries: partners in development*. https://dfat.gov.au/about-us/publications/corporate/annual-reports/ausaidannual-report-2010-2011/02performance.html.

Beeton S. 2006. *Community Development Through Tourism*. Landlinks Press, Collingwood, Australia.

Berman R, Quinn C and Paavola J. 2012. The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environmental Development*. **2**, 86-100.

Binkhoff, T. 2020. *City Population: Vanuatu. Viewed* 30/06/2020 https://www.citypopulation.de/en/vanuatu/admin/?mode=densityandmap=osm_dlrandopacity=0.8

Boserup E. 1965. *The Conditions of Agricultural Growth: The Economics of Agrarian Change Under Population Pressure*. Transaction Publishers, London, UK.

Bowan C, Cutura J, Ellis A. and Manuel C. 2009. *Women in Vanuatu: Analysing challenges to economic participation*. The World Bank, http://elibrary.worldbank.org.ezproxy.library.uq.edu.au/doi/pdf/10.1596/9780-8213-7909-7.

Brown K. 2002. Innovations for conservation and development. *The Geographical Journal*, vol. **168**, 6-17.

Buchy M and Rai B. 2008. Do women-only approaches to natural resource management help women? The case of community forestry in Nepal. Resurreccion BP. and Elmhirst R. (eds.) *Gender and Natural Resource Management: Livelihoods, Mobility and Interventions*. London: Earthscan. 127-49.

CARE. 2002. *Household livelihood security assessments: A toolkit for practitioners* http://pqdl.care.org/Practice/HLS%20Assessment%20%20A%20Toolkit%20for%20Practitioners.pdf

Chambers B, Omot N, Pamphilon B, Tomi B, Linibi M and McGowan C. 2012. *Improving women's business acumen in PNG: working with women smallholders in horticulture.* ACIAR Publication FR201223. http://aciar.gov.au/publication/fr2012-23.

Chambers R and Conway G. 1992. *Sustainable and Rural Livelihoods: Practical Concepts for the 21st Century*. Brighton: Institute of Development Studies.

Chang HF, MacPhail F and Dong X. 2011. The Feminization of Labor and the Time-Use Gender Gap in Rural [People's Republic of] China. *Feminist Economics.* **17**, 93-124.

Cotula L. 2006. *Gender and Law: Women's rights in agriculture*. Food and Agriculture Organisation, Rome, Italy.

Craven LK. 2015. Migration affected change and vulnerability in rural Vanuatu. *Asia Pacific Viewpoint*. **56**, 223-236.

Daley L. 2010. Hijacking development futures: "Land development" and reform in Vanuatu. Anderson T and Lee G (eds). *In defence of Melanesian customary land*. AusAID, Sydney, Australia. pp. 34-40.

de Brauw AQ, Huang J, Zhang L and Rozelle S. 2012. *The Feminization of Agriculture with Chinese Characteristics*. IFPRI Discussion Paper 01189. Washington, DC.

de Brauw AQ, Zhang L, Rozelle S, Liu C, Olivia S and Li Q. 2008. Feminization of Agriculture in [the People's Republic of] China? Debunking Myths Surrounding Women's Participation in Farming, *China Quarterly.* **194**, 327-334.

Department of Livestock. 2016. Vanuatu National Livestock Policy (2015-2030). Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, Government of Vanuatu.

DFAT. 2014. *Gender equality and empowering women and girls*. Australian Government Department of Foreign Affairs and Trade, http://dfat.gov.au/aid/topics/investment-priorities/gender-equalityempowering-women-girls/Pages/gender-equality-empowering-women-girls.aspx

FAO. 2010. *Agriculture for Growth: Learning from experience in the Pacific, Summary results of five country studies in Fiji, Samoa, Solomon Islands, Tonga and Vanuatu*. Food and Agricultural Organisation, FAO, Rome, Italy.

FAO. 2011. *The role of women in agriculture*. Prepared by the SOFA team and Cheryl Doss, ESA. Working Paper No. 11-02, Agricultural Development Economics Division, Food and Agriculture Organisation, Rome, Italy.

FAO. 2015. *State of Food Security and Nutrition in Small Island Developing States (SIDS)*. Food and Agriculture Organisation, Rome, Italy. http://www.fao.org/3/a-i5327e.pdf

Fazey I, Pettorelli N, Kenter J, Wagatora D and Schuett D. 2011. Maladaptive trajectories of 488 change in Makira, Solomon Islands. *Global Environmental Change*. **21**, 1275-1289.

Feeny S, McDonald L, Miller-Dawkins M, Donahue J, and Posso A. 2013. *Household vulnerability and resilience to shocks: findings from Solomon Islands and Vanuatu*. SSGM discussion paper 2013/2, Australian National University, Canberra, Australia.

Fontenay P. 2010. An educated, healthy and wealthy Vanuatu, *Pacific Economic Bulletin.* **25**, no. 2, 25-41.

Hansen J, Kharecha P, Sato M, Masson-Delmotte V, Ackerman F and Beerling DJ. 2013. Assessing "dangerous climate change": Required reduction of carbon emissions to protect young people, future generations and nature. *PLOS ONE*. **8** (art. e81648).

Haverhals M, Ingram V, Elias M and Basnett B. 2014. *Men and women in forest, tree and agroforestry value chains, Evidence from the literature*, CGIAR Research Program on Forests, Trees and Agroforestry.http://www.bioversityinternational.org/fileadmin/user_upload/research/research_portfolio/Forest_and_tree_diversity/Brief_Gender_FTA_value_chains.pdf

IAAKSTD. 2016. Agriculture at a crossroads, International Assessment of Agricultural Knowledge, Science and Technology (IAASTD) findings and recommendations for future farming. Beck A, Haerlin B and Richter L (eds). *Foundation of Future Farming*, Berlin, Germany.

IICA. 2015. Three-way agreement pledges to upgrade agriculture in the Caribbean using cutting-edge approaches. Inter-American Institute for Cooperation on Agriculture. http://www.iica.int/en/press/news/three-way-agreement-pledges-upgrade-agriculture-caribbeanusing-cutting-edge-approaches-0

Kalo N. (sourced 2020) unpublished data. M. Phil Thesis, The University of Queensland, St Lucia, Australia.

Keenan RJ, Reams GA, Achard F, de Freitas JV, Grainger A and Lindquist E. 2015. Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment 2015. *Forest Ecology and Management*. **352**, 9-20.

Koczberski G. 2007. Loose fruit mamas: Creating incentives for smallholder women in oil palm production in Papua New Guinea. *World Development*. **35**, 1172-1185. http://dx.doi.org/10.1016/j.worlddev.2006.10.010

Krieken RV, Smith P, Daphne H, McDonald K, Haralambos M and Holborn M. 2000. *Sociology Themes and Perspectives*. Pearson Education, Frenchs Forest, Australia.

Lanjouw JO and Lanjouw P. 2001. The rural non-farm sector: issues and evidence from developing countries. *World Development*. **26**, 1-23.

Machı´n Sosa, B. 2010. *Revolucio´n agroecolo´gica: el movimiento de campesino a campesino de la ANAP en Cuba*. Cuando el campesino ve, hace fe. Havana: ANAP and La Vı´a Campesina. http://www.viacampesina.org/downloads/pdf/sp/2010-04-14-rev-agro.pdf

Manchón B and Macleod M. 2010. Challenging gender inequality in farmers' organisations in Nicaragua. *Gender and Development*. **18**, 373–386. http://dx.doi.org/10.1080/13552074.2010.521984

McMichael PD. 2010. *Food regimes transitions*. paper presented to the RC-40 plenary at the World Congress of Sociology, Gothenburg, Sweden.

Mikhailovich K, Pamphilon B, Chambers B, Simeon L and Romero J. 2016. Exploring the lives of women smallholder farmers in Papua New Guinea through a collaborative mixed methods approach. *Cogent Social Sciences.* **2**, 1143328, DOI: 10.1080/23311886.2016.1143328

Mu R and van de Walle D. 2011. Left behind to farm? Women's labor re-allocation in rural [People's Republic of] China. *Labor Economics.* **18**, S83-S97.

Nabobo-Baba U. 2008. Decolonising framings in Pacific Research: Indigenous Fijian Vanua research framework as an organic response. *Alternative: An international Journal of Indigenous peoples*. **4**, 140-154.

Napua, A. 2017. Making the invisible seen: Putting women's rights on Vanuatu's land reform agenda, ed. S. McDonnell, M. G. Allen & F. Filer, *Kastom, Property and Ideology, Land Transformation in Melanesia, State, Society and Governance in Melanesia Series*, ANU Press.

National Sustainable Development Plan, Vanuatu 2030, The Peoples Plan. 2016. https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/Vanuatu%202030%20The%20People%27s%20Plan%20-%20National%20Sustainable%20Development%20Plan%202016-2030.PDF

PCCDP. 2020. Pacific Climate Change Data Portal. http://www.bom.gov.au/climate/pccsp/

PIFON. 2016. Outcomes Report-Farmers Organisation Consultation on Family Farming. *Identifying and addressing policy constraints impacting smallholder farmers in the Pacific Islands*. Stice K (ed).

Prime Ministers Office. 2012. Overarching Productive Sector Policy. Government of Vanuatu. https://pafpnet.spc.int/images/articles/policy-bank/vanuatu/Vanuatu-Overarching-Productive-Sector-Policy-2012-2017.pdf

Quantin P. 1982. *Vanuatu – Agronomic potential and land use maps. Explanatory notes*. Ministry of Land and Natural Resources, Government of the Republic of Vanuatu.

REDD+. 2020. Reducing Emissions from Deforestation and forest Degradations program, Vanuatu. http://reddplus.vu/

Regenvanu R. 2010. The traditional economy as a source of resilience in Vanuatu. Anderson T and Lee G (eds). In defence of Melanesian customary land, AID/WATCH, Sydney, Australia, pp. 30-34.

Ripple WJ, Smith P, Haberl H, Montzka SA, McAlpine C, Boucher DH. 2014. Ruminants, climate change and climate policy. *Nature Climate Change*. **4**, 2-5.

Rosset PM, Machı´n Sosa B, Roque Jaime AM and Vila Lozano DRA. 2011. The Campesino-to-Campesino agroecology movement of ANAP in Cuba: social process methodology in the construction of sustainable peasant agriculture and food sovereignty. *The Journal of Peasant Studies*. **38910**, 161-191.

Salafsky N and Wollenberg E. 2000. Linking livelihoods and conservation: a conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development*. **28**, 1421-38.

Scheyvens R and Russell M. 2013. *Sharing the riches of tourism in Vanuatu*. School of People, Environment and Planning, Massey University, New Zealand.

Simeon P and Lebot V. 2012. Spatial representation of land use and population density: integrated layers if data contribute to environmental planning in Vanuatu. *Human Ecology*. **40**, 541-555.

Simo J. 2010. Land and the traditional economy: “Your money, my life” Hu i kakae long basket blong laef? Anderson T and Lee G (eds). *In Defence of Melanesian Customary Land*. AID/WATCH, Sydney, Australia. pp. 40–4.

Stebbins RA. 2001. Exploratory research in the social sciences. *Qualitative Research Methods*. **48**, Sage, Thousand Oaks, CA, US.

Stephens A. 2004. *Gender issues in agricultural and rural development policy in Asia and the Pacific*, Food and Agriculture Organisation resource papers, Regional Office for Asia and the Pacific. http://www.fao.org/docrep/x0177e/x0177e04.htm

Upton C, Ladle R, Hulme D, Jiang D, Brockington D and Adams WM. 2008. Are poverty and protected area establishment linked to a national scale? *Oryx*. **42**, 19-25.

Vanuatu Financial Service Commission 2016, *History of Vanuatu,* viewed 20 May 2017, https://www.vfsc.vu/about-us/history-of-vanuatu/.

VNSO. 2008. *Census of Agriculture, 2007*. Vanuatu National Statistics Office, Ministry of Finance and Economic Management, Government of Vanuatu. http://www.fao.org/fileadmin/templates/ess/ess_test_folder/World_Census_Agriculture/Country_info_2010/Reports/Reports_4/VUT_ENG_REP_2007.pdf

VNSO. 2012. *Alternative indicators of well-being for Melanesia, Vanuatu pilot study report.* Vanuatu National Statistics Office, Ministry of Finance and Economic Management, Government of Vanuatu.

VNSO. 2015. *Provincial Statistical Indicator – MALAMPA Province, 2014.* Vanuatu National Statistics Office, Ministry of Finance and Economic Management, Government of Vanuatu. https://vnso.gov.vu/index.php/provincial-statistical-indicator-psi#provincial-statistical-indicators

VNSO. 2016. *TC Pam Mini Census Report*. Vanuatu National Statistics Office, Ministry of Finance and Economic Management, Government of Vanuatu. https://vnso.gov.vu/index.php/component/advlisting/?view=downloadandfileId=4542

VNSO. 2019. *Provincial Statistical Indicator – MALAMPA Province, 2018.* Vanuatu National Statistics Office, Ministry of Finance and Economic Management, Government of Vanuatu. https://vnso.gov.vu/index.php/provincial-statistical-indicator-psi#provincial-statistical-indicators

Warrick O. 2009. Ethics and methods in research for community-based adaptation: reflections from rural Vanuatu. Ashley H, Kenton N. and Milligan, A. (eds) *Participatory Learning and Action, Community-based Adaptation to Climate Change*. The International Institute for Environment and Development (IIED), London, UK. pp. 76-87.