

Local Voices of Resilience

A Rapid Assessment of Perceptions
into Food Security in Tuvalu

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This report documents many women's, men's and youth's personal stories, openly shared with each other and the wider research team. Accordingly, much of the information presented belongs to communities and individuals; it is a reflection of their attitudes, achievements, challenges, current lived experiences as well as their visions for the future and we thank them for their willingness and consent to share their stories in this format.

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ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
CSO	Community Service Organisation
DFAT	Department of Foreign Affairs and Trade (Australia)
DOA	Department of Agriculture
LLEE	Live & Learn Environmental Education
NAPA	National Adaptation Programme of Action
NCDs	Non Communicable Diseases
NGO	Non Governmental Organization
RAP	Rapid Assessment of Perceptions
R2R	UNDP Ridge to Reef Project
SPC	Secretariat for the Pacific Community
TASMP	The Tuvalu Agriculture Strategic Marketing Plan (TASMP) 2016-2025
TTMT	Taiwan Technical Mission to Tuvalu
UNDP	United Nations Development Program
WHO	World Health Organisation

TERMINOLOGY

Pulaka	A nationally celebrated and culturally important root crop prepared in many ways
Fale Kaupule	Elders, including the heads of clan, and heads of community (women, men and youth)
Kaupule	Local Council (the implementing arm of the Fale Kaupule)
Toddy	A sweet sap traditionally collected from the coconut palm using traditional knowledge
Utanu	Germinating nut
Uto	Sweet chewable fibre found in pandanus and coconut, eaten fresh or roasted to preserve it
Youth	An unmarried male or female

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Executive summary

Sustainable Development Goal Target 2.1 “By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.”

Note that this requires availability and stability of food supplies at the national level and physical and economic accessibility of required food at the household level.

This Rapid Assessment of Perceptions (RAP) report presents the perceptions of eight island communities of Tuvalu toward their capacity to revive local food resources through the uptake of adaptive and appropriate food producing techniques to increase their resilience to climate change and consumption of local foods. During the RAP three full day workshops were facilitated; one with a mix of government departments, local government, civil society organisations and private sector participants as well as two single day workshops with female, male and youth community members from the eight island communities. In addition, 46 community based survey discussions were facilitated by local RAP staff, 14 visits were conducted at Biofilta raised garden bed technology trial sites, and 10 additional key stakeholder group discussions took place. The RAP tools and activities supported stakeholders to critically reflect on their realities through a set of participatory processes underpinned by a strengths-based philosophy. The processes encouraged open and honest story sharing and identified areas to be strengthened to build on existing efforts to enhance local and national food security.

The purpose of this report is to contextualise and guide the identification of appropriate and effective community engagement and design approaches for the forthcoming Tuvalu Food Futures Project commencing a preparatory Phase I in April-December 2019. The project will be funded through DFAT, who aims to support the Government of Tuvalu to improve resilience by improving food security through increased production and consumption of locally grown nutritious foods.

This RAP research is part of Live and Learn’s on-going commitment to climate change adaptation in the Pacific seeking to deliver low cost, community based adaptation activities that are culturally appropriate, work through existing channels and are easy to scale up in remote island locations.

The project supports the objectives of the Tuvalu Agriculture Strategic Marketing Plan (TASMP) (2016-2025) “to revive the marketing of local food and other local produce to increase the resilience of the Tuvalu people to climate change” and the Funafuti Kaupule’s current Strategic Plan, and builds on the recent transformative efforts to change attitudes toward traditional foods made by SPC, the Ministry of Health and Department of Education, outer island Kaupule’s and other local organisations, not least the Department of Agriculture working with the Taiwanese Technical Mission to Tuvalu (TTMT).

Sex disaggregated RAP findings are relevant for the identification of community-led food security initiatives around locally identified agendas for women, men, young women and young men (and their sub groups). Utilising RAP findings as a starting point, the upcoming Tuvalu Food Futures Project is intended to ‘start from where communities are at’ while seeking to take a strengths-based approach to climate adaptation. This report also contributes baseline data for future project evaluation through documentation of peoples’ knowledge, attitudes and practices toward food security topics and cross-cutting health and environmental themes captured during RAP activities in June 2019.

The RAP technique acknowledges that people coming from outside a community have different perceptions and visions of what is required for sustainable development compared to those within a community. It also acknowledges that there are often different ideas within communities between and amongst women and men and their sub groups. While the RAP seeks to unveil perceptions, it also has an exploratory nature as participants investigate, learn and question their own realities and desires for the future. Many stories (via direct quotes) are used in the findings; stories being an essential part of Pacific island culture.

The scope of perceptions arising during the course of the RAP activities was very wide. Main findings that arose were grouped into the following three Learning Areas to guide the research:

- Learning Area 1:** Perceptions toward increasing local food consumption and decreasing reliance on imported foods
- Learning Area 2:** Perceptions on reviving traditional farming practices and embracing new technology
- Learning Area 3:** Perceptions toward increasing knowledge and awareness of the benefits of local food

RAP participants shared a wealth of information relating to the Learning Areas above, including changes in food quality, stability, nutrition and access, and attitudes toward their current lived experience and ideas for securing food sources for the future. A range of research findings emerged relating to the complexity of climate and socio economic challenges currently facing women and men and youth in Tuvaluan communities.

Macro challenges and trends across islands

The macro food security related trends perceived to be urgent and found to be common across communities in Funafuti and outer islands include: increasing climate variability, increased reliance on imported processed and low quality frozen foods, increased prevalence of non communicable diseases (especially diabetes and cardio vascular diseases), increased birth of premature babies related to poor nutrition of expectant mothers, decreasing quantity and availability of local traditional foods; decreasing local food diversity; increasing population growth resulting in lack of land for household community based production; exacerbated by an increase in 'bad weather' events, and saltwater intrusion; compounded by negative youth attitudes toward traditional food consumption and transmission of traditional gardening knowledge, and a gap in information at the household-level for practical agricultural skills for climate change adaptation.

Circumstances perceived to be contributing to the macro challenges include: negative youth attitudes toward participation in traditional farming, perceptions among young people of imported food consumption being desirable and 'modern'; a desire for inactivity over participation in agriculture in some island communities; the preference of foods that are quick and easier to prepare than local foods, lack of access to markets (for some communities); high population growth, and challenging soil conditions especially for six of eight islands, low levels of sea transport security, lack of widespread knowledge, skills and participation in community-based activities to safeguard food sources, underlain and exacerbated by 'bad weather'.

Macro challenges and trends for outer islanders living on Funafuti

In addition to the above, outer islanders living on Funafuti experience the following exacerbated challenges; no access to household soil to grow their own vegetables without permission from landholders, limited ability to make their own compost as they do not hold any rights to utilise green waste on their rented property, limited access to purchase compost due to inconsistent supply, no access to Kaupule run fresh food markets on Funafuti (as no markets currently exist), heavy reliance on a cash based economy, and reliance on traditional foods being transported by family from outer islands to Funafuti; these challenges are compounded by over-crowding and difficulty in finding accommodation and employment to access cash on Funafuti.

Where are the gaps?

The RAP highlighted gaps and strategic locations for capacity building:

- **Limited knowledge, awareness and practice of climate adaptive agricultural practices for food security**

The RAP highlighted the need for strong links between the TASMP and community level planning on Funafuti and outer islands. The Funafuti Kaupule are well placed to support the TASMP with their current Strategic Plan. The Department of Agriculture together with the Taiwanese Technical Mission to Tuvalu (TTMT) and SPC all have very good access to appropriate climate adaptive techniques and seedlings for use in community level activities that will be key for the success of the Tuvalu Food Futures project. Further, the Tuvalu Food Futures project together with its partners will play a key role in the wider dispersion of existing local education resources and hands on workshops with communities on the topics of: soil management, compost production, landuse planning for higher productivity, local food preservation and processing techniques, local food preparation demonstrations and marketing skills.

- **Limited access to local soil, compounded by limited availability of purchasable soil**

Indigenous Funafuti residents are able to access soil on their own land albeit the quality of the soil is often low due to saltwater inundation, sand and coral content. Soil availability presents an even bigger challenge to outer islanders who rent property on Funafuti as they must request permission to move soil from the landowner. Given that overcrowding it is common, it is also common for households to have no soil around their house. This situation is made more complex by shortages of land for food production in general, both on Funafuti and outer islands. Soil can be purchased however the quality and sand content varies hugely as does the amount currently available for purchase from the Funafuti Waste Management Facility.

- **Limited knowledge in soil and compost management techniques for optimum soil health, fertility and productivity**

The RAP results showed there has been a noticeable decline in the transfer of traditional knowledge on farming and food producing practices, including knowledge on how to conserve and manage soil and make compost. The RAP identified that there is great need and desire for community based extension activities to educate householders on how to make compost and 'read' soil health and improve soil fertility and management to aid local produce production, particularly in raised garden beds at the household level.



- **Traditional crops and management practices are not currently designed to cope with saltwater intrusion and extreme climatic events**

Decline in diversity of food sources due to climate impacts both on Funafuti and outer islands coupled with low levels of motivation for involvement in agriculture in some islands has resulted in low production. This situation is worsened by the generational loss of traditional agricultural knowledge. Traditional knowledge, while extremely important and a strong base to draw from, is not specifically designed to cope with the climatic changes experienced, such as saltwater intrusion and extreme conditions such as those experienced during Cyclone Pam in 2015 which widely affected crops and pulaka pits. While some islands are trialling new adaptive approaches and climate resistant species, adaptive practices are not currently widespread.

- **Delayed arrival of cargo ships due to bad weather and inability to manage local food production systems to cover shortfalls**

Weather forecast limitations result in limited capacity of cargo ships carrying imported foods to negotiate bad weather conditions between Fiji and Funafuti. When ships are delayed communities become reliant on local food production and are often unprepared for changing weather patterns that may result in crop losses and reduced subsistence food security; this in turn increases reliance on imported foods.

Summary of RAP findings

Findings for the three learning areas are based on perceptions articulated by RAP participants during the research:

1. Unexpectedly, despite collecting sex disaggregated findings and facilitating community workshops for women and men in different spaces, female and male answers were found to be so convergent that for most exercises the findings have been grouped together to avoid repetition. This may reflect participant comments regarding how women and men working together well in planning and decision making for natural resources, despite carrying out different roles in the natural environment. Youth perceptions on some topics were found to be different from adults and reflect the need for targeted and clever approaches to engage youth.
2. Outer islanders living on Funafuti are the most vulnerable to food security and are disproportionately affected by food insecurity; they are highly reliant on family living in the outer islands sending food, and if there is a shortage in supply, or a delay in shipping coupled with a food shortage in the shops, they have no reliable access to food sources. They have no rights to use soil on Funafuti and must gain the landowner's permission to access any soil around their high-density housing.
3. Food insecurity and risks in Tuvalu have come about mainly through climate stressed soils and seawater inundation coupled with a reduction in per capita food production and a rapid rate of migration from outer islands to Funafuti. The RAP showed that national food security is dependant on the revival in some locations, and continuation in others, of subsistence farming as well as embracing existing and new climate adaptive practices, crop varieties and innovative ideas toward increasing local crop production. Increased productivity is crucial for improving national nutrition, and helping to alleviate food poverty to increase the economic accessibility of nutritious local food by households.
4. Climate change is affecting all RAP communities with climate variations and extremes disrupting all island food production systems to some extent. Changes in rainfall patterns, as well as frequency of drought and extreme weather events (such as tropical cyclones) were cited as particular concerns leaving lasting impacts. The islands' remoteness increases their vulnerability. The RAP shared stories of food risks and crisis as a result of storm water surges or 'big waves', salt water inundation, high winds knocking down trees, and the lingering affects of Cyclone Pam and Cyclone Ula on local food systems four years on.
5. Local foods consumed today are not very diversified compared to the past and women and men are aware that the risks associated with reliance on imported foods are extremely high. The RAP found reduced food security especially at a household level as a direct and indirect result of a changing climate and direct and indirect result of changes in lifestyle choices in food consumption. The decline in food production and supply of nutritional food is impacting national health.
6. Outer island and Funafuti dietary patterns are slightly different; generally those on Funafuti are a step further removed from natural systems than those living on outer islands, and thus their reliance on imported foods is higher.
7. Despite some local foods being more readily available on outer islands, some families still prefer to purchase items from the shops, indicating that availability and accessibility alone do not prompt consumption of local food.

8. Women and men held a similar understanding toward the changes in local food access, quality, and the effects on nutrition and livelihoods through increasing reliance on store purchased imported foods.
9. Women were more aware of the impact of store bought foods on stretching of family finances. The RAP found reliance on imported foods added pressure to family finances as imported foods rely on the consistent availability of household cash for their purchase. Further, available cash levels strongly effect how families can respond to situations of low local food production. In some cases cheap imported foods (e.g. rice and biscuits) compete with the choice to invest inputs (soil and compost) and labour on local crops, increasing dependence on an unstable import market and contributing to high rates of diabetes, heart disease and stroke.
10. All RAP participants, particularly men and male youth noted changes in traditional crop quality and quantity resulting in a decline in food security. Reportedly some communities are becoming less motivated and discouraged by poor quality harvests which are further reducing the diversity of crops which require 'hard manual work' and dependence on imported foods with high fat and sugar contents is rising.
11. In all RAP locations declining crop production was seen to have an effect on peoples' willingness to invest effort in planting.
12. While RAP participants, young and old, were cognisant of the connection between increased reliance on imported foods and prevalence of NCDs, most were still consuming them as they recognise they are easier and less time intensive to prepare compared to traditional foods.
13. Youth willingness to change consumption behaviours and reduce reliance on imported foods was lower than their adult counterparts. An attitude among many young people today is that it's 'chic' to buy food and not produce it.
14. According to RAP participants women and men participate in agricultural decision-making and planning together despite taking on different gendered labour roles; men and male youth undertake most of the heavy garden labour and deep sea fishing, while women undertake lighter labour, and are in charge of food preparation decisions.
15. Participants are highly aware that food security is impacted by a range of variables, including, but not limited to, changes in climate.
16. Participants were asked to describe what they think local food access and availability will be like in ten years time if things continue as they are, the majority of females ranked future access and availability as 'poor' while the majority of men ranked it as 'very poor'. This indicates that awareness of food security impacts and the need to change is high.
17. Many households feel that they lack the knowledge, physical tools (such as shredders), and agricultural skills to adapt their farming/gardening techniques for changing climatic conditions. Despite this the willingness and desire to learn among adults is high, however it is not high for youth, particularly those living in Funafuti.
18. Climatic changes were noted to impact female and male lives differently with women being more resilient in terms of food security for the family, and men more resilient in relation to planning infrastructure and shelter. These different gendered vulnerabilities highlighted the need for women and men to work together in navigating and planning for climate variability.

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19. Willingness to increase local crop production and decrease reliance on imported foods among female and male adults presents an important driver and entry point for the project to engender buy-in and ownership from the outset. Those who are most impacted by food insecurity were found to be those who have the strongest desire to change, and try raised garden bed technology.
 20. The Biofilta garden characteristic of being raised off the ground was enjoyed by all trial participants, however it appeared that other technical features of Biofilta, including its wicking technology and water storage system, was struggling to function as intended in the Tuvaluan context. Participants reported water getting 'too hot' or 'boiling' inside the units and reported that the dark grey and black plastic surface of the Biofilta was 'frying the leaves off plants' when the plants touched the plastic surrounds.
 21. Several households have started to adapt the use of their Biofilta to local conditions and some participants suggested locally made raised garden bed solutions might be more suited to the local environment. Participants suggested that raised garden beds made out of local wood materials might function just as well if not better than the plastic tubs in the prevailing extreme conditions unique to Tuvalu.
 22. The main advantages of Biofilta cited by women and men trialling the systems (using their expression) are: it's space saving, the raised tubs are out of reach of roaming animals, families are eating more fresh vegetables than before, it reduces the money spent at the shops on vegetables, and Biofilta requires less work compared to planting in the ground.
 23. Females and males young and old across government, NGO and community stakeholders cited that there is a low knowledge base among the general public on how to make compost for home gardens.
 24. While a return to an entirely subsistence way of life to feed the whole population is unrealistic, participants easily identified that local production strategically needs to remain at the core of the food system.

What are the strategic design priorities?

According to participants the following design priorities are considered necessary for increasing traditional crop production, increasing uptake of new raised garden bed technology and decreasing reliance on imported foods:

1. **Increase access to appropriate knowledge, skills and solutions to revive and adapt agricultural practices to a changing climate**
2. **Revive traditional food preservation skills** particularly among established women's groups
3. **Build a base of skills to support home based vegetable gardens** using community led demonstration gardens and supportive neighbour buddy systems
4. **Source reliable soil and compost** through Kaupules and/or Waste Management Facilities and/or seek to improve Funafuti householder access to no cost or low cost quality soil and compost inputs
5. **Change attitudes toward consumption of traditional crops** through clever messaging and strategic design interventions
6. **Identify change champions**, especially youth champions from among local communities with the assistance of the Fale Kaupule
7. **Use the existing communication and planning channels of local Kaupule** to own the project and integrate delivery into their strategic planning
8. **Work with the Department of Agriculture** for technical support as well as the equitable dispersion of Biofiltas and other locally made raised garden bed alternatives using a set of household criteria
9. **Seek alternative or complimentary locally sourced and made raised garden beds for use at the household level** made from wood and corrugated iron that can cope with local climate conditions are easier to source than Biofilter at lower cost for more widespread uptake
10. **Consider large raised concrete units for reviving traditional agricultural crops for Kaupule communal gardens** and utilise climate resistant crop varieties from the Taiwanese Garden
11. **Consider innovative and different ways of growing food**, such as vertical pumpkins, demonstrated by the Taiwanese Garden so they are raised from the saline ground and save space
12. **Set up demonstration kitchens** to demonstrate new time-efficient preparation of traditional local crops as well as homegrown garden vegetables
13. **Increase household raised garden bed gardening knowledge and skills particularly for youth** to get them involved and encouraged and decrease reliance on foods from shops
14. **Provide financial management and literacy** support for households to participate in a Funafuti marketplace for traditional foods and sustainable livelihoods from food production systems as proposed by the Funafuti Kaupule
15. **Develop household based food security risk self-assessments** to inform the creation of adaptation plans and support behavior changes

16. **Build upon existing behaviour change efforts to increase consumption of local foods.** Seek to integrate the successful and familiar behaviour change songs and messaging
17. **Seek to work alongside and strengthen participation of local community organisations in sustainable management of food producing sources**
18. **Link to and work with regional organisations, national government, Kaupule and civil society organisations who are creating change toward food security**
19. **Mainstream a gender focus into the Tuvalu Food Futures project.** The RAP highlighted that deliberate efforts should be made to upskill young women together with young men on gardening techniques as it is the youth who are most hesitant to change their food consumption behaviours
20. **Build on existing community and gendered strengths,** and give upward importance to working with and strengthening established and organised Kaupule women's and men's and youth associations.
21. **Establish a community-based advisory group** of interested community members and others outside the project to support change, test ideas, share challenges and celebrate success over the life of the project and beyond
22. **Mainstream gender inclusive food security planning and management** as part of broader climate change adaptation activities with inclusive decision making systems
23. **Support the TASMP and NAPA as well as regional food security plan for the wider Pacific**

Who are the key strategic project partners?

1. The Kaupule are the most important partner for the Tuvalu Food Futures project to support access to well-structured women's, men's and youth groups and undertake much of the project implementation. They may also potentially provide a consistent compost supply to communities on Funafuti as well as an open air market for local produce commencing in 2020.
2. The Department of Agriculture will provide important technical know-how, extension support and decision making on 'who' receives Biofiltas and other alternate locally sourced raised garden beds.
3. The Taiwanese Garden, SPC, and ACIAR are central for provision of free vegetable seedlings and salt resistant local crop varieties and well as soil knowledge.
4. The new Waste Management Facility on Funafuti is key for provision of soil and compost for purchase.
5. Tuvalu Live & Learn Board members are an extremely strong supporting body with their combined health and agricultural wisdom, culturally relevant behaviour change knowledge, contextual understanding and local connections to all the strategic organisations to work and partner with.

Design principles

RAP discussions with supporting organisations and other stakeholders identified some core principles and processes that are relevant to the forthcoming Tuvalu Food Futures project to minimise risk and ensure the project is culturally appropriate and effective:

- Align and coordinate with the TASMP to fully integrate efforts to increase consumption of local food
- Seek opportunities to support the TASMP - the TASMP identifies the potential to work with local NGOs, such as TANGO and their constituents
- Embed a transdisciplinary approach among major stakeholders (health, education, environment, rural development, gender and agriculture, Kaupule and TANGO)
- Seek for the Fale Kaupule and Kaupule to lead many of the decision making components of the project
- Build on the existing work and messaging done by the Department of Education, Health and local media to encourage local people to eat more local foods for healthy bodies and minds
- Build on existing local strengths and leadership, including the garden sites or working 'farms' managed by the Taiwan Technical Mission to Tuvalu. TTMT have a mandate to provide seedlings to the community to support home gardening activities.
- Utilise and support existing organised groups, systems and structures
- Promote an inclusive society through inclusive and equitable implementation
- Seek to build up the relationships, accountability and engagement between governments and farming individuals and groups
- Deliver visible results in the short term (as well as the longer term) and celebrate success along the way
- Avoid over-engineering; use realistic timeframes and ensure predictability
- Promote mutual accountability, and responsible partners
- Promote coordination and harmonisation with other complimentary programs nationally and in the Pacific region

Lessons learnt during the RAP process

The RAP proved to be a highly useful approach to gaining insights into the perceptions and aspirations of communities in Tuvalu toward food security. The approach engendered levels of trust, and led to participation and engagement in the form of critical reflection.

The RAP approach proved to be important for:

- Design that is evidence-based and grounded in community and individuals' reality
- Building a foundation of inclusion with island councils to carry forward which acts to remove the 'them and us' or 'give and take' mentality commonly associated with community based aid provision
- Managing project expectations in a partnership approach with the Kaupule
- Avoiding tokenistic consultation 'after the fact' on a finished design 'from Canberra'
- Ensuring the integrity of starting to engender community ownership of the project from the outset to lead into the community engagement framework

Additional lessons emerging from this RAP and its insight into community use of new raised garden bed technology:

- It is imperative that technological 'fixes' have socio-cultural and environmental 'fits'; just because an innovation works in one context, it may not work in the same way in another cultural or environmental context. The RAP reaffirmed that food security in Tuvalu should not be focussed on a new good looking 'tub' to grow food, but on increasing the knowledge, skills and capacity of local women, men and youth to become less reliant on imported food through reviving traditional agriculture and growing household vegetables, reviving food preservation knowledge as well as new cooking preparation skills of both traditional foods and fresh vegetables for food security.

The meaning and value of RAP involvement to participant motivation for food security is illustrated through unprompted statements from participants:

This (RAP) has made me want to create awareness among my leaders for more local food production. I can help the Fale Kaupule to inform the Kaupule to establish nurseries for more locally grown food crops. (Man, Nuitao)

I am growing seedlings and sharing them with my family and neighbours, this project really excites me as it supports my dream of growing more local food. (Woman, Vaitupu)



RAP context & purpose

The RAP was undertaken in mid June 2019 to inform a community engagement framework and a project design process for the DFAT funded Tuvalu Food Futures Project. The RAP is a good fit with Live & Learn's on going programme on climate change adaptation in the Pacific seeking to deliver low cost, community based adaptation activities that are easy to scale up in remote island locations.

Context

At just 26km squared, Tuvalu is the fourth smallest country in the world. Home to approximately 11,000 people, the average elevation of Tuvalu is just 1.83m above sea level, making it subject to salt intrusion and vulnerable to climate change and rising sea levels. With three reef islands and six coral atolls, soil quality across Tuvalu is generally poor, and growing food is very challenging. Traditional gardens are increasingly subject to salt water inundation and access to nutrient rich growing media is limited.

Currently food production in Tuvalu is limited to a few sites, with supply insufficient to meet consumer demand. The Tuvalu Strategic Marketing Plan (TASMP) 2016-2025 details the Tuvalu government's plan for increasing food security. The overall vision for the TASMP is "to revive the marketing of local food and other local produce to increase the resilience of the Tuvalu people to climate change." The TASMP articulates six (6) objectives with three (3) directly relevant to areas where the Tuvalu Food Futures project will seek change:

- 1) Increase local food consumption and decrease reliance on imported food
- 2) Revive traditional integrated farming practices and consequently increase land productivity
- 3) Increase knowledge and awareness on the benefits of local food

These change areas seek to support the project goal to strengthen the resilience of communities in Tuvalu to climate change.

The Government of Tuvalu led the implementation of the Strategic Action Plan Framework for the TASMP. The TASMP was requested by the Department of Agriculture (DOA) but requires coordination with an support from other government departments including:

1. Coordination to ensure adequate allocation of resources and funds to the DOA
2. Communications campaign through education and health sectors and the media
3. Development and implementation of relevant education curricula that are focused on changing the mindset and attitude of the people of Tuvalu; and
4. Multi-disciplinary approach among major stakeholders (health, education, environment, rural development, gender and agriculture) to fully integrate efforts to increase consumption of local food and production of traditional handicrafts

The plan also notes that the DOA, Fale Kaupule and Kaupule (local government) adopt a policy for their respective communities to clear and utilize their land more effectively, contributing to increased agricultural production and to encourage their people to eat more local food. It also identifies the potential to work with NGOs such as TANGO and the Tuvalu National Private Sector Organisation to provide technical backstopping to the people involved in the sale of local food.

Several interrelated development activities are currently operating in Tuvalu. Two garden sites or working 'farms' are managed by the Taiwan Technical Mission to Tuvalu (TTMT) – one in Funafuti and one on Vaitupu Island (where the high school is located). The Funafuti garden was established in 2004 and covers a total area of approximately 0.58 ha and the Vaitupu garden was established in 2014 and covers 1.5 ha. The demonstration gardens aim to encourage Tuvaluans to eat more fruit and vegetables, to contribute to improved nutrition and promote home gardening to increase food supply. The garden sites have a mandate to provide seedlings to the community to support home gardening. Produce including tomatoes, cucumbers, cabbages, and beans from the farm site in Funafuti is sold weekly from the farm, with queues forming from early in the morning and demand for produce exceeds supply resulting in people bring unable to access sufficient fresh produce for their home needs. The produce from the Vaitupu garden is used to feed the high school students which excess given away rather than sold or shipped to other islands. Other produce is available however as it is imported, it is generally frozen, or of poor quality.

In 2016 DFAT's innovationXchange commissioned a global challenge, LAUNCH food, in partnership with the USAID's Global Development Lab and LAUNCH, a network-centered innovation platform based in the USA. LAUNCH food aimed to find new solutions to address global malnutrition by supporting households to make healthier food choices. Biofilta, a Melbourne based environmental engineering consultancy was selected as one of 11 winning applications and was provided with initial funding to support a trial of their modular wicking gardening systems – the FoodWall and FoodCube – in a low-lying atoll environment. The purpose of these trials was to understand whether the technology would work in the challenging context of Tuvalu and to investigate whether gardens could be established using only on-island resources or if imported growing media would be required.

In the initial trial 100m squared of Food Wall systems were imported and distributed between 2 schools, the local hospital, the Red Cross, the University of the South Pacific, and 25 households on Funafuti. The systems were delivered in two phases, June 2018 and November 2018. Anecdotal results and experiences from using the systems in June 2019 are varied with the biggest perceived challenges being heat effects on water storage and plant growth, and soil acquisition and management.

Other organisations are making important contributions for the food security challenges in Tuvalu. The Secretariat for the Pacific Community (SPC) is providing technical support, training and advice in the areas of genetic resources, sustainable agriculture, and markets for livelihoods. ACIAR is focused on soil health projects, including research on appropriate composting practices and inputs to improve soil health. Outputs of the ACIAR project include fact sheets about nutritious leafy greens that are available but underutilised, compost 'recipes', and information about producing healthy and productive soil with locally available input materials. The ACIAR project received an extension and is due to conclude in December 2019.

Rapid Assessment of Perceptions (RAP)



The RAP is an investigative social research method developed by Live & Learn Environmental Education to gauge community aspirations and perceptions toward sustainable development issues. At its core the RAP methodology acknowledges the intimate relationship that exists between people and the environment.

For project design to be effective, involving the community during the design phase is highly beneficial, not only for identifying where and how support can best be provided, but by engendering trust and ownership from the outset through genuine community engagement. The findings of the RAP are intended to inform a viable and effective community engagement plan and project design. These two documents will be developed using, among other things, the RAP findings.

A RAP is explained by Live & Learn as:

A semi-structured process of learning with and from communities about their aspirations and perceptions toward access and power structures, existing human capital strengths and weaknesses, local capabilities, and other relevant social, cultural, political, environmental and economic information to the subject being explored.

Accordingly, this RAP captures gendered community perceptions toward issues linked to food security. It strives to gauge where strengths and opportunities exist to support socially and culturally appropriate channels for change. During the RAP participants explored different aspects of the resilience of food production systems in their personal past, present and future contexts.

Ideally, social research should entail a long-term comprehensive exploration and analysis of all stakeholder perceptions, issues and options. Practically, as a result of resource constraints, this level of sustained research is not feasible for this RAP. As such, it should be noted that the findings in this report are not based on statistically sound data sets however they are of high value as they do present the perceptions and stories shared with the research team by over 120 participants, female and male, young and old, across the 8 island communities of Tuvalu. Participants engaged in the RAP were from gendered vertical and horizontal 'slices' of each of the 8 communities, however there was a higher number of women than which was found to be a positive yet unplanned outcome.

Key RAP learning areas & research questions

The RAP endeavours to provide insights into a number of overarching research questions. Please note that these were not the questions asked in the RAP, however they guided the development of RAP tools and activities. The research questions have been divided into three learning areas that broadly support the TASMP objectives:

Learning Area 1: Perceptions toward increasing local food consumption and decreasing reliance on imported foods

1. What are the (gendered) perceptions of past, present and future local food availability, diversity and sources?

- a. What are the perceived issues or challenges related to current local farming and gardening practices and food/crop quality?
- b. What are the main food sources of communities and how do communities produce local food?
- c. What is the proportion of imported food to subsistence food production and the main crops for each community?

2. What are the (gendered) perceived root causes of reliance on imported foods?

- a. What are community observations of climate and environmental changes and how is this affecting lifestyles?

3. Is increasing local food consumption and decreasing reliance on imported foods perceived as desirable?

- a. Is there existing demand for fresh locally grown produce (household vegetables) if it is made easily and reliably accessible?
- b. Which local foods would communities (female/males) most like to see an increase in?
- c. What are household perceptions (knowledge, attitudes and practices) toward growing and consuming vegetables for their diet?
- d. What are perceptions toward the time spent producing and preparing food versus the amount and quality of production in the past, present and projections for the future?

4. What changes have happened or are happening in communities to increase local food consumption and decrease reliance on imported foods?

- a. How have the changes impacts families and communities on Funafuti and on outer islands?
- b. If changes are occurring and are positive, what needs to happen to 'upscale it'?

5. For families who have increased their local food consumption, how is this demonstrated and what are the perceived affects and changes (positive and negative)?

6. For families who have not increased their local food consumption, what are the barriers and perceived affects and changes (positive and negative)?

Learning Area 2: Perceptions on reviving traditional farming practices and embracing new technology

1. What perceptions exist on the main opportunities and challenges for reviving traditional integrated farming practices and embracing new tech practices?

- a. What capacity do households have to purchase local vegetables or dedicate time to home gardening, waste management, composting or community gardening?
- b. What experiences do households have with home horticulture, both traditional methods and raised garden beds such as Biofilta's stepped FoodWalls?
- c. In what sort of groupings do people produce their main local food sources? (E.g. households, cooperatives, council groupings etc).
- d. What's the difference in opportunities and services for indigenous Funafuti residents vs outer island migrants to Funafuti as well as between outer islands?

2. Who holds the decision making power for traditional food production systems and how will this affect capacity to revive traditional land-based farming practices?

- a. Who (females, males, young or old) undertakes different food product labour and how will this influence the capacity to revive farming practices?

3. What are household and community perceptions toward compost? Including:

- a. Attitudes toward making compost at the households level? Attitudes toward inputs like kitchen waste, pig manure and human waste?
- b. Perceptions toward the investment in compost for greater productivity?
- c. Attitudes toward sourcing compost and moving compost between locations?
- d. What human and technical challenges, opportunities and good practices exist for effective participation in composting?

4. What are community members' perceived interest levels for participation in using new raised garden bed tech such as Biofilta?

- a. Would people prefer to use the Biofilta at the household level or a collective level (E.g. Council level with shared inputs, produce and profits)?
- b. What human and technical challenges, opportunities and good practices exist for effective adult and youth female and male participation in using the Biofilta? E.g. Availability of inputs for the Biofilta, the commitment and management of it.

Learning Area 3: Perceptions towards increasing knowledge and awareness of the benefits of local food

1. **What attitudes, knowledge and practices do female and male youth and adults have toward the benefits of local food on nutrition and lifestyle?**
 - a. What do they currently know and what would they like to know?
 - b. Where do they source their information on healthy lifestyles?
 - c. Where do the key knowledge gaps lie? What knowledge networks exist?

2. **Can female and male youths and adults identify the relationship between food security and the necessity for changes in food production techniques through climate adaptation?**
 - a. How will climatic changes or variability impact female and males lives differently? What does this mean for leadership and climate adaptation for food security champions?

3. **What are the gendered perceptions for people's capacity to make changes to the way they produce / source food?**
 - a. Are women and men willing to make changes?

4. **What health and nutrition educational programs or behaviour change messaging have been effective (or not effective) in changing dietary knowledge, attitudes and practices in Tuvalu?**

5. **Who are the key community change agents and who holds the power to make change happen and drive sustainability toward better food futures in Tuvalu?**

6. **What is the best way to build trust and capacity between the community and other stakeholders?**
 - a. How can we best ensure communities feel connected to Food Futures and there is coordination of actors with Food Futures?

7. **What challenges, opportunities and good practices exist for partnerships for Tuvalu Food Futures?**
 - a. What is the perceived level interest for involvement and partnership?
 - b. What engagement mechanisms and entry points are appropriate for different change agents?
 - c. What existing strengths and capacities can communities build on to embrace the Tuvalu Food Futures Project?

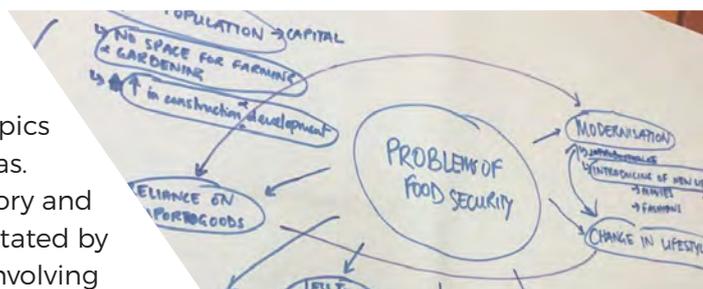
Please note that not all Learning Area questions were explored in depth through the RAP activities, given that RAP workshops ran for one day, with devotion, morning and afternoon tea and lunch breaks, and household interviews were 30minutes to 1 hour, time was limited. As such more information emerged on some Learning Areas questions than others, often reflecting what participants chose to focus on and share. Despite this, while some research questions do not have their own headings in this RAP report, information on perceptions linked to each one can be found in different places within the report.

Data collection methodology & approach

The RAP uses a mix of qualitative and quantitative research methods to facilitate the exploration of relationships and interactions around food security topics and gendered perceptions toward the 3 Learning Areas.

The RAP data collection approach is highly participatory and utilises a combination of: community workshops facilitated by local staff with separate men's and women's groups involving storytelling, group responses to visual stimuli, exploration of a real

life Biofilta, crop/food ranking cards, 'food stress' indicator cards, cause and effect diagrams, and individual and collective drawings and discussions. In addition were individual semi-structured site visits for households and organisations trialling Biofiltas, one-on-one home-based interviews for women caring for children, and additional post workshop one-on-one surveys. Lastly, a Government, NGO, CSO and private sector workshop was facilitated and followed up with informal interviews with different departments and stakeholders.



It was critical to involve and separate women and young women from men and young men for the community focus group workshops particularly to provide females with a space for participation and story sharing with other females. The focus group workshops (known as Learning Circles) were the primary means by which perceptions, reflections and aspirations were generally shared by the communities and documented in the RAP. Learning Circles are similar to focus groups however they also generate learning during participation. Participants sit in the shape of a circle for some activities for learning purposes. Learning Circles seek to reveal views and opinions and help participants reflect on what they know as well as what they have learnt during the research process. Learning Circle discussions enable participants to listen, discuss and share ideas effectively together, which adds to learning outcomes from the Learning Circle itself. Learning Circles were facilitated by one NGO in-country staff and recorded by one or two local note takers and the process supported a consultant and the LLEE Regional Manager.

The RAP approach emphasises the importance of participatory research and the role of community members in initiating, collecting and using their own data, as well as the collaboration of community members with others (in this case Live & Learn community facilitators and researchers) so that the participants lead the transfer of knowledge and shape the design of a project.

Ethical practices

From the outset the RAP sought to follow ethical practices. This includes the practice of obtaining informed consent from all research participants and ensuring all research participants remain anonymous in notetaking and reporting. The only identifies used were to indicate sex, age group and location.

It was decided that RAP activities would be informed by a number of key principles to ensure ethical research practice. The principles include:

- Respect for cultural values and choice of individuals to make their own decisions, including about their participation in the research.
- Mindfulness of the benefit of the research for those that participate in it by ensuring that the participants of the research gain benefit from their participation.
- Fairness in participation - including opportunity to participate, fair distribution of benefits of the research and ensuring no unfair burden of participation.
- Value and integrity - ensuring there is value of the research to research participants and ensuring the quality and integrity of the research itself through appropriate capacity and skills development in local staff undertaking 'researcher' roles.

RAP participants & geographic coverage

Communities invited to take part in this RAP included communities from all eight Tuvaluan islands. All islands are impacted by many common and some different issues in respect to food security.

The RAP focus group workshops were carried out in the UN Partnership Office and at the USP campus with all other activities taking place in offices, households and onsite gardens. Communities involved in the RAP are listed below in Table 1.

Table 1 RAP Participants

RAP Activity	Participants	Females Adults	Female Youth	Male Adults	Male Youth
Community Workshop 1	Nanumea, Nanumaga, Nukulaelae, Nui	8	3	4	3
Community Workshop 2	Nuitao, Viatupu, Nukufetau, Funafuti	7	1	7	3
Community member one-on-one surveys		21	2	18	5
Government, NGO, CSO Workshop 1 and one-on-one surveys	Ministry of Health Department of Environment Department of Education Department of Agriculture Funafuti Kaupule Funafuti Youth Association Funafuti Women's Association TANGO Red Cross	8	1	4	1
Households and organisations trialling Biofilta FoodWall interviews	14 dispersed across Funafuti	10		4	
Government, NGO, CSO, local government and other donor one-on-one discussions		4		6	
		Total: 58 (48%)	Total: 7 (6%)	Total: 43 (36%)	Total: 12 (10%)
	Total 120 participants	65 Women (54%)		55 Men (46%)	

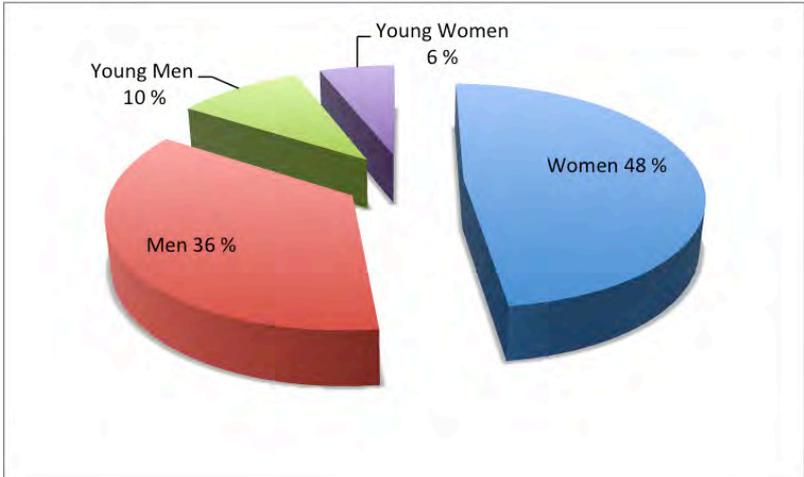
Figure 1 Map of Tuvalu



Gender distribution of RAP participants

The RAP was carried out on the main island of Funafuti and included indigenous Funafuti people, people visiting Funafuti from the 7 outer islands as well as people residing (renting properties) on Funafuti from the 7 outer islands. The research involved people from all 8 islands that make up Tuvalu, spanning a total of 120 participants (54% women and young women and 46% men and young men). The gender distribution of all participants is shown below in Figure 1.

Figure 1 - Gender Distribution of RAP Participants



Local RAP staff undertook engagement visits to all communities inviting community leaders to gather their community members to take part in the research to assist in informing the design of a food security project with a view to potential future involvement in the project. Key leaders in each community were asked to ensure participant gender balance along with diversity in age and socio-economic status. Despite these efforts, participation rates varied as unforeseen cultural events (e.g. funerals) arose on some days. Some women found it hard to attend due to issues related to travel to the research site and proximity from children and family responsibilities. In response to this RAP staff went to their houses to interview them face to face with the children present. Positively, a high portion of both male youth and female youth attended the RAP, illustrating both their interest and sound organisational capacity of some community leaders.

Some similarities in sex-disaggregated findings were identified across islands however differences also existed between some locations. The biggest differences are felt between indigenous Funafuti residents, outer islanders, and those from outer islands who have migrated to Funafuti and rent houses. Where common findings emerged, similar answers were coded and grouped together; where they did not converge, they have been highlighted by sharing stories and experiences to focus on differences between specific island communities. We thank the women and men of the research communities for allowing us to share their stories in this format.

LEARNING AREA 1:

Perceptions toward increasing local food consumption and decreasing reliance on imported foods



Findings:

1. Participants identified the dietary shift that has taken place between the past and present – a decrease of local food consumption and an increase of consumption of imported foods.
2. Outer islanders were found to consume the biggest diversity of fresh local foods followed by indigenous Funafuti communities followed by outer islanders living in Funafuti.
3. Outer islanders living on Funafuti were seen to be the most reliant on imported foods and as a result the most vulnerable to shocks in the food and import system. Their reliance on food being sent from their home island is also challenging as supply is declining, especially pulaka and coconut due to upward migration rates to Funafuti and New Zealand.
4. Participants reflected that food security is impacted by a range of variables including, but not limited to, changes in climate. While imports have contributed to food security by making more foods available, they also pose a big threat by exposing communities to poor quality foods - many are high in calories and low in vitamins and minerals.
5. The importance of traditional agricultural knowledge for traditional crops still carries extreme cultural importance for elders however young people are reportedly not actively seeking this knowledge.
6. Despite some local foods being more readily available on outer islands, some families still prefer to purchase items from the shops, indicating that availability and accessibility alone do not prompt consumption of local food.
7. It became apparent throughout the RAP that local food availability, particularly for youth didn't impact their consumption choices as different dietary and purchasing patterns are linked by young people (and some adults) to social status whereby consuming store bought foods elevates perceived status.
8. Women, men and young people most commonly commented on the positive changes regarding reduced cooking and preparation time associated with store bought food. Women most frequently mentioned this benefit, reflecting their gender roles and responsibility in childcare and domestic duties including cooking.
9. Males and females young and old, were easily able to weigh up and identify the positive and negative attributes of a changing diet from local foods to store bought imported foods. While they have this knowledge, they commented that they still make the conscious choice to consume a large amount of imported foods.
10. Women's perception of the impact of declining food security reflected their gendered roles of home-makers and child carers with their cause and effect diagrams extending to look at how food issues affect the social cohesion of the community. Women made clear links between soil problems, increased population, as well as the effect of lack of youth involvement in agriculture in some communities on food availability.

11. Men's cause and effect diagrams focussed primarily on the impact on traditional crops caused by increased frequency of high winds, saltwater inundation and drought. Men also tended to diagram the impacts on sea resources and rodent and pest populations more readily than women who focussed on family health and wellbeing and family planning.
12. Women and men, young and old were able explain the complexity of food security and climate related issues and how those issues link to their everyday lives. Nearly all participants agreed that major issues exist relating to local food security. Many people, especially youth used words like 'bad weather' and 'climate change', and 'seawater inundation' showing their ability to describe 'what's causing?' food problems.
13. The cause and effect activity saw many participants identifying the root cause of reliance on imported foods as climate change (cyclones, changes in soil texture, droughts) together with introduction of new lifestyles, lacking parental guidance, and, lack of motivation.
14. In all RAP locations declining crop production was seen to have an effect on peoples' willingness to invest effort in planting.
15. The implications of catering for cultural obligations (e.g. church catering roster) and social functions on the quality of household food consumption was raised by both women and men.
16. Participants discussed their perceptions on why the quality of subsistence food has changed, the most frequently cited reasons were: bad weather, poor soil, increasing population, sea level rise and saltwater inundation and flow-on effects decreasing land availability such as over crowding in Funafuti and a cycle of reliance on imported foods and preference for imported foods.
17. All island communities reported experiencing climate and other stresses on their main crops frequently affecting quality and quantity of traditional foods.
18. Nearly all RAP participants cited eating more fresh local vegetables as desirable. It's likely that this change is a result of effective initiatives led by the Ministry of Health, Department of Education, local NGOs with effectively designed messages and behaviour change interventions.
19. The most frequently stated reasons to consume more fresh vegetables were for health and nutrition benefits and the main driver was to avoid non communicable diseases.
20. Participants commonly cited the hardest mindset and behaviours to change are those of the youth who have reportedly become ashamed of eating traditional food.
21. When asked about which local foods participants would most like to see an increase in, most male participants living on outer islands want to see an increase in the ease of growing traditional crops (pulaka, coconut, taro and breadfruit), using climate (e.g. salt and wind) resistant species.
22. Men and women on Funafuti and on outer islands identified a desire to consume more local foods if they were more accessible and easier and quicker to prepare. Preparation time was a key factor driving adults and youths to consume imported foods.
23. Most communities had some experience in climate adaptive practices to safeguard their food sources. Practices included raised pulaka pits, raised garden beds, demonstration agroforestry sites, a conscious effort to plant more and reviving the practice of food preservation, however these practices were not widespread.
24. During a food security visioning exercise the need was identified for a food market to be established on all islands to provide local foods for those unable to provide for themselves.

What are perceptions of past, present and future local food availability and sources?

To understand the context for trying to decrease imported food consumption and increase local food consumption, it was important to listen to local voices explaining the shift they are witnessing in their family food consumption patterns, attitudes and practices.

Main foods consumed in the past compared to today

During an introductory warm-up activity, separate men's and women's groups were asked to identify and reflect on the main foods they consume today and the main foods consumed in the past. All participants quickly identified extensive food lists and then discussed the trends, similarities and differences between the past and today. Despite men and women undertaking this exercise in separate locations across separate days, their responses and comments were so similar that they are grouped together below.

Table 2 Main foods consumed in the past compared to main foods consumed today

Tuvalu - Funafuti and Outer Islands	
Main foods consumed today	Main foods consumed in the past
Mainly: Rice Biscuits Bread Imported chicken Homegrown chicken Canned tuna Other imported canned foods Breadfruit Pulaka (root crop) Imported taro (from Fiji) Laulu (local green fern)	Pulaka (baked, grated, or preserved) Taro (root crop) Pandanus Breadfruit Coconut Uto (sweet chewable fibre found in pandanus and coconut, eaten fresh or roasted to preserve it) Bananas Laulu (local green fern) Fig Germinating nuts (stored to preserve them)
Some: Pumpkin Cassava Pandanus Cabbage Taiwanese Pawpaw Taiwanese Cucumber Fresh caught fish Crabs Clam Pork Main drinks: Water, soda in cans and cordial	Felo (small apple-like fruit) Locally raised chicken Locally raised pork Locally caught fish (dried/salted for preservation) Clams Crabs Seashells Turtles Seabirds Main drinks: 'Toddy' (sweet sap found in coconut palms), and coconut water

In deconstructing and talking about the change in foods consumed in the past compared to today, participants highlighted the shift that has taken place from a balanced diet of local foods to a diet high in carbohydrates and protein with increased reliance on imported (processed and tinned) foods. Representative participant reflections are shared below to help tell the story in their words:

We eat a lot of carbohydrates and protein and very little greens. (Woman, Government)

The big difference is that in the past they didn't use rice compared to nowadays, today (white) rice is the main dish. (Woman, Nui Island)

Mainly we eat rice and fish or rice and chicken. No vegetables. This is what we are given by our women at home. (Man, Government)

Everyday foods are rice, fish and chicken, no vegetables is normal. (Woman, Nui)

Chicken and rice is the main dish we see and eat on the table. (Man, Government)

In my everyday life I mostly eat rice and biscuit and chicken and our local food for special occasions. People just go the easy way now, they are too lazy. (Man, Nukufetau)

The reliance on imported foods purchased from local shops was heard strongly throughout all RAP activities as evidenced below:

Nowadays we prefer food from shops and local foods from the past are less used. (Youth, Nui)

Everyday food is from the shops. Sometimes we add local food sent by families living on outer islands. (Man, Government)

The biggest diversity of fresh local food consumed today was reported as being highest in outer island communities followed by a smaller amount consumed by indigenous Funafuti communities and even less consumed by outer islanders living in Funafuti. Accordingly, some participants living on outer islanders reported a more balanced current diet richer in traditional foods than those on Funafuti:

In my home island food is prepared in a different way (to Funafuti), food is salted, more toddy is drunk and pork and some other foods are still cooked underground. (Man, Nanumaga)

I am healthy because I eat traditional crops and have a big home garden. I don't eat as much rice and canned tuna as my neighbours. (Woman, Vaitupu)

Women also commented that in the past more traditional local foods were eaten and the preparation of foods was different; in the past preservation was key to navigating through uncertain times:

In the past everything cooked went into earth ovens or was salted for preservation. (Woman, Nui)



In the past men were very focussed on different ways of preparing root crops. Most of the food eaten today is frozen but in the past most of it was preserved or dried. (Man, Nanumea)

Nowadays people on the outer islands are relying more and more on imported foods. (Man, Government)

Initial discussions reflected that food security is impacted by a range of variables including, but not limited to, changes in climate. While imports have contributed to food security by making more foods available, they also pose a big threat by exposing communities to poor quality foods - many are high in calories and low in vitamins and minerals. Participants commonly talked about concerns for foods being frozen many times over and exceeded expiry date:

Most of the imported foods from overseas are frozen foods and are not fresh and many can be found to be bad or expired. (Man, Nanumea)

I don't know how long the food has been there or if it has been injected with chemicals and fertilizers. (Woman, Nukulaelae)

We just don't know how many times a bag of vegetables have been frozen and refrozen before we get them. (Man, Niutao)

The RAP found reliance on imported foods added pressure to family finances as imported foods rely on the consistent availability of household cash for their purchase. Further, available cash levels strongly effect how families can respond to situations of low local food production. In some cases cheap imported foods (e.g. rice and biscuits) compete with the choice to invest inputs (soil and compost) and labour time on local crops, increasing dependence on an unstable import market and contributing to high rates of diabetes, heart disease and stroke:

A big part of my family's budget is spent on food because my home garden cannot fully supply my household needs. Our diet also lacks greens. (Woman, Vaitupu)

We now have shortage of cash flow because we spend our money to buy food from the shops instead of planting our own. (Woman, Funafuti)

While a return to an entirely subsistence way of life to feed the whole population is unrealistic, in some communities participants identified that local production strategically needs to remain at the core of the food system:

People feel like they need to choose between modern or traditional lifestyles. The modern monetary lifestyle is pushing them into hardship. The solution is the grab the best of both worlds, while increasing the supply of local foods. (Woman, Funafuti)

Distribution of main food sources

In small gendered groups of females and males from the same island, workshop participants were given a large bag of buttons and were asked to arrange them in to piles to reflect what their main foods consumed today are while showing the relative quantities of the foods consumed by the size of their button piles. The activity provided a very visual representation to spark further conversation on access to local foods and other food security topics. Participants were then asked to group the buttons to represent where they source their main foods from and the relative quantities of food they source from each place.

The visual results of the button exercise to reflect the main foods eaten showed the narrow variety of carbohydrates and proteins consumed, and the comparatively small amount of green vegetables consumed and notably, a huge dependence on imported processed, tinned and frozen foods, generally, and especially for those living in Funafuti. These representations supported the stories shared in the above section about main foods consumed.

The visual results of the second button exercise to reflect where people source their food from showed slightly different results for Indigenous Funafuti people, outer islanders and outer islanders living on Funafuti:



Sources of food for Indigenous Funafuti

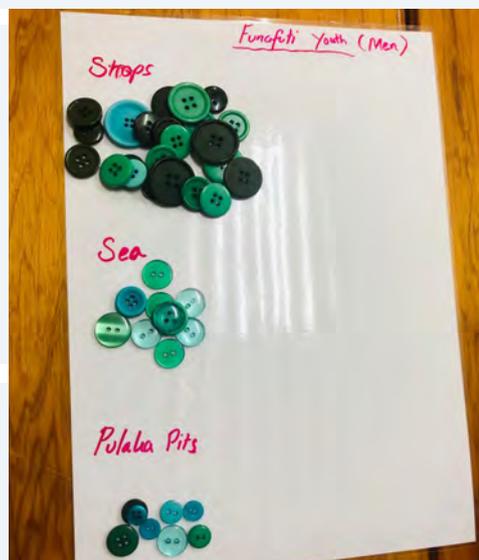
- 1st** Shops – largest button pile
- 2nd** Sea – smaller button pile
- 3rd** Taiwanese garden (the garden sells surplus vegetables weekly to people in Funafuti however supply doesn't meet demand) – even smaller button pile
- 4th** Pulaka pit – often an individual button (Depending on the family there may be a small pile representing foods from a home garden.)

Sources of food for outer islanders

- 1st** Shops – usually the largest button pile yet the pile is not as big as the 'shop' piles of Funafuti communities
- 2nd** Sea/ Motu / Islets / home gardens – smaller than the shop pile, yet even sized piles for each source
- 3rd** Pulaka pits – smaller button pile (Depending on the outer island there were small piles representing local foods bought from the island Kaupule.)

Sources of food for outer islanders living on Funafuti

- 1st** Shops – largest button pile
- 2nd** Sea – smaller button pile
- 3rd** Taiwanese garden / local crops sent by family on outer island – smaller but even button pile



The diversity of foods consumed by outer islanders was also notably bigger than those living on Funafuti. Outer islanders source more local foods from isletes and pulaka pits compared to indigenous Funafuti residents, consequently it was noted that people living on the outer islands tend to buy smaller quantities of imported items. Some participants commented on the price of store bought items being noticeably higher on the outer island compared to Funafuti.

Outer islanders living on Funafuti were seen to be the most reliant on imported foods and as a result are the most vulnerable to shocks in the food and import system. Their reliance of food being sent from their home island is also challenging as supply is declining, especially pulaka and coconut due to upward migration rates to Funafuti and New Zealand:

I migrated from Viatupu to Funafuti and there is now a big difference in my access to fresh local foods. On my home island I had my own plot of land for my gardens so I accessed so much local produce, and lots of varieties as well. Now I must buy all my vegetables, root crops and most of my families' food. There is no one left at our home island to send over coconuts and other basic local food items. (Woman from Viatupu living on Funafuti)



Reflections on changing patterns of local food availability

Participants were asked for their thoughts on why they think the foods they consume and their food sources they use have changed. Their responses highlight the different issues surrounding food accessibility and availability impacting local food security in Tuvalu.

A common answer among men and women was based on increasing population growth and decreasing land availability both on Funafuti and outer islands:

Our population is growing and the food is getting less. If the population continues to rise then it will be even harder for people to plant food. (Woman, Government)

On Vaitupu we have plenty of land with good fertile soil, unlike the other islands, however with over population land is scarce, as it has to be shared between so many people. (Man, Viatupu)



Participants commonly reflected on the changes in health, size and availability of local foods caused by changing environmental conditions:

Before the quality of pulaka was much more delicious compared to today. Pulaka, bananas and breadfruit are smaller now and some bananas are not available. This is because the soil is not as rich, and because of extreme weather conditions like king tides. When crops are destroyed people do not replant it as traditional planting knowledge is not being passed down. The new generation are relying on the shops and that's one reason they don't know how to plant banana and pulaka together in a big patch. (Woman, Nui)

We have less access to local crops now than before - I suppose it's because of these more frequent extreme weather events - now there are less crops to harvest. (Youth, Nanamaga)

Stories relating decline in local food availability to poor soil were heard through out all RAP activities:

It's difficult to grow food crops and do gardening because the soil is so poor. (Youth, Nui)

One food problem is the land - the lack of soil, and lack of soil fertility, lack of space and added effects of climate change. (Woman, Funafuti)

Men and women talked about how catching local fish now requires greater efforts and cash expense with changing environmental conditions:

My ancestors used their canoes to fish in the lagoon, but today we use our outboard motors to go further out to sea near the islets to find the good fish. (Woman, Nui)

Most of our food comes from the shops. It's easy, I buy food from the shops because I am too lazy to go out fishing. (Man, Funafuti)

Getting food from the sea in the outer islands now depends on money and availability of fuel, if we have enough then we go fishing because we have to go further, if not, then we just depend on the shops. (Man, Nui)

The importance of traditional agricultural knowledge for traditional crops still carries extreme cultural importance for elders however young people are reportedly not actively seeking this knowledge:

Here in Tuvalu we have a lot of varieties of local food but our young generation are lazy or have no knowledge on how to plant or grow them. Each Tuvalu family have their own secrets or knowledge on how to plan and grow pulaka, but they are not being shared. (Man, Government)

Young people don't know how or want to know how to prepare traditional foods, they don't know how to plant pulaka. (Man, Government)

Traditional agricultural knowledge is a family wisdom and they can't transfer it to today's younger generation. (Woman, Funafuti)

The young generation don't have the knowledge to plant local foods such as pulaka. (Youth, Funafuti)

Local pulaka and taro availability is notably lower on Funafuti than on outer islands with only five growers on the capital, as a result of low supply another root crop, taro is imported in large amounts from Rotuma, Fiji. Some participants cited the low availability of pulaka as contributing to the high availability and consumption of white rice:

Most families eat rice everyday. They only eat chicken and fish and always love to eat it with rice as it's easy and fast to cook. (Female Youth, Funafuti).

Foods have changes mostly because of our laziness and more job opportunities for both men and women makes them lazy in the gardens. (Female Youth, Nanumea)

Despite some local foods being more readily available on outer islands, some families still prefer to purchase items from the shops, indicating that availability and accessibility alone do not prompt consumption of local food:

People in Nui have many toddys but still they prefer to buy sugar from the shops. But if there is no sugar at the shops then they have no choice but to use toddy. (Man, Nui)

It was noted that food preservation was widely practiced in the past as key way to navigate times of uncertainty in climate and food availability, but is not common today:

Back in the old days we plant and grow all our own food. We preserved our food and it was still good to eat after two years. This is how we managed our food supply, but not today. (Man, Nanumea)

It became apparent throughout the RAP that local food availability, particularly for youth didn't impact their consumption choices as different dietary and purchasing patterns are linked by young people (and some adults) to social status whereby consuming store bought foods elevates perceived status:

Eating imported foods is now seen as 'being progressive' - it's a status thing. Particularly for young people, it's chic to buy food and not produce it. (Man, Government)

I do not like doing physical work, so I was taught to go to school, study hard and get a good job to make money to buy food instead of slaving in the garden or at sea. (Man, Government)

Throughout the community workshops participants reflected on the vulnerability islanders experience when the ships supplying the shops are delayed. Delayed ships are reportedly frequent and featured in a lot of discussions around 'food problems' and food security:

It's regular news on the island that 'there's no food on the island' because the boat hasn't come. This means our food is not secure. (Man, Niutao)

Attitudes to consumption of imported foods

All participants were able to identify the positive and negative aspects of high levels of imported food consumption. Table 3 records a summary of the answers given across research groups and sites, the comments were also found to be common between ages and sexes. Answers use local expression.

Table 3 Positive and negative aspects of consuming imported foods

Positive aspects of consuming imported foods	Negative aspects of consuming imported foods
<ul style="list-style-type: none"> • Imported food is easy to access at the shops especially if there is no soil or bad soil near our home • Imported food is fast and easy to prepare e.g. rice, noodles, tinned food • Store bought food is linked to (perceived) higher social status than those eating traditional food (via the perception that people have the ability to afford it and assumption that <i>'if you eat imported foods you are educated beyond having to work in the pulaka pits'</i>) 	<ul style="list-style-type: none"> • Expense of imported foods is high • Changing to store bought foods is unhealthy and also affects our mental health (which was noted by a few participants on different days as possibly linking to increased domestic violence). • Store bought food is not nutritious, can smell, be past it's expiry and /or frozen multiple times. • Increased rates of Non Communicable Diseases, such as diabetes, obesity, high blood pressure, which economically hurts national finances through high pressure on the Tuvalu Medical Referral Scheme (a scheme where the Government pays for overseas medical services e.g. dialysis) • There is a growing preference in taste for store bought imported foods, especially from children. • People are less active and unfit • Dependence on store bought foods is a major problem when the shops run out of food or a cargo ship is delayed • Loss of traditional knowledge and pride in local culture

Across all RAP communities, many of the participants told stories of witnessing a transition from only eating local foods to more dependence on store bought foods. Following the activity above, participants commented further on how despite knowing imported foods can have negative impacts on their lives, they still choose to consume them.

Women, men and young people most commonly commented on the positive changes regarding reduced cooking and preparation time associated with store bought food. Women most frequently mentioned this benefit, reflecting their gender roles and responsibility in childcare and domestic duties including cooking:

There is not as much time to spend in the kitchen as many women are in paid jobs now. Easy-to-cook foods are more popular e.g. rice and tinned food. (Woman, Vaitupu)

I am a working mum so I cook lunch before I leave for work. Rice is very easy to prepare, so that's what we have for lunch most days, that and noodles. (Woman, Government)

Bought food is easier and quicker to prepare compared to the traditional way of cooking plus the smell of smoke in your hair is not there. It's easier to eat at the right time too and traditional cooking takes so long that people feel hungry from the time taken for food preparation. (Man, Funafuti)

Children nowadays prefer rice to locally produced root crops maybe it's because parents have been feeding them that. (Woman, Local Council)

I notice the younger generation are no longer interested in eating local dishes made from local produce. The main staple food now is rice. I hope we are able to change this eating habit before it's too late. (Man, Nanumaga)



Food security issues, causes & effects

Separate female and male island-based participant groups took part in an activity to examine and discuss the causes and effects and interrelatedness of major 'food issues or problems'. An open topic of 'local food problems' was the starting point for the activity with all groups ending up capturing the interrelationships between climate change and food security.

The activity involved a diagram that developed as participants reflected on local food issues. For each issue participants were asked for stories about 'what's causing it?' A mosaic of inter-linkages and patterns of relationships emerged. The cause and effect activity uncovered the breadth of impacts food issues have on island communities while highlighting some subtle differences in gender perspectives. The issues men and women identified reflected their current gender roles.

Women's perceptions of the impact of declining food security reflected their roles of home-makers and child carers with their cause and effect diagrams extending to look at how food issues affect the social cohesion of the community. Women made clear links between soil problems, increased population, as well as the effect of lack of youth motivation to be involved in agriculture in some communities on food availability.

Men's cause and effect diagrams focussed primarily on the impact on traditional crops caused by increased frequency of high winds, saltwater inundation and drought. Men also tended to diagram the impacts on sea resources and rodent and pest populations more readily than women who focussed on family health and wellbeing and family planning. Both men and women highlighted the over-reliance on imported foods purchased from shops and their vulnerability given the unreliable shipping schedule due to 'bad weather' and weather mapping systems. Both sexes ultimately linked many of the changes in food consumption and food production systems to climate change.

Both women's and men's cause and effect diagrams indicated their ability to draw a direct relationship between changing weather patterns, population increase, land shortage, saltwater inundation, soil fertility decline and changes in community attitudes to participation in traditional crop production.

The following table combines the words of the men's RAP groups and the women's RAP groups (representing the 8 island communities) in their cause and effect diagrams. The similarities between the islands were such that repeating them in full would provide too much overlap and repetition. The diagrams were visually and verbally presented as a complex network of causes and effects during the RAP activity. Accordingly, while the table below presents all the words, it is not able to represent the complexity of causal relationships nor is it able to map all the links identified by participants.

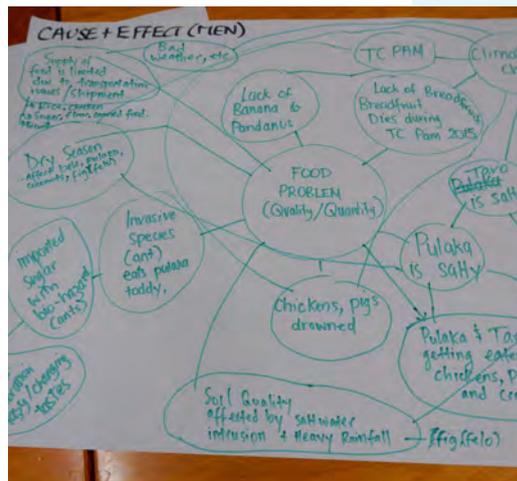


Table 4 Food security cause and effect diagram outputs

The following table uses expression and language as close as possible to that used by participants

Issue	Effects and impacts of the issue	'What's causing it?'	What's the root cause?
<p>Problems with food availability and poor quality food</p>	<p>High reliance on store bought food</p> <p>Health and nutrition issues (NCDs)</p> <p>Changes in tastes of foods (pulaka and taro are watery/salty)</p> <p>Lack of interest in eating local foods</p> <p>Less variety of plants and foods available</p> <p>The dry season is too hot and damages crops e.g. bele, potatoes, figs</p> <p>Traditional planting knowledge and skills are decreasing</p>	<p>Seawater intrusion into crops e.g. pulaka and taro</p> <p>Poor soil fertility due to seawater intrusion</p> <p>Winds are stronger so breadfruit trees are cut down in communities as they are a risk to falling on houses and then the breadfruit supply is low</p> <p>Droughts are hotter</p> <p>Roaming pigs eat crops</p> <p>Long distance to travel to the islet to get food especially in bad weather</p> <p>Young people don't want to work in pulaka pits because they want to be modern</p> <p>People are unmotivated and have no interest in making their own food supply</p> <p>Not enough compost, some islands lack shredders</p> <p>Lack of a home garden</p>	<p>Sea level rise</p> <p>Climate change</p> <p>Tropical Cyclone Pam</p> <p>Elders allow free roaming of pigs</p>

Ships that supply shops are not reliable	Ships carrying imported foods are often delayed	Bad weather frequently causes changes to the shipping schedule	Climate change Poor weather prediction systems
Less land / Shortage of land	Land is now divided among so many people Increasing population pressure on land owners ability to feed a growing population More families share land and grow less Increase in agriculture pests and diseases People steal crops from others	Houses have taken over land People spend time on leisure activities instead of working in the gardens	Population increase due to lack of family planning
Lack of income flow in the family	Lack of funds for basic needs from the shops Lack of funds for agricultural inputs	Unmotivated people High rate of unemployment	Lack of cash job opportunities
Reliance on imported foods	Families are getting sick NCDs are rising Children are not engaging socially	Modernisation Less time to garden as people are busy socialising or attending obligations (bingo, party, grog drinking, fundraising, church)	Parental guidance is lacking Introduction of new lifestyles Laziness Cyclones Change in soil texture Droughts Climate Change
Shop foods contain biohazards	Imported sugar brought with it introduced green ants that eat local pulaka and toddy	The younger generation love sugar and want to buy imported sugar	Lack of local foods and changes in dietary preferences

The cause and effect discussion highlighted that increased climate variability is only one of a multitude of variables impacting food security in Tuvalu, and that food security is intimately linked with other development challenges that require solutions that take in to account the broader picture of livelihood concerns at the community level.

Women and men, young and old were able explain the complexity of food security and climate related issues and how those issues link to their everyday lives. Nearly all participants agreed that major challenges exist relating to local food security. Many people, especially youth, used words like 'bad weather' and 'climate change', and 'seawater inundation' showing their ability to describe 'what's causing?' food problems.

Women, young and old, could clearly see the link between challenges in food production and the affect on the social realm (the human/environment interface). In this way, women were more likely to focus heavily on the social ramifications of diminishing local food security, while men were more likely to focus on the wider political context in which food purchasing takes place and their technological limitations on their ability to fix the soil/bad weather/ship arrival problems.

Division of labour and decision making in food production

To help understand food consumption and production it is important to consider who does the work in food production and who makes decisions.

It is important to note that food grown in home gardens and on family owned land plots in Tuvalu is solely for subsistence use. Culturally Tuvaluan households do not grow food for selling at markets and markets for households to sell home-grown produce do not exist.

On some outer islands, there are Kaupule gardens that employ people from the community or extension and agricultural officers to grow fresh produce. Generally seedlings are sourced from the Taiwanese Garden. Nui, Vaitupu, Nanumea and Nukefetau all have Kaupule gardens. In Nui some food is grown through the Kaupule's women's and youth associations in communal gardens, which they sell e.g. cabbage and tomatoes. The Vaitupu Kaupule sell produce too. In Nanumea the Kaupule have gardens that the women's, men's and youth groups contribute to and benefit from the produce. Also on Vaitupu the Taiwanese Garden farm situated there supplies local high school students with local food and the surplus goes to the local community. On Funafuti the Taiwanese Garden sells surplus fresh produce weekly however supply outweighs demand.

In separate groups and rooms of men and young men and women and young women, participants discussed division of food production labour and decision making. Main themes coming out of their discussions are presented below.



Table 5 Division of food production labour and decision making

	Who does the labour?	Who makes the decisions?
Crop gardening	<p>Youth and men spend most of their time working in the crop gardens</p> <p>On many outer islands (reportedly Viatupu and Naumea), youth form into groups of around ten households and rotate through everyone's crops as a team. Despite gardening together, plots belong to individual households.</p> <p>Youth are also hired by elders who don't have local family to do work. Youth work in exchange for cash or on Viatupu they also work in exchange for traditional knowledge.</p> <p>Participants reported that pulaka, taro, coconuts, bananas, pawpaw, and breadfruit are commonly planted.</p>	<p>It was widely agreed that men tend to do the decision-making regarding root crops and women decide on preparation for consumption.</p> <p><i>Men discuss with woman but decide which land to use and what to plant. (Woman, Nui)</i></p> <p>Nui, Vaitupu and Nukufetau have Kaupule community gardens and the Kaupule are the decision makers for their gardens.</p>
Home gardening	<p>Women are the ones who do the most work in the home garden on most islands however participants said on Viatupu and Nukufetau men and male youths do the work and sometimes women.</p> <p>On Funafuti both women and men work in home gardens where home gardens exist.</p> <p>In Nui Men mix the compost for home gardens.</p> <p>Participants reported that cabbages, cucumber, tomatoes, pumpkin and pawpaw are commonly grown near homes on outer islands. On Vaitupu women also grow cassava, banana, breadfruit and coconuts near their homes.</p>	<p>Both sexes agreed that women and men make decisions together on home gardens:</p> <p><i>Both partners (men and women) make the decisions together but women are always the ones with the planning ideas. (Woman, Nui)</i></p> <p><i>Only men make the planting decisions but women do the planning decisions. (Man, Nanumea)</i></p> <p><i>The men do the heavy work but women and men like to plan together. (Woman, Vaitupu)</i></p>

<p>Bush and islets (some outer islands have bush and others have islets)</p>	<p>Men and youth are usually responsible for collecting food from the bush and islets on the outer islands, this commonly includes crabs, ferns, clams, coconut crabs, birds, coconuts, breadfruit, bananas and pandanus. These foods are considered special and are only for home use or special occasions.</p>	<p>Men and woman reported joint decision making about what to collect from the bush and islets:</p> <p><i>Men and women hold equal decision making power concerning how the bush is used for food. (Man, Nukufetau and Man Viatupu)</i></p> <p><i>Women make plans on what to eat and men go out to fetch. (Woman, Nukufetau)</i></p>
<p>Sea and lagoons</p>	<p>Men and youth spend the most time fishing offshore and women tend to collect seashells. Common sea and lagoon foods for outer islands include: fish and seashells, and Nui also has sea grapes, octopus, and coconut crabs.</p> <p><i>If on the shore the woman go, but if out to deep ocean, men go (Woman, Vaitupu)</i></p>	<p>Most men and women cited joint decision making power concerning how the sea and lagoons are used for food, with men choosing what to catch and women choosing how to prepare it.</p> <p><i>Men make the decision of what is to be collected from the sea and women prepare the food. (Man, Vaitupu)</i></p> <p>This differed in Nui where both men and women reported doing the planning together.</p>

The research found that women and female youth were likely to be responsible for planning home gardens, undertaking planting, weeding and ongoing care while men while commonly responsible for assisting with any heavy labour, and in some locations, planting 'heavy' crops.

Importantly, communities in Funafuti have very limited access to gardening activities due to lack of land and housing commonly situated on sand or over rocky ground lacking soils. As such most people from outer islands living in Funafuti do not have a garden and source their crops and vegetables from nearby shops or the Taiwanese Garden. For those who do have a garden, both women and men perceived that women do most of the gardening however it can be a shared role. The men noted that their lesser input is not due to laziness but rather that there is no space for large gardens requiring heavy labour, as the space is occupied by houses.

What are the perceived root causes of reliance on imported foods?

The cause and effect activity saw many participants identifying the root cause of reliance on imported foods as climate change (cyclones, changes in soil texture, droughts) together with introduction of new lifestyles, lacking parental guidance, and lack of motivation to participate in agriculture. Females and males young and old shared stories and observations of how climate and environmental changes and reliance on imported foods are affecting their lifestyles.



Changing lifestyles & reliance on imported foods

In understanding the reliance on imported foods it is important to understand the reasons and motivations behind family food purchasing habits within 'new lifestyles'. Many of the stories related to this new lifestyle saw participants opting for easier food preparation, while trying to balance the responsibility of feeding a family with time spent at paid work, as well as being seen to be modern despite knowing the increasing levels of NCDs related to increasing consumption of imported foods. In the voices of the participants:

The women don't cook nowadays. They sometimes order takeaway and buy foods from the shops. (Man, Funafuti)

Women nowadays prefer food from the shops because it's easier for them to cook or they might be late for bingo. (Man, Vaitupu)

Even though our home is close by the Government buildings (where we work), we still take the motorbike to work. (Woman, Government)

On a daily basis we eat imported food. We only eat local food if there is a (cultural or religious) function. (Man, Viatupu)

As a working mum my diet consists mainly of noodles, and biscuits and sometimes Chinese takeaway. (Woman, Government).

Our kitchen is full of food supplies like noodles, biscuits, bread, tinned food and frozen chicken, but hardly any local fishes. (Man, Funafuti)

A woman from Funafuti identified the desire to live a Western lifestyle as one reason beyond climate change and over population for community changes in behaviour and consumption patterns:

Our foods have changed due to a change in lifestyle and peoples' behaviour. They are more into living a western modern lifestyle than living how we were living back in the olden days, that is why they are not eating local food, because of laziness - also due to climate change, overpopulation and that leads to no space for gardens as there are so many buildings.

In all RAP locations declining crop production was seen to have an effect on peoples' willingness to invest effort in planting. The comment below is representative of many others:

Back in the old days it was important for each family to have their own plantation and toddy tree. Because of the change in weather and lifestyle convenience of store bought foods, youth are very lazy to get up and work. They rely more on food from the shops and they don't want local food as it's too hard work to grow it. (Woman, Vaitupu)

Culturally we work together to grow crops without pay - we need to teach our younger generation to help each other freely in food production instead of just wanting to work for money to buy food from the shops. (Man, Nanumea)

Sickness was commonly cited to be related to lifestyle changes and reliance on imported foods, with some remarks reflecting people's understanding of nutrition, particularly educated youth; other comments highlighted a need for more education about the health and lifestyle impacts of different food choices:

We have a less nutritious diet these days. Globalisation and climate change play a major role in shaping our current diet. (Man, Government)

The negative side of eating shop foods is sickness - illnesses like high blood pressure from sugar, and poor eyesight, cancer, obesity is here today but not before. (Man, Vaitupu)

I grew up on my home island (Nukufetau) where I had access to land so growing up my diet mainly consisted of fresh local produce. Now I live in fear of getting NCDs especially diabetes. I see many people are getting it and they are forever going to the hospital. Some of them are even having their limbs amputated. This is very scary. (Man, Nukufetau living on Funafuti)

We are now eating imported foods that are grown with fertilisers and chemicals like insecticides - they are grown artificially which is why we get sick. Before we only ate organic foods. (Man, Niutao)

Children are getting into the habit of eating from shops and getting unhealthy and fat - we parents are the ones responsible for this. In the past the children were much more clever compared to today because they ate local foods. (Woman, Nanumea)

Back in the old days people were strong and healthy and hardly sick, people nowadays are getting sick and facing lots of health problems. (Man, Nanumea)

These NCDs were never with us before the new foods came. (Man, Niutao)

The NCD trend is alarming and reaching crisis level in the country. (Woman, Government)

A nurse from the Funafuti Hospital related that poor maternal nutrition is resulting in the increased rate of premature babies who are then predisposed to other illnesses. Local nursing staff together with the Ministry of Health are seeking to raise awareness of the importance of a balanced diet among pregnant women.

A man from Nui (and several others interviewed) had identified the risk store bought food posed to his health and made a decision not to eat it. While this is not the norm, there are still people who choose not to consume imported foods.

I eat coconut, and raw fish every day. I don't want to get sick from eating frozen food. Local foods are much healthier compare to that food in the shops. (Man, Nui)

Despite the prevailing views that modern diets were not good for health outcomes, a small portion of RAP participants (mostly men) thought otherwise:

People look more pretty and handsome now compared to the past due to our diet changes. (Man, Funafuti)

In the past the lifespan for women was shorter, they died early. Now with the change in diet they are not doing the hard job of cooking (over fire) and they are living longer. It's a good thing. (Man, Vaitupu)

Implications on household nutrition of supplying food for cultural obligations

The implications of catering for cultural obligations (e.g. church catering roster) and social functions on the quality of household food consumption was raised by both women and men.

Of note, across all locations most fresh vegetable produce was purchased as imported from shops and fresh from the island Kaupule or in Funafuti and Viatupu from the Taiwanese Garden. The main reason for purchasing fresh fruits and vegetables was for cultural obligations. As such the affect of cultural obligations on household nutrition was found to vary from family to family. Food availability and level of food obligations is also linked strongly to migration patterns:

Our supply from the outer island of pulaka is less regular as there are less people on the island and not as much is being grown as more people are moving to the capital. Our migration to the capital actually reduced our cultural obligations to provide local foods to our family who were in the capital when we were on the island. (Woman, Nuitao)

In respect to saving food for obligations and special events, at the time of the RAP much of the best quality food on the island was being set aside to feed a participants attending the upcoming Pacific Island Forum Leaders meeting in August 2019, some RAP participants and stakeholders commented on how this also appeared to take away resources from food security efforts for local communities.

Reflections on causes for the decline in quality and quantity of local island foods

Food security is a fundamental development issue in the Pacific. Traditionally Islanders achieved food security through agricultural and fishing methods that were in balance with their natural surroundings. Sustainable natural resource management was a matter of survival and communities relied on local staple foods including root crops, bananas and breadfruit. More recently reliance on imported foods has emerged along with huge changes in the supply and demand for food. While this transition to imported foods has helped contribute to food security by meeting growing demand for diversified foods, it has affected the health of Islanders in terms of non-nutritious food and formed other uneven and fragile dependencies which participants talked about below.

Farming families commented throughout the research on the relatively recent decline in quality and quantity of locally grown food. Focus was particularly on the effects of Cyclone Pam in 2015 and Cyclone Ula in 2016. Participants discussed their perceptions on why the quality of subsistence food has changed, the most frequently cited reasons were:

1. 'Bad weather' caused by climate variability (too much drought, high winds, tidal waves) resulting in heavily reduced or inedible harvest. Compounded by lack of production and infertile ground (soil)
2. Increasing population (starting to encroach on the availability of land for crops and carrying capacity of land in general)
3. Sea level rise and saltwater inundation
4. Flow-on effects decreasing land availability such as over crowding in Funafuti and a cycle of reliance on imported foods and preference for imported foods

At this point in the research the effect of climate change on food security became central to discussions and in Nui the importance of understanding how extreme weather events impacts food sources was critical:

Due to tropical Cyclone Pam (2015) we have been getting less food because of all the salty water that was washed in by the waves. Our breadfruit is dead, a few is still growing but not bearing as much fruit. The pulaka tastes salty compared to how it tasted before. The big wave that hit the island drowned the chickens and pigs. The drought is now currently affecting our crops too.
(Man, Nui)

Comments like this were common as the ongoing effects of increased salinity affect crop quantity and quality.

Signs of stress on food sources

The RAP was interested in finding out, what crops are showing signs of general and climate related stress? What are the signs? What are the current approaches to deal with these signs?

As illustrated by the preceding sections, all RAP participants are acutely aware of the link between climate variation and changes in food production and local food availability.

Women and men, in separate groups took part in an activity identifying crops that are showing changes or signs of stress. Facilitators asked separate groups of women and men from each island to write down the top ten local foods on individual local 'crop cards' and then rank them. Participants were invited to undertake the ranking in a way that showed the most frequently consumed local crops to the least consumed. Following the ranking, all participants were then given a set of 'change or stress voting cards' that they could place next to the crops to show which ones were experiencing either high, medium or low stress.



Following the ranking and placement of stress voting cards, stories were shared for crops labelled as showing high or medium stress. The results by island community are presented below. Note that for Nanumaga and Nukulaelae participants this exercise was done by grouping responses from households interviews on the topic as village obligations precluded some participants attending the workshop.

Table 6 - Most common locally produced and consumed foods with their stress ranking

*** denotes high stress, and * denotes medium stress*

	<i>Nui</i>		<i>Nanumea</i>	
	Men	Women	Men	Women
1	Coconut*	Breadfruit**	Coconut	Coconut**
2	Pulaka**	Coconut*	Breadfruits*	Breadfruit**
3	Taro**	Pulaka**	Pulaka	Pulaka**
4	Breadfruits**	Banana*	Taro	Banana*
5	Banana*	Green Fern**	Pandanus	Germinating nuts
6	Pandanus**	Taro**	Pumpkin*	Pumpkin
7	Pawpaw	Pumpkin	Pawpaw*	Pandanus**
8	Pumpkin	Felo (Fig)	Banana*	Green Fern
9	Felo (Fig)	Germinating nuts*	Cassava*	Felo (Fig)
10	-	Taro leaves**	Potatoes*	-

	<i>Nukulaelae</i>		<i>Vaitupu</i>	
	Men	Women	Men	Women
1	Pandanus	Pandanus	Pulaka**	Utanu (germinating nut)
2	Pulaka**	Coconut**	Coconut*	Pulaka**
3	Banana	Breadfruit**	Banana*	Breadfruit
4	Coconut**	Taro	Taro**	Taro
5	Pawpaw	Pulaka**	Sweet Potato	Cabbages*
6	Breadfruit	Banana	Cabbages	Lalu (wild ferns)
7	Cabbage	Taro	Pandanus*	Felo (fig)*
8	Pumpkin	Pawpaw	Tomatoes	Banana**
9	Cucumber	Cucumber	Cucumber	Pawpaw*
10	Tomatoes	Tomatoes	Breadfruit**	Cassava**

	<i>Nukufetau</i>		<i>Funafuti</i>	
	Men	Women	Men	Women
1	Coconuts	Utanu**	Breadfruit*	Banana
2	Breadfruit*	Pulaka**	Banana	Pandanus*
3	Cabbage	Taro	Pawpaw	Pawpaw*
4	Banana	Banana*	Pandanus*	Coconut**
5	Pulaka**	Breadfruit	Coconut**	Cucumber
6	Taro	Pandanus**	Pumpkin	Cabbage*
7	Pawpaw	Pawpaw*	Ferns	Breadfruit*
8	Pumpkin	Laulu	Potatoes	Taro**
9	Sweet potato*	Cabbages*	Taro**	Cassava**
10	Pandanus*	Felo (Fig)	Cassava**	Pumpkin

	<i>Niutao</i>		<i>Nanumaga</i>	
	Men	Women	Men	Women
1	Breadfruit	Breadfruit	Pulaka**	Breadfruit**
2	Pulaka**	Pulaka**	Breadfruit**	Pawpaw
3	Taro**	Banana	Taro	Banana
4	Sweet potatoes**	Pumpkin	Coconut**	Pulaka**
5	Banana	Pandanus	Cassava	Cassava
6	Germinating nuts	Pawpaw	Cucumber	Taro
7	Pumpkin	Taro	Banana**	Pineapple
8	Pawpaw	-	Pawpaw	-
9	Pandanus	-	Pineapple	-
10	Watermelon	-	Cabbage	-

Interestingly women and young woman, and men and young men were as likely as each other to list garden vegetables alongside the well known root crops potentially reflecting their equal roles in decision making for home gardens especially on outer islands. It is important to note that the order of locally produced foods listed above may have been influenced by the time of year and season in which the RAP was undertaken. Further, during the RAP, many participants spoke in their local language, which was encouraged for participation and interaction between participants, however there were limitations in capturing this information.

Stressed foods

As mentioned above, to identify which foods were showing signs of stress, each participants had individual stress voting cards. After the cards were placed a discussion with each island group sought to identify the issues for each of the locally produced food identified as being under stress. The stress was not always weather or climate related, other issues such as pests and diseases were also cited. The main stress issues are documented below island by Island.



Nui

According to female and male RAP participants from Nui, locally produced foods that are most stressed include: pulaka, taro, breadfruits, and pandanus, and to a lesser extent: green fern, coconut and germinating nuts.

Participants attributed these stresses to changing weather conditions, saltwater inundation, poor soils and resource scarcity.

Topical production issues for Nui were cited as reduced size of produce, changed taste, and the need for replanting cyclone affected crops and compost knowledge:

Before the quality of the foods were sweet and now they taste salty and watery like the salt water in the soil. (Woman, Nui)

Pulaka, taro, breadfruit and pandanus were destroyed by cyclone Pam. We need to replant all these crops and plants. People need to learn how to make compost and use it on their gardens. (Man, Nui)

Before the Laulu (green fern) are just found in the village, but now you have to go far into the bush to find it. (Woman, Nui)

Nanumea

According to female and male RAP participants from Nanumea, locally produced foods that are most stressed include: pulaka, coconuts, breadfruits, and pandanus, and to a lesser extent: pumpkin, pawpaw, banana, cassava and potatoes.

Participants attributed these stresses to drought and poor soils:

Cassava, potatoes and pawpaw are not growing well anymore because the soil is so hot and dry. There is not enough water and the drought has been long. (Man, Nanumea)

Vaitupu

According to female and male RAP participants from Vaitupu, locally produced foods that are most stressed include: pulaka, taro, breadfruits, and cassava, and to a lesser extent: bananas, pandanus, cabbages, fig and pawpaw.

Participants attributed these stresses to climate change, sea level rise, and pests. Topical production issues for Vaitupu were cited as inundated pulaka pits, youth not wanting to replant crops, and reduction in crop quality (taste and texture):

A lot of pulaka pits are dying with sea level rise so some people don't want to plant it. People add more soil to try and raise the pits up above sea level. Both taro and pulaka are affected so it's better for planting above the ground. The taro is just good enough for family eating – not good enough for giving for cultural obligations. (Man, Viatupu)

There's a few pandanus but they are not edible and the younger generation are not replanting them because they don't want to eat it. Eating pandanus used to give us good teeth. Pandanus is a fruit, a food, and also a medicine. (Man, Viatupu)

The coconut trees outside my house are ravaged by a new kind of pest. I believe the pests have arrived with the changing climate. The coconuts fall off the trees prematurely and the juice is not sweet and the nuts are rotten. (Woman, Vaitupu)

Vaitupu was commonly seen as not experienced as many food production problems compared to other outer islands as explained by a female youth:

On the island there are not many changes to our food supplies compared to the other islands. Our island is big and large and sea water is hardly on our land. (Female youth, Vaitupu)

Nukufetau

According to female and male RAP participants from Nukufetau, locally produced foods that are most stressed include: pulaka, pandanus and germinating nuts and to a lesser extent: breadfruit, sweet potato, cabbages, and bananas.

Participants attributed these stresses to natural disasters, climate affected soils, increasing prevalence of high winds and pests.

Topical production issues for Nukufetau were cited as salty tasting crops, however participants noted, that like Viatupu, they feel their island and crop production is less impacted by problems compared to other islands:

Before there were plenty of utanu and pulaka but it was affected by natural disasters, by climate change. Climate change affected our soil, it is now salty. (Woman, Nukufetau)

Nukufetau doesn't experience too many stresses on their main foods, the soil is salty but unlike other islands, on Nukufetau most of the young people still cut and prepare toddy. Breadfruit trees are well maintained and pruned to ensure houses are safe in high winds, and old trees are cut down. Due to the high wind management the supply of breadfruit is less. (Man, Nukufetau)

Our coconuts are stressed but not as bad as the ones on Funafuti who have the bio contamination from the weevil. Our young men don't want to climb the coconut trees. In old times they'd climb up and collect 100 coconuts but not now. We have been asking the Department of Agriculture for a new coconut species where we could cut toddy lower. (Male Youth, Nukufetau)



Funafuti

According to female and male RAP participants from Funafuti, locally produced foods that are most stressed include: coconuts, taro and cassava, and to a lesser extent: pandanus, breadfruit, pawpaw and cabbage.

Participants attributed these stresses to climate change, saltwater inundation and sea level rise.

Topical production issues for Funafuti were cited as overpopulation, and local food availability problems:

Due to climate change we can see a lot of changes on our island with our food crops. There is a lot of seawater access on to land due to high tide and sea level rise. Not only climatic changes but the over population effects of too many people living in each household can be seen. We don't have enough of any of our foods. (Woman, Funafuti)

Nanumaga

According to female and male RAP participants from Nanumaga, locally produced foods that are most stressed include: pulaka, breadfruits, coconut and banana.

Participants attributed these stresses to more common extreme weather events, strong winds, drought, seawater inundation, changes in ocean patterns, and pests.

Topical production issues for Nanumaga were cited as reduction in fish catch, stronger winds, changes in growing patterns, and introduced pests:

There are not much fish (tuna and big blue fin) anymore. It could be to do with the current ocean flow and the changes in climate. (Man, Nanumaga)

Strong winds have destroyed many of our crops and extreme weather patterns are occurring more often. If we have more extreme weather events it will have a very bad effect, we will have no local food resources. (Man, Nanumaga)

I'm in my 60s and when I was younger I noticed that when there was strong winds only affected areas around the coast. Nowadays the winds are so much stronger inland that there are no more big trees in the village, they have all been uprooted, the bananas, breadfruit and coconuts. They fruits are shaken off the trees before they are ready for harvest and come harvest time there are none left. The last big Cyclone was Ula in 2016. (Man, Nanumaga)

Due to drought the plants are not growing properly, I'm really concerned about my kid's futures and my grandkid's future. (Man, Nanumaga)

Our crops dried up because the sun is so hot. (Female Youth, Nanumaga)

There used to be many more crops on Nanumaga but since my village was infested by red ants I stopped working on my other crops. Now I just grow pineapple. (Woman, Nanumaga)

One of our taro pits is no longer in use because the sea water has gotten in and destroyed all the crops – a decade of hard work was ruined overnight. One of our pulaka pits over the other side of the island has been completed filled with sand and debris courtesy of Cyclone Ula. There are now more strong winds than before and the pest numbers are increasing. (Woman, Nanumaga)

Nukulaelae

According to female and male RAP participants from Nukulaelae, locally produced foods that are most stressed include: pulaka, coconut, breadfruits.

Participants attributed these stresses to seawater inundation, high winds, drought and pest populations.

Topical production issues for Nukulaelae were cited as rotten pulaka pits, and the impact of climatic changes on crop growth:

Sometimes our supply of pulaka is not enough due to seawater intrusion into the pulaka pit. It causes the pulaka to get rotten and then the tubes are eaten by rodents and insects. This is very bad for our community as pulaka has cultural significance. (Male Youth, Nukulaelae)

I'm concerned about planting crops especially pulaka because the soil has changed and it's very salty. Also due to the drought season the soil is very dry and the plants are not growing properly. (Man, Nukulaelae)

Our pulaka pits have been devastated because of the high salt water content, so many of our men have now lost interest in working in the pulaka pits. (Woman, Nukulaelae)

Strong winds blow down our trees, sea level rise changes the soil and it's salty. During cyclone seasons pests increase and eat of crops and destroy our trees. (Man, Nukulaelae)

Our breadfruits trees are not bearing as much fruit and the branches break in high winds. Our coconuts do not have their tops and it's probably because of the drought and extremely hot weather. (Male Youth, Nukulaelae)



Nuitao

Most stressed foods: According to female and male RAP participants from Nuitao, locally produced foods that are most stressed include: pulaka, taro, and sweet potato. Participants attributed these stresses to climate change, drought and high winds:

The high winds affect our crops. (Man, Nuitao)

Before we had rich soils, but now our soil is no longer rich due to climate change. During drought the soil is all dried up and leaves on the crops dry up too. (Female Youth, Nuitao)

In general climate affects pulaka pits across all islands. Of note Vaitupu and Nukufetau have experienced less saltwater intrusion than other islands, especially Nukulaelae (where pulaka pits have been badly affected).

At the end of this activity participants were asked what is causing changes in the weather patterns and climate change. Nearly all participants had informed answers and most were similar and consisted of a mix of: *air pollution from factories, and pollution from big companies, the green house effect and gasses in the atmosphere.*

One woman had a unique and beautifully phased answer: I think there is an imbalance in nature – we take so much from nature and we hardly give back. It has confused our weather systems. (Woman, Vaitupu)

Is increasing local food consumption and decreasing reliance on imported foods perceived as desirable?

During the RAP participants explored if there was demand for fresh locally grown produce (both traditional crops and garden vegetables) if it was made easily and reliability accessible, as well as exploring perceptions toward growing their own household vegetables.

According to the Taiwanese Garden staff, when the garden was first established in Funafuti in 2004 to provide vegetables for the people of Funafuti, the demand was not high, however today the demand is so high supply cannot meet it. The TTMT like to encourage home gardening by supply free seedlings, however they identify the key challenges to households growing their own vegetables as: renting houses on land with poor soils with no ability to use the soils without landowner's permission, poor soil condition, lack of motivation, and a preference to spend money at shops or purchase fresh vegetables direct from the Taiwanese Garden.

Nearly all RAP participants cited eating more fresh local vegetables as desirable. It's likely that this change is a result of effective initiatives led by the Ministry of Health, Department of Education, and local NGOs with effectively designed messages and behaviour change interventions.

The most frequently stated reasons to consume more fresh vegetables, in order of frequency and using representative local verbatims, were:

1. *Because they will be beneficial for our health, or, they will help us with a balanced diet*
2. *We will live longer and be happy with our family*
3. *So we won't visit the hospital anymore, and, if we eat a healthy balanced diet we won't be diagnosed with NCDs.*

Despite a widely spread desire and willingness, many noted how hard it is to grow anything on Funafuti, especially for those residing on Funafuti from the outer islands:

We would really like to plant our own fresh vegetables, but renting on Funafuti it is hard. Out on the island where the land belongs to us it is much easier to plant. (Man, Nui)

I want to grow my own vegetables but it is hard to do it because of poor soil plus in Tuvalu we are not allowed to move soils to other place. (Woman, Government)

People want to eat more vegetables but because of the lack of soils and compost materials to grow it, they don't. (Man, Government)



It's interesting to note, that vegetables were available at all the workshop catered lunches, however participants tended to choose rice over vegetables; perhaps a small indication of the long way to convert willingness to change (consumption behaviours) to actual change.

Of concern some Funafuti youth felt it would be very hard to convince youth to eat more vegetables:

I don't think youth want to eat more local vegetables, they like they food from the shops too much now. (Youth, Funafuti)

I honestly don't think the next generation even know what vegetables look like they eat so much processed and readily available sugary foods. I don't think they know they significance of vegetables to their diet, and if they do they chose to be ignorant to them. (Woman, NGO).

Which local foods would communities most like to see an increase in?

When asked about which local foods participants would most like to see an increase in, most male participants living on outer islands want to see an increase in the ease of growing traditional crops (pulaka, coconut, taro and breadfruit), using climate (e.g. salt and wind) resistant species. Some talked about dwarf coconut species so making toddy would be more accessible without having to climb the trees.

Men and women on Funafuti and on outer islands identified a desire to consume more local foods, if they were more accessible and easier and quicker to prepare. Preparation time was a key factor driving adults and youths to consume imported foods.

In terms of reviving traditional agriculture we need to come up with quicker preparation methods for young people to desire eating and preparing it. There is also the 'status' problem to overcome – young people have become ashamed of their on cultural food. We need young role models! (Man, Government)

Youth know the benefits of a diversified diet, and local foods, however their drive for changing their existing diet varies from individual to individual.

What changes have happened or are happening in communities to increase local food consumption and decrease reliance on imported foods?



Current coping and climate adaptation practices

All communities had a response when asked what their current plans for increasing consumption of local crops were. Most had some experience in climate adaptation practices to safeguard their food sources. Answers illustrate the ingenuity of communities to cope. Adaptation practices included raised pulaka pits, raised garden beds, demonstration agroforestry sites, a conscious effort to plant more and reviving the practice of food preservation. Representative stories are shared below:

We are building our pulaka pits above ground with cement so the water won't reach the pit. People want to eat pulaka so we are encouraging outer islanders to use traditional knowledge to learn about planting to adapt to climate change. (Man, Nukufetau)

Similar efforts to Nukufetau are seen in Nanumaga where pulaka pits have also hit the water lens and they have adapted by concreting the pits above ground with the help of funding through the NAPA project. Nanumaga people are now strongly advised to eat pulaka instead of white rice.

In Funafuti and Nanumaga some home gardeners are dealing with rising saline water by making their own raised garden beds.

All families should seriously start using raised garden beds like the ones that we have started using in our community. If they don't they will experience a big negative impact. (Woman, Nanumaga)

Meanwhile the Department of Agriculture have been seeking to reduce land degradation and increase biodiversity through agroforestry demonstration sites. Landowners and farmers have been participating to increase the productivity of their unused land. The intention is for farmers to visit the demonstration sites to learn how they can do with their land and what they can grow.

Some RAP participants were leaders and former leaders of outer island communities and they suggested returning to past methods of checking gardens and crops could assist with spreading climate adaptive practices, *'the traditional way was that plants were checked at the household level. We need to revive that.'* (Man, Nuitao)

A handful of participants cited conscious efforts to plant in their home gardens to reduce their reliance on the shops:

I am planting more food to increase my families' resilience to climate change so we have good health and happiness. (Male, Nanumaga)

In Nui communities have been using coconut husks to protect plants from extreme heat.

The fisheries department in the outer islands are producing salted fish. They are preserving it as a way to survive in uncertain times. Community workshop participants acknowledged that the preservation of food is an important adaptation measure to keep food stores safe in climate emergencies that should be revived.

For people who experience more exacerbated local food access issues, such a outer islanders living on Funafuti, and communities living in locations where production is extremely challenging, peoples' interest in food security was heightened and their desire to learn more about adaptive opportunities and practices was also found to be higher.



Food security visions

To further open conversation with participants on what is happening, and what needs to happen in communities to move toward food security, all workshop participants were asked to individually draw and articulate their food security dreams. For all participants their dreams reflected different angles on increasing local food consumption and decreasing the reliance on imported foods.

Government (national and local) and NGO workshop participants generally agreed between themselves that food security is about having access to food that is nutritious, safe and secure.

As part of their vision a Ministry of Health participant identified the need for a food market to be established on all islands to provide for those unable to provide for themselves. Another Ministry of Health participant suggested a goal for every family *“to have a healthy plate”*.

The Department of Agriculture talked about a vision to achieve the ‘3S’s’ of food security within 5-10 years and for Tuvaluans to feel that *“we don’t want to go anywhere because we are happy with where we are.”*

A female participant at the government and other stakeholders workshop said that her food security dream was for:

1. People to eat to live healthily
2. Everyone to have a home garden to grow green vegetables, and
3. Outer islands supply local food to Funafuti in a way where supply meets demand

A female youth member also shared their dream for a vegetable garden of her own, to eat *‘healthy balanced meals so I can become slim and healthy in the near future.’*

Another government participant depicted a dietary shift away from 50% carbs and 50% protein to a more balanced diet of protein, good carbs and leafy green vegetables.

When community groups undertook this activity the men tended to focus on growing ample root crops and the women on flourishing home gardens.

In my dream is a happy family and that is my first priority due to access to all the nutritious food available in in my home garden. (Woman, Nui)

After Cyclone Pam pulaka is very hard to grow because of the salty taste, I am now hoping to build a proper raised pulaka pit and have my plantation grow quality pulaka. Then I will be happy. (Man, Nui)

A community female participant suggested a future where there were less hospital admissions due to a wider variety of nutritious food and every household having a home garden so families can consume plentiful vegetables and protein.

A few community members focused on food preservation as a tool for food security for the future and noted the need to revive skills to preserve local food:

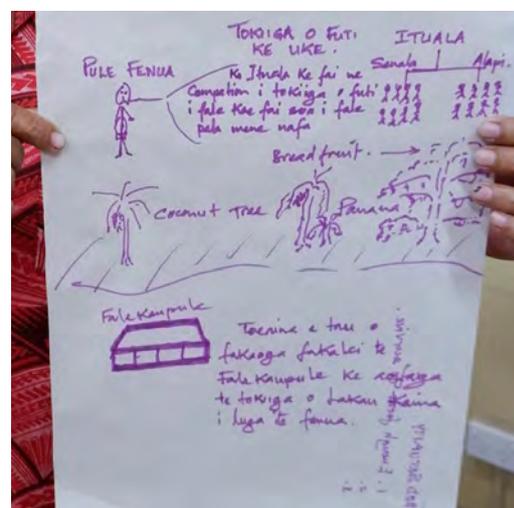
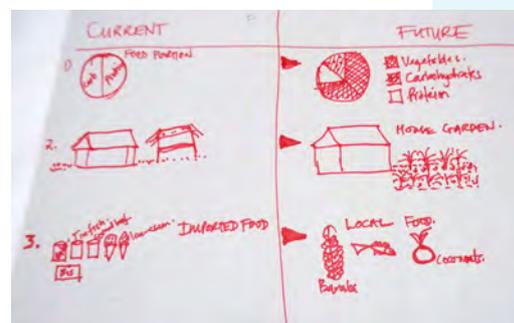
If we sunbake the fish and salt them we can help to preserve them and eat them at anytime for years. (Man, Nanumea)

A man from Nukefetau suggested a balance between traditional crops and garden vegetables:

We need to go back and plant traditional crops as well as home garden fresh vegetables. Traditional knowledge needs to be shared, currently it is not being shared. We need to make people less reliant on imported foods. (Man, Nufetau)

An elder from Nui also dreamed of a balance between past and present foods for food security:

Food from the past and the present should be equally used. We should not let our traditional food be unknown. We should use the healthier imported foods alongside our healthy traditional foods. The young generation should also adapt to this way. (Man, Nui)



LEARNING AREA 2:

Perceptions on reviving traditional agriculture and embracing new technology



Findings:

1. Men cited the need for salt and drought resistant crop species for local crops that are currently stressed, revival of traditional knowledge transmission, and up skilling on climate adaptive crop management practices.
2. Some families choose to purchase local vegetables (from their island Kaupule or Taiwanese Garden) rather than grow their own.
3. Most women, men and youths have the time to dedicate to home gardening however adults are hesitant about the space available around their home, particularly on Funafuti, and challenged by soil and compost availability.
4. Despite the self-selection of participants trialling Biofilta raised garden bed technology and their initial level of motivation, at the time of the RAP some Biofilta units were found to be dormant with householders and owners citing difficulties with soil and compost supply and some also citing difficulties with associated costs. Generally the units growing the healthiest produce had noticeably good soil health and used some compost inputs.
5. Biofilta's characteristic of being raised off the ground was celebrated by all trial participants, however it appeared that other technical features of Biofilta, including its wicking technology and water storage system, was struggling to function as intended in the Tuvaluan context. Participants reported water getting 'too hot' or 'boiling' in the units and the dark grey and black plastic surface of the Biofilta 'frying the leaves off plants' that come in contact with the plastic. In Tuvalu our local way of managing the heat is to place coconut husks on the bottom of the soil and tarpaulins on top to stop the water evaporating and the ground getting too hot, the Biofilta has no way of managing the heat.
6. Participants explained the need to change or add to the soil and compost after each harvest and reportedly found this challenging financially, technically and logistically.
7. Many participants trialling Biofilta reported their first harvest to be more substantial than their second, further reflecting the need for building capacity on soil management practices.
8. The main advantages of Biofilta cited by women and men trialling the systems are: space saving, raised tubs are out of reach of roaming animals, families are eating more fresh vegetables than before, reduces the money they spend at the shops on vegetables, and Biofilta requires less work compared to planting in the ground.
9. The most frequently planted vegetables in Biofilta in order of frequency are; cabbages, tomatoes, capsicum, cucumber, spring onions, celery and beans.

10. Several households have started to adapt the use of their Biofilta to local conditions and some participants suggested locally made raised garden bed solutions might be more suited to the local environment. Participants suggested that the raised garden beds made out of local wood materials might function just as well if not better than the plastic tubs in the prevailing conditions unique to Tuvalu.
11. Participants identified the support they need to manage the Biofilta raised garden beds more effectively; consistent compost supply, soil management skills, seasonal crop knowledge, planting and maintenance skills, knowledge on crop rotation and pest management.
12. Males and females young and old across government, NGO and community stakeholders cited that there is a low knowledge base among the general public on how to make compost for home gardens. The exception to this included some government and NGO participants who reported attending compost-making workshops facilitated by the Department of Agriculture and men and male youths working in pulaka pits on the outer islands.
13. Householders on Funafuti have the option of purchasing soil and compost from the Waste Management Facility.
14. Discussions with potential local partners and key stakeholders, identified that the new Kaupule piggery could provide a source of compost to households at a low cost, the Funafuti Waste Management Facility could provide a source of quality soil (at a cost), the Department of Agriculture could support households with free technical assistance, and the Taiwanese Garden continue to supply free seedlings. Together these stakeholder will be key in supporting the Tuvalu Food Futures project.
15. Nearly all RAP participants, especially community members thought it was best to have Biofilta ownership at the family household level.
16. Participants acknowledged that traditionally they are experts in planting crops like pulaka, bananas and breadfruit, and not lettuce and tomatoes, as such they require training on how to grow and prepare and cook these new vegetables.
17. Given the practical experiences of households and organisations trialling Biofilta, and their feedback, it appears strategic from human-ware, cost, sustainability and tech hardware perspectives that small Biofiltas are replaced or added to by locally made raised garden beds made from locally sourced wood and corrugated iron, like those used in the Taiwanese Garden. Stakeholders suggested the wood would manage the heat concerns, and households would still obtain all the benefits of the Biofilta that they currently enjoy and the materials would be more sustainable in the long term. The Taiwanese Garden costed the raised garden beds at around AUD85 per long unit however the lifespan of the wooden bed prior to rot setting in needs to be examined and balanced against its cost and sustainability advantages.

Perceptions on reviving traditional agriculture was explored briefly in Learning Area 1 and was not further discussed in depth by RAP participants despite many open ended questions being framed around the topic. Generally participants cited the need for salt and drought resistant crop species for crops that are currently stressed, revival of interest in traditional knowledge from youths, and more up skilling on climate adaptive crop management practices.

What capacity do households have to purchase local vegetables or dedicate time to home gardening, waste management, or composting?

Household capacity to purchase local vegetables was discussed in Learning Area 1. Notably some families choose to purchase local vegetables (from the Kaupule or Taiwanese Garden) rather than grow their own. Despite accessibility or financial capacity, it was found that the purchase of local vegetables was most commonly sought for cultural obligations rather than for household consumption.

During the RAP it became apparent that most women, men and youths have the time to dedicate to home gardening however adults are hesitant about the space available around their home, particularly on Funafuti, and soil and compost availability, again these concerns are also more pronounced on Funafuti. Outer islanders noted that they are more capable of making compost on the outer island compared to the capital:

On the (outer) islands it's easier to make compost however for outer islanders living on Funafuti it is much harder to gather (green) material for compost and have space for compost. (Man, Funafuti)

On Viatupu we use a lot of compost as we don't use fertilisers. We use green bases (garden cuttings) for composting and leave them for a while and also add brown compost (manure). Each family needs time and strength to make their own compost, on the outer islands it is daily work as we work on the pulaka pits daily. (Man, Viatupu)

Participants perceived access to an on island shredder to be key to their ability to make compost and some outer islands have council shredders to assist with compost production while others don't.

On Vaitupu we have our own Kaupule who have a shredder who make green compost. It's the same on Nukufetau. (Man, Viatupu)

We still need to be shown how to make compost as we have no machines (shredders) on the island. (Man, Nanumea)

Experiences with Biofilter raised garden bed technology

During the RAP 14 Biofilta FoodWall users on Funafuti were interviewed onsite at their household or organisation's Biofilta.

The selection of sites visited represented a mix of different locations, different soil types on Funafuti as well as different land ownership structures. Participants were a mix of indigenous Funafuti with ownership of the land they live on and outer islanders renting from an indigenous Funafuti landlord. For context, a typical home garden on Funafuti is 2m x 2m or at most 2m x 3m according to the Department of Agriculture.

Participants explained that the Biofiltas had been delivered in two phases; the first phase around July 2018 and the second phase around November 2018. Most households had responded to a radio call out by local organisation Growing Tall to express their interest in trialling the system and had been motivated enough to collect it and commit to using it. Some participants said they just collected the units and then worked out how to use it themselves while others received individual onsite training.



Despite the self-selection of participants and their initial level of motivation, at the time of the RAP some Biofilta units were found to be dormant with householders and owners citing difficulties with soil and compost supply and some also citing associated costs. Generally the units growing the healthiest produce had noticeably good soil health and used some compost inputs. One organisation trialling the Biofilta found that all their crops (cabbages) had been stolen overnight and were meeting to discuss how to deal with this unexpected and unwelcome theft issue.

Biofilta's characteristic of being raised off the ground was celebrated by all trial participants, however it appeared that other technical features of Biofilta, including its wicking technology and water storage system, was struggling to function as intended in the Tuvaluan context. Nearly all householders had cut the hosing (some reported never connecting it) and others were not using the water housing on the side of the system, citing the reason as either not having it in the first place or the level of heat reached by the water in the dark tubs was extreme. It's also worth noting that for the Biofilta to function as intended it needs to be on stable ground (for the water level to be a consistent level), and stable ground is a rarity on the islands.

Participants reported water getting 'too hot' or 'boiling' inside the units and the dark grey and black plastic surface of the Biofilta 'frying the leaves off plants' that came in contact with the plastic. Some households managed the heat stress by moving the units into shade (e.g. under the eave of a house) and all participants managed the water heat problem by watering plants by hand daily using a watering can or improvising with a biscuit bucket:

First there is the soil (availability and management) problems and then there is the tubs getting too hot. In Tuvalu our local way of managing the heat is to place coconut husks on the bottom of the soil and tarpaulins on top to stop the water evaporating and the ground getting too hot, the Biofilta has no way of managing the heat. (Man, Government)

Heat stress killed my whole first harvest as the containers get severely hot. For the second harvest I filled the manure and soil right to the very top and it made a difference. (Woman, Indigenous Funafuti)

Filling the water tank to use the wicking technology makes the water too hot sitting in there. The water heats up very quickly. I now water using a homemade spray bottle and water on the top of the plants. (Man, Funafuti)

Participants discussed where they source the inputs for their Biofiltas:

Soil inputs:

Most households and organisations managed the soil and compost inputs by trial and error. Some indigenous Funafuti participants sourced soil from near their house, others purchased soil from shops or from the local waste facility. Very few households were making their own compost and some were not using compost at all. One male householder's harvest was very dry and on closer inspection it looked like his soil had extremely high sand content. Participants explained the need to change or add to the soil after each harvest and reportedly found this challenging financially, technically and logistically.

It was apparent that participants lacked skills in soil and compost management and nutrient knowledge:

A householder who was making their own soil cited adding rotten coconut tree trunk together with pig manure and sand together to make soil. The crops and sub-straight was not looking very healthy.



I really need a recipe for good soil and plant growth. (Woman, outer islander living on Funafuti)

Next time can you include the soil with the Biofilta? (Woman, outer islander living on Funafuti)

Another Male outer islander living on Funafuti who was having trouble sourcing soil suggested, *'soil be brought across from the outer islands'*.

The Taiwanese Mission suggested that the biggest challenge of the Biofilta was the sourcing and managing the soil.

The Funafuti Kaupule added, *'we need training, and compost - you have to fill those tubs up - where are we going to get the material from?'*

Many participants trialling Biofilta reported their first harvest to be much more substantial than their second, further reflecting the need for building capacity on soil management and soil health practices.

Compost inputs:

Nearly all compost inputs for the Biofiltas were purchased from the Funafuti Waste Management Facility. Participants explained that at the household level all the food scraps go to the family pig pen and are not diverted into compost. All families on Funafuti have pig pens and scraps are delivered morning and night. An indigenous Funafuti man found that his cabbages grew well in a medium of waste facility soil combined with pig manure. The households that used more compost anecdotally had the better harvests.

Water inputs and general management:

Anecdotally it's normal for households and organisations spend 20 minutes per day watering and tending to the plants while others water much less often, and not at all in rain. All but one household visited were watering by hand from the top of the system, and not using the water tank storage as intended.

Seedlings and fertiliser:

All households and organisations visited were sourcing their seedlings for free from the Taiwanese Garden working with the Department of Agriculture. The Taiwanese Garden also offer free semi-organic fertiliser and home visits to determine the amount needed. Only two participants cited using fertiliser.

Participants trialling Biofiltas were asked about the main advantages of the Biofilta FoodWall raised garden bed. Responses ranked by frequency are below using language that reflects participant voices:

Advantages of Biofilta according to stakeholders trialling it

1. Space saving
2. Raised tubs are out of reach of roaming animals (pigs, chickens and dogs)
3. Families are eating more fresh vegetables than before
4. Reduces the money they spend at the shops on vegetables
5. Biofilta requires less work compared to planting in the ground

The participants reported that having the Biofilta units situated at their own house had many benefits:

The benefit of having them right outside is the incentive to use the produce in cooking. Even the kids walk past and eat a fresh tomato. (Woman, Funafuti)

It suits me as there is no travel involved, so I can check them regularly. (Woman, outer islander living on Funafuti)

The Biofilta helps my family to eat more greens and they benefit from a healthy diet. (Man, Funafuti)

For old people like me it's (Biofilta) is very useful, the grandchildren help me look after it and I eat fresh vegetables daily. (Man, Funafuti)

I check mine everyday and it makes me happy. I feel like it's worth the money (soil and compost inputs) as it's growing well. (Woman, outer islander living on Funafuti)

Garden water requirements are minimal. I walk outside and water in the morning and in the evening when the plants are new and then whenever it needs it. (Man, Funafuti)

Participants were asked what vegetables they had planted in the units since receiving them. Their responses are ranked by frequency below.

Vegetables planted in Biofiltas in order of frequency

1. Cabbages
2. Tomatoes
3. Capsicum
4. Cucumber
5. Spring onions
6. Celery
7. Beans



While householders were resoundingly positive about owning the Biofilta units, on deeper discussion it became apparent that they enjoy growing fresh vegetables in a good looking raised tub that is seen as desirable by others in the community, more so than taking advantages of the technical features of the Biofilta (given the majority of users are not taking advantage of the technical wicking system, tubing, or water tank capacity for water storage).

Several households have started to adapt the use of their Biofilta to local conditions and some participants suggested local raised garden bed solutions might be more suited to the local environment:

It was common for participants to mention their plants being affected by strong winds. A few suggested a netting structure would be useful to protect them from wind and heat and a two sites visited had set up their own tarpaulins above the units.

I've found the Biofilta okay – I've adapted it to use for the island conditions. It's good for people who don't have land or space but you need to put it near the house for some shade. I've trialled it with shade and sun and the shade does better. (Woman, Funafuti)

The perfect solution for Tuvalu would be to copy the raised biofilta design and supportive frame but to make the containers out of local wood materials. That would be much better in the heat. (Man, Funafuti)

The Funafuti Kaupule had not yet trialled the Biofilta units but suggested large Biofilta be made from concrete so *'it's a good sturdy container good for our conditions'*.

Several stakeholders (government and householders) questioned how recyclable / reusable the Biofilta tubs are (noting there are no recycling facilities on Tuvalu) and suggested that raised wooden tables might function just as well if not better in the prevailing conditions unique to Tuvalu.

Participants trialling Biofilta all signalled their need and willingness to receive extension assistance with their planting. Participants were asked what kind of support they need for the Biofilta. Their answers are ranked in order of frequency below using language that reflects their voices.

Biofilter support needed:

- Consistent compost supply (for re-filling) and/or assistance with a compost preparation recipe
- Skills to assess and manage soil quality – understanding of nutrients
- Knowledge in maintaining the Biofilta and understanding crop seasons
- Planting knowledge and knowledge on how to maintain the plants
- Awareness and skills on crop rotation to lessen pests and diseases for soil health

What are household and community perceptions toward compost?

Males and females young and old across government, NGO and community stakeholders cited that there is a low knowledge base among the general public on how to make compost for home gardens. Most participants verbalised that good compost adds nutrients to soil however many women and men reported that they did not know how to make it with the exception of some government and NGO participants on Funafuti who reported attending compost-making workshops facilitated by the Department of Agriculture and men and male youths working in pulaka pits on the outer islands who were identified as holding medium to high compost knowledge and skills.

Women living on the outer islands of Nui and Nanumea reported spending a lot of time on community gardens, however felt their time capacity and knowledge base for composting and waste management was minimal.

For the majority of householders with low compost knowledge capacity it was noted that there is adequate time capacity for home gardens as usually there is someone at home who could look after the household garden and compost production. The RAP found that indigenous Funafuti people are open to making compost however the motivation of Indigenous Funafuti was commented on a few times during the RAP:

Funafuti, are not good workers, they are not like the outer islanders who are more motivated. (Woman, Funafuti)

Outer islanders living on Funafuti were also open to making their own compost however it is more challenging for them to source soils and green waste inputs. The Funafuti Kaupule noted that *'people lack material inputs because they are not allowed to pick up dry leaves just anywhere due to needing permission from the landowner to do so.'* (Funafuti Kapulae)

Some participants from outer islands felt that making compost at the household level was not sustainable, largely due to the machines (shredders) and technology they perceived to be required to make high-grade compost. The widespread view confirmed that there is not enough knowledge and skills to maintain good compost and the best compost knowledge is held with elderly males on outer islands.

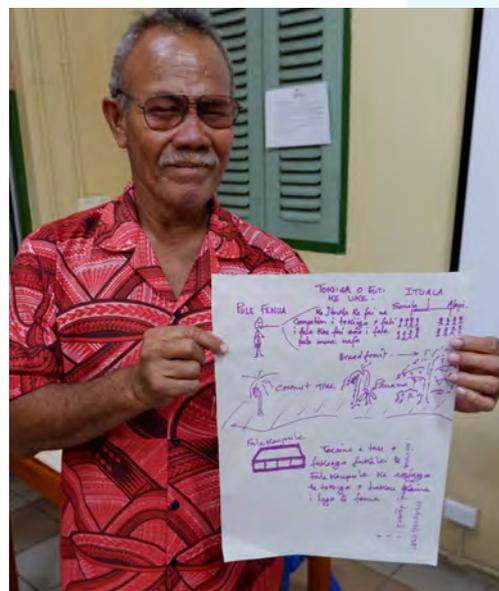
Householders on Funafuti have the option of purchasing soil and compost from the Waste Management Facility for \$3 per 18kg bag of soil and \$2 per 120L bag of compost. According to anecdotal evidence from RAP participants trialling Biofilta it takes five bags of soil to fill two Biofilta FoodWall tubs.

Soil and compost supply at the time of the RAP in June 2019 had been paused due to the opening of a new waste management facility (a transfer station) but was due to resume in late July 2019. It must be noted that the waste facility cited that they need a smaller shredder 'to make materials more fine' to fulfil their role as part of the future Tuvalu Food Futures project.

In discussions with the Department of Waste Management they described how green waste is collected on Funafuti between Monday and Thursday and mulched at the transfer station. Anecdotally the truck collects around five loads of material per day resulting in around 35 x 240L bins of shredded waste per day. If weather is favourable then there is a consistent supply, but in rainy conditions it's problematic as there is no shelter for the compost. To purchase compost people pay at the government cashier, then take their receipt to the transfer station. The Taiwanese Garden use a lot of the compost (they purchase 400 x 240L bins each quarter). Reportedly households mostly purchase soil made from composted shredded waste.

Some male RAP participants discussed and complained about the smell they associate with compost. The Taiwanese Garden also related hearing people's hesitation toward the use of animal manure in compost due to its odour. They also noted that local seaweed cannot be used in compost as it's too salty however they are thinking about the possibility of trialling the use of fishing by-catch in compost.

An important part of the future compost supply picture in Funafuti related to the Funafuti Kaupule's current strategic plan which aims to group all Funafuti pigs together in a mass piggery.



The current timing for piggery construction to commence was cited as being in May 2020, with the potential diversion of a lot of pig manure to biogas for cooking as well as compost to local households and to the Taiwanese Garden.

During RAP discussions with potential local partners and key stakeholders, it was suggested that locally sourced inputs could support the Tuvalu Food Futures project on Funafuti; under this vision the new Kaupule piggery could provide a source of compost to households at a low cost (noting their request for a small shredder to assist), the Funafuti Waste Management Facility could provide a source of quality soil (at a cost), the Department of Agriculture could support households with free technical assistance, and the Taiwanese Garden could continue to supply free seedlings.

Alternative compost inputs were briefly discussed with RAP participants who were trailing Biofiltas when they were asked about their attitudes toward the potential use of human waste in compost. The dominant view was that in theory it (human waste as compost) makes sense however in practice people couldn't find comfort with it:

Human compost is a good idea but it's out of our cultural comfort zone. Processed - maybe - but not direct. (Man, Government)

Once it's composted it's probably okay like pig manure but in my head it doesn't sound good. (Woman, Funafuti renter)

I don't want human waste near my food! (Woman, Indigenous Funafuti)

Human waste is not a problem for me it's cleaner than pig waste. I've seen some families using it as well. (Woman, renter on Funafuti)

Human waste? (shocked face) I'd only use it if I didn't know it was human waste, I know it's healthy for the plants, but no I couldn't use it. (Man, Funafuti)

Representative responses indicate that attitudes are not currently ready to trial this new practice.

What are community members' perceived interest levels for participation in using new raised garden bed technology such as Biofilta?

Nearly all RAP participants, especially community workshop members, thought it was best to have Biofilta ownership at the family household level due to 'challenges around land issues', especially on Funafuti. Some participants suggested that on outer islands a collective grouping with individual plots might work, with each member of the group allocated their own area however these suggestions were in the minority. Outer islanders also noted the potential for existing strong outer island Kaupule run gardens to make use of large tubs.

Household level is best because those who seriously want to utilise this can really be given the opportunity to do so. (Man, Nanumaga)

Participants from the outer island of Nanumea had a strong preference for having raised beds at the households for the 'immediate betterment of families'.

Some outer islanders reflected that the household level would be best as 'some people are lazy and don't participate in island communities.' (Man, Nui)

All community workshop RAP participants in separate groups of females and males were invited to look at the Biofilta units in use at the University of South Pacific Funafuti campus.

Interest in using the Biofilta was then reported out of ten, with ten being the highest. Nearly all women and men young and old, from all islands reported interest in using the Biofilta at household level as a 9/10 or 10/10. Two individuals rated their interest as a 6/10 and 7/10, citing concerns about input availability and the unit getting too hot from the local sun.

RAP participants (who had seen the Biofilta FoodWall but had not trailed it) were asked to identify the potential opportunities and benefits of Biofilta. The answers from both sexes and different island groups were very similar and are ranked by frequency below using participant's language.

Perceived opportunities and benefits of Biofilta by community members who had not used a Biofilta:

1. Ideal for households with little land and small spaces
2. Supports better health for people through access to more nutritious food (balanced diet)
3. Saves money (by growing vegetables instead of buying frozen or poor quality ones from the shops or buying high quality ones from the Tawianese Garden in Funafuti)
4. Avoids damage by grazing animals and pests by being raised off the ground
5. Sits above the seawater level
6. Does not involve hard labour or digging pits and is seen as 'easier' by being raised off the ground

Other benefits identified included: young people will be more likely to help plant food, reduces NCDs and other sicknesses, the height makes it easy to water plants, and it looks long-lasting.

Encouragingly, five of the six perceived benefits were the same as the top five benefits identified by participants already using the Biofilta.

Participants were also asked if there they could see any potential challenges in using the Biofilta. Again the answers from both sexes and different island groups were so similar that they are ranked by frequency below using participant's language.

Perceived challenges of Biofilta by community members who had not used a Biofilta:

1. Lack of access to soil and compost in many paces, especially Funafuti but also on some outer islands
2. Lack of purchasing power for soil and compost (affordability)
3. Obtaining landowner's approval and related tenure issues to move sand/soil around land on Funafuti
4. Temperature that the Biofilta and water in it reaches in the hot sun
5. Limited space available around houses
6. Uneven ground around houses
7. Lack of water for Biofilta in drought
8. Lack of knowledge (in planting vegetables and managing and operating a Biofilta)

Representative comments during this exercise included:

Good soil is expensive, water is expensive. (Man, Nui)

They look like they are made for cool climates not really hot climates like in Tuvalu. Look at the dark colour of the plastic and feel the burning heat on them. It would need green netting to be placed above it to protect it from the heat. (Man, Nukufetau)

Other challenges mentioned included: restrictions on what can be planted in the tubs (men especially would like to grow root crops but they will not fit in the small tubs), lack of interest in gardening, it was also mentioned by some Government participants that the Biofilta may themselves create a waste problem if discarded.

RAP participants were asked to identify the potential support they would need to use the Biofilta. Again the answers from both sexes and different island groups were almost identical despite being recorded at different locations on different days, and are ranked by frequency below using participant's language.



Perceived support required for using the Biofilta at a household level by participants who had not used Biofilta:

1. Support from Kaupule to organise soil and compost inputs
2. Technical training and support service from the Department of Agriculture to know what to grow and how and when
3. Agriculture extension officers on soil health and management and how to make compost
4. Demonstration home gardens
5. Drought resistant seedlings from the Taiwanese Gardens
6. Food preparation support to learn how to prepare and cook the produce
7. Shade or netting to reduce the heat impact on crops

After inspecting a Biofilta one island community suggested it should be made from wood or concrete instead as that thought it was 'too hot and that everything in it will die'.

A man from Viatupu saw the Biofilta as a potential way to partake in the cash economy through marketing:

If they have this project we need a marketplace to sell crops and earn money. When a ship is late to come to the island we could bring our crops and sell them to each other in a market (Man, Vaitupu)

Participants were asked in gendered island groups across different workshop days what they'd most like to grow in the Biofilta units. They then had to order them in their top ten preferences putting the most popular at the top. The ranking results between males and female and across islands were incredibly similar. The top ten preferred fresh vegetable/plants based on frequency of placement are presented below.

Most desired fresh vegetables for planting in household Biofiltas by participants who had not used Biofilta:

1. Cabbage
2. Tomatoes
3. Cucumber
4. Capsicum
5. Beans
6. Eggplant
7. Spring Onions
8. Watermelon
9. Herbs (coriander, chilli, ginger)
10. Pineapple

It was widely noted that people do not know how to plant these kinds of vegetables, and training would be needed.

We do not know how to grow any of these except maybe cabbage. We don't have traditional knowledge on these. I'm interested in learning how to plant and look after them at home. (Nui, Man)

We used to be experts in planting crops like pulaka, bananas and breadfruit, but we don't plant lettuce and tomatoes, they are not our traditional foods, there has been no knowledge passed down on that kind of planting. (Woman, Nanumea)

Stakeholder perceptions of strategic Biofilta dispersion in Tuvalu

Triangulating suggestions from RAP participants together with Funafuti Kaupule discussions it became apparent that strategically larger Biofilta containers would be best located in big active Kaupule owned and run communal gardens, also noting the Funafuti Kaupule's suggestion of being equally happy with large raised beds made out of concrete.

If Biofilta is given to island communities it will only benefit the ones who are kau (strongly) involved in island programs. (Man, Vaitupu)

Given the practical experiences of households and organisations trialling Biofilta, and their feedback, it appears strategic from human-ware, cost, sustainability and tech hardware perspectives that small Biofiltas are replaced or added to by locally made raised garden beds made from locally sourced wood and corrugated iron, like those used in the Taiwanese Garden. The wood would manage the heat concerns, and households would still obtain all the benefits of the Biofilta that they currently enjoy and the materials would be more sustainable in the long term. The Taiwanese Garden costed the raised garden beds at around AUD85 per long unit however the lifespan of the wooden bed prior to rot setting in needs to be examined and balanced against its cost and sustainability advantages.



LEARNING AREA 3:

Perceptions towards increasing knowledge and awareness of the benefits of local food consumption



Findings:

1. Attitudes and knowledge in communities on Funafuti and outer islands, widely accept that consumption of local food crops and vegetables are the key to a balanced diet and hold more nutrition compared to imported foods. The level of knowledge and awareness is not necessarily translating to widespread change in practices.
2. Participants were asked to describe what they think local food access and availability will be like in ten years time if things continue as they are, the majority of females ranked future access and availability as 'poor' while the majority of men ranked it as 'very poor'. This indicates that awareness of food security impacts and the need to change is high.
3. To increase the uptake and accessibility of local foods and vegetables from raised garden beds, female participants from the outer islands noted their desire for: support groups, training workshops and cooking demonstrations, meal planning and nutritionist guidance, and 'how to' soil guides and compost recipes.
4. Locally based stakeholders noted the existence of valuable factsheets and resources in local language on the topics of planting and compost and soil management that could be used for Tuvalu Food Futures.
5. The RAP found most female and male adults are willing to change their actions however converting their willingness to act in to action was noted by Government and NGO stakeholders to require; increasing knowledge on climate adaptive planting, clever behaviour change messaging for adults and especially youth as well as female and male community champions to demonstrate the benefits of making changes to the way they produce and source food.
6. There is a 'status' problem to overcome – young people have become ashamed of their on cultural food. There is a need for young role models and effective messaging to start to change these perceptions.
7. Climatic changes were noted to impact female and male lives differently with women being more resilient in terms of food security for the family, and men more resilient in relation to planning infrastructure and shelter. These different gendered vulnerabilities highlighted the need for women and men to work together in navigating and planning for climate variability.
8. Key local change agents in getting effective health and nutrition and lifestyle messages out to communities to date have included the Department of Education, Department of Health (working with local radio) and Fale Kaupule on outer islands.
9. During RAP interviews with Government and NGO stakeholders and other partners it was clear that everything affecting communities needs to go through the Kaupule (the implementing arm of the Fale Kaupule). As such the Kaupule are well placed to lead the project and work directly with the community through their established channels.

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10. The RAP found that gender needs to be considered in the identification of engagement mechanisms and community entry points. Women and men participate differently in formal and informal community-based associations and groupings for the management and use of natural resources. Women in particular are found to be intensively engaged in building social capital through informal soft networks.
 11. The RAP found there were good levels of interest for involvement and partnership among many local actors working on complementary projects and programmes. Being a small country with the close proximity between government departments, organisations and individuals enables the Tuvalu Food Futures project to be nimble. The self identified key stakeholders and potential partners included, the Fale Kaupule, the Kaupule, Department of Agriculture, Ministry of Education, Ministry of Health, Department of Waste Management, the Taiwanese Garden, SPC, ACIAR, TANGO, Growing Tall (and many others) who are all already working well together and are receptive to working in harmony to augment the Tuvalu Food Futures Project using their individual proven strengths and skills.
 12. Under the Funafuti Kaupule Strategic Plan they aim to set up a Kaupule market to sell the produce from Funafala to the islanders via a new open air marketplace in central Funafuti. The vision for the marketplace is to provide the public with access to more local food. The Kaupule noted that for the market to work they will need to remove some cultural stigmas attached to selling produce.

What attitudes, knowledge and practices do youth and adults have toward the benefits of local food on nutrition and lifestyle?

Research Area 1 shed light on participant voices, female and male, young and old toward the benefits of local food on nutrition and lifestyle. Attitudes and knowledge in communities on Funafuti and outer islands, widely accept that local food crops and vegetables are the key to a balanced lifestyle and hold more nutrition compared to imported foods. The level of attitudes and knowledge are not necessarily translating to a widespread full time change in practices. As has been noted, female and male youth are still likely to choose store bought foods over traditional local foods, partly due to taste, but mostly due to perceived increased social status attached to consumption of imported and store bought foods and 'being seen to be modern.'

Perceptions on 'current access and availability of local foods' was rated by individuals on a scale of very good to very poor as being, 'sometimes good, sometimes poor' by the majority of individual female and male participants with some outliers from outer islands ranking it current local food access and availability as 'good'. The same participants were asked to describe what they think local food access and availability will be like in ten years time if things continue as they are, the majority of females ranked future access and availability as 'poor' while the majority of men ranked it as 'very poor'. This indicates that awareness of food security impacts and the need to change is high.

Change toward a diet higher in local foods is desired by most adults, female and male and is occurring slowly with the support of Government and Fale Kaupule initiatives presented later in this Learning Area.

To increase the uptake and accessibility of local foods and vegetables from raised garden beds, female participants from the outer islands noted their desire for several forms of training and support.

Female outer islander desired support to increase access to local foods:

1. Support groups with a combination of assistance from health and agriculture experts on how to manage raised garden beds
2. Training workshops and cooking demonstrations to increase their knowledge on how to cook traditional crops more efficiently and prepare and cook home grown vegetables.
3. Meal planning and nutritionist guidance on how to reduce salt and sugar content of foods consumed
4. 'How to' soil guides and compost recipes

Government, NGOs, UNDP and other locally based stakeholders noted the existence of valuable factsheets and resources in local language on the topics of planting and compost and soil management. Notable, outputs of the ACIAR project include fact sheets about nutritious leafy greens that are available but under-utilised, as well as compost 'recipes', and information about producing healthy and productive soil with locally available input materials. It would be value to use them and see where any gaps are rather than create new resources.

What is people's willingness and capacity to make changes to the way they produce / source food?

The RAP found most female and male adults are willing to change their actions however converting their willingness to act in to action was noted by Government and NGO stakeholders to require; increasing knowledge on climate adaptive planting, clever behaviour change messaging for adults and especially youth as well as female and male community champions to demonstrate the benefits of making changes to the way they produce and source food.

We are willing to change our habits and ways of thinking. We have to have a role model, a champion, so we have the courage to follow them and do the same. Change comes from within the family, so that others close to them can see it for themselves. I help we need training on how to plant new crops and adapt traditional crops to the new soil conditions (following Cyclone Pam). (Man, Nui)

There is also the 'status' problem to overcome – young people have become ashamed of their on cultural food. We need young role models! (Man, Government)

Can participants identify the relationship between food security and the necessity for changes in food production techniques through climate adaptation?

The RAP found that females and males young and old are able to make the link between food security and the necessity to adapt food production techniques:

In Nui a woman reflected on the impact of Cyclone Pam in 2015 and the need for climate adaptation, *'our food security was impacted by Cyclone Pam when our pulaka pits and taro were removed, so it's been four years now since that happened, we need to change our planting methods.'* (Woman, Nui)

It was also noted by participants that since Cyclone Pam, Nui has sought climate resistant seedlings to increase their ability to safeguard food sources into the future.

Despite some communities starting to think about how they change and adapt, adaptation practice is slow for several reasons, cited by Government and potential partner stakeholders.

Reasons why climate adaptation of food production systems is slow:

1. Increasing migration rates to Funafuti
2. Limitations on land availability
3. Decreasing availability of local foods (particularly for outer islanders living on Funafuti)
4. Low levels of technical know-how for climate adaptive responses among communities

As cited above migration presents a major problem for food security both in the outer islands and in Funafuti. In outer islands less people are left to supply food for more people and in Funafuti overcrowding and lack of land and lack of local crops is increasingly problematic:

People don't plant as they have a paid job. They now realise that the food from the shops make them sick, and now when they turn around to look for local food and it's not there. (Women, Funafuti).

Youth voices on food security were not entirely consistent and attitudes and practice depended on individual values. A progressive yet not representative youth voice had a good outlook to seek food security solutions:

If we see things in the shop that are not good for us we should try and get rid of it and get the shops to stop selling it. We need to plant more local crops and get the shops to sell these healthier foods. If our Government doesn't look into this there will be no changes. We need rules to stop importing unnecessary foods that are making us sick. We also need to change our behaviour to stop ourselves from eating foods that are not good for us. (Female Youth, outer islander living on Funafuti)

In support of the youth's outlook a woman working in Government suggested, 'I would like to see the Government increase tax on imported foods that are sugary and remove the tax from fruits and vegetables.'

How will climatic changes or variability impact female and males lives differently?

It was widely acknowledged through the stories shared during the RAP that women are generally more resilient to climate changes in food security than men:

An example can be taken from Cyclone Pam. Women have the care-taking roles which results in them looking after and planning for shelter and looking after food preparations – in her role she must be a 'future thinker'. The hardship of the mothering role makes her a strategist in terms of what needs to be done and an organiser of the home to withstand periods of vulnerability. (Woman, NGO)

Men and male youth frequently talked about their skills in hard harbour, strength for climbing trees, and cutting down pandanus around houses (as a safety measure in high winds). As such males appear more resilient in periods of climate change when it comes to infrastructure and shelter and more vulnerable when it comes to food security.

The implications of these different gendered roles for leadership and climate champions would best be reflected by females and males working together in leading climate adaption planning as well as identifying separate males and females to be champions among their own constituent groups.



What health and nutrition programs or behaviour change messaging have been effective in changing dietary knowledge, attitudes and practices?

Key local change agents in getting effective health, nutrition and lifestyle messages out to communities to date have included the Department of Education, Ministry of Health (working with local radio) and traditional leaders on outer islands. As a result of their efforts, in very recent years focus has increased at the household and community level for a desire to consume more local food and changes in behavior are starting to move in the right direction.



School children now eat local food at least weekly due to new school directives from the Department of Education who set out that students must consume local foods one day a week. Awareness of the lack of nutritional content of many foods has been increased thanks to effective radio health awareness campaigns conducted by the Ministry of Health.

A common messaging catch call that students and families currently say to each other is 'it's not balanced!' - when they see meals that are not nutritionally balanced. To compliment this songs on food and nutrition that relate to NCDs have good recall rates among young people as well as adults.

To support the shift toward increasing local food consumption there has also been the introduction of traditional laws that prescribe days of the week where only traditional foods may be consumed in outer island communities; Nanumea has three days per week where only local food can be consumed and no motorised transport can be used; Vaitupu has the same rule every Sunday. These small but important behavior shifts are the first steps in moving toward embedded behaviour norms and reflect the strength of existing cultural power structures in changing community food consumption and behaviour.

On Vaitupu it's compulsory to eat local food and drinks once a week, including in the school; this was announced by a local chief. (Man, Vaitupu)

It's not too late to change our eating habits to eating balanced fresh meals. It will take time to change but it's doable. (Woman, Nanumea)

In addition to these positive changes, people can see what life looks like living with NCDs daily e.g. amputees, which is a very direct visual message for change.

In efforts to revive traditional food crops, SPC projects have sought to revive traditional agriculture using salt resistant species and propagated these in Funafuti for use on all islands.

In addition to the local initiatives above, RAP discussions with the UNDP funded Ridge to Reef (R2R) Project found that R2R currently encourages Tuvaluan households on three islands to register and plant as many endangered indigenous plants and trees as possible for food security and health as part of a wider 2016-2020 project. The aim is to preserve ecosystem services, sustain livelihoods and improve resilience in Tuvalu using a 'ridge-to-reef' approach to restore, rehabilitate and enhance marine and terrestrial ecosystems.

At the time of the RAP 60 households had registered across three islands with around 30 households with ready-made garden beds. A R2R gardening competition is running from February 2019 – September 2019 with prizes at the household level and winners will receive gardening tools. Households will be scored on their innovations, outputs as well as technical agricultural skills. The project has integrated health messages and communications via radio. The Department of Agriculture provide technical assistance and the Taiwanese Garden provide seedlings and some extension services. The Kaupule have an officer at R2R to try and ensure sustainability beyond the life of the project.

In engaging some RAP stakeholders in discussions on messaging for Tuvalu Food Futures, they noted the importance of ensuring no duplication of existing messages and to ensure new messages are consistent with those already in circulation. There is a clear need for messaging to build pride and social status for young people who hold traditional knowledge and eat traditional foods because the current perception among youth is that if you consume traditional food 'you are not modern'.

RAP participants shared some suggested messages for target groups below.

Table 6. Suggested messaging for Tuvalu Food Futures

Target group	Suggested messages
Suggested messages for communities:	'Food is our Health' (Female, Government) 'Our Food Our Life' (Male, Government)
Suggested messages for youth:	If you love yourself eat healthy foods! (Female Youth, Funafuti) Healthier diet for a healthier future. (Male Youth, Nukulaelae) For a healthier, longer-living you! (Man, Government)
Suggested messages for adults:	Keep the promise – eat locally (Woman, Government) Eat towards a sustainable Tuvalu (Woman, Government) Reduce our diabetes and obesity – eat local (Woman, Funafuti)

A woman from the Department of Health suggested the Tuvalu Food Futures project come up with a hypothetical situation asking what Tuvalu would become like if diets are focussed on the shops and pose the question to adults and youth, *Is this the future you want for Tuvalu?* She thought this could be a clever way to actively engage communities in the answer and prompt discussions within households.

Stakeholders discussed the best ways to build trust and capacity between the community and other stakeholders in successful change programmes to date in Tuvalu. Stakeholders cited some elements as integral to success.

Elements for effective change programs

1. Involving the community right from the start to engender upward levels of community ownership
2. Use of local strengths, resources and materials to ensure the sustainability of the programme beyond the funding period
3. Work with both the Kaupule and TANGO from the outset – they are both closely connected to the way communities and their sub groups think and the mechanisms that can change behaviour and mindset.

Who are the key community change agents and who holds the power to make change happen and drive sustainability?

In all workshops and during all interviews the important role of the Fale Kaupule (elders) and Kaupule (local council) in planning for food security could not be understated. As such they will be a key community change agent to drive change toward better food futures. One of the elderly men from Viatupu suggested the forthcoming project, *'group together the Fale Kaupule (elders and heads of community – men, women and youth) on the outer islands and take their guidance on who the local champions and role models are best to be'*.

During RAP interviews with Government and NGO stakeholders and other partners, it was clear that everything that impacts communities needs to go through the Kaupule (the implementing arm of the Fale Kaupule). As such the Kaupule are well placed to lead the project and work directly with the community through their established channels. It was suggested that LLEE Tuvalu could work with the Kaupule to do things like set up criteria for households to receive Biofilta and suggest culturally appropriate messaging and strategies and for the Kaupule and community to work together to decide on implementation details of household gardens as well as reviving traditional crops.

One woman working in Government advised, *'the elders' leadership is very strong and will be key when the implementation phase arrives.'*

Sharing skills is most important and the elders of the community through the Fale Kaupule and Kaupule need to make plans to up skill young people. (Man, Nuitao)

Elders need to make a plan for food security in communities. They need to bring back the agricultural show – where households grow more food crops in their land in the traditional way. These used to be done on all islands but they are only on Viatupu now. (Male Youth, Funafuti)

A female Agriculture Extension Officer suggested that the Tuvalu Food Futures Project concentrate on working with Women's Associations *'because they are the active audiences that can implement the project efficiently and effectively.'*

What interest exists for partnerships for Tuvalu Food Futures?

The RAP found there were good levels of interest for involvement and partnership among many local actors working on complementary projects and programmes. Being a small country with the close proximity between government departments, organisations and individuals enables the Tuvalu Food Futures project to be nimble. The self identified key stakeholders and potential partners included, the Fale Kaupule, the Kaupule, Department of Agriculture, Department of Education, Ministry of Health, Department of Waste Management, the Taiwanese Garden, SPC, ACIAR, TANGO, Growing Tall (and many others) who are all already working well together and are receptive to working in harmony to augment the Tuvalu Food Futures Project using their individual proven strengths and skills.



A range of preliminary engagement mechanisms for different stakeholders were suggested by some RAP participants and potential partner listed above via interviews and one on one surveys. The most common suggestions are included below.

Table 7. Potential engagement mechanisms for different stakeholders:

Audience	Engagement mechanisms and entry channels
School children (girls & boys)	School curriculum, radio and school aged change champions, and an easily identifiable project mascot to travel around schools/ communities
Youth (females & males)	<p>Youth voices on radio, buddy systems to keep youth accountable in their food choices, youth champions who can change the perception that store bought foods and diets rich in imported foods indicate higher social status than eating local foods</p> <p>It was noted that youth group 'buddy systems' work well and can create healthy competition especially among young men. On Viatupu they have competitions to compare and weigh produce. This used to happen on other islands and it was suggested that it be reintroduced as an incentive to revive traditional agriculture and be run and judged by the Kaupule.</p>

<p>Women</p>	<p>Radio, community trainings, household raised garden demonstrations and workshops, cooking classes demonstrating efficient ways to cook traditional foods on modern stoves and preparation of vegetables, food preservation training run by women as champions for women</p> <p>In talking about potential support from collective households one participant pointed out that gardening as individual households and receiving support from neighbours can be more motivating for change: <i>It's like exercising, if you have a friend it's more motivating!</i> (Woman, Government)</p>
<p>Men</p>	<p>Radio, trainings on revival of traditional crops and land use planning, 'look & learn' opportunities where men look and learn from others who are demonstrating good land use practice, traditional agricultural workshops run by men as champions for men</p> <p>The Department of Agriculture pointed out that 'look & learn' opportunities have been proven to be successful and culturally motivating for the SPC/Global Climate Change Alliance agroforestry demonstration and could also be well placed in the Tuvalu Food Futures project.</p>

Strategic partners for potential distribution of Biofiltas and locally sourced raised garden beds

Following stakeholder discussions it became obvious that the Department of Agriculture is best placed to undertake technical assessments for distribution of the existing Biofiltas ear-marked for Tuvalu, as well as distribution of raised garden beds made from local materials.

The Department of Agriculture commented that islands with existing established strong community farm gardens are well-placed to utilise large Biofilta tubs. Accordingly islands considered to be ideal for large tubs were suggested to be the islands of Nukufetau and Viatupu on their islets. It was noted that small Biofilta units would also be suitable for Viatupu given that they have a strong existing system and commitment to working on household gardens.

Funafuti was also seen as a location for potential use of large Biofiltas and good project sustainability given the Biofilta is already in the Kaupule's Strategic Plan. The Plan details food security activities to take place at Funafala (an islet of Funafuti with five farming families and good soil availability often used as model for solar projects, biogas and home gardens).

Funafala already has two agricultural workers working on a SPC soil health project growing traditional crops including pulaka, sweet potato, taro for special events on Funafuti.



During RAP discussions the Department of Agriculture and Funafuti Kaupule agreed the remaining smaller Biofiltas for households should also be distributed by the Department of Agriculture with households meeting some criteria. It became clear from community workshops that fairness is very important in the transparency of the distribution and for future respect of any project collateral; as actual or perceived favouritism or corruption has no place in such a small country for the success and effectiveness of the project. It was suggested that part of the selection criteria would need to be evidence that household is hard working.

The Department of Agriculture is able to provide two extension officers for each outer island to support the Tuvalu Food Futures project with a focus on soil health and compost capacity building and technical assistance.

Creating new local fresh food markets

Apart from the Taiwanese Garden there is no current existing market for root crops or fresh produce on Funafuti. Under the Funafuti Kaupule Strategic Plan they aim to set up a Kaupule market to sell the produce from Funafala to the islanders via a new open air marketplace in central Funafuti to provide the public with more local food including banana, papaya, nuts, and traditional fruit crops.

The market would be located near the bread bakery in central Funafuti and would be run as a big open fresh produce market, which has not been done before. The intention would be to make it the norm to sell local food there. This represents a big cultural shift to households as it's not a cultural tradition to sell local produce. The Kaupule noted that for the market to work they will need to remove some cultural stigmas attached to selling produce. They explained that, *'some people are ashamed to sell as it looks like they need money. There is the perception that it's only very poor people are selling.'* (Funafuti Kaupule)

The Kaupule vision is to encourage people to partake in the marketing, and in addition to the big piggery, sustain crops and gardens around households on Funafuti. At the time of the RAP the piggery plan was *'almost ready to submit to cabinet'* with the date of May 2020 *'to get it off the ground'*. As described in Learning Area 2, the piggery vision is to sell compost to households on Funafuti.

Attitudes and perceptions to outcomes of food security

Across all island communities planning for safe guarding food sources was not practiced as the norm despite all RAP participants understanding the concept of food security and need for it. The final activity in the community workshops focussed on participant attitudes and perceptions toward future food security.

Small groups of gendered participants were asked to reflect on what food security could mean for their families, community and island. Women and men, young and old responses were similar (as with many RAP responses) across research sites and are presented below:

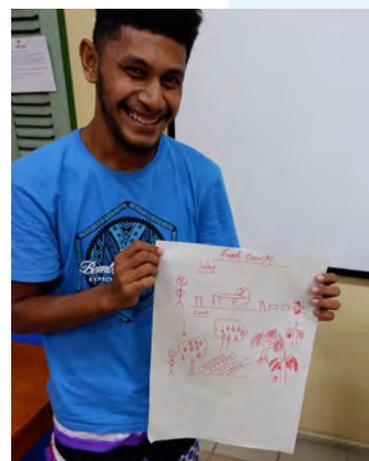


Table 8. Women and men’s perceptions of food security outcomes for their family, community and island

Women and men, young and old responses were similar (as with many RAP responses) across research sites and are presented below using participants’ language:

Food security at the family level would mean:	Food security at the community level would mean:	Food security at the island level would mean:
<ul style="list-style-type: none"> • Improved general health • Increased productivity • Less stress • Increased happiness • Improved economic status with less money spent on imported food and hospital bills • Possible family income generation through selling surplus produce • Increased amount of food for families (enough and surplus) • Increased nutritional value of food for family • Live longer • Decreased violence 	<ul style="list-style-type: none"> • Supported community through being able to market surplus foods • Happiness in the community • More money for social services • Increased ability to participate in the community • Happier and healthier communities with less NCD’s • More money to meet basic needs 	<ul style="list-style-type: none"> • Increased productivity in islands to supply the community with local foods • Because contentment level is higher there would be less corruption • Agricultural skills are developed by sharing climate adaptive knowledge • Skills developed for sustainability through traditional knowledge • Happy, safe and peaceful island • Everyone is protected from lots of sicknesses • Everyone can dance the traditional fatele

Community uptake of new ideas

The RAP found that island communities will be more likely to make changes toward food security if Tuvalu Food Futures ideas:

- Fit with existing local social structures and values
- Are economically feasible (no or low cost) e.g. soil and compost inputs to households gardens
- Are entirely 'proven' and tangible - by adopting a 'look and learn' approach
- Expressed attractively through local 'media' such as radio channels
- Reinforced with celebrations of success (e.g. revival of outer island agricultural shows)
- Expressed in local language and local concepts
- Supported by female and male adult and youth champions who are chosen by the community in partnership other stakeholders, based on values, attributes, achievements and abilities. It is envisaged that champions will act as focal points momentum, inspiration and communications with project stakeholders within communities. The premise behind having local champions is that they will be able to provide upward support to the project through their understanding of the community language, ways of thinking, values and communication channels and will deepen the engagement.



Concluding remarks

Long-term food security can only exist where changes are community-led, owned, managed and contextually appropriate. Through the RAP approach ownership building processes have already commenced by engaging communities members which can be further built upon on consequent project design phases.

This RAP provides context for the community engagement framework and project design 'to start from where the community is at'. The RAP is not an exhaustive research study, however it does provide useful insights into perceptions toward climate adaptation, revival of traditional agriculture, introduction of raised garden bed technology for food security, and decreased reliance on imported foods. It serves to indicate areas for focus, places to build on existing strengths, future visions, and spaces to bring community desires for the future forward. The upcoming Tuvalu Food Futures project is not only timely but paramount to the future of healthy and safe communities in Tuvalu.

