

Scaling up EbA actions in Guadalcanal, Solomon Islands

Final report: Women, urban gardens, and local food security
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Cover Photos: John Clemo and Lorraine Livia.

Acknowledgements: Our thanks go to all the women of the communities for their time and participation, their enthusiastic engagement with project activities, and for sharing their local knowledge.

This report is dedicated to Josephine Teakeni, leader of Vois Blong Mere Solomon and the original coordinator of the project's engagement with local women, who sadly passed away in February 2022. She was a shining beacon for the women of Solomon Islands.

Executive Summary

As is happening to other Melanesia cities, Honiara is rapidly urbanizing due to significant rural-urban migration. This is leading to the growth of informal settlements and increasing numbers of urban poor in the city. These people continue to rely heavily on forest and garden crops for both subsistence and cash income. It is therefore critically important to protect the remaining productive urban and peri-urban open spaces to enhance local food security in the context of urbanisation and a changing climate (as well as other shocks, as Covid restrictions in 2021 demonstrated).

In the city, it is predominantly women who are involved with urban and peri-urban farming, as well as the selling of produce at markets. Produce from home (sup sup) and bush gardens are therefore integral to their, and their families, sustainable livelihoods and well-being. The aim of this project was therefore to better understand the local relationships between women and their urban gardens, the daily challenges they faced, and to promote urban agriculture good practices with women's groups to enhance local food security.

To achieve these aims, there were three discrete elements to the project. Firstly, satellite imagery was analysed remotely to get a better picture of productive space in the city. This involved GIS analysis of temperature and vegetation, including an examination of the health of vegetation. This was then supplemented by workshops, site visits, tok stori activities, and urban garden surveys in three case study informal settlements: Wind Valley, Jabros, and Ontong Java. Finally, training on best practice urban organic farming, led by Kastom Gaden Association (a local horticultural NGO), was carried out with these three communities, as well as two additional communities, Fishing Village and Aekafo-Feraladoa.

High-level findings from the project indicate that vegetation health is being negatively impacted by development pressures, increasing temperatures, and problems like pests, and that further targeted interventions in the form of best practice training, seeds, equipment, and materials are needed to maintain the productivity of urban gardens in Honiara (both sup sup and bush) that are so critical for the health and well-being of local families.

List of Figures

Figure 1. The case study communities.....	4
Figure 2. Landsat 8 scenes: 2013 (top) vs. 2021 (bottom).....	5
Figure 3. Land surface temperature over Honiara, 2013 vs. 2021.	6
Figure 4. Zoom in to the area outlined by the dashed box in Figure 3: parts of Kukum Highway, the National Hospital, and Chinatown.	6
Figure 5. Changes in vegetation health, 2013 vs. 2021.	7
Figure 6. View of Wind Valley settlement (Credit: J. Clemo, 2021).....	8
Figure 7. View looking north over Jabros community (Credit: S. Yeo, 2021).	8
Figure 8. Ontong Java: high density and lack of space for gardening.....	9
Figure 9. Comparative distribution of gardens according to area.	9
Figure 10. Topography of Wind Valley and distribution of surveyed house gardens.	10
Figure 11. Distribution of house gardens in Jabros (including those growing the most common crops, banana and slippery cabbage).	11
Figure 12. Types of crop damage in Wind Valley.....	12
Figure 13. Types of crop damage in Jabros.....	12
Figure 14. Distribution of damaged gardens in Wind Valley and correlation to NDVI analysis.	13
Figure 15. Distribution of house gardens with damaged crops (top) and location of damaged gardens correlated with NDVI analysis (bottom).	13
Figure 16. Settlement growth in Wind Valley (outlined in yellow), 2010 vs. 2021. The Honiara municipal boundary is shown in white (Source: Google Earth Pro).	15
Figure 17. Walking route to a bush garden outside Wind Valley and bush garden area.	17
Figure 18. Elevation profile of the walking route shown in Figure 17 (Source: gpx.studio).....	17
Figure 19. Settlement growth in Jabros community (outlined in yellow), 2011 vs. 2021 (Source: Google Earth Pro).....	18
Figure 20. Discussions with women gardeners in Jabros (credit: J. Clemo, 2021).	19
Figure 21. Walking routes to two bush gardens outside Jabros with approximate walking distances being 2.7km and 1km respectively.	21
Figure 22. Elevation profile of walking route to bush garden 1 (Source: gpx.studio).	21
Figure 23. Elevation profile: bush garden 2 from bush garden 1 (Source: gpx.studio)	21
Figure 24. Changes in Ontong Java settlement, 2010 vs. 2020 (Source: Google Earth).....	23
Figure 25. Examples of taro (left) and slippery cabbage (right) patches.....	24
Figure 26. Workshop participants (Fishing Village).	27
Figure 27. Women planting pakchoy nursery seedlings (Fishing Village).....	27
Figure 28. Training workshop (Jabros).....	27
Figure 29. Preparing a raised garden bed (Jabros).	27
Figure 30. Demonstration of extracting and saving seeds of pumpkin (Aekafo- Feralodoa).	28
Figure 31. Hands on training (Aekafo- Feralodoa).....	28
Figure 32. Seed extraction and saving session (Ontong Java).	28
Figure 33. Demonstrating seed extraction & saving (Wind Valley).	28
Figure 34. Harvesting saladeer (Ontong Java).	31

Table of Contents

Executive Summary	i
List of Figures	ii
Table of Contents	iii
1. Introduction	4
2. Environmental analysis	4
2.1. Overview	5
2.2. Key findings	5
3. Characteristics of the case study urban gardens	7
3.1. Settlement overview	7
3.2. Size and distribution of gardens (Wind Valley and Jabros)	9
3.3. Crop variety	11
3.4. Threats to crops	11
4. Reflections on the remote analysis and garden surveys	14
5. Community workshops, transect walks, and Tok Stori	14
5.1. Wind Valley	14
5.2. Jabros	18
5.3. Ontong Java	22
6. Training workshops: urban organic farming best practice	25
7. Conclusions	32

1. Introduction

This project is part of the EU-funded Intra-ACP GCCA+ Pacific Adaptation to Climate Change and Resilience Building initiative (PACRES). It is implemented jointly by the Secretariat of the Pacific Environment Programme (SPREP), the Pacific Islands Forum Secretariat (PIFS), the Pacific Community (SPC), and the University of the South Pacific (USP). The aim is to scale up ecosystem-based adaptation pilots in five Pacific ACP countries – Samoa, Vanuatu, Solomon Islands, Papua New Guinea, and Timor Leste.

This project, focusing on women and urban gardens in Honiara, Solomon Islands, focused on three informal settlements (see Figure 1):

- Ontong Java (high density, inner city, with no open space for gardens),
- Wind Valley (inland, within municipal boundaries), and
- Jabros (peri-urban, outside the municipal boundary with bush gardens on customary land).

This report summarises the main findings from city-wide GIS analysis, urban gardens workshops and surveys conducted in the three case study settlements, and the training activities carried out with women from five communities in the Greater Honiara area.

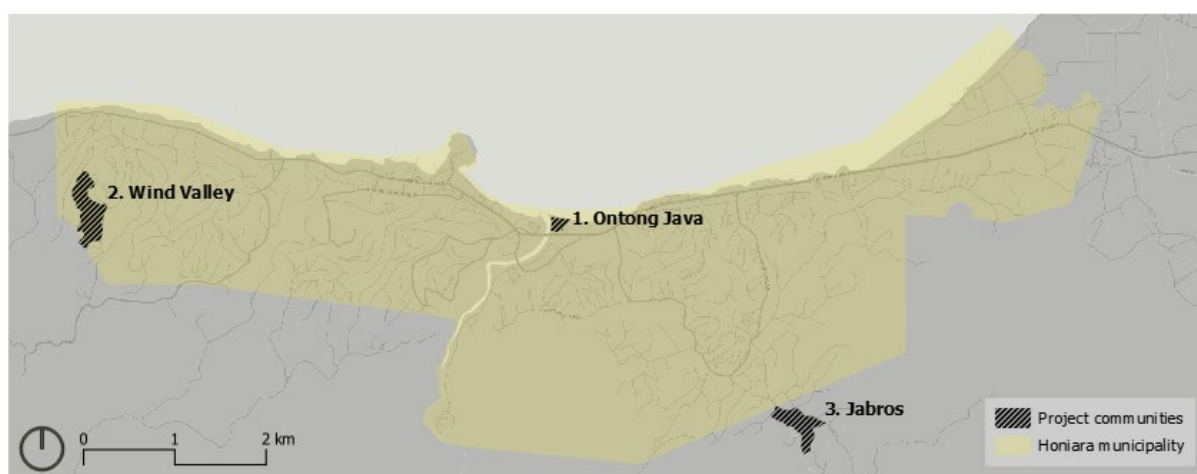


Figure 1. The case study communities.

2. Environmental analysis

To better understand the environmental conditions for vegetation in Honiara, and in particular to gain some insight into changes over time in the city due to climate, two types of analysis were undertaken which are relevant to vegetation health: land surface temperature (LST) and Normalized Difference Vegetation Index (NDVI). More details are provided in the accompanying technical report: Remote environmental analysis of urban vegetation.

To understand change over time, two epochs of data were selected: 31 May 2013 and 6 June 2021. A combination of cloud cover and where the cover occurred (minimum cover over the city itself) were the main reasons for selecting the final imagery. The two datasets are shown in Figure 2.

May 31, 2013



June 6, 2021



Figure 2. Landsat 8 scenes: 2013 (top) vs. 2021 (bottom).

2.1. Overview

Land Surface Temperature (LST) is commonly used to understand the ambient environmental temperature. In cities, LST is useful for understanding urban heat islands (and their extents and intensity), which in turn is a key driver of ecological stress. NDVI is a common index derived from remotely sensed data that provides an index of greenness (or green density in the landscape). The NDVI ranges from -1 to 1 where higher values indicate healthy and dense vegetation while lower values indicate bare ground, stressed, or sparse vegetation.

2.2. Key findings

A heating city

Minimum and maximum temperatures were similar between 2013 and 2021 with both scenes showing minimum temperatures of just over 19C and maximum temperatures of just over 27C; however, the spatial distribution of those temperatures changed significantly in 8 years. Figure 3 shows the city (and the ocean) becoming significantly warmer by 2021, with the hottest parts of the city being its coastal fringe, extending inland. These regions correspond to built-up areas of the city, especially the main road traversing east-west, Kukum Highway, the National Referral Hospital, and the dense area of Chinatown along the eastern bank of the Mataniko river (see Figure 4).

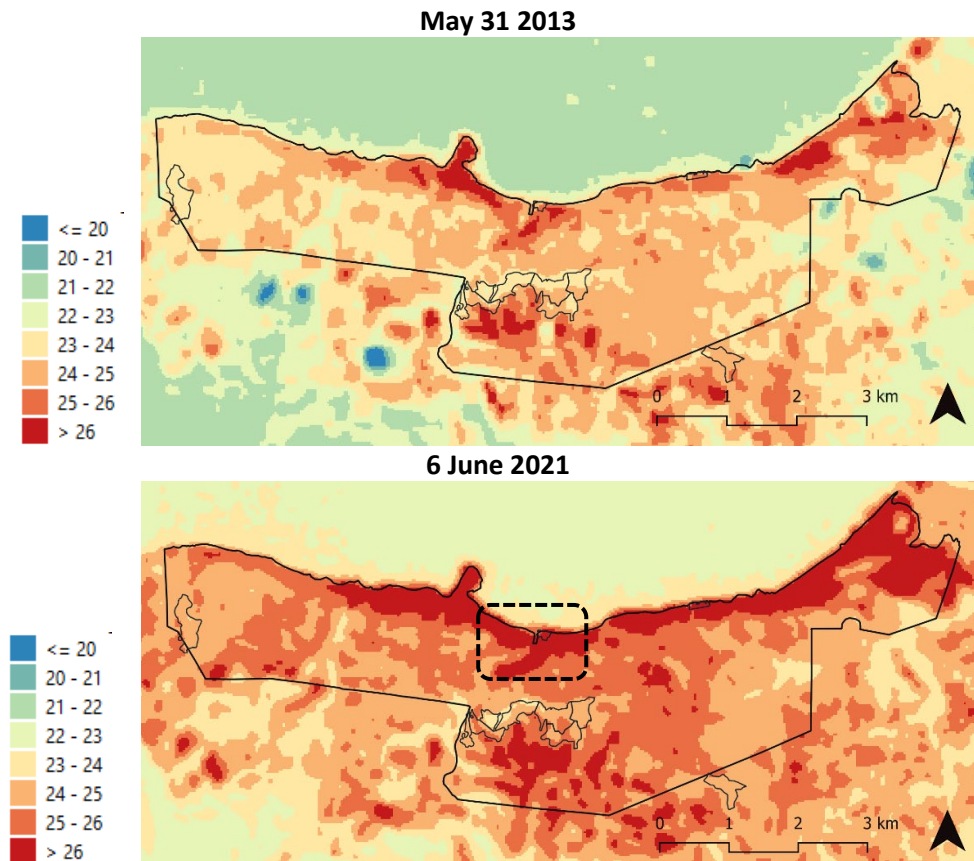


Figure 3. Land surface temperature over Honiara, 2013 vs. 2021.

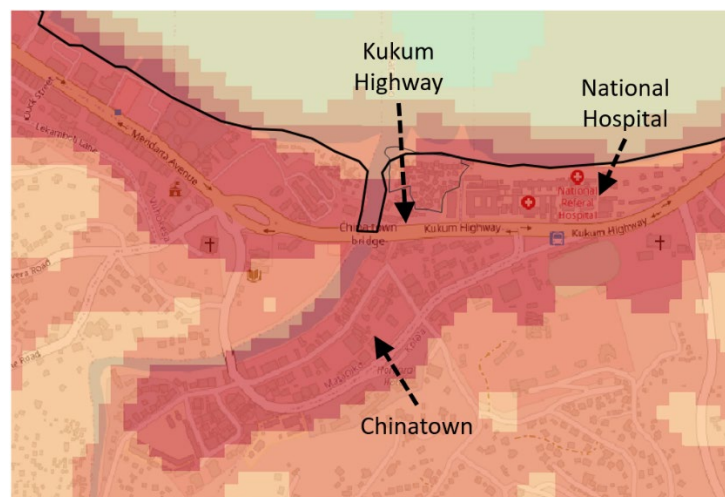


Figure 4. Zoom in to the area outlined by the dashed box in Figure 3: parts of Kukum Highway, the National Hospital, and Chinatown.

Vegetation health

The NDVI analysis in Figure 5 shows built-up areas and bare ground in red. The analysis also shows that, over the 8 years, vegetation throughout the city is generally becoming more stressed, with a wider spatial distribution of yellow areas; in both epochs, there are few areas in Honiara where the vegetation can be considered as healthy. A combination of the NDVI and LST analysis of 2021 confirms that areas that have become warmer correspond to areas where vegetation health has degraded.

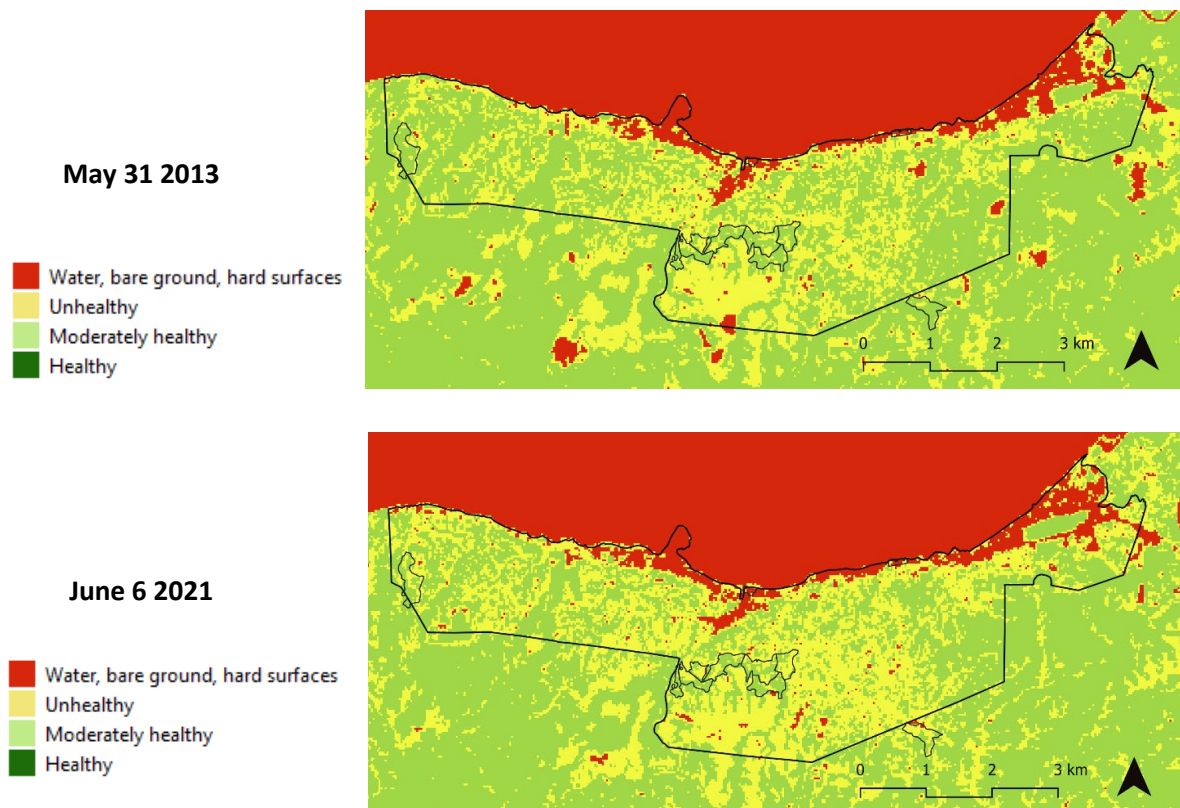


Figure 5. Changes in vegetation health, 2013 vs. 2021.

3. Characteristics of the case study urban gardens

3.1. Settlement overview

Wind Valley and Jabros are both peri-urban communities that are located on and beyond the city's boundaries respectively. Ontong Java (also known as Lord Howe settlement) is a high-density coastal settlement near the city centre (previously shown in Figure 1).

Wind Valley is an inland urban settlement located in West Honiara, in the White River suburb of Ngossi Ward. Wind Valley measures approximately 1km in length and 0.5km in width. It is characterised by steep slopes with a stream running through the middle of the settlement. The density of the settlement has approximately doubled in the past decade, with houses increasingly built on the steep slopes or where space might still be available on the flatter areas of the valley. Known climate hazards

for Wind Valley are flood risks, especially along the local stream (up to three metres in some areas), and landslides. Figure 6 shows a view of part of the settlement from higher ground.



Figure 6. View of Wind Valley settlement (Credit: J. Clemo, 2021).

Jabros Community is situated just outside the boundary of Panatina Ward and the municipality itself. Its location in the city's foothills translates to a gentle topography ranging between 50-80m above sea level, with the midpoint of the settlement generally being its lowest point. There are several key water sources in the settlement: a creek running in a northwest direction along the boundary, and a creek that runs in a north-south direction through the middle of the community. The soil in this area consists of rich, clay-like material that inhabitants noted to be good for plant growth but challenging to traverse in rainy periods. Figure 7 shows the view across Jabros community, looking north.



Figure 7. View looking north over Jabros community (Credit: S. Yeo, 2021).

Ontong Java is located on the eastern banks of the Mataniko river mouth, covering an area of approximately 2.89 hectares. Much of the area is located below the high-water mark and is regularly flooded during high tide and heavy rainfall events. Access from the southeast has been blocked by compact housing development and expansion, with a series of footpaths providing the only form of access in and out of the settlement. Due to its high density and lack of space (Figure 8), there are limited substantive sup sup gardens, and the few bush gardens are located far away. Consequently, women in the community tend to buy their food from shops and markets.



Figure 8. Ontong Java: high density and lack of space for gardening

3.2. Size and distribution of gardens (Wind Valley and Jabros)

A total of 36 and 53 gardens were surveyed in Wind Valley and Jabros respectively. Between the communities, there were variations in garden sizes with gardens in Jabros generally larger, which is expected since Wind Valley is more constrained by its steep topography on the eastern and western sides of the settlement. Figure 9 shows the most common garden size in Wind Valley to be 25 to 50m² while in Jabros, the most common garden size is likely to be greater than 100m².

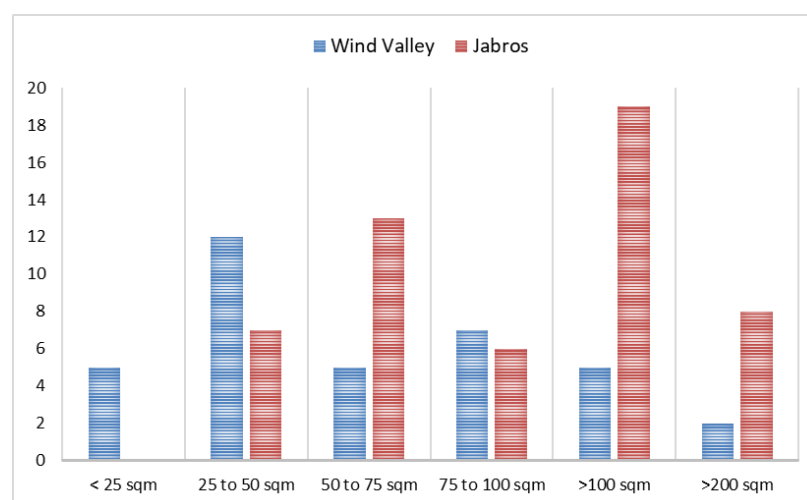


Figure 9. Comparative distribution of gardens according to area.

Figure 10 shows the distribution of the gardens, significant water sources (Strahler stream order greater than 5¹) in Wind Valley settlement, as well as gradient (using 5m contour lines) and areas of extremely steep topography where the gradient exceeds 45 degrees (red areas).

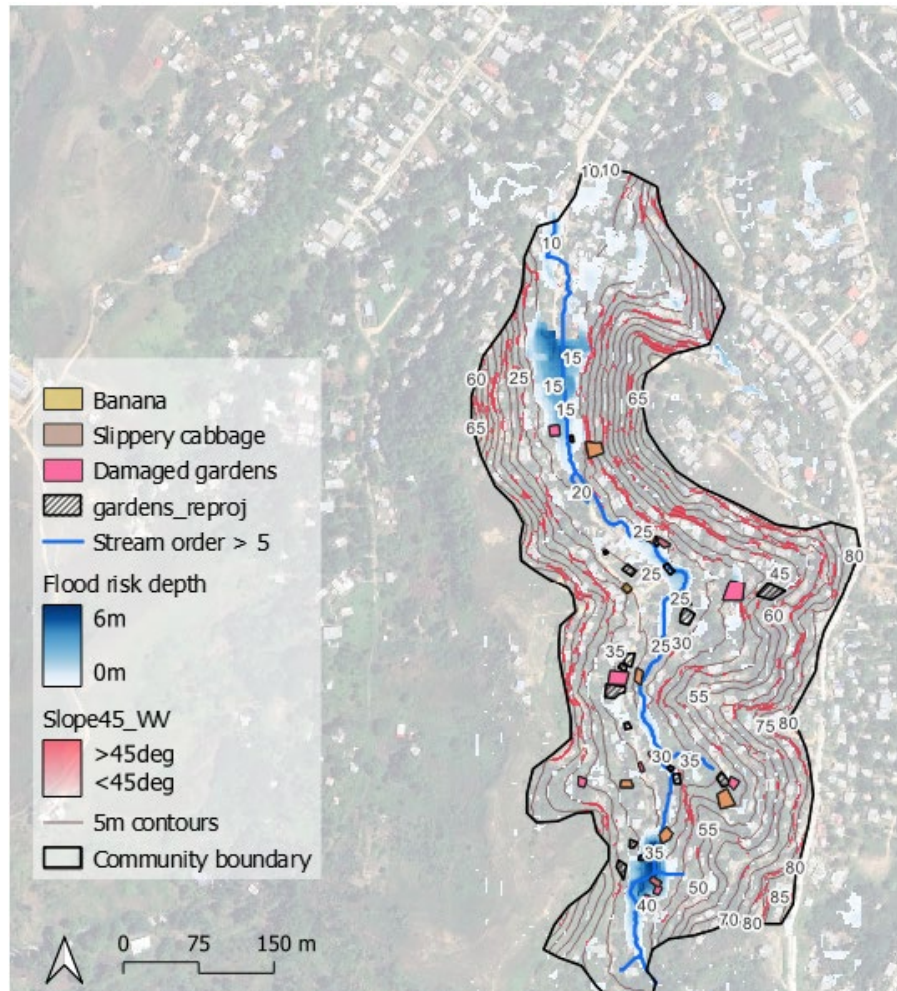


Figure 10. Topography of Wind Valley and distribution of surveyed house gardens.

In comparison, Jabros community has a generally gentle gradient and gardens tend to be planted either in flat areas, or areas where a gentle slope provides good drainage. Figure 11 shows the topographic conditions in the settlement and the distribution of gardens. The figure also shows some of the larger house gardens are located just outside of the settlement's boundaries.

¹ Strahler's stream order was used to classify streams in this analysis, which categorises the relative sizes of streams from 1 (small) to 12 (largest). Any stream of order 7 and above is classified as a river.

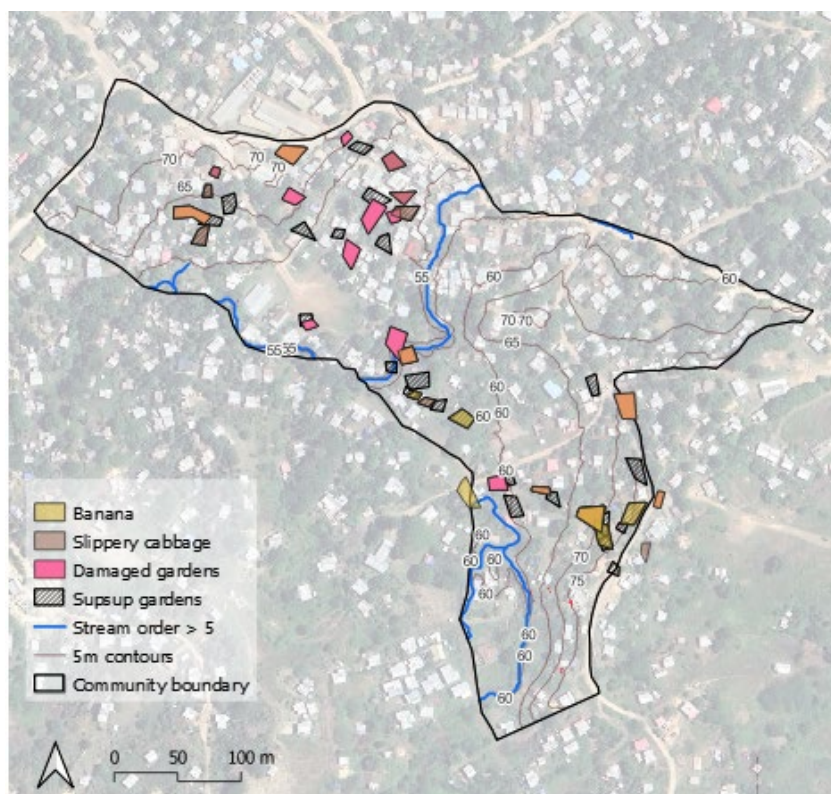


Figure 11. Distribution of house gardens in Jabros (including those growing the most common crops, banana and slippery cabbage).

3.3. Crop variety

Both settlements had a mix of vegetables, fruit, and flowers grown in house gardens. In both communities, the banana was a dominant crop, likely due to ease of propagation and short production cycles. They are easy to transport and are also common produce in markets. Staples like slippery cabbage and root vegetables like cassava and kumara were also common. Growing these vegetables for home consumption in house gardens is likely to lead to household savings as crops like banana, cassava, eggplant, slippery cabbage, and pawpaw all tend to cost around SBD10/kg (just over US \$1) at the market.

3.4. Threats to crops

Threats to crops were identified across both settlements with gardens in Wind Valley (64%) having more visible signs of damage or poor health than those in Jabros (53%). Threats from pests and poor plant health were the most common signs of threats, as shown in the graphs in Figure 12 and Figure 13.

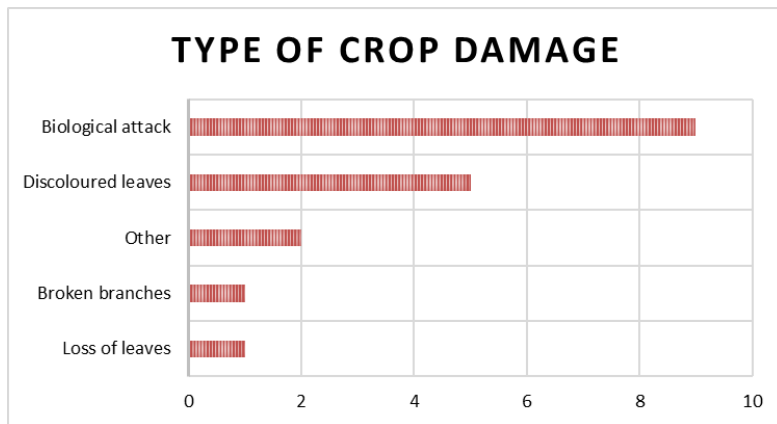


Figure 12. Types of crop damage in Wind Valley.

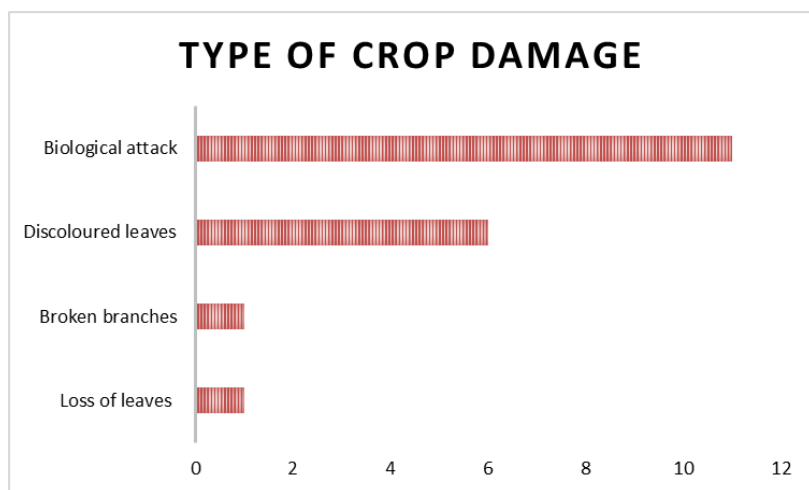


Figure 13. Types of crop damage in Jabros.

Figure 14 and Figure 15 show the spatial distribution of gardens in both communities with visible crop damage, and alongside this are the NDVI analysis for each settlement. Although the coarse resolution of the satellite imagery and the small size of house gardens makes it difficult to gain dependable insight into correlations between overall vegetation health with crop health, the NDVI analysis does indicate that house gardens in Jabros may potentially benefit from more inputs to be productive.

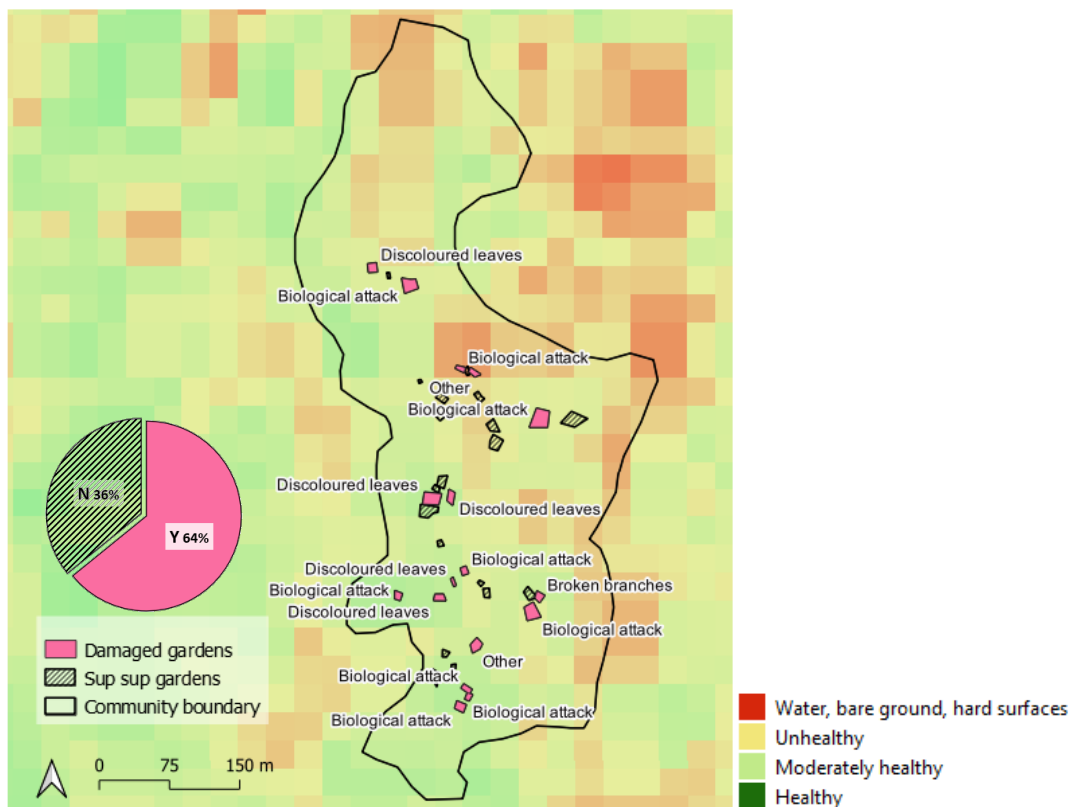


Figure 14. Distribution of damaged gardens in Wind Valley and correlation to NDVI analysis.

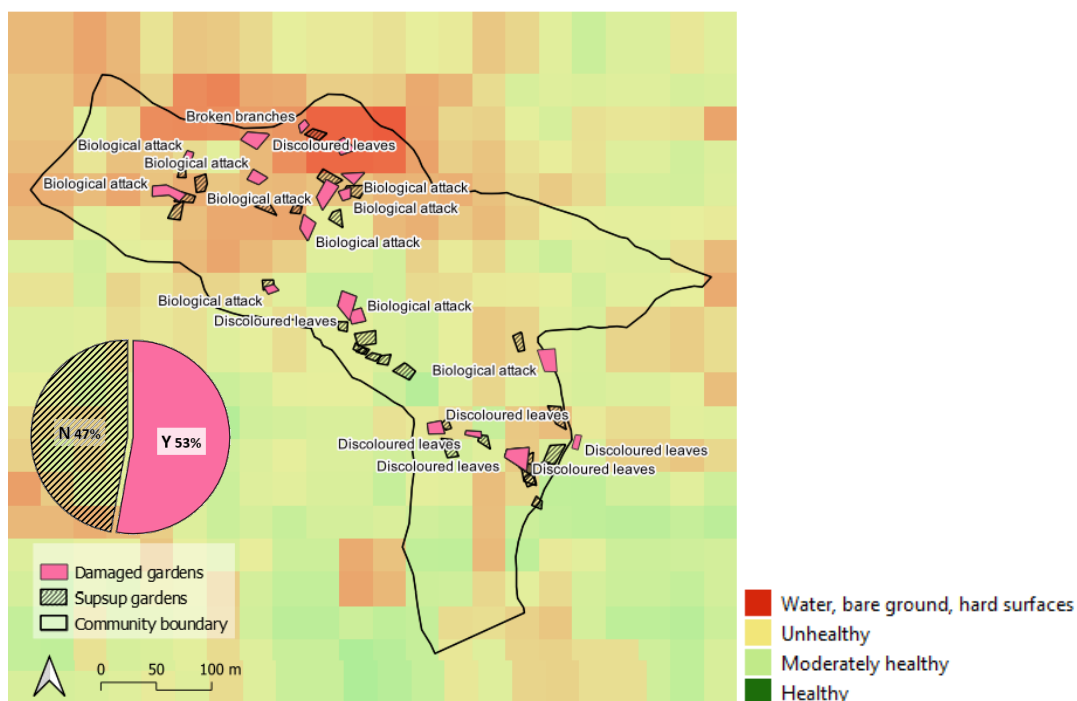


Figure 15. Distribution of house gardens with damaged crops (top) and location of damaged gardens correlated with NDVI analysis (bottom).

4. Reflections on the remote analysis and garden surveys

89 house gardens were surveyed across the peri-urban settlements of Wind Valley and Jabros. Gardens in Wind Valley are in general smaller in size, due to steep topography and dense housing. Women living in these peri-urban areas reported limited access to suitable land for gardens. Access to gardens is also worsening due to rapid urbanisation and the growing numbers of houses making up Honiara's burgeoning informal settlements. Some gardens can be as far as 90-minutes' walk away; often involving the navigation of steep terrain. With many of the gardens located on customary land outside the municipal boundaries, most women have negotiated access to gardens with the landowners.

Gardens in both peri-urban communities are likely to grow edible produce such as fruit and vegetables. 'Leafy greens' species are grown for family subsistence purposes, though this makes them vulnerable to pests, including the Giant African Snail. Ornamental crops are also common.

However, gardens in both communities were subject to high incidence of biological damage to crops (insects and fungus), with crops also commonly visibly stressed (e.g. discoloured leaves). Women not only highlighted the need for practical items such as seeds and tools, but also the knowledge and training needed to build raised gardens and then maintain them using best practice techniques e.g. composting, pest management, etc. Such training is needed if sup sup gardens are to remain productive in the face of overall vegetation degradation pressures. Kastom Gaden Association, a local civil society organisation, was contracted to carry out training for women in the settlements.

The critical importance of sup sup and bush gardens for local subsistence and access to food was brought into sharp focus by the introduction of a State of Emergency in 2021; enacted in response to the global pandemic. This sought to restrict people's movements and led to the closure of Honiara's informal satellite markets (which disrupted the local cash economy and people's ability to spend). The consequences of these restrictions resulted in renewed community interest in urban gardens as a local food security option.

5. Community workshops, transect walks, and Tok Stori

Due to local Covid restrictions, engagement with local women from the three case study communities took place in 2 phases. Workshops, transect walks, and Tok Stori activities were conducted with Wind Valley and Jabros communities in 2021, whereas the final workshop with Ontong Java women took place at the end of 2022.

5.1. Wind Valley

Wind Valley (outlined in yellow in Figure 16) measures approximately one kilometre in length and half a kilometre in width and is characterised by steep slopes and a river running through the middle of the settlement. The density of the settlement has doubled in the past decade, with houses increasingly built on the steep slopes or where space might still be available on the flatter areas of the valley.

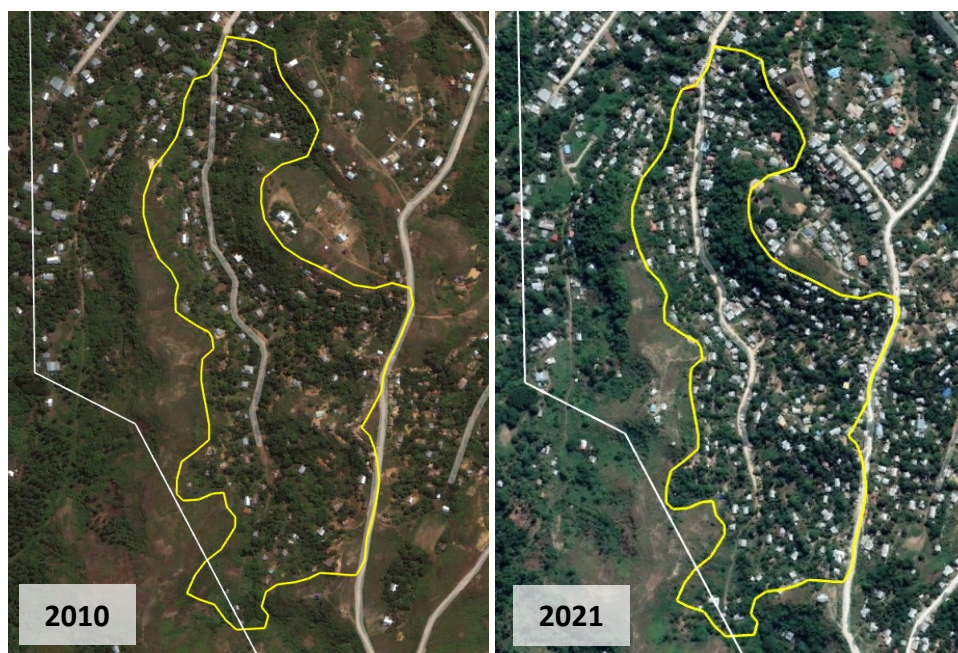


Figure 16. Settlement growth in Wind Valley (outlined in yellow), 2010 vs. 2021. The Honiara municipal boundary is shown in white (Source: Google Earth Pro).

Sup sup gardens

The key crops grown in Wind Valley sup-sup (home) gardens were leafy greens, mostly for subsistence purposes. The women cited several barriers to sup-sup gardening, mostly due to environmental and physical conditions. The steep topography made gardening challenging, and women talked about landslides destroying planted gardens as well as topsoils.

Additionally, the growing density of the settlement left little viable space for gardening and increased the likelihood that in-ground gardens would be damaged by children, dogs, and chickens running around. Pests like Giant African snails were also cited as an issue, as was a general degradation of soil quality. Some wanted to grow sup-sup gardens but found them difficult to establish. Consequently, the women preferred to build raised garden beds, but women perceived the costs of soil and timber for constructing garden beds to be prohibitive. The women agreed they needed support for sup-sup gardening both in terms of seeds and tools, but also relevant knowledge (e.g. building, maintenance, composting, etc.).

Water in the community tended to be supplied from cash water, which is sometimes a shared account across households. Cash water is piped in by Solomon Water, sourced upstream from the Kongulai Spring, which is a main source of water for the city. However, water quality is often impacted by illegal logging activities higher in the catchment as well as heavy rains, which can result in high levels of turbidity. This has led to Solomon Water having to turn off the water supply, which results in the community experiencing no water supply for 1-2 days. However, the pressure of the water supply from cash water is low, resulting in women often waiting till late at night when others were not using

water to irrigate gardens. Some had other mitigation strategies like filling a drum with water for hand irrigation.

The women also reported the use of a well near the top of the community as an alternative water source but noted that this could often be polluted and not safe for drinking, especially after heavy rains; water tended to be used for washing instead; the water source is also often crowded. There is a spring in the community used for washing clothes, but again, this was susceptible to pollution and blockages after heavy rains. Hence, the women cited the need for water tanks in the community.

Bush gardens

The key crops grown in bush gardens were mainly cassava (which grows well in both wet and dry seasons), banana, and crops like shallots which grow well in rocky conditions and sell well at markets. The women mentioned other crops like Chinese cabbage (which only grows well during the dry season) and kumara. Some fruit trees were also grown (e.g. guava) but these tended to be for children. Shallots were another key crop grown, with one woman saying that she had planted shallots after being prompted by her relatives in Gilbert Camp as they sell well at the market (highlighting the role of knowledge exchange through Wantok networks).

The main purpose cited for bush gardening was household subsistence, though some women also sell some crops at the market. Women generally enjoy their time in the garden, likening the nurturing of plants to caring for children. They also report a sense of increased well-being and cultural connection with their home provinces, with one participant stating, “It feels like home (in the province)”, when she walks around in her garden. However, with bush gardens being located further and further away from settlements, this reduces the frequency with which they can garden – sometimes only every 2-3 weeks; those whose gardens were closer to home were still able to garden daily.

Almost all Wind Valley bush gardens were planted on customary land. Most did not seek permission to use the land, citing reasons of not knowing who the landowners are. The women reported a variety of locations of their bush gardens – some were on the next mountain along from Wind Valley, some indicated locations west of Wind Valley; whilst some were close to the settlement on the ridge. Most preferred grassland sites for establishing bush gardens as this was good for cassava, although the women also wanted to have diversity in their crops. The selection of crops was often in part dictated by the location of the garden, e.g., one woman tried to grow kumara but the lack of water and strong sun in her garden meant cassava was more suitable and had a better crop yield. However, this was also influenced by their own knowledge of customary horticultural practices around growing conditions, as well as information from Wantok (e.g. in Gilbert Camp) about crop demand in markets. In some instances, the women had arrangements with landowners.

Bush gardens are increasingly located further away from the community, in less accessible areas. Figure 17 provides an example of the route to a bush garden located less than 1km southwest of Wind Valley, and the indicative size of the (fairly large) garden (around 2,000m²). This introduced several issues for the women. In terms of access, a generally steep climb to gardens at the top of the ridge makes it challenging in general for transporting tools, water and produce. In the rainy season women also said that these steep paths become slippery and dangerous. Figure 18 shows the elevation profile of one woman’s walk to her bush garden. Conversely, gardens on flatter ground can get waterlogged or flooded. Often, the women would check weather forecasts on their phones or the radio to plan

their trips. Gardens were often exposed with little shade, which not only affects crops but also makes gardening hard and hot work.

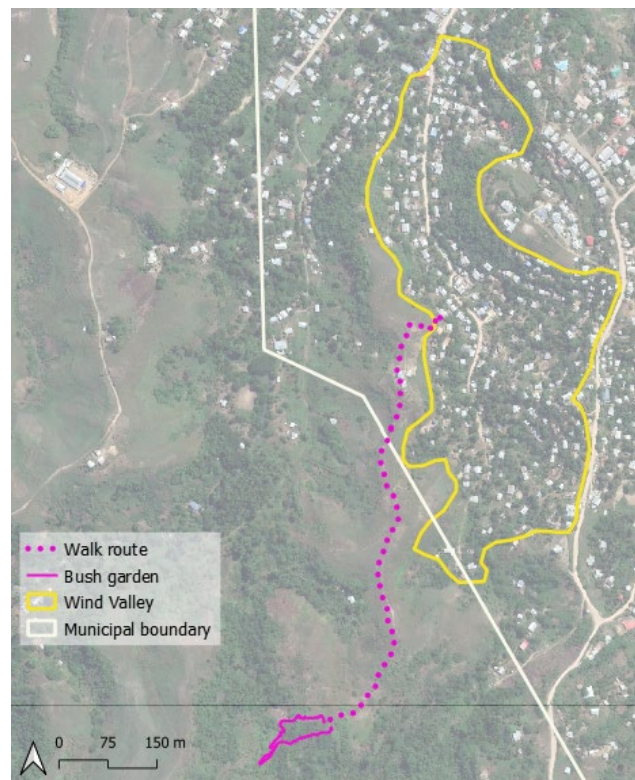


Figure 17. Walking route to a bush garden outside Wind Valley and bush garden area.



Figure 18. Elevation profile of the walking route shown in Figure 17 (Source: gpx.studio).

The long walk exposed the women to various security issues. One woman noted it was important to only walk during the day and some women take their dogs with them for security; it was not common for men to accompany women to the gardens. The women would also sometimes walk to their gardens in a group to ensure their safety. As a group, they would call out to each other as a way of checking in while gardening, and also if they walked home separately. The relatively remote locations of the gardens also introduced risks such as theft of crops; as well as attacks on women while they were gardening. The women attributed these to disaffected young people who tended to drink. Consequently, this led some women to reconsider the value of bush gardens and focus instead on sup-sup gardens.

For some, the location of bush gardens (being further away) impacted time, but there were trade-offs considered in locating gardens. Bush gardens were also impacted by climate-related hazards, which not only affected production but also access to the gardens.

5.2. Jabros

Jabros community, associated with Gilbert Camp, is situated just outside the boundary of Panatina Ward and the municipality itself. Its location in the city's foothills translates to a gentle topography ranging between 50 - 80m above sea level, with the midpoint of the settlement generally being its lowest point. There are several key water sources in the settlement: a creek running in a northwest direction along the boundary, and a river that runs in a north-south direction through the middle of the community. The soil in this area consists of rich, clay-like, material. Figure 19 shows the increase in settlement density over a decade.



Figure 19. Settlement growth in Jabros community (outlined in yellow), 2011 vs. 2021 (Source: Google Earth Pro).

Sup sup gardens

Sup sup gardens were mainly used for growing crops for feeding families, although these were also sometimes sold at the markets. Fruit trees were sometimes grown, though this tended to be for the children's enjoyment and consumption. One woman grew ornamental flowers (e.g. helicon, ginger, spider flowers) as a business, which generated substantial income for her. However, one participant sold some produce from her garden, which went towards bus fares for her children to get to school.

Gardening practices were often taught by mothers to children, with mostly children and younger people helping out in the gardens; this used to be for free but now needs some payment. The women attributed to the high costs of living in Honiara, which has made money a bigger part of the culture than before.



Figure 20. Discussions with women gardeners in Jabros (credit: J. Clemo, 2021).

Women wanted to have sup sup gardens but felt that the problems posed by Giant African snails were a significant barrier. Giant African snails were identified as the most significant pest issue for sup-sup gardens, particularly for leafy greens such as bok choi and slippery cabbage. This issue worsens during the wet season. As a management strategy, some women go out at night to eradicate snails but noted this did not seem to make much impact overall; the snails even posed an issue for those with raised garden beds. White flies were an issue too, especially for tomatoes and pawpaw (papaya) plants. Pumpkins were the only crop that did not seem too affected by pests.

There is piped (cash) water into most houses in the community with some households sharing the same pipe/metre (which can create disputes around payment). Some have metered water to their houses (charged at a fixed rate of SBD\$30/month), which is less likely to be cut off; however, many households have now been converted to cash water which is perceived as less secure and more expensive. Solomon Water allows households to pay their water bills in instalments, but the women perceived this as an increased financial burden and in general, were worried about water security. Moreover, as women are more involved in washing activities, they felt that water issues tended to affect them more than men and that water management tended to be regarded as women's work, including water collection (at pre-dawn hours), maintenance, and repair of plumbing and water-related equipment.

Bush gardens

The main crop grown in bush gardens was cassava (as it grows well on slopes and does not need much water); other crops mentioned included potato, banana, sugarcane, paw paw, and Hong Kong taro. Pana and yam are sometimes grown but these are susceptible to Giant African snails; in fact, one participant observed that she was now not able to grow yam at all due to the snails. Most bush gardens were primarily for subsistence purposes (which at times included an extended family), but also for income (e.g., crops like banana, cassava, and kumara).

The Jabros/Gilbert Camp women are renowned for the quality of their cassava in Honiara markets, a reputation which they were proud of and keen to protect by maintaining growing conditions (this reputation has been appropriated by others at times). They noted, however, that after replanting their

gardens several times, the quality of the soil would diminish, resulting in a poorer-tasting crop. In such instances, the women would leave the site, often for around 1-2 years, before burning off grass and replanting on replenished soil. However, they noted that it could be difficult to find an interim gardening site. Some women had seasonal practices, with crops grown as suited for wet and dry conditions.

The women also felt that bush gardens played an important role in maintaining a link to culture and 'kastom' (custom) in home provinces. Most had acquired their gardening knowledge from their parents, and in turn, were educating their children. One participant noted that she wanted to raise her children as she was raised in her home province, and that meant teaching them to garden and involving them heavily in the garden. Further, that woman said the location and environment of the settlement were generally reminiscent of a provincial lifestyle. Another participant felt that gardens also offered a spiritual connection.

Most participants had some help from immediate family members in the garden, although others had a more gendered experience; weeding in particular seemed to be a women-only activity. One participant was able to pay other women to help her (SBD\$150/day per woman). The women's ability to garden was often impacted by other caring responsibilities, e.g. caring for school-age children.

In terms of transporting produce to the market, some women did this daily while others were only able to do this a few times per week (e.g. on Mondays and Fridays). To move their products, some women paid young men to carry their crops (SBD\$20 per sack of cassava/crops) to the bus stop or their village; the bus was mostly used to transport the produce into town as there was no additional freight cost.

Bush gardens were often located a significant distance from the settlement, ranging from around a 30- to 90-minute walk; hence, some women reported only being able to visit their gardens a few times per week or less frequently. Figure 21 shows two walking routes to bush gardens located south and east of Jabros (elevation profiles of these routes are shown in Figure 22 and Figure 23). A shift further away for bush gardens was also sometimes motivated by soil quality.

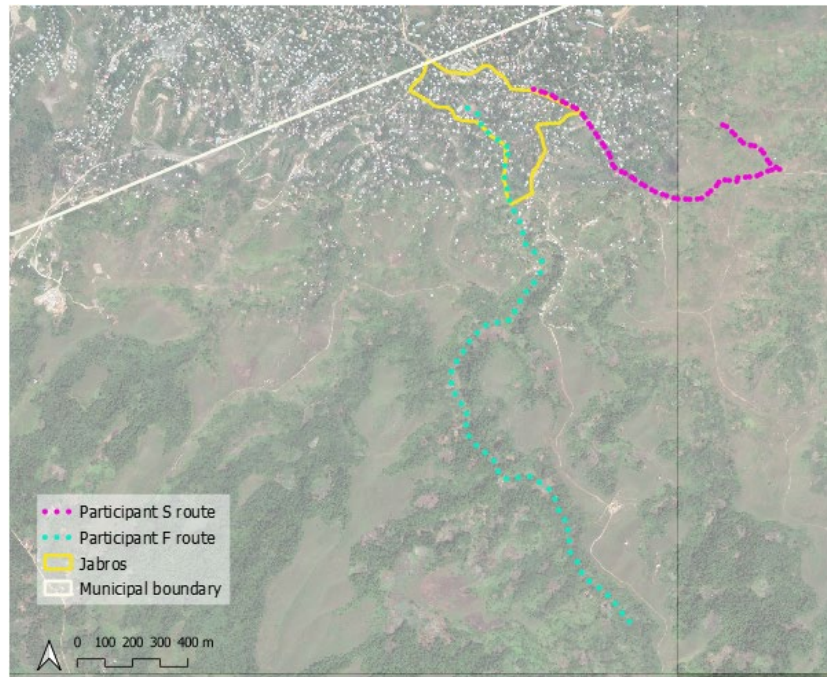


Figure 21. Walking routes to two bush gardens outside Jabros with approximate walking distances being 2.7km and 1km respectively.

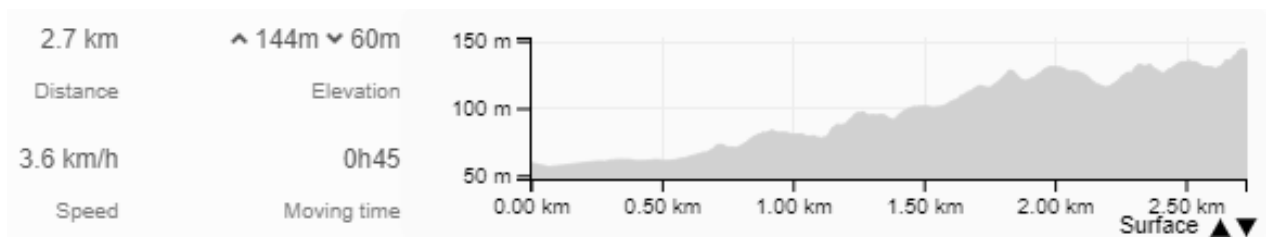


Figure 22. Elevation profile of walking route to bush garden 1 (Source: gpx.studio).

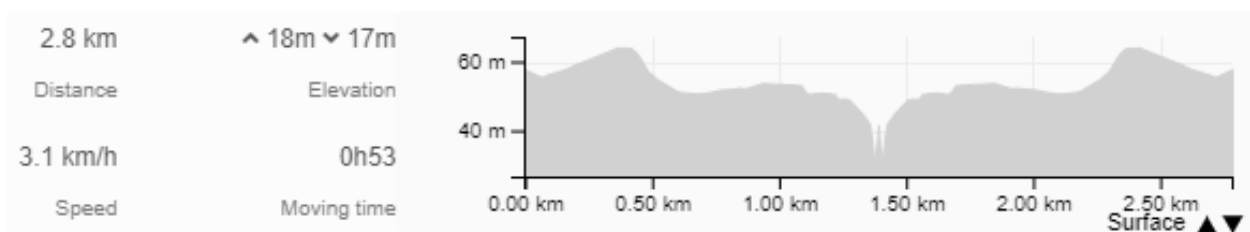


Figure 23. Elevation profile: bush garden 2 from bush garden 1 (Source: gpx.studio)

Many were able to catch the bus partway to their bush gardens (SBD\$3) and walk the rest of the way (approximately 20 minutes). Hence, some women felt they were no longer strong enough to sustain the physicality of bush gardening and tended to focus on sup-sup gardens. Participants felt that lack of available land has contributed to the rise of bush gardens being located further away: houses were

increasingly constructed on spaces that were once used for gardens. This was attributed to an influx of migrants to the area, particularly after the 'tensions'.

One woman had been compelled to move her bush garden and now it was quite far away. The distance of the walk, and the nature of the route, often meant that women did not feel safe travelling to their gardens on their own, and this in turn, has impacted the frequency of their gardening. Similar to the women of Wind Valley, the women of Jabros cited examples of being threatened by inebriated men. Many felt that the reduced sense of safety and security was also another consequence of increasing density and population from in-migration. Additionally, a lack of jobs has led to social issues such as a rise in home brewing of alcohol and growing of marijuana (inferring also to increased consumption of both). Despite these issues, women still felt some benefits in more remotely located bush gardens as gardens located closer to the settlement were prone to crop theft. Crops like eggplants, bananas, corn, and cassava were particularly prone to theft. However, even if they felt unsafe, they had to persist due to expectations around women's roles in gardening.

In general, the women did not perceive the land for bush gardening to be secure (although the government has indicated to people in these communities that the community would get 'first priority' for purchasing land in the area). Others expressed concern for the ability of their children to be able to continue gardening at their sites. To access land for bush gardens, the women tended to approach those in the vicinity to seek permission to garden on the land or have built relationships with landowners. Others had inherited land through their family or used family connections to access land.

During Covid-19 restrictions, the reduction in income and less cash in circulation impacted the women's livelihoods from gardening, as well as other forms of revenue i.e. selling carvings at markets. For example, reduced demand/sales have led to decreased prices, with the price of cassava reportedly falling 50% (from SBD\$10/kg to SBD\$5/kg); hence, bush garden crops have more recently tended to become more for subsistence rather than sale. Due to the decreased prices of crops, the women have had to innovate, often pursuing other activities like buying and re-selling peanuts within the community, setting up a barbeque stand to sell food (fish with cassava) which was returning 200% more income than selling cassava, and weaving baskets for sale.

5.3. Ontong Java

Community engagement with the women of Ontong Java was led by Steve Likaveke and Lorraine Livia, and supported by the Solomon Islands National Council of Women. 45 women participated in the workshop activities, 28 of whom had sup sup gardens with 10 having access to bush gardens. As noted, the settlement is dense and overcrowded, has little available space for home gardens, and has been subject to erosion along the Mataniko riverbank (Figure 24).



Figure 24. Changes in Ontong Java settlement, 2010 vs. 2020 (Source: Google Earth).

Sup sup gardens are mostly used to grow vegetables such as greens and cabbages that can be harvested in short growth cycles (usually a few weeks). Bush gardens are used mostly to grow crops that require larger spaces and have crops which require longer growth cycles (a couple of months) like tubers (e.g., taro, cassava, potatoes, etc.). Bush garden crops often require significant labour inputs compared to sup sup gardens; however, women reported people that these crops were often more in demand at local markets.

Sup sup gardens

Women tended to their gardens several times a week, if not daily, and the average age of women performing gardening labour is typically between 30 – 50 years of age. The frequency of gardening for women was dependent on several factors including crop type and demand (e.g., Chinese cabbage and other cabbages require daily tending) as well as the demands of household chores and responsibilities (some women stated that gardening was secondary to household obligations). Those who had sup sup gardens near their homes tended to garden more often.

The workshop discussions highlighted that produce from sup sup gardens was predominantly for family consumption, although surplus crops (e.g., banana) were commonly shared with relatives/wantoks, neighbours, and friends, or sold within the settlement with some women using Facebook as a platform to buy and sell crops within the community. Popular crops grown in the settlement included taro, slippery cabbage, banana, turmeric, cut nut, and pumpkin. For some, crop choice was a consequence of factors like taste, soil type, ease of growth and maintenance, landscape, and flood resilience. For others, crop choice was more random, simply hoping that planted crops would survive and flourish in current weather conditions. For most, the city's increased heat was highlighted as a significant issue affecting the growing of crops. The women described how most crops

were easy to plant with little to no need for fertiliser or much attention. Many women grew turmeric for this reason, as well as the crop being part of their culture and history. Chinese cabbage, however, required more specific knowledge and maintenance to flourish in gardens.



Figure 25. Examples of taro (left) and slippery cabbage (right) patches.

Gardening resources were commonly shared amongst women but only within family units. Sharing resources, especially between wantoks, was highlighted as a prudent strategy, aiding financial stability. The women described asking for and sharing crop resources such as banana suckers, taro, and turmeric from family members and wantoks either within the settlement or back in the village on the outer island of Ontong Java; supporting enhanced crop diversity and growth without the need to buy seeds. According to the women, seeds are accessible from the Honiara Central Market but are not always an option due to cost.

Bush gardens

As noted, only a few women had bush gardens. Similar to sup sup gardens, women and children are the ones who tend to bush gardens on average once or twice a week, or when women had free time. Labour in these gardens was also dependent on the accessibility of the garden with some only visiting bush gardens once a week due to the distance of the site, and the time involved to travel there. The labour for maintaining bush gardens was mostly provided by women and their families rather than engaging paid assistance or working cooperatively – which was more common in the past. It was highlighted that women used to rally together for gardening work, but this is no longer the case.

To access bush gardens, women either used private cars or a combination of travelling by bus, taxi and/or walking. Private cars were often used to transport produce from gardens to the settlement. Accessibility, distance, and cost barriers were highlighted as the main challenges for those tending bush gardens. As with the other two communities, women also stated safety concerns when tending to gardens in the evenings, as well as challenges of looking after bush gardens when they were unwell.

Bush gardens were predominantly situated on customary land outside of the municipal boundary. Such land tended to be acquired through families owning and then passing down the land, marriage

to landowners, or via registered land ownership with the Ministry of Lands, Housing and Survey. As a result of these land arrangements, bush gardens tended to remain on the same sites with families unable to expand bush gardens or develop new garden sites (also affected by a lack of space).

Food crop choices for bush gardens were based on ease of growth, availability, and whether crops would complement local food staples such as rice (a staple of Solomon Island food not grown locally). Women also chose crops based on space availability, with bush gardens reserved for crops needing more space than available in sup sup gardens. Women also identified cultural aspects to crop choice, such as turmeric (a cultural crop for the Ontong Javanese). Common crops grown in the bush gardens included cassava, taro, turmeric, banana, pineapple, pawpaw, slippery cabbage, pana tomatoes, corn, potatoes, and peanuts. Popular crops to plant were those with suckers, stems, and vines (e.g., bananas, taro, turmeric, cassava, and slippery cabbage) that could be harvested from friends, family, or wantoks. Some women bought seeds from the market for their bush garden; however, most crop resources were accessed or received from family members or wantoks. One participant described how she obtained crops she wanted to plant from the central market, (e.g., slippery cabbage) - buying 4-5 stalks usually costing SBD\$10, using the leaves for food and the stalks for planting.

Crops grown in bush gardens were generally for private consumption. However, if the crop harvest was large, the excess was usually given to relatives, neighbours, and friends or sold within the settlement. Cassava and potato were most commonly grown for family consumption, while corn and peanuts were often sold; however, this varied between households. The surplus crops provided an avenue of additional cash income, supplementing the family income. However, food was often shared with those who did not have enough. When selling crops, women stated that word-of-mouth within the settlement ensured crops were usually sold, with community members coming to each other's houses to buy produce. Due to such methods, women did not often need to rely on selling produce at markets. If markets needed to be accessed for selling, this was generally done via bus, taxi, or by foot.

Bush gardens were perceived to assist with both the availability and accessibility of food, as well as economic pressures impacting food security. Bush gardens ensured consistent access to healthy food for families, and helped women to save money by not buying food at the market or outlets. For one woman who owned a bush garden, she reported that 90% of her family's food came from her bush garden, with 10% still being shop or market sourced.

During Covid-19 restrictions, food support came mainly from direct family members or wantoks who offered rice, sugar, cassava, cabbage, and other items of assistance. Ontong Java also experienced a 3-week lockdown due to being a hotspot for Covid-19, with community members sharing resources amongst themselves due to movement restrictions. However, it was stated that food resources were continuously shared regardless of disasters or adverse times as a normative cultural practice within the community.

6. Training workshops: urban organic farming best practice

Kastom Gaden Association (KGA) was sub-contracted to carry out 'gardening best practice training' with women from five settlements around Honiara, namely: Ontong Java, Wind Valley, Fishing Village, Aekafo-Feralodoa, and Jabros / Gilbert Camp. The training was carried out in late 2022 and early 2023.

The objective of the training workshop was to build the capacity of women groups by providing new information on backyard/urban gardening as well as aligning with KGA's mission and goal of promoting organic farming and agro-ecological practices that are appropriate for rural farmers and peri-urban settlements. The training was structured to:

- Deliver the skills and knowledge acquired to train other members of their community on best gardening practices to produce varieties of nutritious vegetables and fruits for their family consumption, and to sell the excess for income.
- Deliver the organic gardening / agro-ecological farming system advocated by KGA by utilising the land space around their home. This provides additional sources of income for the households to combat the rise in the cost of living as well as respond to market demand.
- Utilise 'waste' such as disposal cups, plates, empty tins, empty milk cartons, truck tyres, etc., that could be made into pot plants for raising plants / vegetables.

There was a positive turnout in each of the 5 communities, with a total of 132 men and women attending the training, as shown in Table 1.

Table 1. Participants in KGA training by community/sex.

Settlement	No. Participants	Gender	
		Male	Female
Ontong Java	37	3	34
Wind Valley	24	6	18
Fishing Village	20	1	19
Aekafo	24	4	20
Gilbert camp	27	3	24
Total	132	17	115

The training workshops

Training workshops were held at meeting halls in the respective settlements. The day began with a welcome and prayer, with participant introductions, a presentation on organic gardening theory, followed by practical, hands-on, experience. This included demonstrations, the establishment of gardens, nursery and seed beds, building a compost pile, preparation of pest-derived pesticides (PDPs), extracting and drying seeds, and group discussions. The training exercises were very interactive and participatory, covering basic 'know-how' and practical exercises and fieldwork, interspersed by oral explanation and question-and-answer sessions. In the majority of sessions, the information was new to the trainees, and they were engaged interactively with the demonstrations and 'hands-on' training for nursery management, seed extractions, drying and saving, soil improvement, and use of PDP.

Participants appreciated the gardens being set up in their respective settlements, making use of the available space around their houses to grow nutritious vegetables. Theory and practical demonstrations involved preparing good nursery soil (e.g., grating old coconut husks), sieving of the

soil, seed sowing, making nursery soil mixture for seeds/seedlings, soil sterilisation using hot water treatment, pricking of grown young seedlings/plants to allow correct spacing in the nursery, and field transplanting of nursery seedlings supplied by KGA. Participants were shown how to recycle garden waste (organic wastes), as well as recycling plastic bottles, disposal cups, tins, empty bags, drums, etc., to grow vegetables or pot plants.



Figure 26. Workshop participants (Fishing Village).



Figure 27. Women planting pakchoy nursery seedlings (Fishing Village).



Figure 28. Training workshop (Jabros).



Figure 29. Preparing a raised garden bed (Jabros).

Seed Extraction & Saving

There was both theory and practical demonstrations on the extraction, drying, and packaging of the seeds of tomato, eggplants, cucumber, pumpkin, and the rapid multiplication of yam and taro. Trainees had the chance to actively participate in the session, with extractions and saving seeds of available material provided by KGA.



Figure 30. Demonstration of extracting and saving seeds of pumpkin (Aekafo-Feralodoa).



Figure 31. Hands on training (Aekafo-Feralodoa).



Figure 32. Seed extraction and saving session (Ontong Java).



Figure 33. Demonstrating seed extraction & saving (Wind Valley).

With new knowledge and skills, women in each of the respective communities were able to save their own open-pollinated (OP) seeds to have an available food supply year-round. It is anticipated that trainees will be able to save the open-pollinated seeds so that they will not have to buy new OP seeds every planting cycle. Supplies of seeds in Honiara are not consistent and in most cases, not affordable to communities. A supply that is diverse and plentiful, accessible, and nutritious is important (as the Covid-19 pandemic has shown).

Soil improvement

During the training workshops, participants were taught how to feed and look after the soil (mulching and composting) for good crop production. Most of them admitted they only knew about animal manure (chicken) which could be applied as a side dressing, basal dressing, or cultivated into the soil before planting crops. Participants were given muccuna beans, a leguminous crop, and were

encouraged to grow these for green manuring, and to mulch crops. Trainee participants also built compost piles, as part of their training, which were filled with layers of organic materials such as: kitchen waste, garden residue, green and brown leaves, and chicken deep litter (alternating green and brown materials were added in layers until the pile of compost reaches the top end of the box and then covered).

Management of pests & diseases

Participants learned garden husbandry best practices to help reduce or control the incidence of pests and diseases in their gardens. This included a practical session on PDP preparation and application of the pre-prepared PDP solution/spray made of neem, chili extracts, as well as other 'soft' pesticides.

Seedbed nursery

A seedbed garden and nursery were established for each settlement and were used as a training model where the trainees were able to plant seeds or nursery seedlings as part of practical exercises during the training. The types of crops planted in the gardens during the training are shown in the table below.

Settlement	Type of seed bed	Crop planted	Material type	Quantity
Wind Valley	Raised Table Bed	Pakchoy	Seedlings/plants	20
		Saladdeer	Seedlings/plants	20
		Eggplants	Seedlings/plants	20
		Beans	Seedlings/plants	20
		Green pepper	Seedlings	20
		Sweetbasil	Seedlings/plants	20
		Choysum	Seedlings	20
		Yam	Minisets	9
		Taro	Minisets	4
		Choysum	Seed packets	10 packets
		Pakchoy	Seed packets	10 packets
		Saladdeer	Seed packets	10 packets
		Eggplants	Seed packets	10 packets
		Beans	Seed packets	10 packets
		Sweetcorn	Seed packets	10 packets
Ontong Java	Raised Table Bed	Pakchoy	Seedlings/plants	20
		Saladdeer	Seedlings/plants	20
		Eggplants	Seedlings/plants	20
		Beans	Seedlings/plants	20
		Green pepper	Seedlings	20
		Sweetbasil	Seedlings/plants	20
		Choysum	Seedlings	20
		Yam	Minisets	9
		Taro	Minisets	4
		Choysum	Seed packets	10 packets
		Pakchoy	Seed packets	10 packets
		Saladdeer	Seed packets	10 packets
		Eggplants	Seed packets	10 packets
		Beans	Seed packets	10 packets
		Sweetcorn	Seed packets	10 packets

Settlement	Type of seed bed	Crop planted	Material type	Quantity
Fishing Village	Raised Table Bed	Pakchoy	Seedlings/plants	20
		Saladdeer	Seedlings/plants	20
		Eggplants	Seedlings/plants	20
		Beans	Seedlings/plants	20
		Green pepper	Seedlings	20
		Choysum	Seedlings	20
		Yam	Minisets	9
		Taro	Minisets	4
		Choysum	Seed packets	10 packets
		Pakchoy	Seed packets	10 packets
		Saladdeer	Seed packets	10 packets
		Eggplants	Seed packets	10 packets
		Beans	Seed packets	10 packets
		Sweetcorn	Seed packets	10 packets
Aekafo	Raised Table Bed	Pakchoy	Seedlings/plants	20
		Saladdeer	Seedlings/plants	20
		Eggplants	Seedlings/plants	20
		Beans	Seedlings/plants	20
		Green pepper	Seedlings	20
		Sweetbasil	Seedlings/plants	20
		Choysum	Seedlings	20
		Yam	Minisets	9
		Taro	Miniset	4
		Choysum	Seed packets	10 packets
		Pakchoy	Seed packets	10 packets
		Saladdeer	Seed packets	10 packets
		Eggplants	Seed packets	10 packets
		Beans	Seed packets	10 packets
		Sweetcorn	Seed packets	10 packets
		Vitivar	Cuttings/Rhizome	100
Jabros	Raised Table Bed	Pakchoy	Seedlings/plants	20
		Saladdeer	Seedlings/plants	20
		Eggplants	Seedlings/plants	20
		Beans	Seedlings/plants	20
		Green pepper	Seedlings	20
		Sweetbasil	Seedlings/plants	20
		Choysum	Seedlings	20
		Yam	Minisets	9
		Taro	Miniset	4
		Choysum	Seed packets	10 packets
		Pakchoy	Seed packets	10 packets
		Saladdeer	Seed packets	10 packets
		Eggplants	Seed packets	10 packets
		Beans	Seed packets	10 packets
		Sweetcorn	Seed packets	10 packets

Outcome of the training

The majority of the participants had little prior knowledge of the topics covered during the training workshops. The training was well received by women in the communities, especially the practical or 'hands-on' components. The participants were excited and willing to continue learning, with KGA staff mentoring them. There is a need for a second round of training, and follow-up visits may be arranged. Some workshop participants have filled in the Planting Material NetWork (PMN) registration form to become members of the KGA PMN network. The women of Ontong Java and Wind Valley have also had their first harvest of the crop that they planted during the training workshop.



Figure 34. Harvesting saladeer (Ontong Java).

7. Conclusions

This project on women, urban gardens, and local food security was underpinned by three main activities. The first of these was a remote assessment of vegetation health using satellite imagery over time, complemented by an on-the-ground survey of crop types and conditions in sup sup gardens in two of the case studies. Findings confirm that soil and vegetation health have declined over the last decade, a consequence of urbanisation and increasing urban heat. Degradation is particularly evident in the coastal fringe where urban development pressures are most pronounced. Furthermore, the survey indicated that over half of crops in both settlements were showing signs of visible damage, with the Giant African snail noted as a particular local problem.

The second activity involved interactive engagement with women from three contrasting communities – Jabros, Wind Valley, and Ontong Java. Workshops and tok stori activities were used to elicit important information on the critical social, economic, and cultural relationships that women have with sup sup and bush gardens, the contemporary threats and opportunities facing urban gardening, and the training and resource needs of women to improve the health and productivity of their gardens. It was found that fast-growing leafy greens were the most common crop grown in sup sup gardens (mainly to feed the family), though ornamental crops were also planted. The general preference was for raised garden beds but the cost of timber and soil was prohibitive for many. It was also confirmed that home gardening practices were increasingly and significantly disrupted by the pressures for land (once used for sup sup gardens) from the growing population in the city. The conversion to cash water in communities was also raised as a negative issue, perceived to introduce additional costs, especially if it is used to water home gardens.

The relationship that women have with bush gardens is complex. On the one hand, having a bush garden is reminiscent of provincial lifestyles and provides women with a spiritual connection to the land; however, the use of bush gardens was constrained by needing permission from customary landowners to access land outside the city (or having family connections that allow access), and with the additional pressures of a growing population and new housing, many women are now finding themselves travelling long distances, often across steep terrain. Transect walks with women from each community illustrated the difficulty of some of these routes, which ranged between 1-3km over difficult terrain. Steep topography introduces challenges for transporting water and crops, but also makes accessibility more difficult during rainy weather. Difficult access to land, issues of personal safety, and the impact of flooding and landslides were all barriers to regular bush gardening. For some women, these difficult conditions have prompted a desire to return to sup sup gardening (where this is possible).

Most women agreed that the Covid-19 pandemic had increased the pressure on land for gardening, and on women themselves to continue gardening. However, there is evidence of women demonstrating a range of innovative adaptations to secure income for their families, such as changing to more valuable goods (e.g., baskets, cooked food, etc.). Information was also exchanged between wantok networks (e.g., recommending the planting of shallots) and there are instances of women trading their labour for the use of customary land. One woman also shared seeds from her sup sup garden and harvested vegetables for other community members after attending a government-facilitated agriculture workshop (promoting a wider benefit than just those that attended).

The needs of the women in the case studies informed the subsequent best practice training that was carried out by Kastom Gaden Association. This was a combination of both theory and hands-on training which was carried out in the case study settlements (and an additional two settlements) to ensure that the training was appropriate for local conditions. Best practice training involved soil management (e.g., mulching and composting), waste recycling, seed extraction and saving, and pest control. Women participants thoroughly appreciated the new knowledge and practical gardening advice they received and indicated that they would welcome further capacity-building initiatives.

A key message that comes out clearly from the project, with implications for policy and practice, is that low-income families in Honiara continue to rely heavily on home and bush gardens for the products they provide, whether for subsistence or cash purposes. Furthermore, by highlighting and giving voice to women's experiences at the grassroots level, this research has also illustrated the role that women and urban gardens play in buffering communities against the impacts of poverty and local food insecurity. It is important that these critical socio-ecological relationships, as encapsulated by urban gardens, are recognised by multiple actors operating at different scales. At the city scale, urban gardens should be considered a contribution to the policy goal of being a 'liveable city' and explicitly accounted for in the Honiara Local Planning Scheme (currently being updated from the previous 2015 planning policy document) as part of lot coverage and open space and landscaping components of the scheme. The social, economic, and environmental importance of urban gardens also needs to be considered by urban planners when devising subdivisions for new housing or by those implementing settlement upgrading schemes (e.g. the UN-Habitat Participatory Settlement Upgrading Scheme). Outside the city, introducing suitable engagement mechanisms to facilitate agreements with customary landowners for access to bush gardens would be mutually beneficial.

A further enabling measure would be more committed and high-profile government and NGO support for agricultural extension schemes which reach out to civil society organisations, community development committees, and women's groups; providing the required training, seeds, and materials, which will encourage urban organic farming, as well as recognising the central role played by women in local food supply. To some extent this form of training is being promoted by regional funding bodies such as the SPC Pacific Organic Learning Farm Network funded by KIWA, but could go further with a programme of community-led initiatives that support home gardeners. Using local training experts, and physically doing the training in the communities, also delivers local beneficial impacts and should be supported by national, regional and international funds. Urban gardens, and the well-being benefits they bring to low-income families, are a vital component of food security and community resilience in an era of rapid urbanisation and climate change.