December 2020

Pacific Community Water Management Plus

Phase 1 Findings Report for Fiji

International WaterCentre

Griffith UNIVERSITY
Queensland, Australia

CRICOS 00233E

Research Partners:

Civil Society Organisation partners:

With the support of:

Published December 2020

https://watercentre.org/research/research-impacts/pcwm/

Suggested citation:

Love, M., Souter, R., Gonzalez Botero, D., Pene, S., and Beal C., 2021. Pacific Community Water Management Plus: Phase 1 Findings Report for Fiji. International WaterCentre, Griffith University. Nathan: Australia.

Cover images: D Gonzalez Botero, International WaterCentre

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ANCF	All Nation Christian Fellowship
AoG	Assemblies of God
AR	Associate researcher
CBT	Compartment bag test
CDD	Community-driven development
CFF	Christian Fellow Fellowship
CPR	Common pool resource
CSO	Civil society organisations
CSR	Community background summary report
CWM	Community water management
CWM+	Community water management Plus
CRA	Community Research Assistant
DW	Drinking water
EHD	Environmental Health Division
EU	European Union
F	Female
FB	Facebook
FBO	Faith-based organisation
FN	Field notes
GESI	Gender equality and social inclusion
Gp Int	Group interview
GU	Griffith University
HH	Household
HW	Handwashing
ICT	information and communications technologies
IWC	International WaterCentre
JMP	Joint Monitoring Programme (for Water Supply and Sanitation)
KII	Key informant interview
LH	Life history (interview)
M	Male
MNP	Most-probable-number
PA	Project actor (interview)
PaCWaM+	Pacific Water Management Plus
PEA	Political economy analysis
PIC	Pacific island countries
RA	Risk assessment
RWT	Rainwater tank
SDA	Seventh Day Adventist (Church)
SDG	Sustainable Development Goal
S-E HHS	Socio-economic household survey
TS	Tap stand
UNDP	United Nations Development Programme
VL	Community leader
VM	Vulnerable/Marginalised
VRA	Community research assistant
WASH	Water, sanitation and hygiene
WC	Water committee

WCR	Water committee representative
WfW	Water for Women
WHO	World Health Organisation
WM	Water management
WQ	Water quality
WQT	Water quality testing
WS	Water system
YR	Youth representative (interview)

ACKNOWLEDGEMENTS

The authors would like to thank the communities where the research was undertaken, as well as the Fijian Government, The University of the South Pacific – especially those who worked closely on this project from the Institute of Applied Science (Isoa Korovulavula, Albert Whippy, Sereseini Kurulala, Rsosemay Dautei, Mere Vere and Joji Sivo, Teddy Fong, and Pio Radikedike) as well as the numerous other enabling actors who made this research possible. In particular, we thank the staff from the following organisations and departments who constructively participated in project meetings and stakeholder workshops and interviews: Ministry of Health and Medical Services - Environmental Health Department, iTaukei Affairs Board, Department of Water and Sewerage, Mineral Resources Department, Water Authority of Fiji, Habitat for Humanity Fiji, UNICEF Pacific, Partners in Community Development Fiji and Rotary Pacific Water for Life Foundation.

EXECUTIVE SUMMARY

Purpose

In many Pacific island countries, including Fiji, the ongoing management of water systems in rural communities is the responsibility of community members. This is, in large part, because of the inability of government or the private sector to provide water supply services to the many small and remote communities that make-up the bulk of the population.

One critical outcome of community water management is its influence on whether community members are able to enjoy good water supply for domestic needs and support good sanitation and hygiene practices (i.e., good WASH)[1].

A key lesson from community-managed water systems elsewhere is that although many communities are able to successfully manage many aspects of their water systems, communities typically require some ongoing assistance to be able to fully realise successful community water management in the long-term.

The specific purpose of this research is to identify ways that enabling actors, in particular civil society organisations (CSOs) and governments, can better support communities to manage water systems in order to enable them to support improved WASH outcomes; that is, WASH outcomes that are resilient to natural hazards and disasters, that are sustainable (exist for the long-term), and that are inclusive (meet the needs of everyone).

Approach

The community water management actions and arrangements that work well for one community may not work in other communities. This is because a range of factors influence what community water management arrangements work best for any one community, including the physical environment of the community and its water catchment, the social and economic structures and context of the community, and interactions or engagement with people and organisations residing outside the community (Figure A).

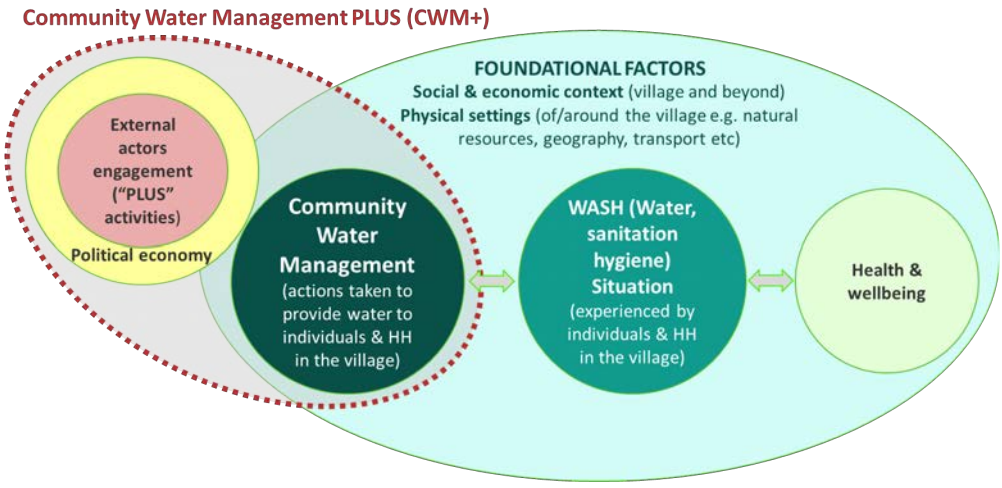


Figure A: Graphical summary of the key concepts underpinning the PaCWaM+ research, identifying key influencers of community water management, including 'plus' activities by external actors

[1] There are a range of indicators used to define good WASH, such as the SDG6 indicators. Here, we use the SDG6 indicators for water supply, sanitation and hygiene services, plus a range of other qualitative measures of the reliability, availability, and quality of water access, as well as qualitative perspectives on sanitation and hygiene.

This research sought to apply a strengths-based approach, identifying the specific factors that influence the success of water management. By examining a range of communities across different physical and socio-economic contexts in Fiji, we identified a range of factors that aligned with good water management.

The strengths-based approach entailed identifying ways that communities have worked to successfully manage their water systems, recognizing that these may differ between communities. However, recognizing that communities (villages and settlements) in Fiji currently receive no regular, ongoing support, we expected that even communities with better water management than others, would still have challenges that they have been unable to address. We expected that these challenges would give insights into the type of additional support that may be useful.

The main measure of how successful a community was at managing its water system was the status of water (and sanitation and hygiene) services available to community members. We assessed water accessibility, availability, reliability at the household level (where water is used for a range of domestic purposes) and drinking water quality. We also measured sanitation and hygiene situations, as secondary measures of the success of community water management. Good hygiene practices require sufficient water (although poor hygiene may not always be due to limited water services), good sanitation systems can contribute to good water management through protection of water resources (though may also affect water demand), and thus good water managers might be expected to promote sanitation.

Key findings

WASH situations in the case study sites

This study explicitly sought to study communities (villages and settlements) that reportedly had good WASH situations, and thus they are not considered to be representative of the range of situations found across the country and are likely to have better WASH situations than many other communities. No communities achieved the highest level of service or conditions across all aspects of WASH (Table A). Although this is the aspiration, it was not expected that communities would achieve highly in all of these dimensions, particularly given that communities receive no regular ongoing support to manage their water systems.

Although there was variability between the communities, some key patterns were observed:

- All communities relied upon at least two water sources for drinking, and used additional sources for non-drinking needs. The predominant water supply model consisted of piped water into the homes or within the property boundaries. The water systems were generally delivering water services that were reliable and available throughout the year, with some seasonal variability
- Accessibility and reliability experiences varied within a single community, with considerable variations depending on location (most commonly relating to water pressure). Low water pressure at certain times of the day or year resulted in some access points providing no water at some times, and requiring residents to walk further to cart water or wait for access to resume
- When water had to be collected outside the house, water collection was the responsibility of both females (in about 55% of households and more so in the wet) and males (in about 40% of households and more so in the dry)
- In most communities, householders and the Water Committee managed multiple water sources, reflecting seasonal availability and usage. However, there was evidence that the preferred drinking water source was also widely used for non-drinking purposes throughout the year, despite the increased scarcity of the primary source in the dry season (e.g. Bavu, Rukuruku and Wailotua-two used at least three drinking and non-drinking water sources, but were not managing to conserve drinking water for the dry season)
- There was a disconnect between perceived and actual water safety in many communities:
    - Most households across all communities perceived their drinking water supply to be “very safe” or “mostly safe”, with the exception of Bavu, where 45% of household respondents considered the bore water as "not safe"

    - In all the communities there was a presence of the microbial indicator *E. coli* in at least one, if not all, of their drinking water source types with spring and rain water sources typically having lower most-probable-numbers of *E. coli*
    - In most communities, there was some evidence of positive associations between perceived drinking water safety and water treatment practices, with five of the seven communities that perceived a risk to water quality engaging in some treatment (usually boiling), throughout the year. In Bavu, although there was a high perception of unsafe drinking water quality, there was only a low-medium level of water treatment reported during the WASH HHS
- Overall, people were generally more satisfied with their household water source in the wet season than the dry season. High satisfaction with the water system usually coincided with higher accessibility and higher water point functionality, while perceptions of water quality were usually not linked to satisfaction
- With regard to accessibility, that is anyone in the house being able to get water for themselves, there were examples in five of the eight study communities where at least one household reported to have difficulties for a household member with day-to-day access, usually for their elderly residents or people with a disability.
- As a general observation, water users were more concerned with the accessibility, availability and reliability of water, rather than water quality, and prioritised water system improvements that would further these outcomes
- The desire for WAF water (piped into their homes) and/or treated water (e.g. chlorinated and/or filtered) was a recurrent theme, echoed most strongly in Narara, Cobue and Rukuruku
- Low rates of open defecation were reported, with households reporting open defecation only when they were away from their own or a nearby toilet (e.g. in the garden)
- Generally, people prioritised improvements to water systems more highly than sanitation and hygiene, with a common preference to improve water systems to enable water-based sanitation.

Table A: Overview assessment of WASH situation of community water management in the eight case study sites.

	Assessment criteria	Bavu	Cobue	Daviqele	Galoa	Nabubu	Narara	Rukuruku	Wailotua-two
WASH SITUATION	SDG 6.11[2] - Drinking water service level								
	SDG 6.2 – Sanitation								
	SDG 6.2 – Hygiene service level								
	Water quality (drinking)								
	Drinking water risk assessments								
	Perceived water quality (%HH perceived water as "very safe")								
	Water treatment (%HH that treat water at least sometimes)								
	WASH-related Health								
	Drinking water availability and reliability								
	Accessibility (i.e. does anyone have difficulty getting water for themselves?)								
	Water system functionality								
	Satisfaction with water situation (%HH reported being "happy" with water source)								
	Handwashing (aggregate indicator of behaviour)								
COMMUNITY WATER MANAGEMENT	Water committee / nominated people								
	Water point functionality (observation)								
	Maintenance activity								
	Drinking water risk assessments (scores)								
	Risk management (awareness, actions)								
	Supply management								
	Demand management actions								
	Inclusion (processes, actions etc)								
	Policy/ rules/ norms								
	Monitoring								
	Consulting, reporting to community								
	Linkages to other committees/ groups								
	Capacity to access external support								
	Collective action: financial								
	Collective WM action - other								

VERY LOW
LOW
MED
HIGH
VERY HIGH

The colour-coded ratings applied to the SDG 6.1 indicator results were based on the proportion of population accessing basic and safely managed water services. SDG 6.1 indicator results were based on the location, type of facility and water quality of the primary source of drinking water identified by the household. However, water tests were conducted at one point in time (wet season), and water quality was not tested at every household surveyed but rather from a sample of 'types' of water supplies and extrapolated to all of similar types (e.g. results from 1 or more rainwater tanks were applied to all households using rainwater as the primary drinking water source). In addition, some households indicated different primary drinking water sources for wet and dry season; in these cases, the lower service level was used to represent overall service level. Therefore, the colour codes given in this table may vary throughout the year.

Community Water Management

The objective of this research was to learn lessons from communities where community water management (CWM) was considered to be 'good'; that is, supporting good WASH outcomes including resilient, sustainable and inclusive water supplies (as defined in the WASH section) and also considered by community members to be 'good'. However, it is clear that although there were some strengths in particular aspects of community water management, all eight study communities were struggling with some aspects of community water management. This is not a surprise given the global evidence that communities left to manage water systems on their own will typically struggle to sustainably deliver inclusive, reliable, available, safe water systems.

Water management institutions

Water management can be broadly defined as people being organised and undertaking water management activities. We deliberately did not assume that a Water Committee was an essential component of water management but rather were interested in what forms of organisation existed and how did they work. It appears that most communities in Fiji have Water Committees or designated groups of water managers, many of which were instigated through engagement by external actors (and which is now formally required as part of Fiji's rural governance models). The decree that there must be Water Committee appears especially suited to Fiji, where government regulations do influence people's actions at the village/settlement level.

Our research highlighted a number of key **strengths**, including:

- The existence of land agreements with neighbouring communities where the water source is located and an absence of land disputes
- Evidence of proactive and regular maintenance in some cases (e.g. regular dam cleaning and keeping communal tap stands free of weeds and rubbish)
- *Soli*-related community work and fundraising – as well as cultural obligations to assist with community development activities – were common and critically enhanced community well-being, both within and beyond the realm of WASH and CWM
- There was, overall, regular and effective systems of financial contributions. The absence of a set water fee did not appear to correlate with better or worse CWM outcomes
- Strong WASH-related linkages with town cousins in some locales
- Despite a range of WM challenges, people were fairly satisfied with 64% of all the respondents in the WASH HHS reporting that they believed that their water supply was "managed very well" and 20% "mostly well".

However, it is clear that although there were some strengths in particular aspects of community water management, all eight study sites were struggling with critical aspects of community water management. This is not a surprise given the global evidence that communities left to manage water systems on their own will typically struggle to sustainably deliver inclusive, reliable, available, safe water systems. Some of these persistent challenges include: .

- Water Committee (or other responsible people) not doing enough ***proactive*** **maintenance** (e.g. leaky pipes, blocked pipes and dam, not cleaning dam frequently enough)
- A lack of funds are an impediment to good CWM outcomes in some cases (e.g. spare parts, up-grading systems)
- There is a paucity of supply and demand planning and management (especially in Cobue, Bavu and Rukuruku)
- HH water wastage/mismanagement is a problem in some places (Galoa, Daviqele, Cobue)
- Cross-committee linkages are lacking – especially between the Water Committee and Health Committee/nurse – and seems to be a widespread and recurrent issue

- WC and community/HH cooperation and communication is typically weak (e.g. Rukuruku, Daviqele, Cobue)
- Age disparity is an issue in all water committees (negatively impacting knowledge transfer, institutional resilience)
- Knowledge of old sources – such as shoreline springs/wells – is not always passed on, delimiting community resilience into the future (e.g. Galoa)
- Lack of knowledge and skills to deal with all WS maintenance, including some specific technical problems
- The prevalence of water piped directly into the house is, in some people's eyes, contributing to water wastage (e.g. Galoa)

Water management

- Water Committees were often struggling to operate and maintain their water supply, often due to limited technical capacity – even for simple issues
- Water Committee collective action varied across sites. In the strongest case (Galoa), maintenance activities were primarily driven by a motivated individual (water champion)
- Water Committees displayed a range of organisational structure and member attributes. A lack of prescribed governance structure (e.g. executive roles, number of members etc.) did not appear to be an issue or impact management actions
- In many cases, there was a lack of active linkages between the Water Committee and community health workers/health committee
- No locales reported having clear formal (codified) polices or guidelines that they followed for regular WM operating and maintaining activities, but some still had fairly prescribed and organised maintenance and operation schedules
- Surface water contamination during wet weather was prevalent, but there were usually only rudimentary control measures in place (e.g. makeshift filters)
- There is some evidence that there is a level of dependency on WAF that is not in line with current community-led water-management policy (e.g. reactive rather the proactive operation and maintenance, a reliance on WAF for water delivery (Bavu) and a strong desire for WAF-treated water)
- Levels of maintenance activities varied across the communities. All case-studies had evidence of *reactive* maintenance activities, such as cleaning out dams after heavy rain or flood events, cleaning and flushing the storage tank and fixing leaking, burst, or blocked pipes, but proactive maintenance was less wide-spread (e.g. monthly cleaning of dam)
- Most Water Committee's displayed limited awareness of risk mitigation measures, with risk management and risk awareness observed to be generally poor across all the communities
- Limited evidence of planning for supply constraints such as might be experienced during disasters, or in planning for future demand
- The main water management issues identified through the WASH HHS related to lack of community or household co-operation and money
- There is a critical need to strengthen Water Committee linkages and communication with other committees or groups in communities (particularly with community health worker/nurse, Health Committees, Sanitation Committee, and possibly Church groups.

Gender equality and social inclusion

- Women were rarely directly consulted about WM issues
- There is a clear age disparity in Water Committee membership that does not reflect the national reality - Youth are valued as the "hand of work" but are not valued as potentially constructive contributors to CWM more widely
- There is a lack of diversity in water committee membership (age and gender)

- In terms of equity of **access to water**, most community respondents felt that everyone had equal access to water, although in practice some households did not due to the physical location of their house, which may be related to underlying forms of marginalisation.

"Good" Community Water Management

We broadly defined water management as people being organised and undertaking water management activities. As noted, we did not assume that a water committee was necessarily an essential component of water management. Based on existing literature and the results of the research – both strengths observed and problems encountered (i.e. evidence by inadequate WASH, or factors identified by community members) – we identified a suite of key features of what constitutes 'good' water management. These features are clustered under three core areas: i) **Actions by a water management group** (e.g. water committee); ii) **Actions by all water users** (across different socio-spatial levels); and iii) **External actors role** (in each community relating to WM) (Table B).

Table B: Features of 'good' water management

FEATURES OF 'GOOD' WATER MANAGEMENT
Actions by a group of people in the community (water managers): • Maintenance (proactive, timely, innovative) • Managing / encouraging drinking water quality Risk management (mitigate hazards, e.g. promote sanitation, maintenance, treatment/promoting HH treatment of poor water) • Planning and managing supply (multiple sources, storage capacity, plan for future demand and changes) • Managing demand (supply strategies with multiple water sources, awareness activities, community messaging about why, when and how to conserve water) • Efforts to achieve inclusion – physical accessibility, participation of gender, youth, vulnerable, all parts of community • Use of policies and rules (formal, informal) • Managing finances transparently and competently • Monitoring to guide improvements and report to community • Consulting with and reporting to community on water issues, transparency and accountability • Coordination and leverage between community committees/groups • Ways, means and capacity to access external support • Motivate and coordinate collective action of community members

Actions by all water uses:
• Collective action (from all individuals, or other levels of organisation within the community such as households / families, clan/tribe, committees), including:
  ○ Maintenance: either conducting regular smaller-scale maintenance, or reporting maintenance needs to the management group, as agreed
  ○ Operating / using the water system as agreed e.g. conserving water use and using multiple sources
• Collective action in the form of making financial contributions

Enabling actors – community-level actions: • Provide technical advice at appropriate times and in appropriate formats, such as for specific maintenance problems, or with other water management group activities listed above • Supplement finances: assist with financial costs, such as with capital costs, and potentially some maintenance costs • Provide access to appropriate spare parts • Monitoring of WASH outcomes ***Note:*** *There are many additional actions that enabling actors undertake to support community water management at a sector-wide level, such as developing standards and regulations, implementing and assessing policy, etc. However, this list focused on the actions of enabling actors (government, civil society, private sector businesses) that are required at the community-level.*

These are the key features that most influenced CWM outcomes in our case-studies and, based on our findings, constitute and support 'good' water management in Fiji, and were the same as those identified for Solomon Islands. Using most of these features, Table A (above) provides an assessment of the status of Community Water Management in the eight study communities. As evidenced by the colour ratings, Galoa, Nabubu and Rukuruku recorded had the 'best' CWM were the 'best' examples amongst the eight communities in terms of these CWM features. There was some connections between CWM status and WASH outcomes.

Links between good water management and WASH outcomes

Whilst the sample size is too small to confidently extrapolate too far, some connections and potential correlations were noted. The communities with the better WASH situations (Daviqele, Galoa, Nabubu), did also appear to have the strongest CWM actions overall. And, the communities with the worst WASH situations had weaker CWM actions overall (Bavu, Wailotua-two).

The community with the strongest **identifiable water manager group** (e.g. Galoa), also had:

- Higher accessibility to water services, including from a social inclusion perspective
- Greater water point functionality
- High drinking water reliability and accessibility
- More maintenance activities
- Higher satisfaction with the water systems as a whole.

Notably, there was also strong collective action, both financial and in direct WM actions in this Galoa, which may be associated with a more active committee/group (or vice-versa), and, also had amongst the highest levels of external support.

The relationship between water management satisfaction and water committee/group is worth further exploration:

- There was a trend toward a higher management satisfaction levels when there was a ‘stronger’ water committee or group
- Communities with comparatively 'weaker' water management (Bavu, Wailotua-two and Rukuruku) all recorded lower management satisfaction levels
- There was a correlation between higher management satisfaction of community members in communities with the overall “better” water management (Galoa, Daviqele and Nabubu).

Community satisfaction with water management was also somewhat linked to both water point functionality and drinking water availability and reliability. Daviqele, Galoa and Nabubu all recorded “high” or “very high” scores in drinking water reliability and availability, as well as “high” or “very high” in WM satisfaction. Interestingly, water quality was not good in these communities with higher management satisfaction, indicating management satisfaction may be more closely linked to water availability than with water quality. Of further relevance here is also the point that water-based sanitation was a key driver for improved water supply and appears to remains a motivator for ongoing maintenance in various Icoales (e.g. Wailotua, Daviqele, Galoa, Narara, Cobue).

Structural factors influencing CWM PLUS

Structural factors include the physical setting (water resources, geography, climate) and social context (economic, socio- cultural, historical and religious particulars, etc). These structural factors influence how “good” community water management is, and can be, achieved in each community. Understanding such factors, and how they inform CWM and WASH-outcomes, is important.

Some key structural factors, as identified and explored in the research, include:

- **Demographic factors:** Population and size of the community; number of Mataqali; religious denomination(s); mobility and livelihood particulars (e.g. proportion of waged workers)
- **Governance**: Leadership specifics, dynamics, tensions; committee numbers, activeness, ability (and willingness) to potentially link with WM group
- **Potential WM group members:** Age, inclusiveness, other roles and responsibilities; willingness to link with other committees; ensure against redundancy (through mentoring and including young people)
- **WASH history:** Experience of water hardship, reliance on WAF delivery
- **Cultural norms:** Women's agency and ability to engage with WM group are informed by kinship dynamics (e.g. a lack of maternal linkages within a *koro* can delimit the community health workers ability to engage with the WM group); youth are not customarily given leadership positions in committees
- Extant **social issues** (e.g. "community disharmony") informs the scope of collective action possibilities and hence WM approach
- **Physical setting:** Topography, water availability, natural resource specifics (logging, animal husbandry, forestry practices) impact the WASH situation

Government and CSO engagement in the sector needs to focus on improving factors that can be influenced in a short-medium timeframe, whilst navigating around foundational factors that require longer-term changes. To do this, the specific foundational / structural factors of a given locale need to first be assessed.

Contextual Factors

In addition to structural factors contextual particulars also provide to be important to understand the WASH situation and CWM outcomes.

there are different strengths and weaknesses in different communities, as each *koro* or settlement has its own unique context (socio-economic, physical setting) and thus will do things differently. They will therefore require different kinds of external support. Some examples of how the *physical setting* and *social context* intersect with and informs both the WASH situation and CWM status, are summarised below:

- **Physical Setting:**
    - Communities with varied topography will often struggle to achieve inclusive access with a gravity fed system, often resulting in some households having poor function (Galoa, Cobue)
    - Land use practices such as logging and intensive agriculture can impact the water system (Bavu, Narara), affect infrastructure and water quality, and are out of the communities control
    - The water source may be located on land where non-village/settlement residents have primary rights (Daviqele, Cobue)
    - The environment in which a community is situated informs livelihood activities, which in turn influence social dynamics (economic status, human resource availability).
- **Social context:**
    - Smaller communities typically tend to have stronger bonding social capital (e.g. Galoa, Nabubu), but not always. For example, Bavu, Wailotua and Cobue are small communities but a variety of indicators suggested that they experienced numerous cooperation challenges
    - Galoa and Nabubu had the 'best' CWM and least amount of reported social issues (as elucidated by respondents), whilst Daviqele, Rukuruku and Wailotua-two had comparatively ‘poorer’ CWM and the most reported social issues (with the majority being community disharmony)

- Context informs economic collective action: water-fees worked well in some contexts (e.g. Bavu), whilst in Cobue and Nabubu organised fundraising to support CWM negatively impacted people's ability and/or willingness to maintain the monthly water fee.
- Remittances and/or community-town linkages can be crucial to CWM performance (e.g. Galoa, Nabubu)
- Wealth is not a driver of good CWM - of the comparatively wealthiest communities (Bavu, Daviqele, Wailotua-two, and Rukuruku) only Daviqele was in the top three 'good' CWM category
- Poor past experiences and limited water options may be a motivator for strong CWM actions. For example, in Galoa (an small island with limited fresh water options) is likely a motivator for maintaining their current water system, as (older) people remember the hardships of the past. However, this 'memory' is likely to wane over time as the older generation are replaced by the next generation, who do not have experience of such hardships.

Conclusions

Building on the strengths and weaknesses identified in this study, a number of recommendations can be made relating to the types of actions communities need support with, as well as the ways enabling actors engage with and support communities.

The community water actions that were consistently poor across most/all case study communities were: assessing and managing risks to water quality; planning and managing supply and demand; and, engaging with the broader community and other village or settlement committees/groups. Even the communities with the highest achievement in the identified community water management actions appear to have persistent difficulties achieving these actions. We recommend enabling actors consider strengthening these aspects of their existing approaches.

In terms of the type of support required by communities, the capacity and context of each community influences its prospects to achieve a range of the factors identified as critical to ‘good’ water management. Assessing and responding to the specific strengths and challenges of each community – recognising that every village/settlement is different – will increase the effectiveness of interventions, and, in the longer term, also their efficiency. The support that is given by enabling actors needs to be contextualised to the community dynamics and specific needs and capabilities of each community.

Beyond providing support to address specific challenges faced by communities, enabling actors such as government and CSOs can further strengthen CWM outcomes by either *influencing* (through direct support) or by improving their *awareness* of community context prior to engagement (diagnostics and pre-awareness activities). Irrespective of the mode of support, interventions need to be pragmatic and place-based - where a balance is struck between fostering dependency (undesirable) and encouraging self-help (desirable).

The following are recommendations of actions and approaches that can be implemented for improving CWM outcomes based on the Phase 1 research:

Community specific diagnostics to better inform external actors about pre-existing factors that influence community attitudes and actions about water management. This may include:

- *Identifying and working with existing levels of social cohesion* where a community’s multiple social structures (e.g. individual, household, clan and tribe, external family members) are leveraged as a strength. This is an example of 'working with the grain' of existing and functioning social networks that are already active in collective action terms
- *Socio-economic context*: In some communities, a large proportion of people may be salaried employees, meaning they have limited capacity for collective action. Additionally, the level of fundraising in a community – as well as the community's size and socio-

economic status – impacts the effectiveness and sustainability of using a water fee to support CWM
- *Consideration of past experience with external support* and the level of project dependency that a community might have (as this can potentially limit motivation for collective action)
- *Understanding past experience with WASH and water systems,* as positive or negative experiences can affect expectations and motivation.

Building and Maintaining a strong water management group/committee using education and motivation to form and maintain strong water/WASH management group/committee. This may include:

- *Mobilising the water committee* to reach out and tap into existing strengths within the community e.g. help them to better identify and make links that may not have been clearly mapped out before
- *Working with existing social capitals and community skills* to reduce redundancy and multiple responsibility fatigue within the water committee
- *Strengthening Water Committee linkages and communication* with other committees or groups in communities (e.g. community health worker, women's and youth groups)
- *Ensuring youth are engaged in WM planning and decision makings,* not just used as labour. The mean age of WC members is high and there is evidence that crucial information (e.g. the location of shoreline springs/alternative water sources) are not being handed down through the generations. Moreover, older WC members tend to have multiple responsibilities - engaging young people in more meaningful ways within WC's can better ensure sustainability and greater committee activeness
- Providing *guidelines* to accompany the quota mandate to include women in the WC. Engaging with the community Women's Group Leader who, typically, speaks on behalf of women within the *vanua*, would be a key action for Water Committees to more formally institute on a regular basis.

Strengthening technical capacity in the community to manage risks (through fostering proactive and appropriate maintenance rather than reactive and "band-aid" maintenance), including both water quality management and planning for and managing supply and demand. This may include:

- Providing *community-specific technical advice* about the community's water system and recurrent and emerging challenges. This could be achieved through a program of "Technical backstopping" or training workshops (see recommendation below regarding leveraging connections between communities and urban-based community members)
- *Adjusting existing water management training*, such as the Drinking Water Safety and Security Planning approach, and other community-engagement resource kits to include targeted and more effective training on:
    - Demand management (water conservation; fit-for-use approach to multiple sources);
    - Identifying and managing risks to water quality to promote 'proactive' maintenance and hazard management (e.g. water quality hazard identification).

Town to community knowledge transfer: Town-based community members are potentially rich agents for knowledge transfer in regards to CWM and WASH matters more widely. Identifying strategies to engage with town-based community members – perhaps through village development committees –would not only facilitate capacity across multiple villages more cost-effectively, but would also encourage peer-based learning (sharing of lessons about specific CWM problems between communities). Such training workshops should be designed to combine structured learning on common situations and problems, with workshop opportunities for participants to seek advice on problems specific to their given community's system.

The recommendations described above are based on insights identified in the formative research component and are derived (primarily) from only eight communities, thus they may not all be relevant, suitable or achievable for implementation in all Fijian communities. Notwithstanding this, the recurring theme that emerged during the Phase 1 research was the need for more place-based understanding of the wider socio-cultural dynamics that were limiting (or enabling) functional, proactive and collective management of water systems. Successful delivery of the recommendations above, or any modifications of them, are best achieved through pilot implementation first, which is monitored and evaluated by the community as well as the implementers.

Tap stand and water containers, Bavu village, Nadroga Province, Viti Levu (Photo credit Mark Love)

1. INTRODUCTION

1.1. Context

Water, sanitation and hygiene (WASH) development in Pacific Island Countries (PICs) remains sluggish compared to global trends. For example, while 80% of Melanesians live in remote, rural areas, only 40% have access to basic water services (JMP, 2017). Although there is an increasing coverage of improved drinking-water sources in several PICs, there is little information about the quality and safety of the water delivered to these populations, particularly in rural communities (WHO, 2016).

A suite of challenges constrain progress on improving water service delivery outcomes in rural PICs, including slow economic growth and employment, disparate governance models, high climatic-induced disaster vulnerability, limited local capacity and resources, and large rural population base. Compounding this are the very real threats from climate change to already limited freshwater sources, unique cultural factors, and the sheer social, geographical and cultural heterogeneity characteristic of many PICs (McDonald et al. 2017).

Previous evidence demonstrates the critical role of local capacity in managing and maintaining safe and secure water systems in the Pacific islands (Foster and Willets, 2018, Gero et al 2017, Souter and Schuch 2016). Improving local capacity, combined with well-informed and relevant external support, will strengthen the likelihood of improved equity, health and wellbeing around WASH services in rural communities; consistent with Sustainable Development Goal 6 – Clean water and sanitation (SDG 6) aspirations. Government and private sector services in PICs are limited and likely to remain so. Consequently, community-based water management (CWM) will remain the dominant model for rural water service delivery into the future, as reflected in many Pacific government policies. Thus, CWM is the necessary model in the PIC context. However, evidence from the Pacific and elsewhere indicates that CWM models of service delivery typically have low (Clarke et.al., 2014; Bond et.al., 2014; Hutchings et al 2016; World Bank, 2017). This low sustainability leads to poor WASH outcomes, such as inadequate accessibility, quality, and reliability of water and compromised hygiene practices (Hutchings et al, 2016). This, then, compromises the health and wellbeing of all people, but disproportionally affects women and girls. Importantly, the SDG6 targets reiterate that water service outcomes, sanitation and hygiene practices and ecosystem health, are intimately affected by CWM, and vice versa.

The community water management plus (CWM+) model is widely considered a viable improvement to the “one-size-fits-all” basic CWM model (Baumann, 2006; Hutchings et al., 2016, Souter and Schuch, 2017). The CWM+ model advocates long-term support from external organisations following the initial hand-over of water infrastructure to communities. The current CWM + research has identified a range of intrinsic and extrinsic factors that inform the success of CWM; however, more targeted research is required to understand how these factors manifest in different socio-cultural, economic and environmental contexts. Furthermore, there has been limited investigation of how wider factors, such as institutional and customary norms, may further inform the success, or not, of maintaining community water source infrastructure (Joubert and Summers, 2018).

Pacific governments appreciate that further support is required to support CWM. But while some lessons can be gleaned from research in other parts of the world, the unique PIC's context (rurally-dominated populations characterised by diverse and complex socio-cultural settings with discrete and varied hydrogeological constraints and a limited enabling environment) requires more contextually specific and rigorous evidence about which approaches are most feasible and effective.

1.2. Purpose of research

The core rationale for this project was to explore what a CWM+ approach might look like in a PIC context – specifically Solomon Islands and Fiji – and to better understand what **internal** (e.g. local-level social, cultural, economic, governance and historical characteristics) and **external** (e.g. community engagement process, political economy characteristics) factors are most aligned to ensuring relevant and tangible bipartite support to improve current rural CWM outcomes across different community, island and country contexts.

Figure 1.1 (below) is a conceptual figure of the framework used to guide the research.

We know that community water management actions and arrangements that work best for one community may not work so well in other communities. This is because a wide range of factors influence what is the most appropriate and sustainable community water management arrangements in any given community, including: the physical environment of the community and its water catchment; social and economic structures and context; and, interactions or engagement with people and organisations residing outside the community. Some of these factors can potentially be influenced, facilitated, or triggered with targeted support and engagement from enabling actors. These are the factors that we explored through this research to identify if and how they might be utilised by enabling actors in future interventions to improve CWM outcomes and sustainability.

Some factors that influence community water management are difficult to change or influence, either because they are not changeable (e.g. natural water resource availability, distance from town) or are not easily influenced and/or likely to change in the foreseeable future; particularly through water management interventions (e.g. socio-cultural structures, livelihoods). We have termed these 'structural factors' and recommend that assessing the status of these factors before commencing a water supply or management intervention is important as it can influence the type and content of community engagement.

This report synthesises the findings of the **formative research component** (PHASE 1) of the Pacific Community Water Management plus project in Fiji, which undertook research in eight different communities across all four Divisions and in six of the fourteen Provinces.

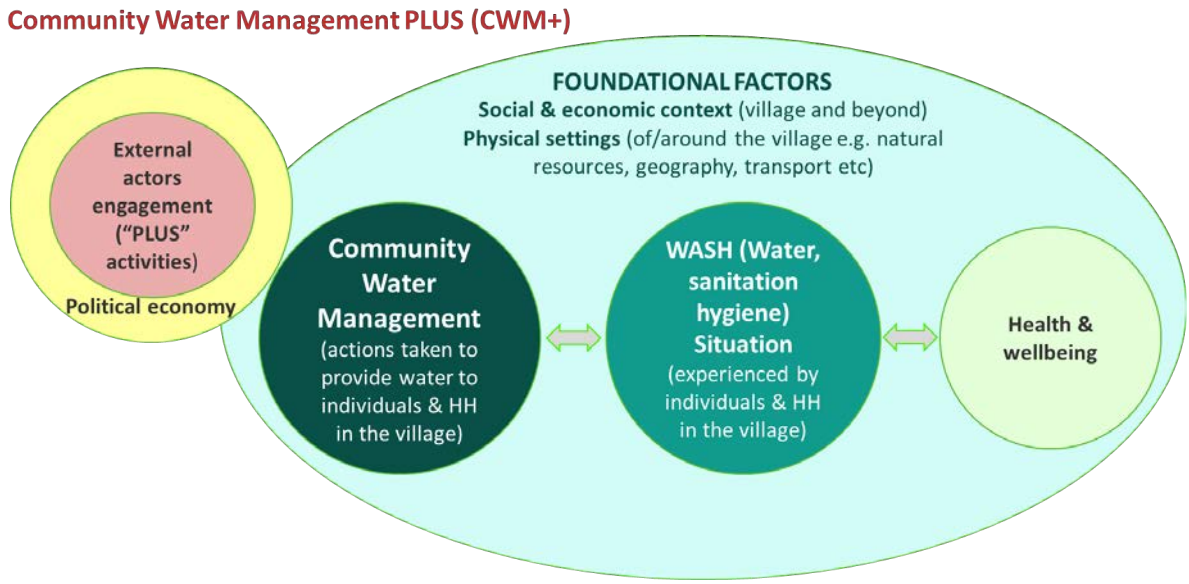


Figure 1.1: A conceptual figure underpinning the PaCWaM+ research, identifying key influencers of community water management, including 'plus' activities by external actors

1.3. Objectives of the research

This research seeks to address the significant gap in evidence noted above; that is, provide some regionally-appropriate evidence about what kinds of support are needed to complement and improve community capacities for water management across different community, island and country contexts in the Pacific islands.

In partnership with civil society organisations (CSOs), government and communities in Fiji and Solomon Islands, the **'Pacific Community Water Management Plus'** (PaCWaM+) project seeks to explore how CSOs and governments can better enable rural CWM in the Pacific. This three-year collaborative and applied research effort is led by the International WaterCentre and Griffith University, and funded under the Australian government's WASH Research Awards (as part of the Water for Women Fund)[3].

Specifically, the overall objective of the research is to investigate how CSOs and governments can better enable rural CWM in the Pacific to improve SDG6 outcomes, including the resilience, inclusiveness and sustainability of WASH outcomes. There are two key research questions and associated activities formulated to address this key research objective (Figure 1.2):

PHASE 1: What can be learned from evaluating CWM across diverse community contexts, especially about which community governance, engagement, and support features are most aligned with inclusive, integrated and resilient SDG6, including WASH, outcomes?

PHASE 2: What approaches and tools, that are sensitive and responsive to local context and improve inclusion, can CSOs/Governments use, to strengthen these community engagement, support and governance features?

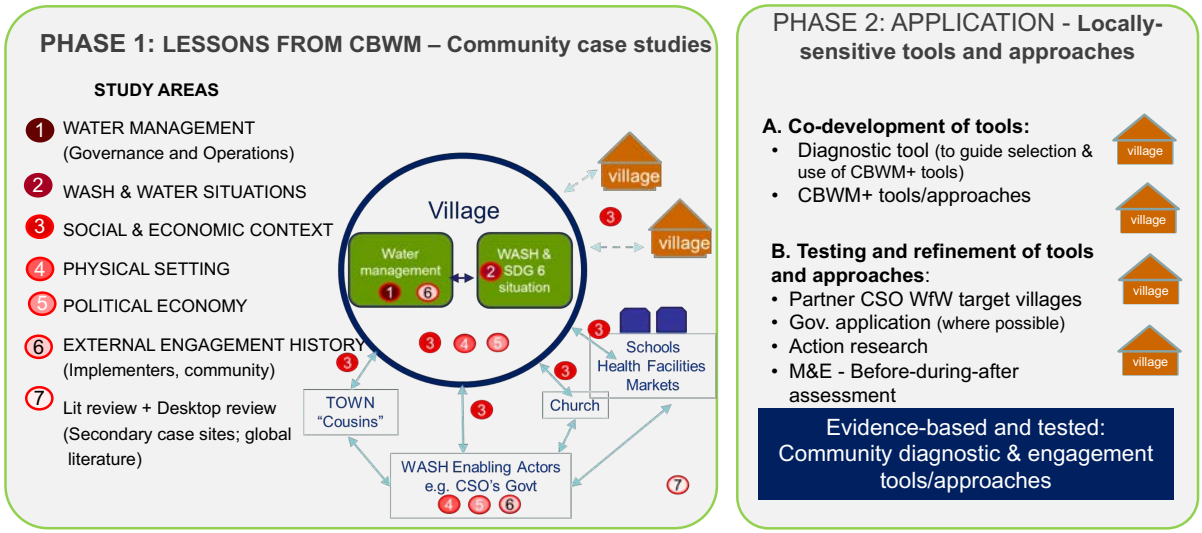


Figure 1.2: PaCWaM+ Research Approach and Phases

[3] University partners: The University of the South Pacific (Fiji) and Solomon Islands National University (Solomon Islands); Civil Society Organisation (CSO) partners: Habitat for Humanity Australia, Habitat for Humanity Fiji, Plan International Australia and Live & Learn Environmental Education - Solomon Islands.

1.4. Methodology

1.4.1. Community-level data

This research sought to use a strengths-based approach, identifying specific factors that influence the success of water management, which entailed conducting formative research in communities with 'good' water management. The primary indicator used to assess good water management was the WASH situation, in particular the water services achieved, and also people's attitudes about the WASH and CWM situation.

The presence of a formal "water committee" was, deliberately, not assumed to be an indicator of good water management.

A strengths-based approach entails identifying ways that communities have worked to successfully manage their water systems. However, recognising that communities in Fiji currently receive no regular, ongoing support, we expected that even communities with better water management than others would still have challenges that they have been unable to address. This was certainly the case. We expected that these challenges would give insights into the types of additional support that may be useful, as well as assist in identifying some of the key contextual factors that inform – both delimit and enable – CWM outcomes. Identifying these factors *prior* to a water intervention program, and tailoring community engagement to these specifics, can also improve CWM outcomes.

The key domains of information collected in each community are represented in Figure 1.2 above (Research Approach and Phases), and included:

- **WASH situation**: The main measure of how successful a community was at managing its water system was the current status of water services available to community members, including water accessibility, availability, reliability at the household level, and drinking water quality. Sanitation and hygiene situations were also rapidly assessed, as secondary measures of community water management status
- **Social and economic context:** Both within the community, as well as social networks extending out from the community to other people and organisations, was considered as inclusive of the social and economic 'whole' (that is, the community was not considered as an isolate). The type of social and economic information collected included descriptive and attitudinal data on topics such as community history, governance structures, socio-economic particulars, and examples of community cooperation and self-help
- **Physical setting**: Geography, infrastructure, natural resources, land use and climate
- **External engagement and political economy**: The history of engagement with people and organisations, particularly relating to water projects but also considering other development projects or initiatives was captured. The political economy of government and CSO engagement with community WASH and water management was also assessed
- **Community Water Management**: Governance and operations relating to community water systems, focusing on current actions and arrangements but also reflecting on previous arrangements and experiences. This included operational activities and responsibilities/implementers; the structure and history of a water committee (if it exists), water management actions and capacities, and relationships with other community institutions; perceptions of success/challenges by water committees and community members; water-related formal and informal rules; design & funding for infrastructure; consultation & communication processes; finances; reporting to community; catchment/water resources management practices; community mobilisation; and, community/household responsibilities for water management.

1.4.2. Community selection

Site selection was designed to encompass different bio-cultural contexts (e.g. socio-cultural, economic and geographic) and various CWM arrangements, including differing types/amounts of external support. The selection criteria included:

- Communities in rural settings, including villages and settlements
- Communities with ‘good’ community water management. ‘Good’ was defined as having safe water, inclusive access coverage, and year-round access to water (even if water resources were insecure)
- A diversity of external engagement experiences (e.g. previous CSO engagement/work, government support, external stakeholder support or engagement, etc.)
- Diversity of climate, vulnerability to disasters, water security
- Selection of geographic locations (different provinces represented).

An inception workshop with stakeholders in Fiji, with subsequent sharing of WASH data, was critical to identifying potential study communities.

However, pre-identifying eight 'good' CWM sites proved challenging and all sites ultimately displayed both strengths and weaknesses. Ultimately, the research was undertaken in eight communities across all four Divisions and in six of the fourteen Provinces in Fiji (Figure 1.3).

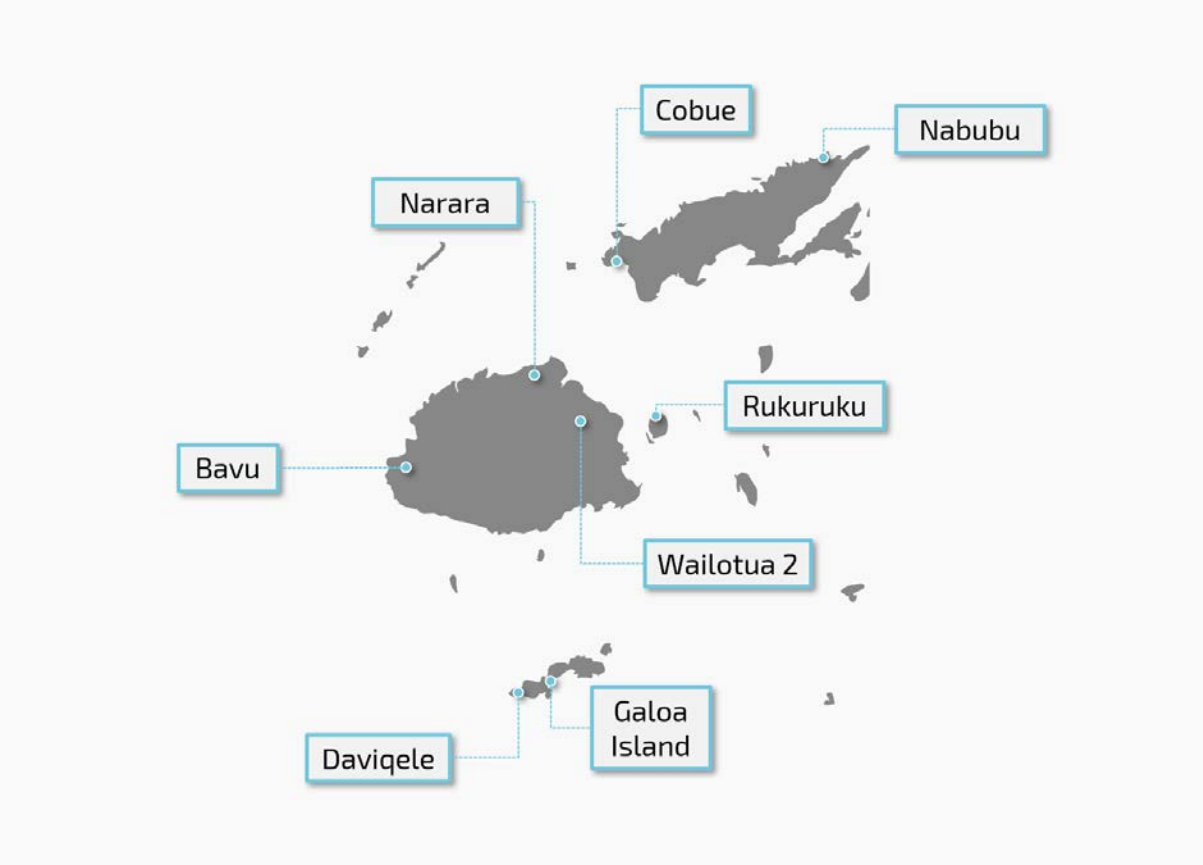


Figure 1.3: Map of Fiji study sites

Table 1.1 (below) is a demographic summary of the community case-study sites. **Error! Reference source not found.** (below) is a map of the communities involved in the Phase 1 research in Fiji.

Table 1.1: Demographic summary

Community name	Type of community	Division, Province & island	Population	No. Households	Religion	No. Mataqali
Bavu	*Koro* (registered village)	Western Division, Nadroga, Viti Levu	~300	57[4]	Main: Methodist Other: SDA, Jehovah Witness, AoG, Evangelist	5
Cobue	iTaukei settlement	Northern Division, Bua, Vanua Levu	125	26	Main: Methodist; Other: Prayer Ministry, SDA	6
Daviqele	*Koro* & iTaukei settlements	Eastern Division, Kadavu	356	88 (65 in *koro*[5])	Main: Methodist; Other: All Nations, Catholic	3
Galoa Island	*Koro*	Eastern Division, Kadavu	~180	40 (occupied)	Main: Methodist; Other: AoG	4
Nabubu	*Koro*	Northern Division, Macuata, Vanua Levu	73	20	Methodist	5
Narara	Indo-Fijian settlement	Western Division, Ra, Viti Levu	~74	16	Main: Hinduism; Other: Methodist	n/a
Rukuruku	*Koro*	Eastern Division, Lomaiviti, Ovalua	~375	77	Main: Methodist; Other: Catholic, AoG, SDA, New Methodist, Apostle, COC, All Nation	8
Wailotua-two	*Koro*	Central Division, Tailevu, Viti Levu	~120	20 (6 unoccupied)	Main: Methodist; Other: CFF; Pentecostal; ANCF	5

Note: All communities reported a significant increase in community population levels during holidays, especially at Christmas.

1.4.3. Community Data collection

The Phase 1 formative research methodology comprised a mixed-methods approach, drawing on a range of quantitative and qualitative research techniques (see Table 1.2 below). Data were collected from communities between November 2018 and March 2019.

Qualitative data

Research teams spent one week (typically 5-6 days) in each community. Teams consisted of one male and one female Associate Researcher (AR) from The University of the South Pacific (USP), a minimum of two community research assistants (CRAs) – one male, one female – from each host community, and in four cases a member of the Brisbane team (International WaterCentre/Griffith University).

[4] Research was conducted in the Bavu *koro* only; Bavu settlement – located on the other side of the Queens Highway – is much larger (370 pop./71 HHs).

[5] There is a total of 88 HH, but 68 are located within the *koro* (including 6 belonging to the school and two to the health centre) with the remaining 23 located in proximal settlements outside the formal *koro* boundaries. Some of the HHs are unoccupied.

Community-level data collection comprised of:

- 16 group interviews (Gp. Int.) (8 x water committee/group reps; 8 x women group/reps)
- 86 key informant interviews (KIIs) (53 Male and 33 Female), including 2 people with cognitive or physical disability and 8 health workers (community nurses) and 5 teachers
- 374 household surveys (HHS), of which 174 were S-E HHS and 200 WASH HHS
- 43 water quality tests (WQT) and 36 risk assessments.

Quantitative HHS data collection was undertaken on tablets linked to the mobile data collection platform SurveyCTO® then entered into MS Excel™ and summarised using Excel and SPSS™.

Interviews (Key informant interviews, Group interviews) were conducted in Fijian or English, transcribed and translated (a mix of paraphrasing with some verbatim quotes, using time codes) into English. Along with Community Background Summary Reports (CSRs), fieldnotes (FN), and other community-related documents, this data was entered and coded in NVivo™.

To supplement information about external engagement provided by community members, a search of public (internet and other sources) documents describing external engagement for each of the study sites, as well as discussions with stakeholders at in-country stakeholder workshops were conducted.

A summary of key data collection tools and instruments are appended below (Table 1.2).

Table 1.2: Research methods

Instruments	Abbreviation	Notes
Key informant Interviews (community)	KIIs	Target: >10 KIIs in each community. Includes: Elders (male & female), youth representatives (M & F), Women's Church group reps, chiefs, water committee reps, religious leaders, project actors (WASH &/or non-WASH), teachers, health workers, vulnerable/marginalised persons
Group Interviews	Gp. Int.	2 group interviews in each community: 1 x water committee or group reps responsible for, or active in, CWM (including a water system and implementation mapping and timeline activities); 1 x women's group or reps interview (including a women's daily water access wheel and water preference ranking activity)
Community Background Summary Report	CSR	A community profile and research summary report document, filled-out in the community during fieldwork by the ARs
Fieldnotes	FN	Associate Researcher and water committee/ researcher notes (observation and informal discussions)
WASH Household survey	WASH HHS	Target: 40% or higher sample coverage of total community HHs
Socioeconomic household survey	S-E HHS	Target: 40% or higher sample coverage of total community HHs
Water Quality testing	WQT	Aquagenx *E.coli* water testing: Source to house (5-6 replica samples in each community, e.g. source, dam, reservoir tank, tap stands, water container)
Risk Assessment	RA	Risk Assessment undertaken at each WQT location. Ideally also drainage assessment
Political Economy Analysis	PEA	Sector level PEA. Key Informant Interviews (national and Provincial level Gov. actors, CSO reps). Desktop review of relevant Policies

Quantitative and semi-qualitative data

Water quality sampling and testing - Aquagenx

Water quality testing was undertaken using the portable Aquagenx® CBT (compartment bag test) that is based on matching a colour pattern in the water sample with a corresponding score to ascertain the most-probable-number (MPN) of *E. coli* colonies per 100 millilitres of sample liquid. All the ARs were trained prior to community visits in the correct procedures to obtain water quality samples and subsequent water quality testing. For each site, key drinking water sources were identified during the water committee group interview and then subsequently tested in-situ. Two samples were tested per drinking water source.

Overall, a total of 43 drinking water sources were taken across the eight communities. Types of drinking water sources that were tested include: surface water (dams, storage tanks and tap stands); spring water (spring source); boreholes; and rainwater (storage tanks – communal and private).

Once the water quality tests were complete and the scores were recorded, the ARs prepared a water quality report for the community leader to discuss with the water committee and other community members (this was left to the *Turaga ni Koro,* or in two settlements, other community leaders to determine how to communicate the results). Information on how to clean rainwater tanks and treat drinking water was also given to the water committee to share with the community. It was highlighted that the water quality tests were a 'one off' (one point in time and hence not necessarily representative) and that the researchers could not return to conduct follow-up tests.

Limitations of water quality testing

It is important to note that water quality tests were a one-off sampling event only and was not intended to provide a detailed and accurate indicator of day-to-day risks to human health from the community's drinking water supply.

While *E. coli* remains an important indicator of faecal contamination for verification of water quality, measurements of *E. coli* do not represent a risk-based water quality target (WHO, 2017). The presence of *E. coli* does not necessarily indicate the presence of human faecal microorganisms, but is good evidence of recent general faecal contamination which may have been sourced from any animal species including pigs, dogs, chickens, lizards and birds . The test is for presence and absence of *E.coli* only; as such, the origins of the *E. coli* cannot be conclusively inferred (although a good site risk assessment can help with this).

Faecal contamination is also not distributed evenly throughout all components of a water system (dam, tank, pipes, taps etc) so presence in one part of the system does not necessarily mean presence in another part of the water system. This is one of the reasons why testing was conducted at a range of water sources and, as best as possible, across all parts of the water source system.

Sanitary inspections and risk assessments

A total of 36 risk assessments were conducted across the eight study sites. The ARs were trained in conducting drinking water risk assessments. These assessments were usually carried out at the time of water quality testing. A risk assessment score sheet was completed which included prompts to take photographs and notes on general observations, such as weather, infrastructure, animal and human contamination sources, and slope and vegetation description. There were two scores as part of the risk assessment, with a low number representing a lower risk:

1. A drinking water (DW) score that considered risks to the sources of drinking water (e.g. from animals, humans, and including microbiological and chemical)
2. An overall health risk score that included the DW scores plus risks to human health from water-based disease vectors (i.e. mosquitoes).

Drainage inspections

A drainage assessment was also undertaken as part of the site risk assessment activity to identity any hazards and contaminant sources that could impact on drinking water quality (e.g. water pooling in open defection areas) and overall health hazards (e.g. poorly drained surfaces as vector habitats).

1.4.4. Community engagement

In addition to securing ethical approval and permissions to conduct research in each community, the following engagement activities were undertaken:

- Community meeting on arrival, and presenting of *sevusevu*
- Laminated aerial/satellite images of the community and surrounds
- Identification and training of CRAs
- Research participants were not individually rewarded for participation
- Water testing and risk assessment – accompanied by some community members
- Water testing results were shared with the community before the research team departed, orally and in a short, written report
- Community report: a 4-page summary of key and relevant findings from each community, as well as key findings from all study sites, was shared with communities once the analyses was completed.

1.4.5. Country-level Political Economy Analysis

A political economy analysis (PEA) of the Fijian water and sanitation sector was undertaken, with a focus on understanding the power dynamics in government bodies at provincial and national levels that inform water and sanitation plans, projects, and management.

The approach to the political economy analysis was drawn from the USAID PEA framework (Rocha Menocal et al., 2018). This framework uses four pillars to investigate the structures impacting aid implementation:

- **Foundational (or structural) Factors**: the long-term structures that actors need to work within and around, because foundational factors either need a complete restructure of the way things are done to overturn, or are impossible to do so (the broader research program has adopted the more conventional term of Structural)
- **Rules of the Game**: the policies structures and power dynamics that governance systems work through
- **The Here and Now**: addresses current events and changes that impact how governance is done
- **Dynamics**: Refers to the interactions between the other three pillars and how the affects reinforce or work against each other (Rocha Menocal et. al., 2018).

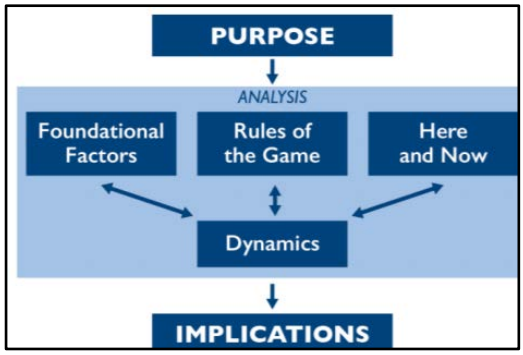


Figure 1.4: USAID's PEA framework.

Source: Rocha Menocal et al., 2018.

The methodology of the PEA involved using the framework to guide collection and analysis of data. Semi-structured interviews were conducted with government officials from the Department of Water and Sewerage, Environmental Health department, Mineral Resources Department, iTaukei Affairs Board, Kadavu Province officials; representatives from the Water Authority of Fiji; UNICEF and CSO representatives.

1.4.6. Limitations

Due to financial and logistical constraints the number of sites where the research could be undertaken was limited to eight. As noted above, pre-identifying "good" CWM sites was particularly difficult; however, this likely represents the fact that there are few documented or known sites where CWM can be said to be especially "good", even with regards to the truncated criteria noted above (1.4.2). This impacted the strength-based approach as there are potentially not enough "good" CWM sites to confidentially identify **all** the key internal and external factors likely to correlate with good CWM. Nevertheless, the diversity in CWM status in our final sample does allow for inter-case comparison (with a caveat regarding the small sample size) and the opportunity to explore instances of "positive deviance". The breadth and depth of the data has ultimately been sufficient to provide some productive insights and address the key research objectives.

1.4.7. Ethics

All required Ethics documentation was completed and approved prior to commencement of data collection. Approval was granted from the following research institutions and agencies:

- Griffith University – ref HREC 2018/793
- University of the South Pacific – ref sarahpene/2018
- University of Queensland – ref 2019000441/2018/793

In addition, permission was sought from Provincial and District administrators and relevant community leaders from each locale prior to site visits and data collection. Informed consent was obtained from all respondents prior to participating in data collection activities (surveys and interviews).

Wailotua-two community (Photo credit: D Gonzalez Botero).

2. WASH AND WATER SITUATION

2.1. Summary of SDG 6 indicators across communities

No communities met the SDG 6 definition for safely managed water system services; this is mostly due to the inadequate water quality and, for some communities, the location of access (being outside the household plot). As shown in Figure 2.1, drinking water service levels for the project communities (88% basic) were very similar to the national average (89% basic). Twenty eight percent of the population in the study sites had sanitation classified as safely managed which is considerably higher than national rural standards which indicated no safely managed systems from the 2017 data (JMP). There was however, a greater proportion of the lowest service levels for sanitation[6]; in the communities (23% limited and 3% unimproved) compared to the national rural average (5% limited and 0% unimproved) (Figure 2.1).

The service levels of hygiene (handwashing facilities) were mainly reported as limited (70%), or basic (23%). Seven percent (7%) of households had no handwashing facility observed. There was no available data for national rural average service levels for hygiene.

In general, the drinking water service levels reflected the national rural situation where drinking water was reasonably accessible but not always of a high quality. Sanitation levels were less consistent with the rural national average which also reflected the observed sanitation infrastructure that varied quite widely in the communities from flushing toilets in the house to open defecation or shared / community systems.

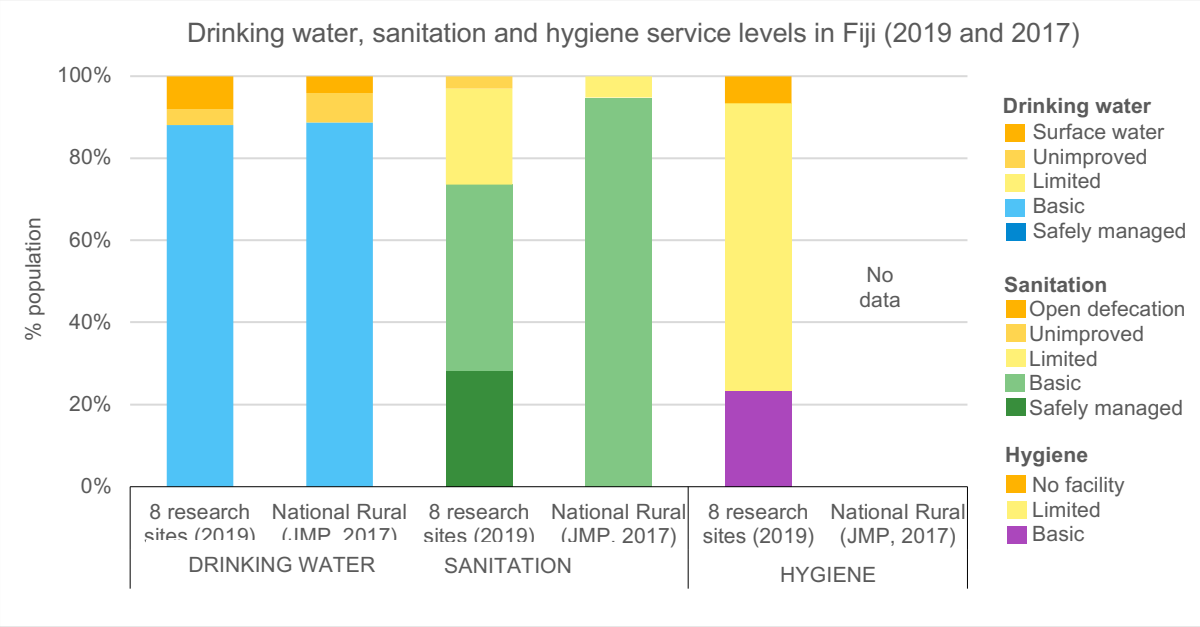


Figure 2.1: Drinking water, sanitation and hygiene service levels for the eight research sites (2019) compared to the national rural levels (2017)

[6] There may be a difference in the way the definition for safely managed sanitation was applied to the national rural dataset compared with the study communities; the interpretation used here is that on-site sanitation, such as pit latrines, that meet the criteria for a functional user interface (lid, slab etc), are exclusively used by the household, but that are never emptied, are considered safe. Once filled, these pits are covered and a new pit dug, thus faecal sludge is not extracted or transported from the pit, nor should humans come into direct contact with it. Additionally, the faecal sludge in septic tanks in rural locations was assumed to never be emptied and disposed so that human contact is generally not possible, and were thus classified as safely managed.

2.2. Overview of water systems

Water systems vary across Fiji with many communities having multiple water sources (Table 2.1), of which their uses are seasonally determined. All have some surface water sources but only some are used for drinking water purposes via a dam in a water source in the hills, reservoir or storage tank and tap stands or pipe to the property (not necessarily inside the house) (e.g. Wailotua-two, Cobue). Alternatively, collecting water directly from surface water sources may be a secondary or seasonal source for non-drinking water purposes. Some communities rely on water being trucked in by WAF, particularly during the dry season (e.g. Bavu, and the school in Nabubu). Groundwater – boreholes and springs, were also important water sources for some communities (Bavu and Cobue).

Daviqele *Turaga ni Koro* at the community's spring, the main water source (Photo credit: D Gonzalez Botero).

Table 2.1: Summary description of study community water systems

Community name	Main water source	No. of types of water sources in use	All water sources and system description	No. taps	Is water piped to all houses?	Water collection place (wet & dry season)	Rainwater tanks (% HH)[7]
Bavu	Borehole	4	1) **Borehole** --> pumped 1-2 times a week --> 5 storage tanks --> pipes --> gravity-fed to communal tap stands (1978, Fiji Gov) 2) WAF **tanker trucks** (dry season) 3) **Rainwater** 4) Directly from **stream** (for washing)	>45	No	Inside house: 3% & 6% Outside house (still in property): 91% & 7% Outside property: 6% & 46%	67%
Cobue	Borehole & stream	4	1) **Borehole** --> pump --> 3 elevated plastic water tanks --> filtered before distribution --> gravity-fed to 41 tap stands. Supplies iTaukei and Veikau (east) Indian settlements. Available from 6-10 am and 4-6 pm. (2016, Rotary) 2) **Stream** --> dam --> reservoir --> piped --> supplies iTaukei and Vatubogi (west Indo-Fijian) settlements. Available 24h. (2017, WAF) * Directly from **stream** (but not for drinking) 3) **Rainwater** 4) **Shallow dug well**	41	No	Inside house: 0 & 4% Outside house (still in property): 79 & 25% Outside property: 21 & 71%	19%
Daviqele	Spring	3	1a) **Spring** (box) #1 --> concrete reservoir (1988, Public Works Dept). From the reservoir, the water is split like this:i) --> 3 plastic storage tanks --> piped to the schoolii) --> (from reservoir) piped to each HH and the clinic 1b) **Spring** (box) #2 (this is the old source, used as backup). Still connected to piped system. 2) **Rainwater** (only 1 HH has installed RWT. Some communal tanks donated to hall and clinic, but not installed, so not in use) 3) Directly from **stream** (only some settlement HHs)	>65	In koro, yes. In settlements, no.	Inside house: 71 & 17% Outside house (still in property): 29 & 17% Outside property: 0 & 67%	27%

[7] Percentage of surveyed HHs (taken from the S-E HHS). In Bavu and Rukuruku, especially, there are many households using make-shift rainwater collection systems.

Galoa	Stream	4	1) From mainland Kadavu to Galoa island: **River** --> Dam --> piped across the sea --> reservoir tank --> piped to 12 standpipes and also directly to some houses (2004) 2) **Rainwater** (8 HHs with RWT, and shared with extended family) 3) **Wells** (in settlements) 4) Shoreline **springs** (used during dry season and in extreme cases, only available at low tide). Not piped.	>12	No	Inside house: 16 & 3% Outside house (still in property): 84 & 81% Outside property: 0 & 6%	27%
Nabubu	Spring	4	1a) **Spring #1** (Yavai) --> reservoir tank --> 23 standpipes and HH taps (1984) 1b) **Spring #2** (Tonialo) --> reservoir tank --> standpipes and HH taps (Rotary Pacific, 2011) * **Spring #3** (Nasaka - old and not in use) (1974) 2) **Rainwater** (3 HHs currently have RWT, school also has 5 tanks, other HHs use containers to collect rainwater) 3) **Creek** used for doing laundry, not used for drinking 4) **Seawater** used when there is water shortage for things like cooking (esp when there's no salt), bathing, flushing toilet, cleaning * **Well** (Koroqara) - used in the 80's and not currently in use	>23	Yes	Inside house: 53 & 47% Outside house (still in property): 47 & 53% Outside property: 0 & 0%	14% (5 school rainwater tanks)
Narara	Stream	2	1) **Stream** --> dam --> 2 reservoir tanks --> 3 small filter tanks --> 16 HH taps & 2 communal tap stands (built in 2016 and used since 2017) * Directly from **stream** as back up when pipes are blocked or water pressure low 2) **Rainwater** (7 HHs with rainwater tanks)	18	Yes	Inside house: 69 & 56% Outside house (still in property): 31 & 44% Outside property: 0 & 0% (2 communal taps)	44%
Rukuruku	Spring	4	1) **Spring #1**--> Spring box (dam) --> reservoir --> taps in houses and community tap stands (2016, Rotary Pacific) * **Spring #2** (Nasega) for drinking water when there are disruptions to piped water from spring box (dam) 2) **Rainwater** tanks 3) Directly from the **stream** when there are disruptions (non-drinking uses) 4) **Dug well** (women's group) - rarely used, only when there are disruptions. Not used for drinking, only for bathing, cooking and washing.		No	Inside house: 53 & 47% Outside house (still in property): 47 & 53% Outside property: 0 & 0%	9%
Wailotua-two	Stream	2	1) **Stream** --> dam --> reservoir --> piped to HHs (2015) * Directly from **stream** 2) Communal **rainwater** tank at the community hall (2010)	>20	Yes	Inside house: 12 & 18% Outside house: 82 & 18% Outside property: 6 & 65%	

2.3. SDG 6.1 service levels

Using SDG6.1 as an indicator of water access, no water systems met the definition for safely managed services (Figure 2.2); this is mostly due to the level of water quality (E. coli presence) and the ease of access. Being limited to outdoor access only (whether inside or outside the property boundary) is linked to diminishing health and wellbeing benefits.

The service level varied between wet and dry season in five of the eight case-studies, but only notably in two - Wailotua and Daviqele (Figure 2.3). The reason for the drop is most often the switch to a different main drinking water source, which has a lesser water quality – most usually a switch from rainwater to other sources, including dam (surface water) sources. This variability highlights the importance of considering seasonality when reporting service levels.

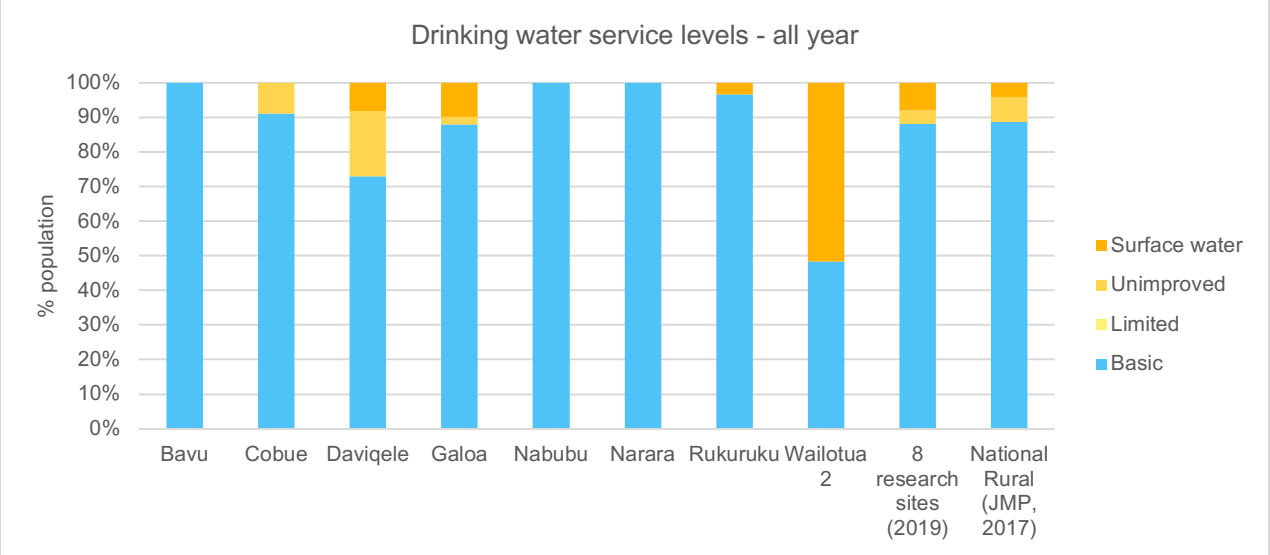


Figure 2.2: SDG 6.1 - Drinking water service levels for each site (2019), aggregate for all case studies (2019), and rural national (2017)

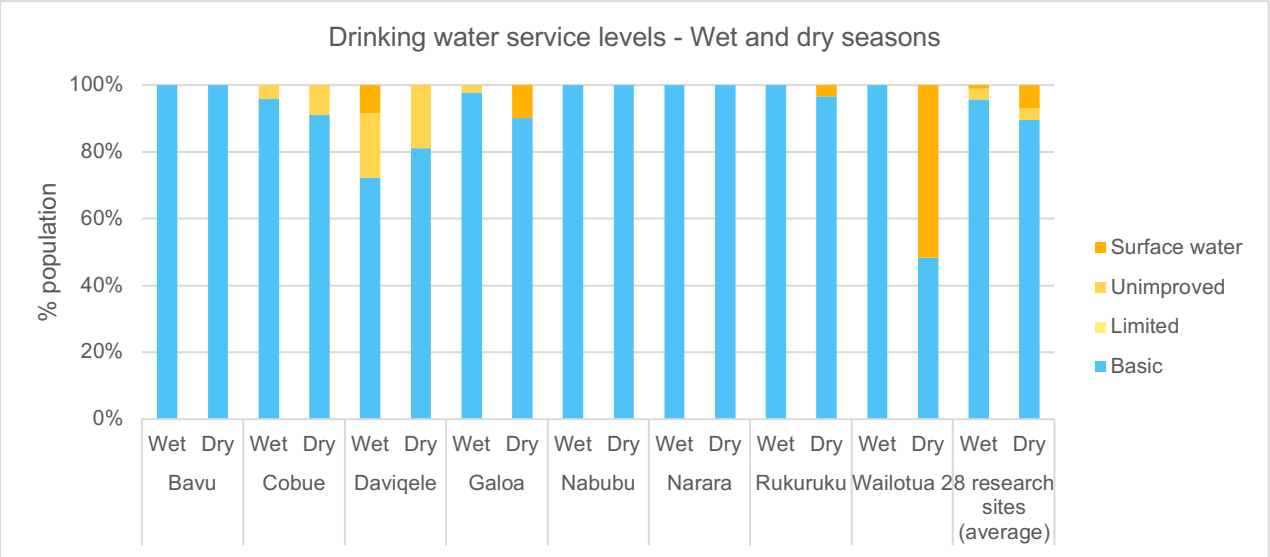


Figure 2.3: SDG 6.1 Drinking water service levels per site and disaggregated by season (wet and dry seasons) (% population, n=950)

Following the JMP definition for SDG 6.1, the above indicator results were based on the location, type of facility and water quality of the primary source of drinking water identified by the household. However,

water tests were conducted at one point in time (wet season), and water quality was not tested at every household surveyed but rather from a sample of 'types' of water supplies and extrapolated to all of similar types (e.g. results from 1 or more rainwater tanks were applied to all households using rainwater tanks as the primary drinking water source). In addition, some households indicated different primary drinking water sources for the wet and dry seasons; in these cases, the lower service level was used to represent overall service level.

The use of SDG 6 indicators, and their definitions and monitoring methods, have sparked debate amongst academics and practitioners (e.g. Guppy et al., 2019; Massa et al., 2017). Indeed, the potential ambiguity and accuracy of SDG 6 indicators have been recognised by the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) (e.g. WHO and UNICEF, 2017a; WHO and UNICEF, 2017b). The JMP, as well as critics of the framework and methodology have highlighted important limitations and caveats, which are pertinent to recognise when using WASH service ladders and the data associated with them.

2.4. Water sources and availability

Across the eight sites, there were eight types of water sources in use, and most communities use the same primary water source for both drinking and non-drinking uses (Table 2.2). All communities relied upon at least two water sources for drinking, and used additional sources for non-drinking needs.

There is some seasonality in the primary water sources used for drinking (Figure 2.4) and non-drinking in most sites. Less households use rainwater as their primary drinking water source in the dry season, and some sources that are not used for drinking at all in the wet season are used during the dry season, in particular, direct surface water (Figure 2.4).

Table 2.2: Diversity of water sources used by case study sites, for drinking and domestic non-drinking needs. Based on multiple reports (HHS, KIIs, Risk Assessments, and Gp Int) and observations.

Sources used by any HH	Bavu		Cobue		Daviqele		Galoa		Nabubu		Narara		Rukuruku		Wailotua-two	
	Drinking	Non-drinking	Drinking	Non-drinking	Drinking	Non-drinking	Drinking	Non-drinking	Drinking	Non-drinking	Drinking	Non-drinking	Drinking	Non-drinking	Drinking	Non-drinking
Water Authority of Fiji (trucked)	●	●														
Reservoir from Dam (Surface water source, piped)			●	●			●	●			●	●			●	●
Spring					●	●		●	●	●			●	●		
Rainwater (tank or other containers)	●	●	●	●		●	●	●	●	●	●		●	●	●	●
Borehole / tube well	●	●	●	●												
Shallow Dug Well			●	●			●							●		
Directly from surface water		●		●	●					●		●	●	●		●
Seawater										●						

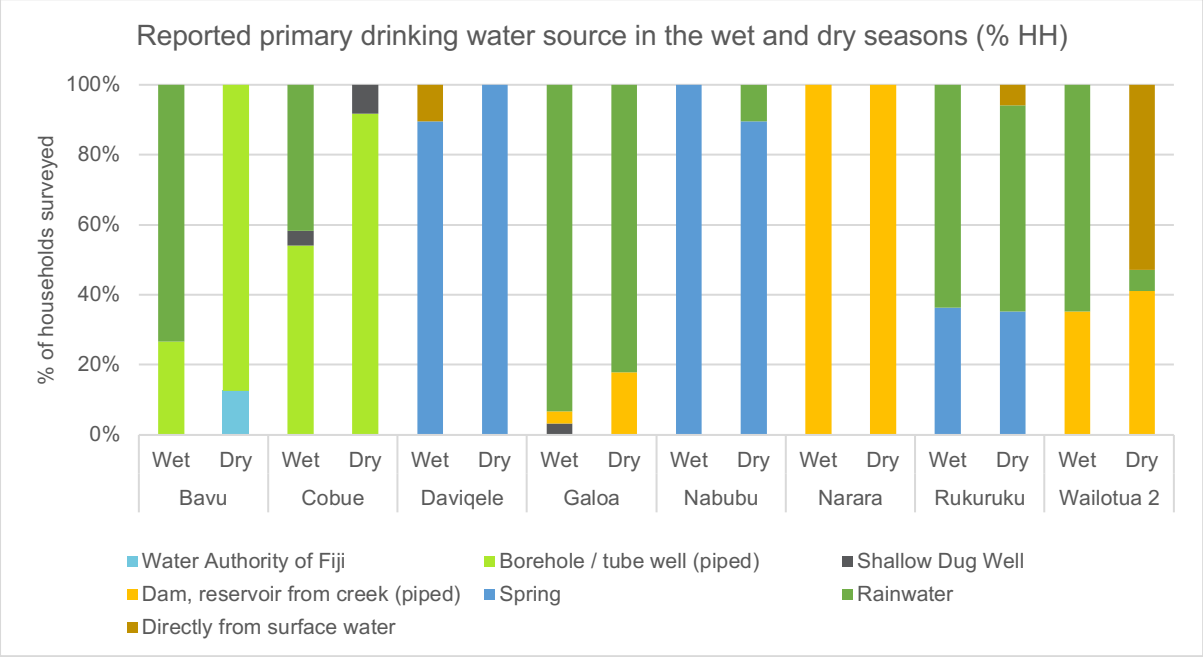


Figure 2.4: Reported primary drinking water source in the eight case study sites, during the wet and dry seasons. (n=200)

Managing multiple sources to maintain drinking water availability

In all the study sites there were many households that used their primary water source for both drinking and non-drinking needs (Table 2.3, *% HH drinking source used for non-drinking purposes*). The proportion of households that reported using the same water sources for drinking and non-drinking purposes was generally lower in the wet season, when rainwater is available (Bavu, Cobue, Daviqele, Nabubu and Rukuruku). In Galoa and Wailotua-two this proportion decreased in the dry season, and it remained unchanged in Narara. Cobue had the highest seasonal variability. This could be explained by the types of water sources used, and the reliance on rainwater for drinking purposes in the wet season (Figure 2.4).

Table 2.3 also indicates the proportion of households that had their main drinking source not available in dry season. Five of the communities had only 6% or less of households that could not access their main drinking water source all year-round. The remaining 3 communities (Bavu, Rukuruku and Wailotua-two) had less access to their main drinking water source in the dry season. Interestingly, these communities, although lacking availability of their primary drinking source during the dry season, still used that source for non-drinking purposes. For example, 25% of households in Rukuruku, 22% in Bavu, and 18% in Wailotua-two indicated a shortage of their primary wet season drinking source in the dry season, but 47-81% of households are using their drinking source for other non-drinking uses. All of these communities use at least two drinking and non-drinking water sources, but are not managing to conserve drinking water for the dry season. Bavu, in particular, experiences high levels of water scarcity in the dry season and relies on WAF water truck deliveries. Moreover, alternate sources (drinking and non-drinking) have largely *"all dried-up"* (Gp. Int., WC, Bavu).

Women that participated in the group interviews acknowledged the year-round accessibility of non-drinking water sources, as it allowed them to carry out water-related activities in both the dry and wet seasons:

"It's readily available, always there, whether in rainy season or dry season"
(Grp Int Women's, Cobue).

Table 2.3: Water availability (n=200 households)

	Bavu (n=32)		Cobue (n=24)		Daviqele (n=24)		Galoa (n=32)		Nabubu (n=19)		Narara (n=16)		Rukuruku (n=36)		Wailotua-two (n=17)	
	Wet	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**
% HH drinking source used for non-drinking purposes	69%	78%	17%	96%	83%	88%	75%	31%	79%	89%	100%	100%	67%	81%	47%	35%
% HH main drinking source (wet) is **not** available in dry season	22%		0%		4%		0%		0%		6%		25%		18%	
Total No. sources in use (wet or dry)	4		4		3		4		4		2		4		2	
No. drinking sources in use	3		4		2		3		2		2		3		2	

Numerous participants in the Water Committee Group interview noted that an increase in water-based sanitation over the last decade, combined with population growth, were impacting on water availability, primarily in relation to low water pressure (e.g. Cobue, Daviqele). In Daviqele, it was noted that:

> *Low water pressure is experienced at times due to low water level in the reservoir. This is a result of an increase in number of pipes per household. Some houses have two toilets while the others have 4 or 5 taps or tap stands [additionally] some people leave the tap running because it's broken, without reporting the matter to the Water Committee (Gp. Int. WC-Daviqele).*

In contrast, respondents in Nabubu reported that during the dry season, when there are water shortages, community members resort to using seawater for non-drinking purposes, such as bathing, flushing toilets and cleaning (Table 2.2).

2.5. Water service reliability

The majority of households surveyed reported that their water sources are "fully functional", with some small variability between wet (93%) and dry seasons (89%). The lowest functionality rates were 75% (Cobue, dry season) and 78% (Galoa – dry season). However, crosstabulations with other WASH HHS questions and inspections of water infrastructure revealed some functional weaknesses in other sites as well (

Table 2.4). The most common problems affecting reliability were low water pressure (particularly to elevated or more distant locations in the distribution network) as well as demand (most notably in Daviqele, where a growing number of households have two toilets and 4-5 taps per house), and pipe blockage during the wet season (due to an increase in leaves and sediment entering the dam). Leaks and broken taps and pipes were also observed and reported as issues affecting water source functionality and reliability.

Table 2.4: Functionality of water systems (based upon key informant interviews, WASH HHS and inspections of infrastructure)

	Reliability of water supply & water point functionality
Bavu	Reported: Disruptions due to technical failures and low water level in bore – Water system (WS) 84% fully functional Tap stands/HH tap reported: 88% fully functional Observed: A few leaks
Cobue	Reported: Frequent disruptions (technical), e.g. low pressure, slow recharge -75-96% fully functional [seasonal] Tap stands reported: 100% fully functional [seasonal] Observed: A few taps broken
Daviqele	Reported: Occasional disruptions in wet season (blockage after heavy rain) and low water pressure due to high consumption (inc. taps and toilets in HHs) - WS 100% fully functional Tap stands/HH tap reported: 100% fully functional Observed: Some leaks, a few broken taps and pipes, taps left running
Galoa	Reported: Occasional disruptions in wet season (blockages after heavy rain) - 78-81% (seasonal) Tap stands/HH tap reported: 100% fully functional Observed: A few to no leaking taps
Nabubu	Reported: Occasional disruptions in wet season (blockages after heavy rain - gravel accumulation); low pressure in dry season - 90-95% (seasonal) Tap stands/HH tap reported: 100% fully functional Observed: One leaking tap
Narara	Reported: Occasional disruptions – dry season (low pressure). Wet season (pipe blockages, sand in pipes) - 100% (seasonal) Tap stands/HH tap reported: 100% fully functional Observed: No leaking taps
Rukuruku	Reported: Some issues with low water pressure (uphill homes) - 100% (seasonal) Tap stands/HH tap reported: 83% fully functional Observed: Some broken and leaking taps
Wailotua-two	Reported: Disruptions from dam blockages after heavy rain - WS 94% fully functional (wet) Tap stands reported: 94% fully functional Observed: Some broken pipes and low pressure issues in a few HHs

2.6. Water accessibility

Depending on seasonality, between 0% to 71% of all households had water access points inside their house, with an overall average of 34% (wet season) and 26% (dry season) (Figure 2.5). Narara, Nabubu and Narara had the most households with indoor access points across both seasons. Most households in Cobue, Daviqele and Wailotua-two were sharing their main access point with other households in the dry season.

In five of the eight sites there were households that reported a family member had difficulty accessing water for themselves (Bavu, Daviqele, Galoa, Narara and Wailotua-two), with the highest proportion of accessibility difficulties found in Narara (13% of households surveyed) and Galoa (9%). The difficulties were associated with older age, a disability and the far distance required to fetch water, particularly in the dry season when fetching water outside the households' yards (Figure 2.5).

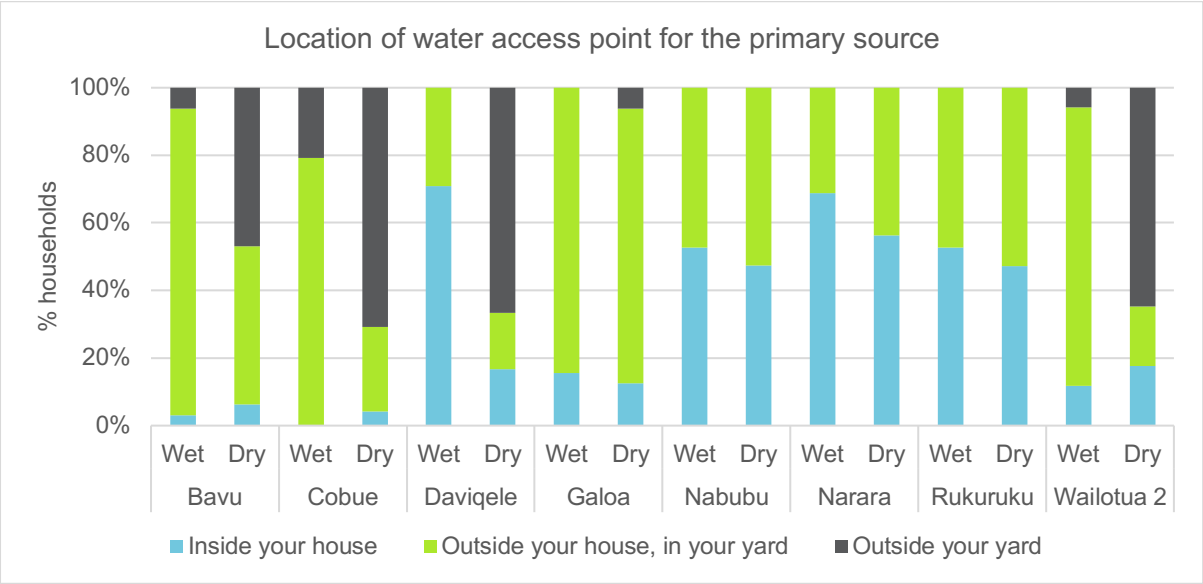


Figure 2.5: Location of primary water access point (% households surveyed, n=200)

Both females and males participate in water collection whenever water has to be collected outside the house. Across all study sites and age groups, females are the main water collectors in 58% and 52% of the households (in dry and wet season respectively), and males in 34% (wet season) and 41% (dry season) of households. In all cases, water collection is predominantly done by adults (over 17 years old), although youth and children also participate, but to a lesser extent (between 1% - 5% of the time).

The data shows a general increase in men's participation in water collection during the dry season, when the access point was often further from the house, such as carrying water from a stream or river. The communities in which men's share of water collection during the dry season increased the most were Daviqele, Nabubu and Wailotua-two, and in contrast, it decreased in Narara.

Piped water supplies to taps in the house or yard, or tap stands, were considered the "best" water service option, and was already the predominant distribution system in most sites (especially in the wet season, Figure 2.5). There was concerns in Rukuruku and Daviqele about population growth and the capacity of the current system to meet demand in the future.

For the communities where a significant proportion of households accessed water sources outside their house or yard (especially if they used a different water source in the dry season), the average water collection time across all locations was 3 minutes in the wet season and 10 minutes in the dry season. Bavu and Wailotua had the longest water collection time (11 minutes and 27 minutes respectively in the dry season). Being limited to outdoor access only (whether inside or outside the property boundary) is linked to diminishing health and wellbeing benefits from water access (Evans et al., 2013).

As part of the women's group interview, a participatory 'water wheel' activity was developed whereby participants began the interview by temporally figuring their typical daily routine around a clock face, capturing when, why and for how long they access water. Below (**Key:**

Figure 2.6) is an example of a 'water wheel' from Cobue and Galoa. As well as a process to prompt dialogue, this activity neatly captures the centrality of water access to women's daily life.

In Rukuruku, most of the women need to rise by 4 am as the community is far away from the main town where the school is located (Levuka). Therefore, water use activities started early - 4 am generally - in this community. In both examples, the morning activities are much more oriented around water than the afternoon, though clothes and linen washing can occur during most times in the day.

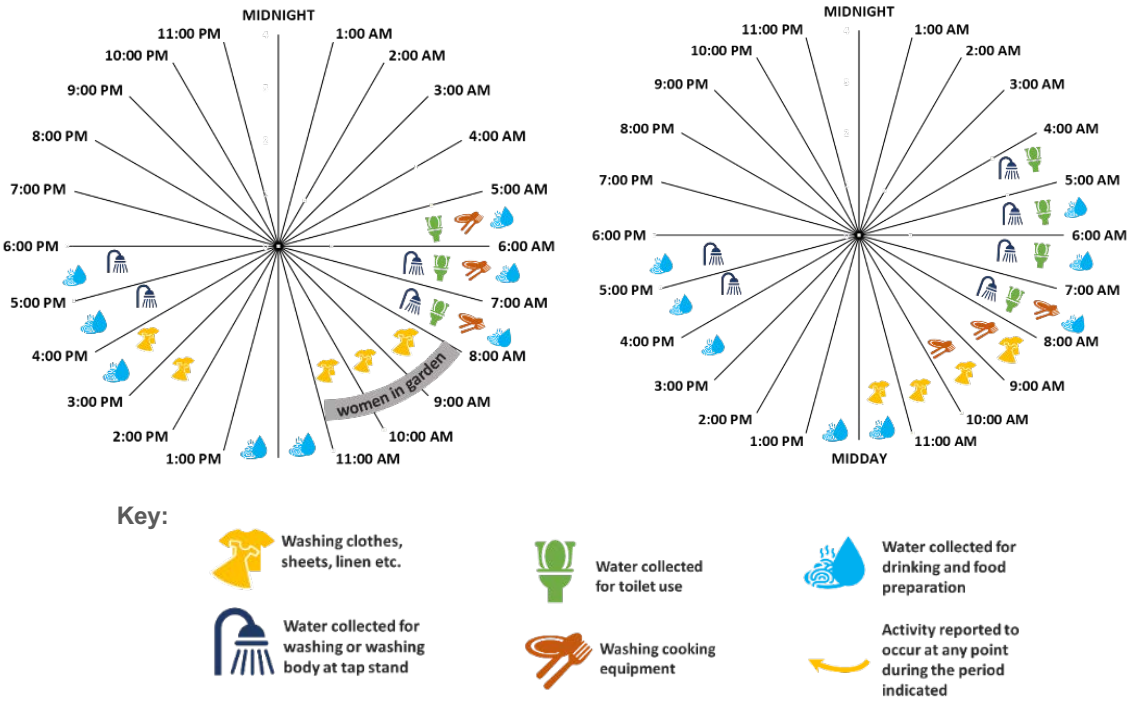


Figure 2.6: Women's water wheel indicating timing and type of water use activities for Cobue (left) and Galoa (right)

2.7. Water quality and sanitary risk assessments

Across the eight study sites, a total of 43 drinking water samples were tested for presence of *E. coli*. Water samples were taken along the distribution water system of different types of drinking water sources, which included surface water (samples taken directly from the rivers/streams, or dams, storage reservoirs and tap stands); spring water (samples directly from the spring source, storage tanks and tap stands); rainwater (samples from storage tanks – communal and private) and groundwater (boreholes and shallow wells).

It is important to note that a majority of the water testing occurred during or just after rainfall, which is known to influence (reduce) the quality of surface water drinking supplies – of which several of the project communities relied on as their prime water source. It is quite possible that *E. coli* counts may have been lower had the samples been taken during the dry season.

Site risk assessments were also undertaken concomitantly with water sampling to allow a visual assessment and description of potential points of contaminant for main drinking water sources and access points in each community (e.g. dams from a stream/river, spring boxes, storage tanks, taps, and rainwater tanks/containers). The rationale for combining these activities was to explore whether there was any agreement (correlation) between drinking water quality (presence of *E. coli*) scores and risk assessment scores (e.g. could a site risk assessment potentially be a useful indicator of drinking water quality). Further, in line with WHO (2017) criteria for health-based target approach, risk assessments represent a key component of the overall framework for safe drinking water management. In this respect, a site risk assessment could help to identify areas for improved community water maintenance

and operation activities (e.g. cleaning tap stands, fixing pipes, reducing animal and human access to creeks and dams).

In all the communities there was a presence of the microbial indicator *E. coli* in at least one, if not all, of their drinking water source types (Table 2.5 below). As is expected based on other studies, spring and rain water sources typically had lower most-probable-numbers (MPN) of *E.coli*. Microbial presence in surface waters in Fiji (Nadi to Lautoka area) have been recently reported by Singh and Railoa (2020) and they also found a high number of drinking water samples containing *E. coli* in untreated samples.

Cobue was the only community that recorded no counts of *E. coli* in two of their water sources (both originating from groundwater sources). These also corresponded relatively well to the drinking water risk assessment scores.

Table 2.5: Water quality results: E. coli MPN[8] measured using Aquagenx compartment test bags, and compared with 2017 WHO Guidelines according to the key to the right

Water source type		Bavu	Wailotua 2	Cobue	Daviqele	Galoa	Nabubu	Narara	Rukuruku
Surface water	Direct source (stream)	>100		>100				74.0	
	Dam			>100		48.3		31.0	
	Storage tank (reservoir)	41	>100			48.3			
	Tap stand		>100	78.0		48.3		31.0	
			>100			>100		13.6	
Spring water	spring source				>100		>100		74
	Storage tank (reservior)				74.0		>100		48
					11.0				
	Tap stand				31.0		48		48
					48.0		48		31
Rain-water	Tank	>100	>100	>100	31.0	13.6	13.6		13.6
						9.6			
Ground-water	Borehole	>100		0.0					
				40.0					
	HH container (filtered water)	>100							
	HH container (boiled water)	0.0							
	Shallow wells (protected)			0.0					

E. Coli CFU/100ml	
0	SAFE
0-10	LOW
10-100	INTERMEDIATE
>100	HIGH

2.7.1. Surface water

Bacterial contamination in surface water samples exceeded 100 MPN/100 ml ("High") in 43% of all samples and exceeded 10 MPN/100mL ("Intermediate") in 100% of all samples (including stream, reservoir tanks and tap stands). As noted, the wet conditions during much of these sampling events would most likely contribute to some of the high *E. coli* counts.

Sanitary risk assessments conducted in-situ at the time of water quality sampling suggested that there were variable control measures in place, with most dams having no controlled access, only rudimentary filters on the offtake pipe in the dam and observed animal activity at some sites. It is highly likely that water quality is impacted by animals defecating in the dam catchment with varying degrees of attenuation observed along the downstream water supply chain (e.g. storage reservoir and taps). Notably, Narara and Bavu did exbibit some removal of pathogens between surface water source and tap stand.

[8] Note that MPN (most-probable-number) and CFU (colony forming units) can be used interchangeably. Both units measure the estimated number of bacteria in a water sample. Both are recognized internationally.

2.7.2. Spring water

Three communities accessed spring water as a main drinking water source: Daviqele, Nabubu and Rukuruku (Figure 2.4). Spring water, particularly from a protected spring (covered access) can be of a better quality compared with open surface water sources. This was somewhat shown in the results - although all samples from spring water had an open spring box, and had presence of *E. coli*, scores were generally lower than surface water with around 23% of spring water samples in the "High" range compared to 43% for surface water. "Intermediate" samples ranged from 31 to 74 MPN /100mL (spring) (Table 2.5). Additionally, Rukuruku exhibited some removal of pathogens between spring water source and tap stand.

2.7.3. Groundwater

There were only two communities where groundwater was a primary source of drinking water: Bavu and Cobue. For Bavu, there was a high presence of *E. coli* in the raw groundwater though there was no formal sanitary risk assessment done (pilot study site) and so it is difficult to assess the reasons for this. Cobue raw groundwater samples had the 'best' results across all the communities with two sampling locations indicating no pathogens were present in the water on that day (Table 2.5). The borehole is a relatively new system that has its origins in the neighbouring settlement of Veikau and is shared between the two communities. This is the preferred drinking water source in Cobue though is only intermittently available to the Cobue residents due to low pressure and slow recharge of the storage tanks from the source bore in Veikau. Management of this source is, in theory, shared between Cobue and Veikau, though there appears to be some tension around access and management (see Chapter 3: *Community Social Context & Characteristics* below).

2.7.4. Rainwater

Samples for rainwater quality testing were taken from seven of the eight communities. The scores markedly varied and ranged from "Low" to "Intermediate" and "High" (Table 2.5). In Bavu (communal rainwater tank), Wailotua-two (communal rainwater tank) and Cobue (household tank), all rainwater samples had high levels of *E. coli* (exceeding 100 MPN/100mL). While none of the rainwater samples were classified as "Safe", the remaining rainwater tank samples were relatively low ranging from 9.6 ("Low") in Galoa to 13.6 and 31 ("Intermediate") MPN/ 100mL in Galoa, Daviqele, Nabubu and Rukuruku.

Based on the risk assessments, it is unlikely that the recorded presence of *E. coli* originated from human faecal contamination and more likely from rats, lizards and birds. Nevertheless, these types of non-human pathogens can cause illness (especially from mammal-based *E. coli* strains). Rainwater was often identified as the preferred water source by many respondents, and it was recognised from the site assessments and general discussions that there is 'room for improvement' in maintenance and operating procedures for rainwater tanks. One of the common maintenance issues noted was the lack, or poor quality, of the screen/lid at the intake point. Guttering was also often broken and dirty and tanks were rarely cleaned out properly, if at all.

2.7.5. Water containers

Only minimal testing of water in household storage containers was conducted. However, in Bavu a water quality test was conducted with water that had been filtered and then stored in household buckets. This filtered bore water was 'treated' by passing through a sediment filter in a 2-bucket system (e.g. filtered then left to settle prior to use) and was provided by the Assemblies of God Church. Although filtered, the water had *E. coli* counts at >100 MPN/100mL. It is not possible to distinguish with certainty the source of the contamination - it may have been from a dirty container that water was poured into, or the filter itself needed cleaning and/or was ineffectual. Nevertheless, this provides a good example of the challenges of household level treatment of drinking water where people perceive they are drinking

clean water as they have 'treated' it, but the treatment technique may not be as effective as it could be for a number of reasons. Here, education and external engagement can play a role – for example while the Research team were in Bavu, they took the opportunity to boil the same bore water for 2 minutes and then test it for presence of *E. coli*. The results were 0 MPN/100mL, which is consistent with the messaging from WHO and others that boiling drinking water (for two minutes) is the most effective treatment of water at the household level.

Data from the WASH HHS indicated that households used a variety of water containers to collect, carry and store drinking water, with the most common containers across all study sites being PET/drinking bottles (70%), open containers/buckets with no lids (65%) and containers with a lid (43%). **Water container cleaning frequency was variable.** On average, the majority of respondents across all communities reported cleaning their containers daily (55%) or 1-3 times a week (35%). However, direct inspections of household water containers cleanliness revealed that three of the communities (Cobue, Nabubu and Narara) had at more than 94% of households where *all* drinking water containers were visually clean. Galoa had the lowest rate of *all* clean containers (9% of households), the reminder were all between 50% and 88%. Rukuruku had the highest proportion of households (19%) were *none* of the water containers were observed to be clean.

2.7.6. Attitudinal data on water quality and water treatment practices

Most households across all communities perceived their drinking water supply to be "very safe" or "mostly safe", with the exception of Bavu, where 45% of household respondents considered the bore water as "not safe" (**Error! Reference source not found.**).

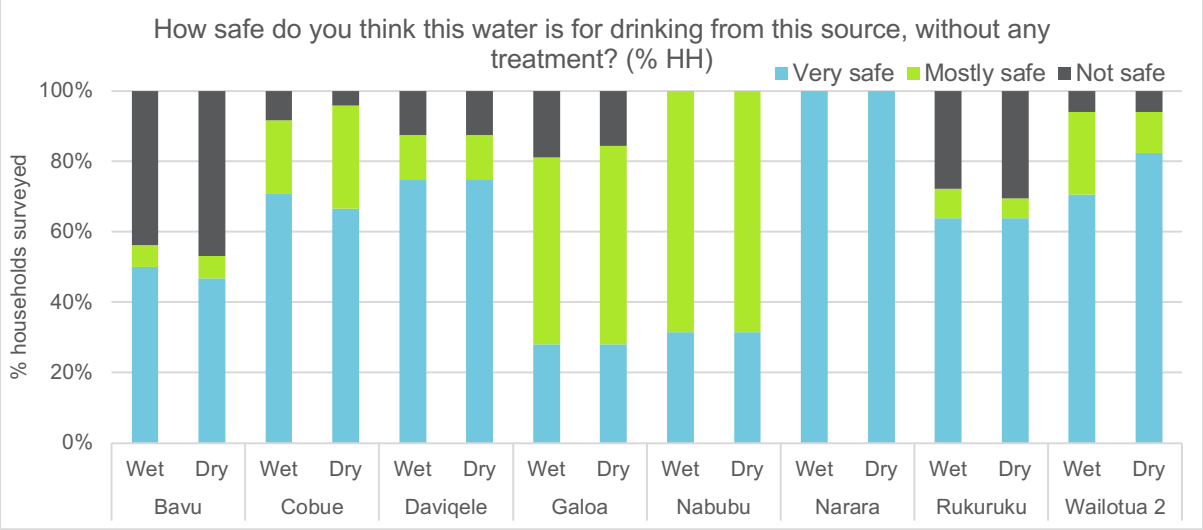


Figure 2.7: Perceived drinking water safety (% HH, n=200)

On average, almost all households surveyed reported they treated their water in the wet (89%) and dry seasons (92%). In all communities, the households used between two to three water treatment methods, and the method used changed slightly depending on the season (due to using different water sources in the different seasons). Of the households that reported treating water, boiling was the main method (70 in wet season and 82% in dry season), followed by filtration (56% wet season and 54% dry season) and precipitation by letting water sit (48% in wet season and 44% in dry season).

When asked to rank different water sources according to which are best for health, women from communities **ranked rainwater source as the healthiest water source**, except in Cobue (where there are no tanks but people collect rainwater in make-shift containers) and in Rukuruku. In both these communities, rainwater was ranked second "best" for health. In every locale, the women's group ranked piped water as best for "well-being" due to convenience.

In the two communities that relied primarily on bore water – Cobue and Bavu – participants in the women's group interview considered the bore water to be clean and safe; however, the water committee, nurse, and some other individual interviewees generally considered the bore water not to be safe (especially in Bavu). This disconnect is noteworthy, signalling a lack of communication between the water committee and community nurse and local residents. In most other locales, people noted that the water was dirty mainly only after heavy rain.

Figure 2.8: Water quality testing and site risk assessment activities (Green liquid indicates presence of E. coli) (Photo credit: D Gonzalez-Botero)

2.7.7. Water drainage

Drainage assessments were carried out as part of the sanitary risk assessments in only two of the study sites: Cobue and Narara. For Cobue, there had been some drainage work carried out to improve the flow of the 'wastewater drains'. This seems to be a fairly proactive action, as reported during the group interview with the Water Committee:

> *"there is a hole/drain with some stones and a pipe from the bathroom, sink that channels wastewater into this drain or hole. For the tap stand, there is also a hole dug to channel all the waste water and this hole has stones properly placed to get in waste water. Each tap stand in the Cobue community has this in place." (WC Grp Int, Cobue, 33:50 – 36:00)*

In both Galoa and Daviqele, weeding and cleaning dams was undertaken once a month as part of regular community *soli*.

2.8. Drinking water safety risk assessment

Drinking water scores based on the site risk assessments were typically in the "Intermediate" range (scores between 15-65 of a possible 81). For a majority of the risk assessment locations in each of the communities' water source types, there was some degree of risk of pollutants entering the water source system (whether at dam, storage tank, tap stand). The risk factors were heightened typically due to absence of control measures such as fencing around a dam, lack of covers on tanks/water containers, animals being able to access tap stands/water containers, etc.

We examined drinking water risk scores to explore if these could be aligned with water quality (Figure 2.8), as this could potentially be a cost-effective way to predict water safety without testing the water quality.

We found some correlations: When the drinking water (DW) risk score is low, water quality was generally better, and when the risk score is high, the water quality was generally poor. However, the middle risk scores (15-65) did not correlate well with the water quality results, with numerous mid-range DW risk scores (probably contaminated) showing either **low** *E.coli* MPN/100ml counts (e.g. a groundwater water access point in Cobue [DW 28%/WQ 0.0]) or **high** *E.coli counts* (e.g. water access point W2 MT in Wailotua-two [DW 12%/WQ >100).

Based on our case-study results, the risk assessment method appears to be a potentially useful proxy for water quality testing *if* risk scores are either very low or very high, but needs further refinement and ground truthing to assess if predictions for the middle range can be improved or not.

2.9. Water system satisfaction and aspirational water systems

Overall, people were generally more satisfied with their household water source in the wet season than the dry season (Figure 2.9). Satisfaction levels varied across communities. The highest satisfaction rates were found in Nabubu, Narara and Daviqele, and the lowest satisfaction rates were in Bavu and Wailotua-two. It may be noteworthy that the majority of households in both Bavu and Wailotua-two accessed water outside the house (inside and outside the household yard), whereas in Nabubu, Narara and Daviqele between 53% - 71% of households had water piped inside their house (see Figure 2.5). Additionally, Bavu suffers water scarcity issues due to technical and environmental issues with the borehole, whilst Wailotua-two frequently suffers from flooding.

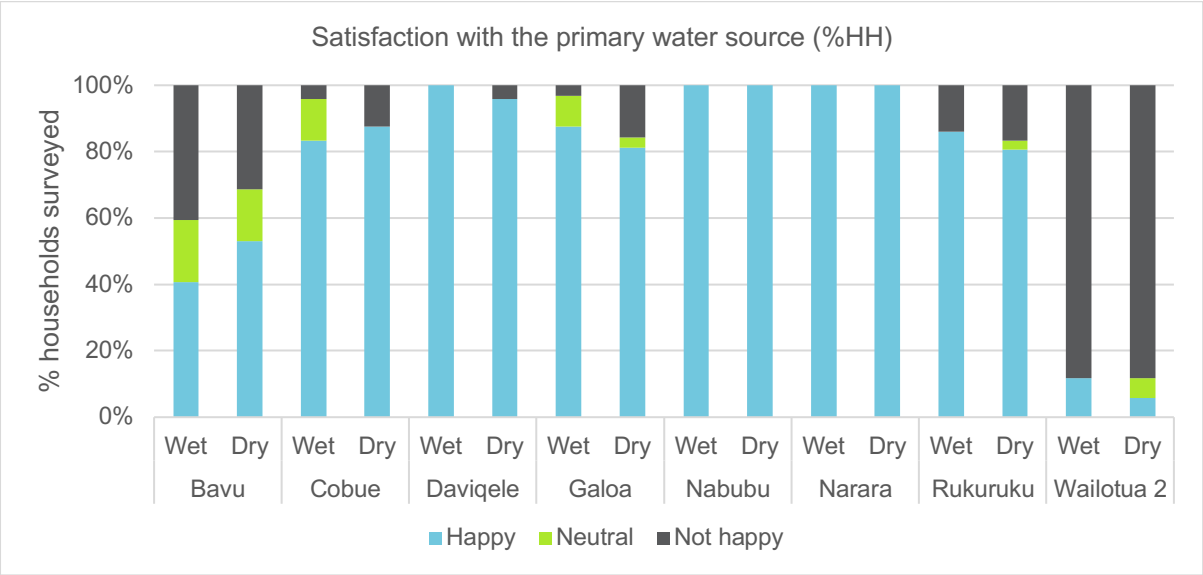


Figure 2.9: Satisfaction with water source (n= 200 households)

In the group interviews with women, many respondents stated that they currently had their preferred system, which was being able to access water from inside their house (six of the eight communities had most or a significant proportion of houses with water inside the house). The participants voiced a desire for all houses to have water piped inside. Additional water system aspirations varied, and were context-specific. In Wailotua-two, having piped water into the house was the main aspiration, whilst in Bavu the women's group viewed a borehole as the "best" water system and wanted a new borehole; conversely, the water committee in Bavu emphasised that they wanted multiple water sources rather than relying on just one. In Nabubu, they wanted another storage tank so that the *"…school has a back-up supply during challenging water supply times. The current tank is too small…"* (Gp. Int.-W, N). Similarly, the water committee in Cobue wanted a new borehole and more storage tanks (to address the water storage and service issue). The women, however, wanted WAF-treated water piped into their house:

> *"[We want water] supplied by the Water Authority of Fiji. One that is clean and treated, safe for drinking and where every household has access to tap stands or pipes in every home, where they can finally use their flush toilets, build sink inside their kitchen and help us women in cleaning our dishes" (Gp.Int-W, Cobue).*

The desire for WAF water (piped into their homes) and/or treated water (e.g. chlorinated and/or filtered) was a recurrent theme, echoed most strongly in Narara, Cobue, and Rukuruku. In Cobue, the women in the group interview were specific about their desired water system:

> *"Sa rawa ga ni tatadratakí tu me yaco mai na wai mai na matanitu me da vaka meter ni wai, baleta oya e lako tu ga, ena sega ni na maca vakadua"*

> *We always dreamt of having water; supplied by the Water Authority, and for each house to have a meter so that there won't be problem of water shortages and we would be able to use flush toilets and build in our kitchen sinks inside our house" (Grp Int Women, Cobue)*

The women acknowledge that if they received this level of water accessibility and treatment, then they would have to pay more, and this was a negative point of their aspirational system:

> *"The only thing that would be not good about this water supply is that we will have to pay water bills. If bills aren't paid, there will be no water". (Grp Int Women, Cobue)*

> *"The only thing not good in this water supply (WAF) is we are going to pay bills". (Grp Int Women, Narara)*

Interestingly, other negative perception of the WAF aspirational system was the reliance on external people to fix the supply if something went wrong:

> *"Sometimes there will be no water supply in the area. Maybe a pipe is broken, or something, and if that is the case, then we will have to let the relevant authorities know about it, so they can come and fix it" (Grp Int Women, Cobue).*

This is interesting as it indicates that they do not believe that the community is responsible for the operation and maintenance of a water system resulting from external intervention. This suggests that there is a lack of awareness, possibly not just among the women, that external intervention to undertake a water project (install/upgrade a water system) does not imply long-term external support and management.

2.10. Sanitation

2.10.1. Sanitation service levels

Across the case study communities, the sanitation practices varied (Figure 2.10). The proportion of toilets that met the requirements for "Safely managed" sanitation was higher in all communities than the national average (JMP, 2017). This may reflect a higher sanitation service level in these communities, but may also relate to a difference in the way the definition for safely managed sanitation was applied to the national rural dataset compared with the study sites. The interpretation of the SDG 6.2 guidance used here is that on-site sanitation, such as pit latrines, that meet the criteria for a functional user interface (lid, slab, etc), are exclusively used by the household, but that are never emptied, are considered safe. Once filled, these pits are covered and a new pit dug, thus faecal sludge is not extracted or transported from the pit, nor can humans come into direct contact with it. Additionally, the faecal sludge in septic tanks in rural locations was assumed to never be emptied and disposed, so that human contact is not possible, and thus were not classified as safely managed.

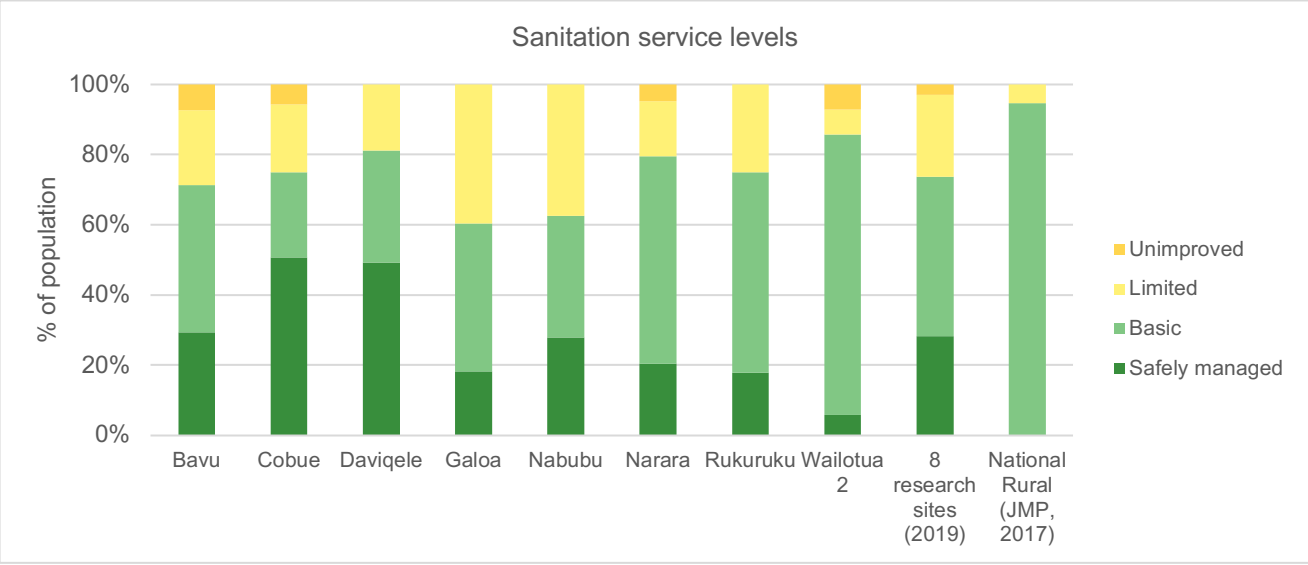


Figure 2.10: Sanitation service levels by % of population for each community (2019), aggregate for all case studies (2019, n=918), and JMP rural national levels (2017)

Overall, household toilet coverage was high, with 91% of all households surveyed owning their own toilet. The lowest rates of toilet coverage were observed in Cobue (75%) and Galoa (81%). Toilet inspections revealed that less than half of the toilets were functional, hygienic, private, and accessible (Figure 2.11). In communities were this proportion was low (Rukuruku, Galoa, Narara and Cobue), toilet coverage was also the lowest, except for Narara. Water-based pit toilets, pour-flush or cistern-flush,

were the most common types of toilets (Figure 2.12). Very few ventilated improved pit (VIP) latrines were observed, though a larger number of dry pits with lids and slabs were in use.

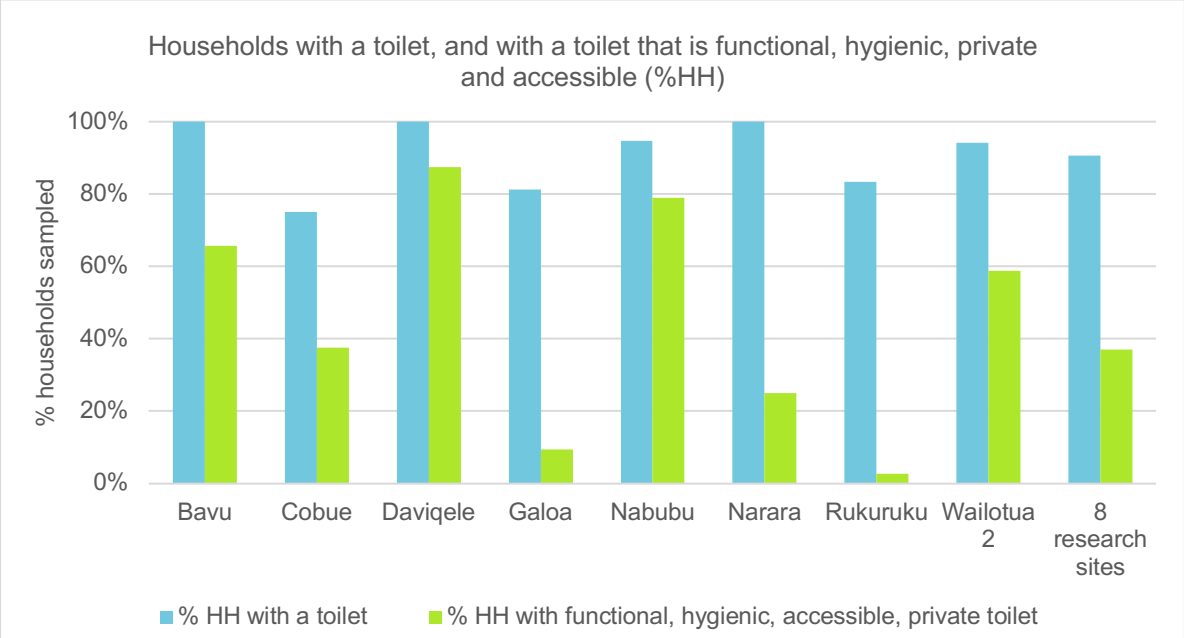


Figure 2.11: Proportion of households with their own toilet, and proportion whose toilets are functional, hygienic, private, and accessible. (% all households; n=200)

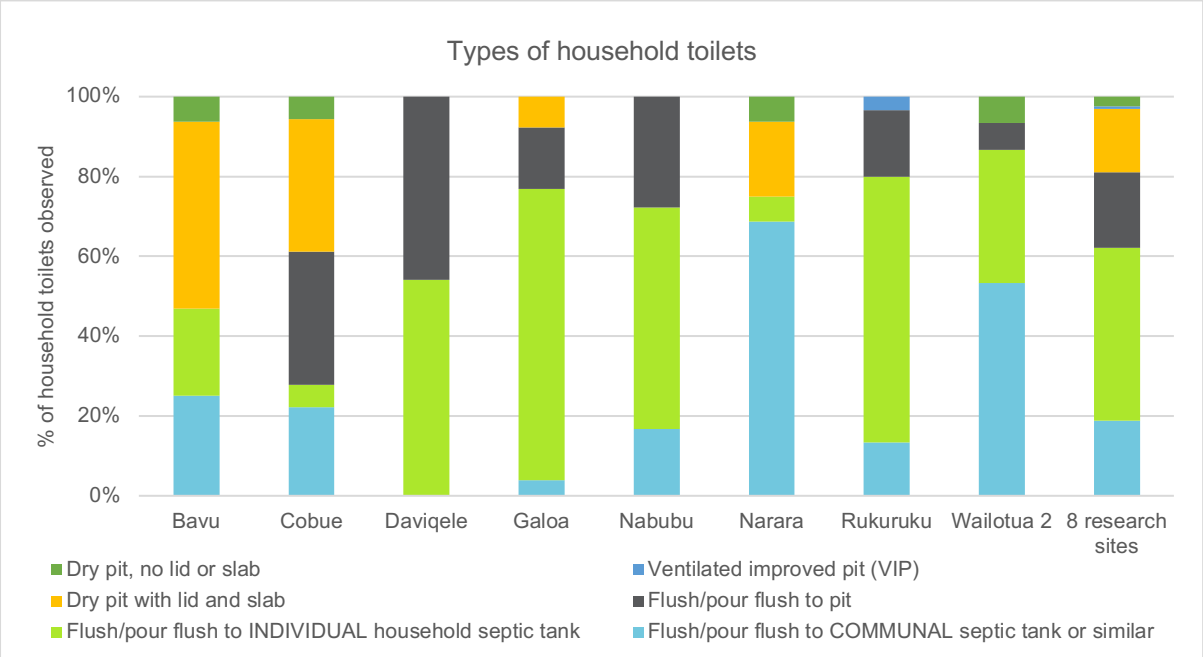


Figure 2.12: Types of toilets in use (% household toilets of each type in each community, and across all sites)

2.10.2. Water-based sanitation

Water-based sanitation levels were relatively high across most sites, with the highest levels in Daviqele and Nabubu (at 100% in each community), and lowest levels in Bavu and Cobue (Figure 2.13). Water-based sanitation is clearly the preferred option, seen as an indicator of "progress" and improved health, and tied to improved water access in the home.

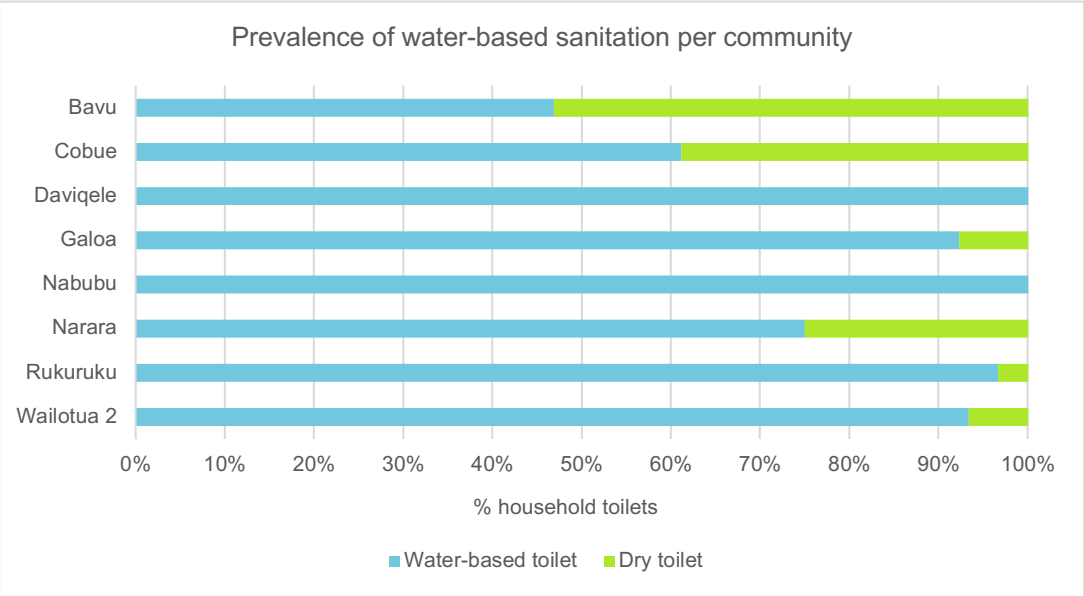


Figure 2.13: Water-based sanitation: % of household toilets that are water-based/dry across all sites (n=179 toilets)

There was a **strong link between sanitation and water**, which was evident across all case-studies. The rise of water-based sanitation was explicitly tied to water supply system improvements. For instance, in Daviqele *"almost all houses have a flush toilet due to the good water supply"* (KII-Daviqele, YR-F). In Nabubu, the *Tonialo* source was established in addition to *Yavai* to meet growing water demand, because most houses now have "flush toilets" and this requires "a lot of water" (KII-Nabubu, WCR-M). Similarly, in Narara, it was noted that:

> *Before the new water system, the houses did not have flush toilets and all toilets were either pit or water seal toilet. Now there is good water system all houses have good water pipes that are connected to the sink in the kitchen, water to the bathroom and toilet, and for washing clothes (Gp. Int-Narara, WC.)*

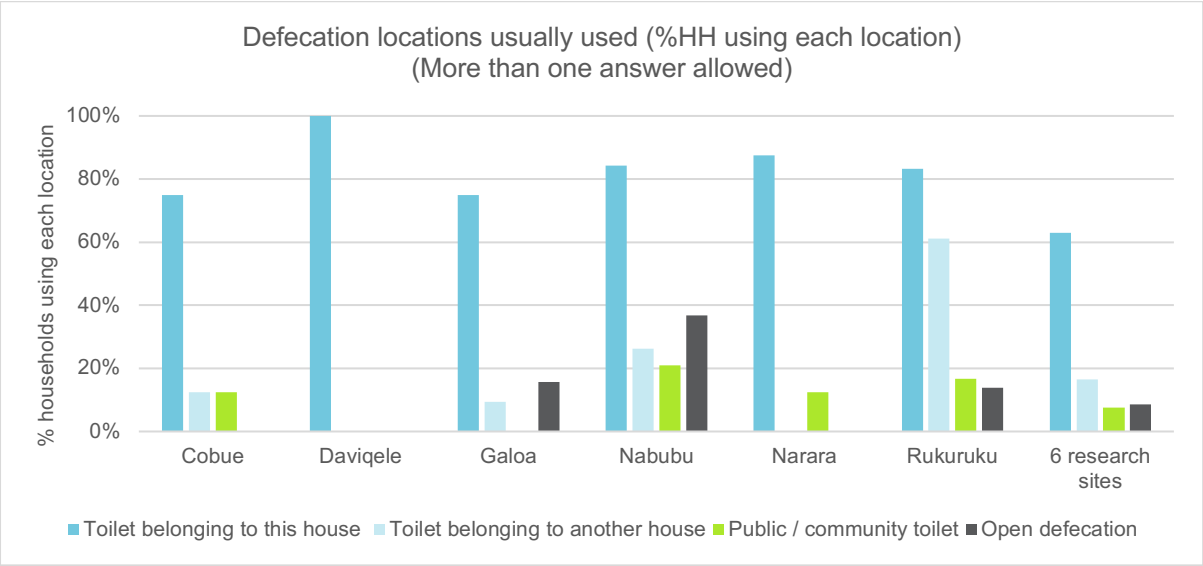
Although water shortage is a real problem in the school in Narara, it was reported that all teachers' quarters have flush toilets, despite experiencing water shortages that leads them to rely on external provision of water supplies from WAF:

> *In almost every year's dry season the school would rely totally on WAF, with the WAF truck carting water from Labasa to the school twice a day two times a week. [KII, Narara]*

In Cobue, it was noted that the "transition from pit and water seal toilets to flush toilets" had increased water requirements (Gp. Int. WC-Cobue). Combined with greater dry spells – when people use drinking water to sustain their gardens – this impinges on the already poor water service reliability of the current water supply system (Table 2.4). Cobue had the second lowest number of water-based toilets, and one respondent stated that this was due to *"insufficient supply of water at times"* (KII-Cobue, YR-F).

2.10.3. Open defecation

Reported usual defecation locations (when at home), indicate low rates of open defecation (OD) (Figure 2.14), with only three of six communities reporting any incidences of open defecation, and for an overall average of 9% of households usually practicing OD.



Note: This question was asked differently in Bavu and Wailotua-two (pilots), so data for these communities is not included.
Figure 2.14: Usual defecation locations. "Where do people living in this house usually defecate? Please identify all locations used" (% households surveyed; n=200)

However, this rate increased significantly when people were away from home (such as working in the garden, fishing, at the markets etc., Figure 2.15), with OD practices reported in all eight research sites. The highest rates of OD occurred in Cobue, Wailotua-two, Daviqele and Galoa, where between 96-100% of surveyed households reporting that at least one family member would defecate in the open when not at home. In these cases, the open defecation locations were the seaside/beach, bushes or the ground and in rivers. Note that this does not mean that all people always openly defecate when they are away from their home, but that every household does this at least sometimes.

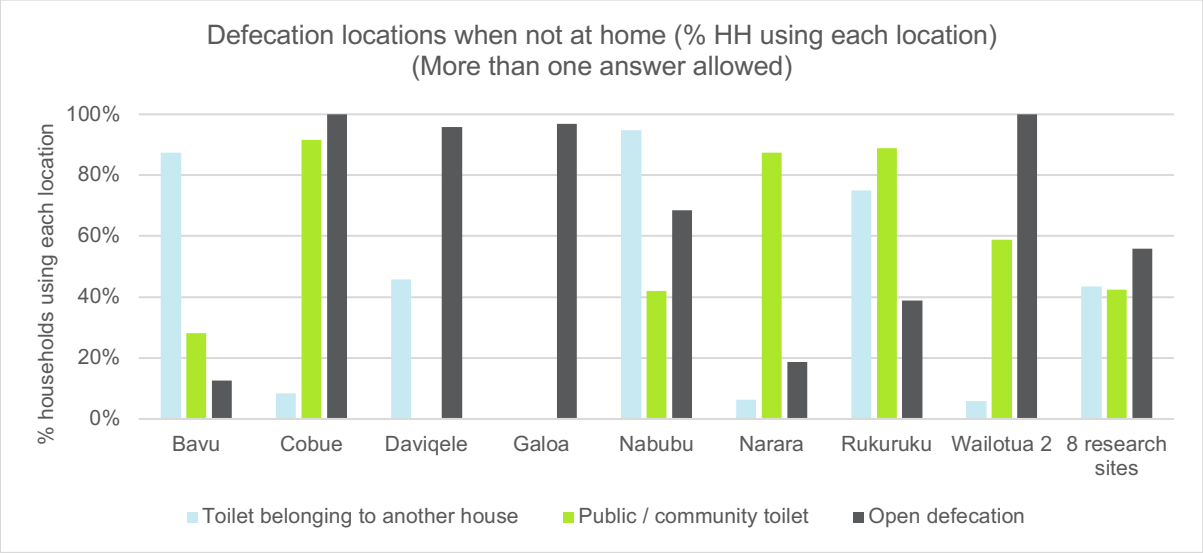


Figure 2.15: Defecation locations when not at home. "Where do people living in this house usually defecate when they are not at home? Please identify all locations used." (% all households; n=200)

The women's group interview participants were asked about their knowledge of links between water and sanitation, which was very strong in most communities. For example, women in Galoa explained the links they see between water and sanitation regarding water quality:

> *" […] there is a stream that runs across the village and before we use to bathe in it but now not anymore. The reason being is that in most houses, the outlets from*

the bathroom goes directly to the stream and so that water is no longer clean as it used to be. It's all contaminated and not safe even for bathing."
(Grp Int Women, Galoa)

In Narara, the women talked about the need for water in order to have improved sanitation:

"Improved sanitation is determined by the availability of water. When there is supply of water in the area, people will make sure sanitation level in every households is well maintained and improved."
(Grp Int Women, Narara)

Other respondents explained that the links they see between sanitation and water were related to using water for hand hygiene after defecation, and requiring water to flush and clean toilets, as well as for anal cleansing when toilet paper is not available.

2.11. Hygiene

Using the SDG 6.2 definitions for the hygiene service levels, a basic handwashing facility (highest rung in the ladder) requires a facility that is available on premises and has both water and soap present. There was variability across all research sites, but on average, 23% of the population surveyed had access to basic hygiene services (Figure 2.16), the highest rung in the hygiene ladder. Taken on a site by site basis, the presence of basic handwashing facilities was generally low, ranging from 3% (Galoa) to 20% (Bavu), and on the extreme, 75% in Rukuruku.

Overall, only 7% of the population surveyed across all eight locations lacked access to a handwashing facility on their premises (these were in Galoa and Rukuruku), and 70% had access to a handwashing facility that lacked either soap and/or water at the time of inspection. That means that 93% of the surveyed population had a place to wash their hands.

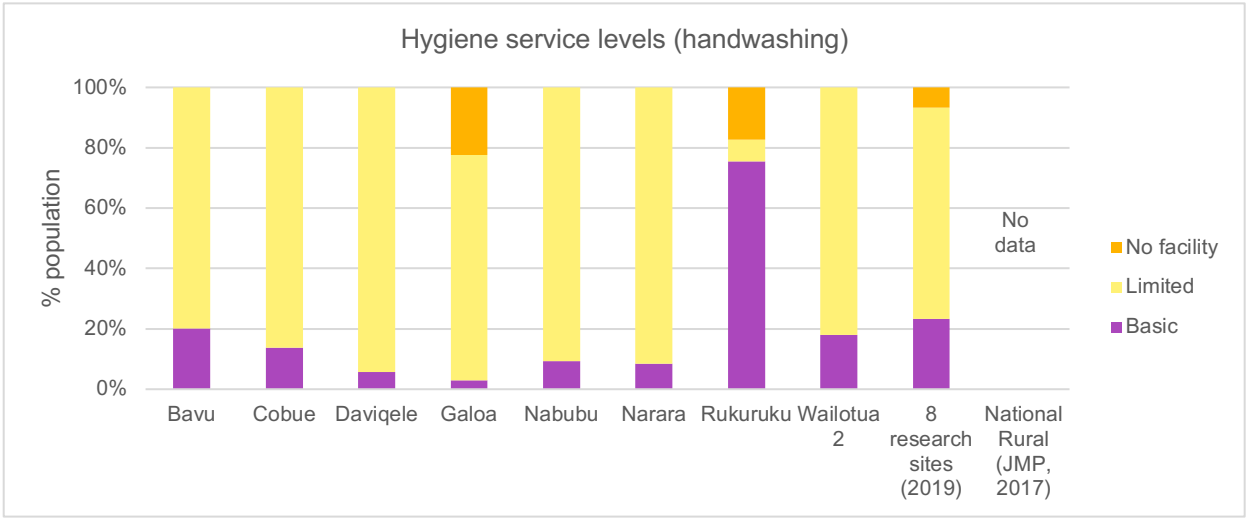


Figure 2.16: Hygiene service levels by % of population for each community (2019) and aggregate for all case studies (2019, n=930). Note: no data from JMP for rural national levels

Overall, 185 handwashing facilities were directly inspected. Most had either running water (80%) or still water (9%). The facilities with 'running water' were typically a sink or tap that was located next to or near the household toilet (within 10 metres). However, there was wider variability with the observed availability of cleansing agents, ranging from 4% of households (in Galoa) to 100% (in Narara). Most commonly this was soap, but occasionally it was other agents such as Axion (a popular dishwashing cleanser).

When respondents were asked to describe how they washed their hands, and using what equipment, most (62%) described using water and soap; 37% of respondents reported using only water. In Bavu, the women stated that they always use soap when washing their hands, however, the research team indicated that there was no observation of this practice during fieldwork. This positive reporting bias is not uncommon. A better indicator of likely handwashing with soap is to aggregate, for each household, reported handwashing with soap with structured observation of soap and water at the handwashing location.

This aggregate indicator of handwashing with soap indicated that across all eight communities, *only 19% of respondents both reported using soap and had soap and water present at the handwashing location* (Figure 2.17). There was significant variation between communities, but even the highest rates, at Rukuruku (53%) are still well below the required 100% to minimise transmission of germs from poor hand hygiene.

In Rukuruku, some women stated that *"we just wash our hands straight, we don't use soap"* (Gp. Int.-R, W), indicating the low concern about the need to use soap, even in a community where around half the women reported using soap and had access to soap and water.

Note that in Narara, the aggregate indicator rates are low because of a lack of water observed at the handwashing facilities; the respondents reported they did wash hands with soap and soap was commonly observed. The lack of water at facilities appears inconsistent with the availability of water in this community, and may reflect an error in assessing or recording data on handwashing facilities from this community.

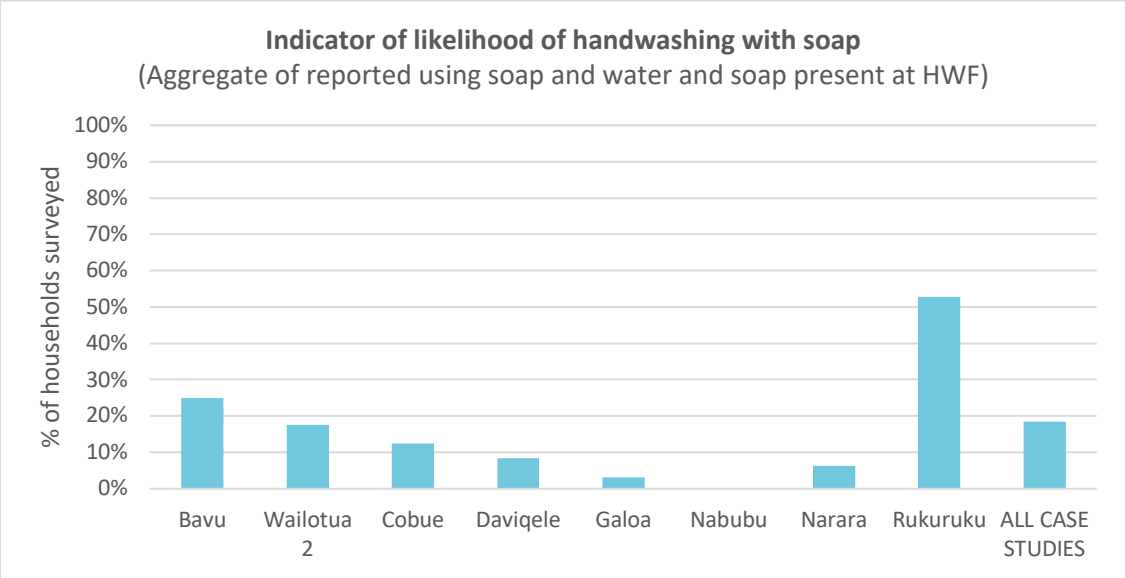


Figure 2.17: Aggregate indicator of likely rates of handwashing with soap (aggregate of reported use of soap with observation of soap at the handwashing facility), (% household, n=200)

Specific questions were not asked to assess knowledge or attitudes about handwashing, but respondents were given the opportunity to provide comments relating to each key survey topic, in this case handwashing. Based on these responses, it is clear that knowledge of the reasons for handwashing was high – most people identified the importance of washing hands with soap to avoid the spread of germs, and to maintain good health. Some examples include:

Handwashing is part of maintaining proper hygiene especially when coming back from toilets

Handwashing is part of life and we should not overlook it

Handwashing is very important and it's a must that we do it to prevent dirt from getting in food

The main aim of washing our hands is to avoid contact with any type of disease

As shown above, many respondents mentioned washing hands after defecating as important, as well as before eating or handling food. This reinforces evidence from many other studies that knowledge of the importance of handwashing is generally high, and thus education alone is not sufficient to result in safe handwashing practices.

The women's group interview participants reported that bathing most commonly took place in their house or another house if they didn't have a bathroom. In Bavu, bathing was regularly done in the creek or river. When asked whether soap was commonly used for bathing, women reported that sometimes soap was used, if it was available. In one community, women noted that it was not yet part of a regular routine to use soap because it was not always available:

"Some use soap when handwashing…while others forget because it's not a habit"
(Grp. Int. Women, Nabubu).

This also reinforces the theory that without regular prompting (in this case the presence of soap), behaviour change around hygiene (e.g. use of soap when washing hands and/or bathing) is less likely to occur.

As with sanitation, improved water service access – primarily piped water to the house or yard – was regularly cited as essential to good health, e.g.

There is no hygiene without water (Grp Int Women, -Narara).

In Cobue, women stated that since each household now had a tap stand, the use of soap was more frequent (if available)

"Majority [of women] use soap, especially now since we each have a tap stand"."
(Grp Int Women, Cobue)

2.12. WASH-related Health

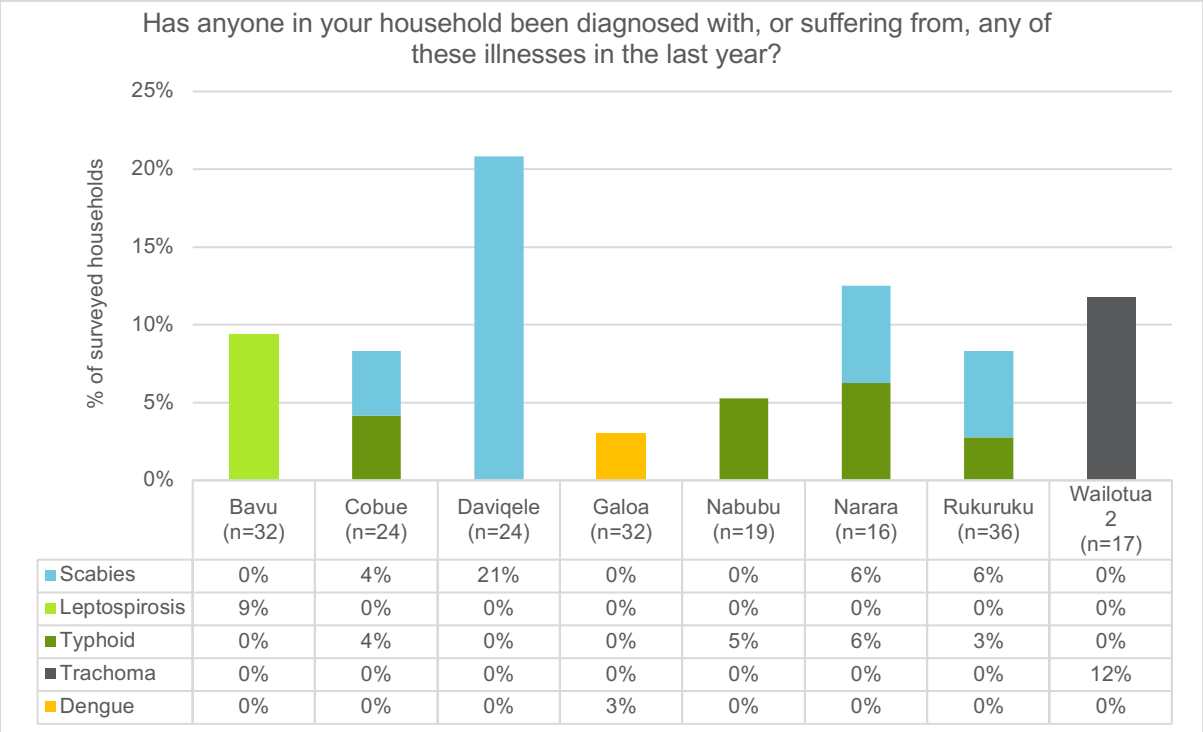
The health and wellbeing of communities is inextricably linked to WASH outcomes. One of the largest causes of morbidity and mortality in children under five years of age in low- and middle-income countries is diarrhoeal disease, of which a significant (>85%) portion has been attributed to inadequate WASH systems (WHO, 2018; Black et al., 2010). WASH strategies (e.g. safe potable water storage, latrines for sanitation, and soap for hygiene/handwashing) aim to prevent and control transmission routes and spread of bacteria, viruses and other micro-organisms to humans (WHO, 2018, Cairncross et al., 2010). The main WASH-related illnesses in Fiji are water-borne/water-accessed illnesses (typhoid, cholera, scabies, trachoma). The Fijian Ministry of Health (MoH) have referred to typhoid, leptospirosis, and dengue as the "three plagues" (FMoH, 2010), and there was a substantial post-flood leptospirosis outbreak in Fiji in 2012 (Moceituba & Tsang, 2015). This section looks at some qualitative and quantitative results of the WASH-related health data.

2.12.1. Household reported WASH-related illnesses (vector and water access-related)

In the WASH HHS, respondents reported on the prevalence of key water-related incidences of ill-health. **Note:** In Wailotua-two the community nurse reported several cases of scabies. However, these did not emerge from the household survey
Figure 2.18 below displays the overall percentage of reported illnesses that were **vector-related** (dengue) or **water-access related** within the last year. Around 21% of surveyed households across the eight communities reported having vector- (10%, n= 2 HH) and / or water-access related (90%, n=19HH) illnesses within the last year. Only Galoa reported an incidence of dengue in the last 12 months. Narara and Daviqele reported the greatest number of water access-related illnesses. Scabies

and typhoid were generally the most prevalent across households and communities. In Daviqele, scabies was high relative to the other communities (*n*= 5 individual cases, 21% of HHs surveyed) (Note: In Wailotua-two the community nurse reported several cases of scabies. However, these did not emerge from the household survey

Figure 2.18).



	Bavu (n=32)	Cobue (n=24)	Daviqele (n=24)	Galoa (n=32)	Nabubu (n=19)	Narara (n=16)	Rukuruku (n=36)	Wailotua 2 (n=17)
Scabies	0%	4%	21%	0%	0%	6%	6%	0%
Leptospirosis	9%	0%	0%	0%	0%	0%	0%	0%
Typhoid	0%	4%	0%	0%	5%	6%	3%	0%
Trachoma	0%	0%	0%	0%	0%	0%	0%	12%
Dengue	0%	0%	0%	3%	0%	0%	0%	0%

Note: In Wailotua-two the community nurse reported several cases of scabies. However, these did not emerge from the household survey

Figure 2.18: Combined water access-related illnesses (n=200)

While not tested for statistical significance, there were some associations between observed presence of soap at handwashing facilities and reported water-borne illnesses within the last 12 months. In particular, higher self-reported incidences of scabies (78%) were associated more strongly in households with no observed soap or other cleaning products at their handwashing facility (

Figure 2.19).

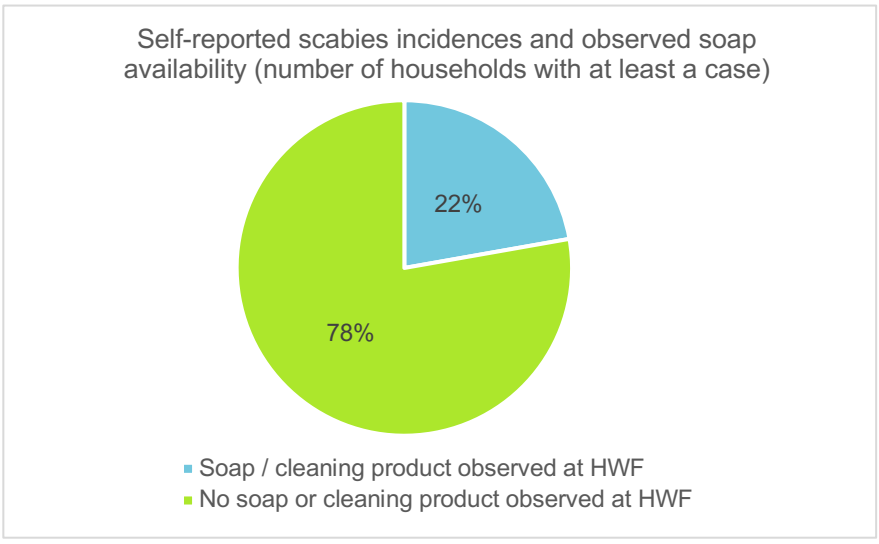


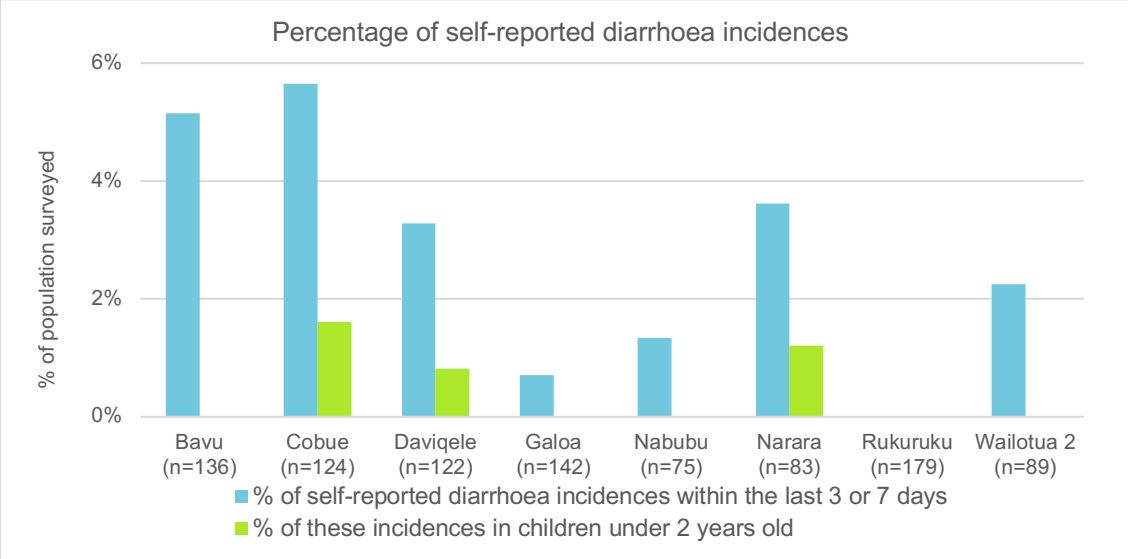
Figure 2.19: Self-reported scabies incidences and observed soap availability at handwashing facilities (n=9 households with at least one case)

2.12.2. Diarrhoea

Diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual). It is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral and parasitic organisms. Infection is spread through contaminated food or drinking water, or from person-to-person as a result of poor hygiene.

Around the world, diarrhoeal disease kills approximately 1,400 children under five every day (UNICEF, 2014). Diarrhoea is the second largest cause of under-five mortality globally and diarrhoeal disease is also associated with a higher risk of stunting (low weight for age and developmental delay) (UNICEF, 2014). In Fiji, an estimated 6.4% of deaths of children between 1 month to 5 years of age was a result of diarrhoea (Pruss-Ustun et al., 2014). Additionally, in a study in Viti Levu, diarrhoea was reported in 17.5% of households in a sample of 1,463 homes (Tintle et al., 2019).

Overall, there were fairly low incidences of diarrhoea across all the communities, with only 25 of 950 individuals (2.6% of population sampled) self-reporting having had diarrhoea in the last three or seven days (Figure 2.20). On a community basis, the proportion of households that reported diarrhoea incidences ranged from 0% (Rukuruku, n=179 people) to 5.6% (Cobue, n=124 people). Cobue also reported the highest instances of diarrhoea for children under 2 years of age (1.6%). Seasonality in diarrhoea is commonly reported, however this data was collected during the wet season, when diarrhoea rates are typically higher. Cases of diarrhoea are known to be widely under-reported in surveys, especially in regions that have not had education or awareness campaigns (Burnett et al., 2016). Additionally, diarrhoea cases are generally treated at home with traditional remedies, unless very serious and this was confirmed through the qualitative health data (e.g. key informant interviews with nurses and other community leaders).



Note: Bavu and Wailotua-two self-reported diarrhoea incidences within the last 3 days, while the other communities reported incidences in the preceding 7 days. n= total number of people represented in the household surveys in each community.

Figure 2.20: Self-reported incidence of diarrhoea within last 3-7 days of WASH HH survey (n=200 households, representing 950 people)

2.12.3. Qualitative WASH-related heath data

Interviews with health workers generally linked diarrhoea with poor hygiene and various respondents reported a notable increase during holiday periods and after feasting events, as well as in the wet season more than the dry season. Similarly, women in some of the group interviews mentioned outreach awareness activities undertaken by nurses that emphasised the importance of good personal hygiene and food storage and handling practices.

Some observations from the qualitative data concerning WASH-related health indicated a variability in diarrhoeal incidences as reported by the community/settlement nurses. In some communities, there was no mention of this as an issue by the nurses (e.g. Galoa, Cobue) and others only a limited mention (e.g. Nabubu and Daviqele). There is some awareness of the links between water quality and illness such as after heavy rainfall, and for illness preventions, such as leaving water sitting in the sun for longer, and boiling water more frequently when a household member is sick. In Bavu, discussions with the nurse and others in the community revealed that there were regular incidents of diarrhoea and scabies in the community, and this was attributed to poor water quality. However, in most communities there was a disconnect between reported use of soap by respondents and observations from the researchers during site visits and handwashing facility inspections.

2.13. Summary of WASH situation

In order to assist in identifying strengths in well-managed community water systems, the WASH status of the study communities was assessed, with the expectation that good WASH outcomes require well-managed water systems.

Error! Reference source not found. (below) gives a high-level summary of the WASH situation across the eight case studies. Different aspects of WASH were used as indicators to make the summary assessment, including the SDG 6 indicators, as presented in the first column of Table 2.6 . Some of these dimensions of WASH may be considered more important than others, and such weighting will likely differ amongst stakeholders, but no weighting has been applied here.

This study explicitly sought communities that reportedly had good WASH situations, and thus they are not considered to be representative of the range of situations in communities and settlements across the whole country and are likely to have better WASH situations than many other communities.

None of the case studies achieved the highest level of service or conditions across all aspects of WASH assessed here. Although this is the aspiration, it was not expected that communities would achieve highly in all of these dimensions, particularly given that they receive no regular ongoing support to manage their water systems.

The case studies that had the best **WASH situation** – based on the key indicators used – were Daviqele, Galoa and Nabubu.

Table 2.6 Overview assessment of WASH situation in the eight case study sites.

	Assessment criteria	Bavu	Cobue	Daviqele	Galoa	Nabubu	Narara	Rukuruku	Wailotua-two
WASH SITUATION	SDG 6.11[9] - Drinking water service level	🟢	🟡	🟠	🟠	🟢	🟢	🟠	🔴
	SDG 6.2 – Sanitation	🟡	🟡	🟢	🟠	🟠	🟢	🟡	🟢
	SDG 6.2 – Hygiene service level	🟡	🟡	🟡	🟠	🟡	🟡	🟢	🟡
	Water quality (drinking)	🔴	🟠	🟠	🟡	🟠	🟡	🟡	🔴
	Drinking water risk assessments	🔴	🟠	🟡	🟡	🟡	🟡	🟠	🟡
	Perceived water quality (%HH perceived water as "very safe")	🟠	🟡	🟡	🟠	🟡	🟢	🟢	🟢
	Water treatment (%HH that treat water at least sometimes)	🟢	🟢	🟡	🟢	🟡	🟢	🟢	🟢
	WASH-related Health	🟡	🟡	🟠	🟢	🟢	🟠	🟡	🟡
	Drinking water availability and reliability	🟠	🟡	🟢	🟢	🟢	🟡	🟠	🟠
	Accessibility (i.e. does anyone have difficulty getting water for themselves?)	🟢	🟢	🟢	🟡	🟢	🟡	🟢	🟢
	Water system functionality	🟡	🟡	🟢	🟢	🟡	🟡	🟡	🟢
	Satisfaction with water situation (%HH reported being "happy" with water source)	🟠	🟢	🟢	🟢	🟢	🟢	🟡	🔴
	Handwashing (aggregate indicator of behaviour)	🔴	🔴	🔴	🔴	🔴	🔴	🟡	🔴

Some of the key WASH situation findings include:

- All communities relied upon at least two water sources for drinking, and used additional sources for non-drinking needs. The predominant water supply model consisted of piped water into homes or within the property boundaries. The water systems were generally delivering water services that were reliable and available throughout the year, with some seasonal variability
- Accessibility and reliability experiences varied within a single community, with considerable variations depending on location (most commonly relating to water pressure). Low water pressure at certain times of the day or year resulted in some access points providing no water at some times, and requiring residents to walk further to cart water or wait for access to resume
- When water had to be collected outside the house, water collection was the responsibility of both females (in about 55% of households and more so in the wet) and males (in about 40% of households and more so in the dry)
- In most communities, householders and more broadly the water committees managed multiple water sources, reflecting seasonal availability and usage. However, there was evidence that the preferred drinking water source was also widely used for non-drinking water purposes throughout the year, despite the increased scarcity of the primary source in the dry season (e.g. Bavu, Rukuruku and Wailotua-two use at least three drinking and non-drinking water sources but are not managing to conserve drinking water for the dry season).
- There was a disconnect between perceived and actual water safety in many communities:

[9] The colour-coded ratings applied to the SDG 6.1 indicator results were based on the proportion of population accessing basic and safely managed water services. SDG 6.1 indicator results were based on the location, type of facility and water quality of the primary source of drinking water identified by the household. However, water tests were conducted at one point in time (wet season), and water quality was not tested at every household surveyed but rather from a sample of 'types' of water supplies and extrapolated to all of similar types (e.g. results from 1 or more rainwater tanks were applied to all households using rainwater as the primary drinking water source). In addition, some households indicated different primary drinking water sources for wet and dry season; in these cases, the lower service level was used to represent overall service level. Therefore, the colour codes given in this table may vary throughout the year.

- Most households across all communities perceived their drinking water supply to be “very safe” or “mostly safe”, with the exception of Bavu, where 45% of household respondents considered the bore water as "not safe"
- In all the communities there was a presence of the microbial indicator *E. coli* in at least one, if not all, of their drinking water source types with spring and rain water sources typically having lower most-probable-numbers of *E. coli*
- In most communities, there was some evidence of positive associations between perceived drinking water safety and water treatment practices, with five of the seven communities that perceived a risk to water quality engaging in some treatment (usually boiling), throughout the year. In Bavu, although there was a high perception of unsafe drinking water quality, there was only a low-medium level of water treatment reported during the WASH HHS.

- Overall, people were generally more satisfied with their household water source in the wet season than the dry season. High satisfaction with the water system usually coincided with higher accessibility and higher water point functionality, while perceptions of water quality were usually not linked to satisfaction
- With regard to accessibility, that is anyone in the house being able to get water for themselves, there were examples in five of the eight study communities where at least one household reported a household member having difficulties with day-to-day access, usually elderly residents or people with a disability
- Accessibility remained less than desired in every community, with women in all sites identifying aspirational water systems that supported internal house connections. This was associated with improved privacy when bathing, and convenience for cooking, cleaning and washing
- As a general observation, water users were more concerned with the accessibility, availability and reliability of water, rather than water quality, and prioritised water system improvements that would further these outcomes
- The desire for WAF water (piped into their homes) and/or treated water (e.g. chlorinated and/or filtered) was a recurrent theme, echoed most strongly in Narara, Cobue and Rukuruku
- Sanitation and hygiene practices, assessed using SDG6.2 and other indicators, was variable
- Low rates of open defecation were reported, with households reporting open defecation only when they were away from their own or a nearby toilet (e.g. in the garden)
- Generally, people prioritised improvements to water systems more highly than sanitation and hygiene, with a common preference to improve water systems to enable water-based sanitation.

Toilet and septic tank in Bavu village, Nadroga Province, Viti Levu (Photo credit: Mark Love)

3. COMMUNITY SOCIAL CONTEXT & CHARACTERISTICS

One of the key rationales of the formative research was to identify which, if any, contextual factors correlated with good or better community water management more than others. Put differently, we were examining what internal (within a community) and external (beyond the community) socio-economic factors exist and exploring what the 'plus' factors might look like in the Pacific Islands context.

Some of the specific questions explored included: Does greater access to money – income/markets and remittances – align with better or worse CWM outcomes? Do demographic particulars – population size, clan and religious affiliation and diversity – matter to CWM? Does collective action in non-WASH domains – e.g. committee participation, fundraising levels, community work – correlate with collective action in WASH? How might access to relatively novel technology such as mobile telephony be productively harnessed by governments or CSOs to enhance rural WASH outcomes? What other engagement opportunities might there be that better work 'with the grain' of local contexts (e.g. "communities within community", "communities beyond community")? These and other questions informed the methodology of this sub-component of the research.

3.1. Demographic summary

Table 1.1 in chapter 1 (reproduced below) provides a summary of community demographics.

Table 1.1: Demographic summary

Community name	Type of community	Division, Province & island	Population	No. Households	Religion	No. Mataqali
Bavu	*Koro* (registered village)	Western Division, Nadroga, Viti Levu	~300	57[10]	Main: Methodist Other: SDA, Jehovah Witness, AoG, Evangelist	5
Cobue	iTaukei settlement	Northern Division, Bua, Vanua Levu	125	26	Main: Methodist; Other: Prayer Ministry, SDA	6
Daviqele	*Koro* & iTaukei settlements	Eastern Division, Kadavu	356	88 (65 in *koro*[11])	Main: Methodist; Other: All Nations, Catholic	3
Galoa Island	*Koro*	Eastern Division, Kadavu	~180	40 (occupied)	Main: Methodist; Other: AoG	4
Nabubu	*Koro*	Northern Division, Macuata, Vanua Levu	73	20	Methodist	5
Narara	Indo-Fijian settlement	Western Division, Ra, Viti Levu	~74	16	Main: Hinduism; Other: Methodist	n/a
Rukuruku	*Koro*	Eastern Division, Lomaiviti, Ovalua	~375	77	Main: Methodist; Other: Catholic, AoG, SDA, New Methodist, Apostle, COC, All Nation	8

[10] Research was conducted in the Bavu *koro* only; Bavu settlement – located on the other side of the Queens Highway – is much larger (370 pop./71 HHs).

[11] There is a total of 88 HH, but 68 are located within the *koro* (including 6 belonging to the school and two to the health centre) with the remaining 23 located in proximal settlements outside the formal *koro* boundaries. Some of the HHs are unoccupied.

Wailotua-two	*Koro*	Central Division, Tailevu, Viti Levu	~120	20 (6 unoccupied)	Main: Methodist; Other: CFF; Pentecostal; ANCF	5

Rukuruku, Bavu and Daviqele had the largest population of the eight case study sites (>300) and Nabubu and Narara were the smallest; but note that all communities experience a marked increase in population levels during holiday periods, especially Christmas. In terms of *Lotu* [Church], all of the case-studies were primarily dominated by Wesley Methodism – the dominant Christian denomination of Fiji. Bavu and Rukuruku had the highest number of diverse Christian denominations present amongst HHs. Narara is an example of the socio-cultural 'melting pot' of Fiji, with the majority of the inhabitants being Indo Fijians (or Fijian's of Indian descent) and half the households practising the Hindu faith (50%), the other half Methodism (44% Methodist, 6% New Methodist). Six the communities were *koros* (registered and recognised by the state as iTaukei communities) whilst Narara and Cobue are both legally classified as settlements. Lastly, the average number of *mataqali* present in each case-study site was 5, with the lowest number in Daviqele and Galoa and the highest in Rukuruku (Table 1.1).

With the exception of two communities (Narara and Cobue), our household case-study demographic data were slightly lower than the national (rural) average of 4.8 people per household (Narsey et al., 2010: 4). All the communities had a higher male to female ratio except Daviqele. The percentage differentials between the genders was higher than the national average – which is 50.7% male (FBoS, 2018) – at 56% males for the community/settlement (n=M 428, F 355). Community age distribution (Figure 3.1) parallel national trends (mean age of 27 years in rural areas), with a substantial youth bulge (cumulatively, 69% of the national population is below 40 years old) (FBoS, 2018).

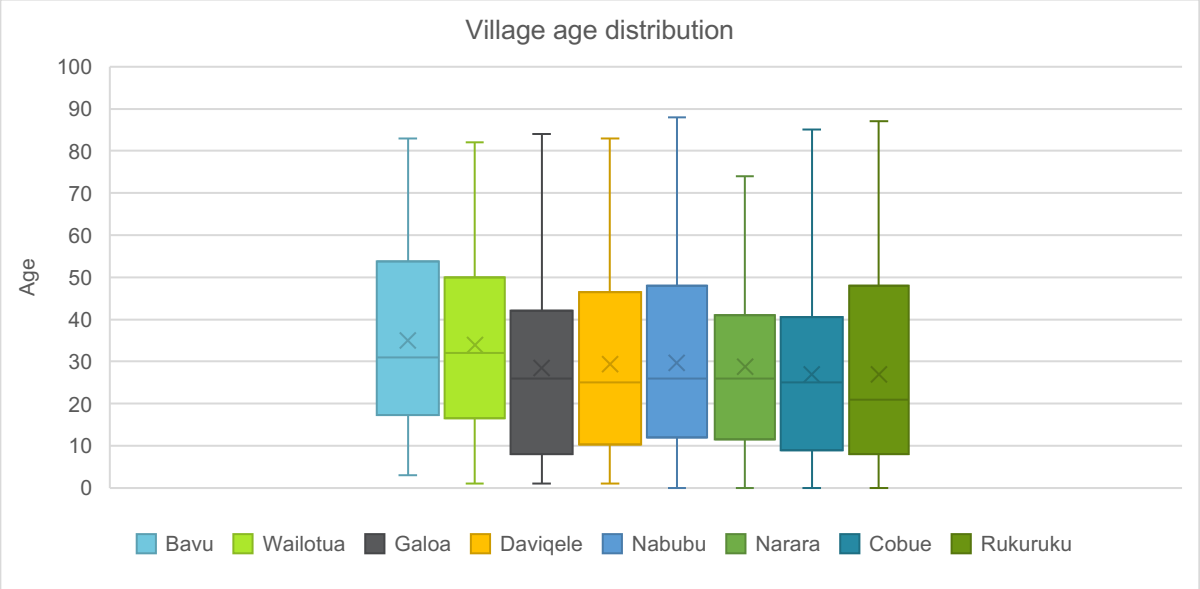


Figure 3.1: Community age distribution (box plot) (S-E HHS, n=779 indiv.)

The number of family members residing outside the village/settlement (e.g. town) varied considerably across the case-study sites (Figure 3.2). Comparatively, Galoa had the most (n=32), followed by Rukuruku (n=20), whilst Daviqele (n=9) and Wailotua two (n=11) had the lowest. The high number of external individuals in Galoa (n=32), relative to the smaller percentage of HHs with external members (30%), reflects the fact that a few households have many members resident elsewhere. For example, one household had nine external family members. Similarly, in Nabubu, one household had eight members residing elswhere. The mean age of external family members varied: Wailotua (43yo), Cobue

(43yo) and Nabubu (41yo) had the oldest mean age, whilst Daviqele (31) and Rukuruku (28yo) had the youngest.

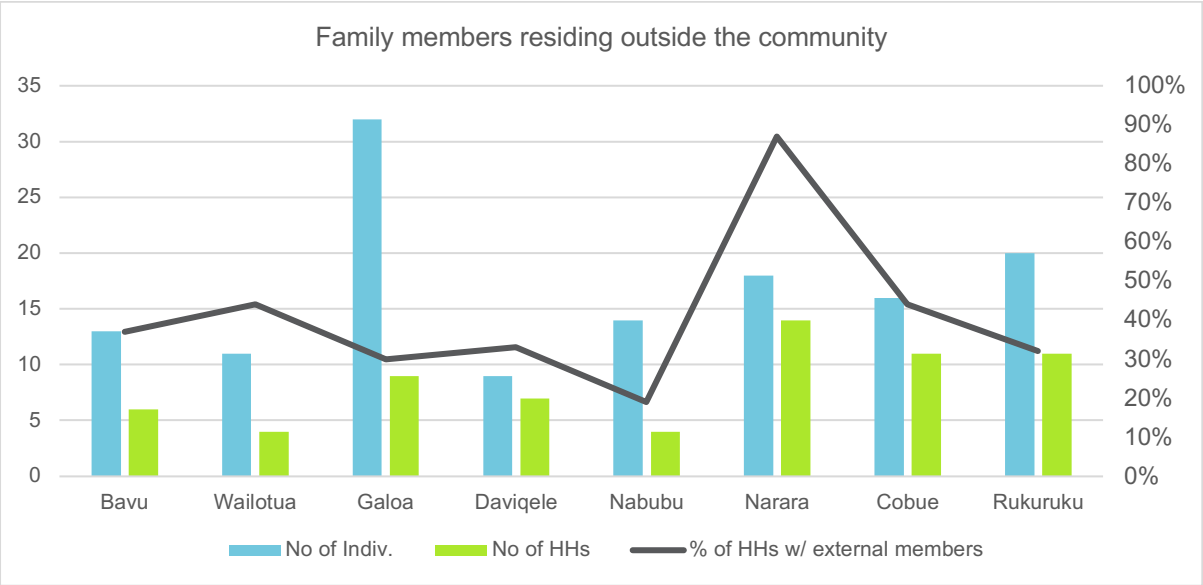


Figure 3.2: External HH members (frequency) and % of HHs with external members (S-E HHS, n=66 HHs, 133 indiv.)

3.2. Socio-economics

Main income generating activities differed considerably across the sites, as did income flows. Gardening for market sales was a core income generating activity practiced in six of the eight sights, most notably in Wailotua, Nabubu, Bavu and Rukuruku. Salary (part or full-time) was a core income stream for households in six of the sites, but primarily Cobue and Bavu (the latter almost wholly tourism/hospitality related, the former at the local sawmill). Cash cropping was a key income stream in five sites: sugar cane in Narara; *yaqona* in Galoa, Daviqele, Nabubu and Rukuruku. Fishing was a main income stream for many HHs in Nabubu, and an income stream for some HHs in Galoa and Cobue. 'Other' income streams included mats (Daviqele), trade stores and government pensions/welfare.

Most households earnt money from more than one source, but not as many as in nearby Solomon Islands or Vanuatu (this reflects the stronger national economic situation and lower rates of poverty found in Fiji relative to the afore mentioned countries). Households in Rukuruku, Galoa and Nabubu had the highest number of multiple income streams, Bavu and Wailotua the lowest.

Self-reported HH income levels varied considerably across the eight communities. Bavu, Daviqele and Rukuruku reported the highest income amounts; Bavu from salaries and land rents (from tourism-related sources), Daviqele and Rukuruku primarily from *yaqona*. In terms of intra-community income differentials, Bavu, Daviqele and Nabubu reported the most income disparity, Wailotua, Rukuruku, Cobue and Galoa the least. Based on the 2008/09 poverty incidences data, Cobue, Nabubu and Narara are located in Provinces with the highest rates of poverty, Bavu (Nandronga Province) sits in the middle poverty range whilst Rukuruku, Galoa, Daviqele and Wailotua are all located in Provinces with the lowest rates of poverty (FBoS data, analysed in Narsey, 2011, and Narsey et al., 2010). Bavu and Wailotua two reported the highest store staple expenditure, Galoa, Nabubu and Rukuruku the lowest (Figure 3.3).

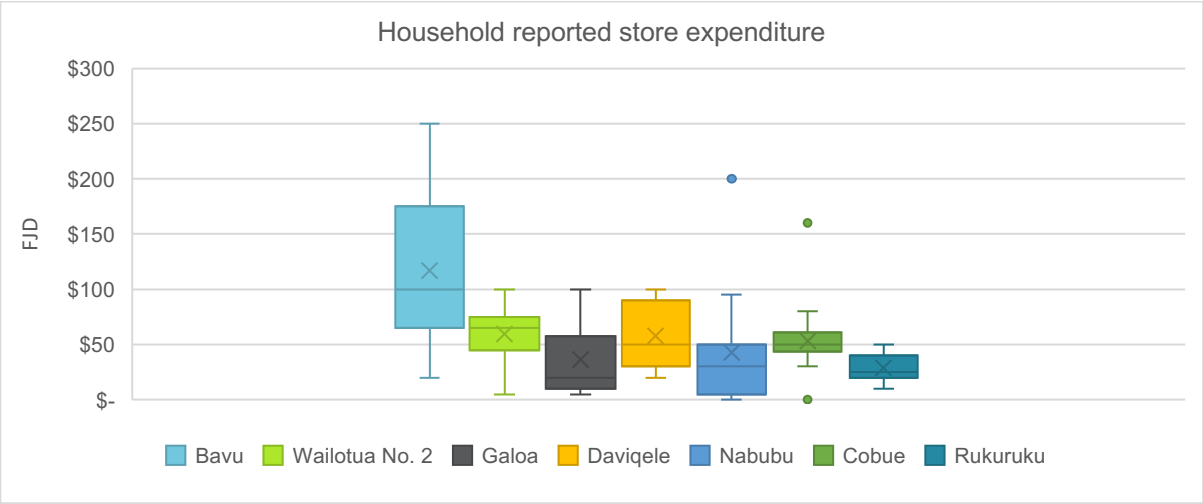


Figure 3.3: Self-reported store staple expenditure (S-E HHS, n= 200)

Remittances are an essential component of many PIC's livelihood portfolio. Household remittance levels, and the proportion of households receiving them, varied considerably across the eight sites. In some locales, a much greater proportion of HHs received remittances than others, e.g. Galoa (FJD$974.00) and Daviqele (FJD$925.00) reported similar community means, but 80% of surveyed HHs in Galoa reported receiving remittances compared to just 29% of households in Daviqele (Figure 3.4). Overall, the iTaukei villages in Viti Levu reported receiving the highest amounts of remittances; Cobue, Nabubu and Rukuruku the lowest. The percentage of HHs receiving remittances – along with other data such as community-to-town remittances, the percentage of HHs where 'people pay for other things' and fundraising levels – can all serve as proxies for bonding social capital.

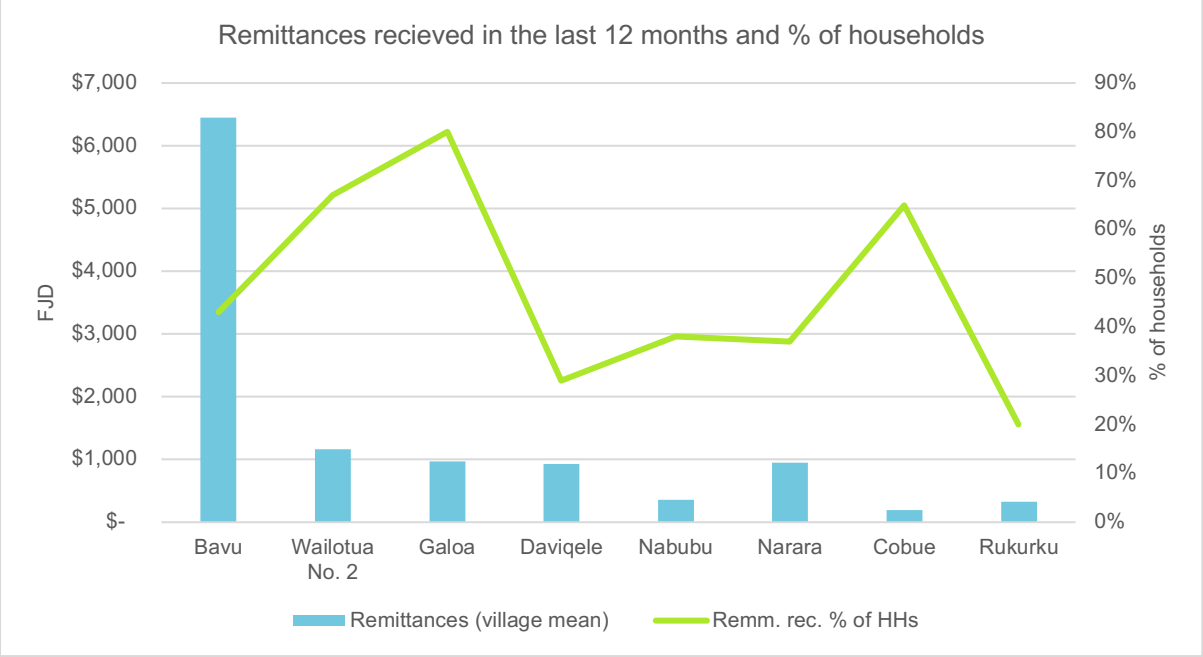


Figure 3.4: HH remittances level and % of HHs – last 12 months (n=220)

Due to the small sample size of the S-E HHS data in Daviqele and Bavu, combined with unreliability of self-reporting income and expenditure generally, all such data needs to be taken as provisional. The below figure overlays the percentage of incidences of poverty taken from the 2008/09 Fiji HIES data

(Provincial aggregates) with income, remittance and store expenditure data to construct a composite 'proxy' community wealth ranking data for inter-case comparison (Figure 3.5). [12]

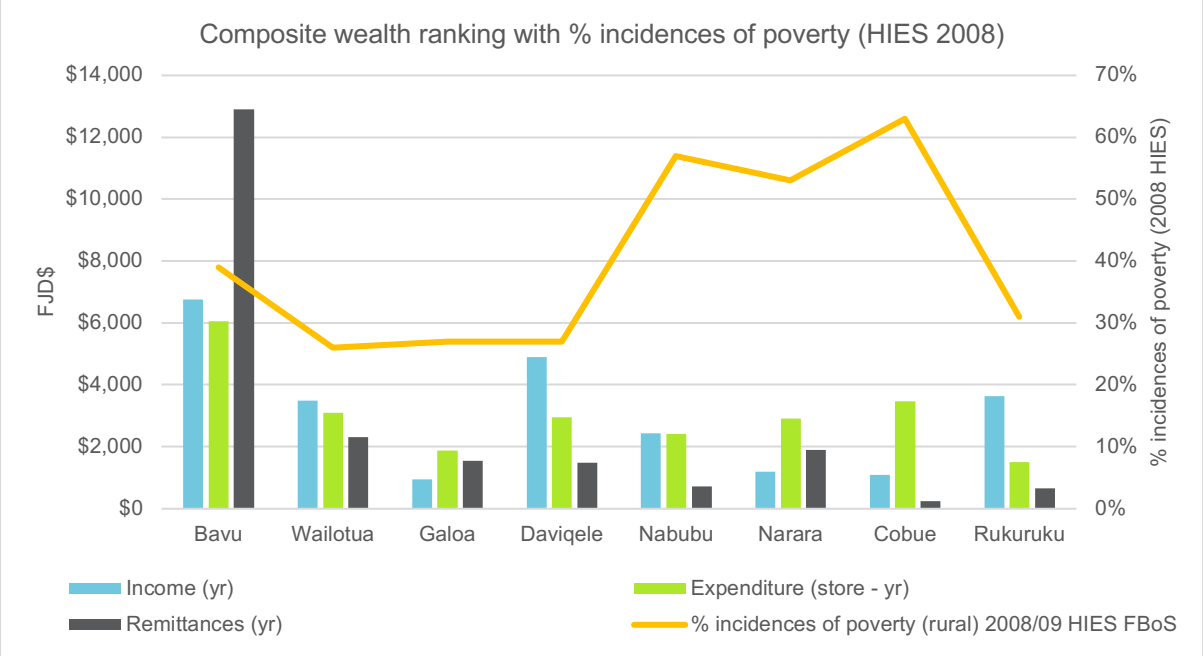


Figure 3.5: Composite proxy wealth indicator based on reported income and expenditure for the last 12 months with percentage of poverty indices (taken from aggregated Province data, FBoS, HIES 2008/09, Narsley et al., 2010)

According to the composite wealth indicator, Nabubu, Narara and Cobue are relatively *poorer* in fiscal terms than the other locales, with Bavu, Daviqele, Rukuruku and Wailotua two *wealthier* in comparison. Galoa sits somewhere in the middle; especially given the high number of households receiving remittances. However, it is important to note that the poverty incidence data, as well as income, remittances and store expenditure amounts, do not capture the extent of household subsistence activities, such as gardening and fishing, and thus are not an indicator of 'wellbeing' as such.

3.3. Community Governance

Governance structures were similar across all seven iTaukei case-study sites, but were substantially different in the Indo-Fijian settlement of Narara.

iTaukei case-study sites governance systems

In the seven iTaukei sites there was a traditional village chief, as well as the *Turaga ni Koro* (a quasi-public servant appointed by the state and sitting under the iTAB) and numerous *mataqali* (clan) chiefs (*Turaga ni Mataqali*). The number of *mataqali* leaders varies. For example, in **Daviqele,** there are two *Yavusa* and four *mataqali*; in **Nabubu,** there is one *Yavusa* and five *Mataqali*. The remaining iTaukei villages – Galoa, Rukuruku, Bavu and Wailotua – are similarly structured; the only slight variation being Cobue (which is a settlement rather than a registered *koro*). Cobue was settled in 1977 by people from nearby Navunievu *koro* (also referred to as Waitabu village, located approximately 3.8 kms away). The current settlement leader first moved his family to Cobue because it was their familial piece of land and

[12] Note that there was no store expenditure data gathered for Narara. For the sake of the proxy wealth ranking a mean store expenditure figure between that given for Nabubu and Cobue has been inserted as an estimate. This matches the trends for the weekly store staple frequency count from the S-E HHS.

it was located nearer to the school. Previously, the settlement was freehold land occupied by Indo-Fijian settlers whose forefathers had leased and farmed the land. There are two nearby Indo-Fijian settlements – Vatubogi and Cobue Indian settlement (KII-C, LH-M). Regardless, Cobue is still governed using the standard iTaukei hierarchy system and the proximity and ties to the nearby 'home' *koro* is a key thread of strength and cohesion throughout the community (evidence through inter-community fundraising and committee participation). Moreover, despite some tensions over water (see Water Management section below), there is relative harmony and cooperation with the nearby Indo-Fijian settlements.

Narara settlement

The exact settlement history of Narara was not known, but it was settled by the ancestral *Grimity*as of today's residents. The local Advisory Councillor (AC) is responsible for 77 households, including Narara, and his *"role and responsibilities includes providing advice to the community and [is the] eyes and ears, leg and hands, of the government"* (KII-Nr, AC-M). At the settlement level, there is a settlement committee and residents hold meetings and gatherings, and it is the elders in the community who make decisions. Whenever there is an issue to be discussed, someone is elected to undertake the responsibility to resolve it.

3.3.1. Committees and household participation

Committees are a ubiquitous part of village/settlement governance across all rural communities in the Pacific Islands. In iTaukei *koro'*s, committees sit under the umbrella of the *Bose Vakoro* or Village Council. The Village Council has under its jurisdiction the Church (*Lotu*), under which are typically three further groups: Men's Church committee or group, Women's Church group, and Church Youth Group. Additionally, there are typically a range of other committees, such as a Water committee, Health committee, Development committee, Natural Resource management committee, Women's committee, School committee, and more. Many of these are a legacy of the colonial period. There is a (draft) Village Bylaw regulation which suggests that every *koro* should have eleven committees, but it has not yet been legislated. Regardless, these committees form part of the quorum for discussions and decision-making in the Village Council meetings.

Church committees were often considered to be the most active of all community groups by respondents. The smallest communities in our case-studies – Wailotua and Narara – had the highest percentage of HHs with a member in a community committee (Figure 3.6).[13] However, on its own, the percentage of HHs with members in a committee is not necessarily an accurate proxy for community wide collective action, cooperation, or self-help (especially beyond the church). Moreover, due to the highly structured character of iTaukei Fijian communities, indicators such as committee participation are not necessarily solid proxies for social capital or mobilisation on their own (but may be of some use for in-country comparison). The combination of qualitative data and other indicators (i.e. community work [*solesolevaki*] and bonding social capital demonstrated through fundraising and community-town linkages) arguably provides a fuller and more contextually appropriate picture.

[13] Note that two communities had lower than a 40% household sample rate (the 'ideal benchmark for extrapolation) – Bavu (28% HH coverage) and Daviqele (23%) – and hence may not be representative.

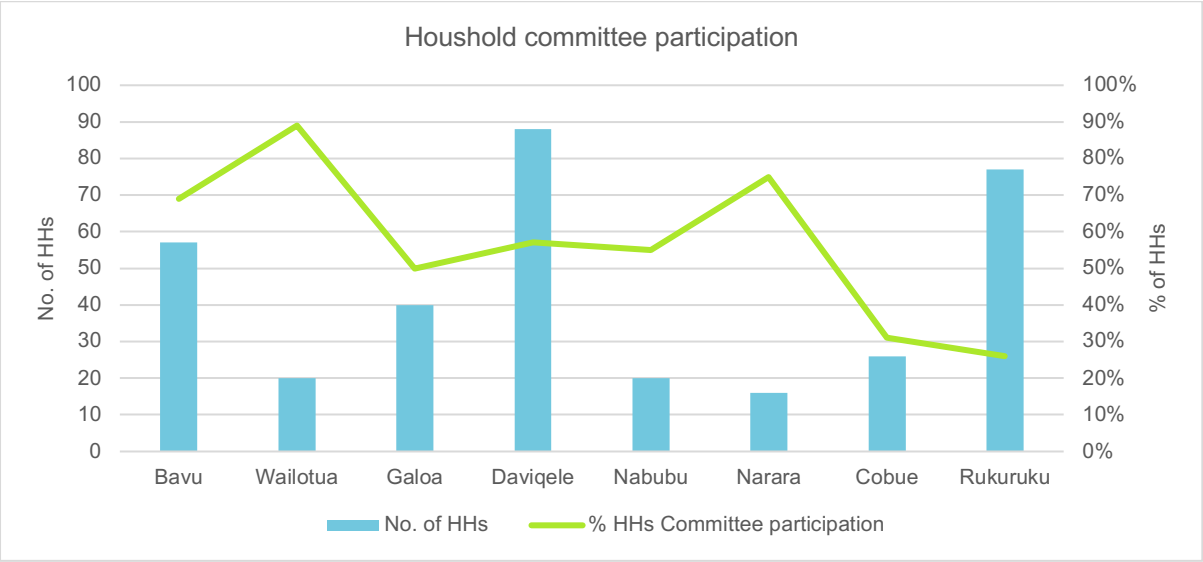


Figure 3.6: HH committee participation (S-E HHS, n=174)

In interviews some respondents complained about the activeness of committees. For example, in Nabubu a community elder stated, *"Committees are not well organized and rarely meet, with the Turaga ni Koro assuming all the responsibility in the community "* (KII-N VE/L-M). In Galoa, the Health committee was barely functioning (KII-G, VN-F). Additionally, in both Daviqele and Rukuruku, one respondent in each community listed "commitments and obligations" as a main issue in the S-E HHS. Overall, however, the formal character and state codification of aspects of Fijian culture and community governance provides a structure and order to community life-ways; especially relative to neighbouring Solomon Islands and Vanuatu. This is evident in the regular *Bose Vakoro* meetings and nation-wide debate on the draft Village Bylaws (although the latter have not been formally legislated, many people perceive them as 'law').

There was little to no ongoing cooperation and linkages between the water committee and other committees, other than during the initial construction phase when women and youth groups typically assisted with water supply construction (see further CWM section)

3.4. Fundraising and other forms of community contribution

Fundraising is a crucial part of rural community life throughout the Pacific Islands and is often closely connected to the committee and governance structures discussed above. There are typically two main types of fundraising or community contributions in Fiji - a one-off/ irregular household contribution where the amount is set, and a more general contribution where the amount is not set. Across our eight case-studies, Narara and Cobue reported the largest fundraising/community contributions over the last six months, whilst Galoa and Nabubu recorded the lowest (Figure 3.7). Note, however, that Narara and Cobue have relatively new water supply systems (2017 and 2016 respectively) and both had been active in raising funds to support their water system in this time.

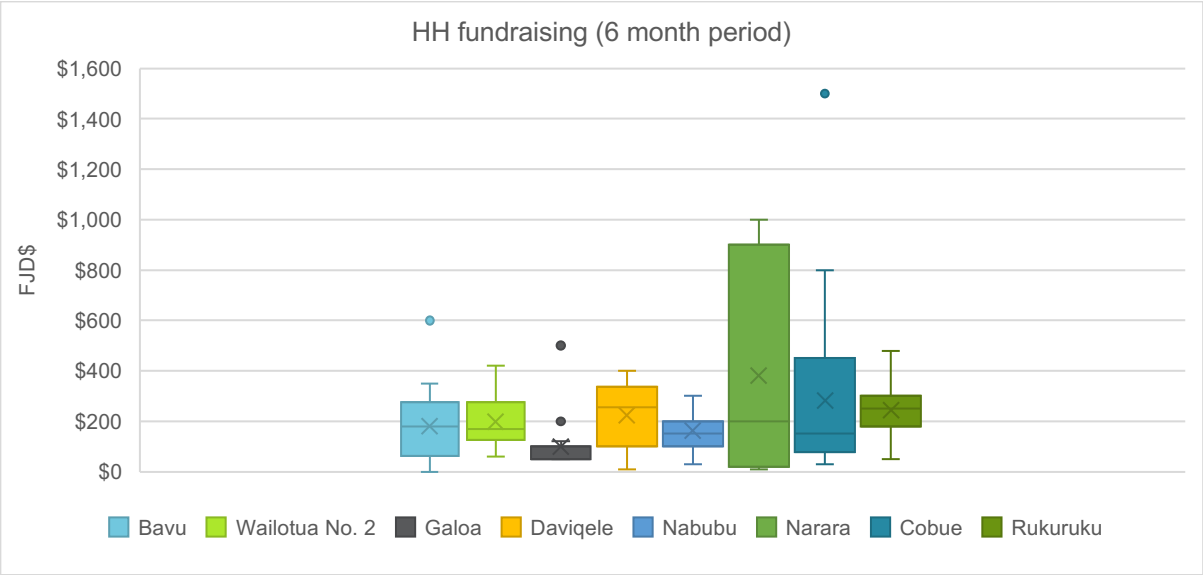


Figure 3.7: HH reported fundraising amounts (S-E HHS, n= 162 [Bavu n=14, Wailotua n=9, Galoa n=30, Daviqele n=16, Nabubu n=21, Narara n=11, Cobue n=26, Rukuruku n=25])

Much fundraising is focused on church related matters, but not all. For instance, in **Nabubu** there were numerous examples of community organised contributions focused on community improvement, e.g. ten years ago women conducted a fundraising drive (set at FJD$25.00 per HH) to purchase flush toilets for the community. One community leader noted that one of the main challenges they faced is that numerous fundraising, in a small community, places a "burden on the community " (KII-N, VE/L-M). *This is a likely factor informing the short-lived water fee in Nabubu* (cf. CWM section below).

In **Cobue**, fundraising activities have been related to specific committees and groups (e.g. Water Committee $10/month, Youth Group $20/month) and any general issues / activities that may arise (e.g. fix the church roof, the bore water pump, a death in community etc.) (KII-C, VL-M). The Cobue community recently undertook a fundraising drive of FJD$100.00 per household to purchase a new generator for the borehole, and this included the neighbouring Indian settlement who share the bore water (KII-C, OD-F). This has fuelled complaints regarding the set household water fee (cf. CWM section, below). In **Narara** – which had the highest (self-reported) fundraising levels over the six months prior to research – the only fundraising example proffered was also related to the new water supply system (and thus is not representative of normal trends).

A further indicator for assessing economic collective action is the number of HHs *not* making any contribution. This was highest in **Narara** (4 HHs, 25%)[14] and **Daviqele** (4 HHs, 24%), with just one surveyed household in **Galoa** (3%) and **Bavu** (6%) reporting *no* contribution in the last 6 months; all the remaining sites had a 100% participation rate (amongst surveyed HHs). In some locales – e.g. Nabubu, Galoa and Rukuruku – people residing elsewhere also often participated in key fundraising activities, especially those concerning community development (as well as in regards to paying Provincial levies).

An important point here is that the qualitative data from Cobue and Nabubu demonstrate that there is a limit to financial self-help, and in these two cases fundraising appears to have been a salient factor informing the sustainability of a formal monthly household water fee (cf. CWM section, below). This echoes data from Solomon Islands (Love et al., 2020). In short, the provision of a water fee to raise funds for CWM is likely affected by the degree of existing fundraising obligations in a given community, as well as the size and the socio-economic status of a community. A simple community diagnostic could

[14] One of the four HHS who reported not contributing to fundraising in the last 6 months were iTaukei.

assist in better identifying and facilitating discussions about how residents can best financially support CWM.

3.5. Cooperation and collective action

Community cooperation and collective action (both within and outside WASH domains) were explored through a variety of instruments to better understand what social determinants may inform CWM outcomes and possibilities. Collective action is considered critical to 'good' CWM. For our purposes, collective action can be defined simply as any action taken by a group of people whose goal is to achieve a common objective. Below (Table 3.1) provides an assessment of community cooperation, based on interviews, material examples, and the "main Issues" question from the S-E HHS (see further below).

Table 3.1: Summary rating of community cooperation

	Wailotua -two	Bavu	Galoa	Daviqele	Cobue	Narara	Rukuruku	Nabubu
Cooperation	●	●	●	●	●	●	●	●

● VERY LOW
● LOW
● MED
● HIGH
● VERY HIGH

The communities with the clearest consensus and empirical evidence of collective action were Galoa and Nabubu, whilst Daviqele and Rukuruku – the two most populated communities – displayed the greatest amount of cooperation challenges, with the other locales sitting in the mid-range. Collective action in iTaukei communities in Fiji are strongly connected with *solesolevaki* and other 'neo-traditional' norms.

Throughout the Pacific islands, systems of cooperation and self-help that contribute to 'social protection' are widespread (AusAID, 2012). In iTaukei villages, examples of social protection include *solesolevaki*, *solevaka* and *kerekere*; traditional forms of reciprocity which promote social cohesion and good relations within (and beyond) the community. *Solesolevaki* and *solevaka* both involve the exchange of collective labour.[15] *Solesolevaki* (lit. working together) is, socio-historically speaking, the mobilization of collective labour to address tasks that benefit, principally, *individuals* within the collective, whilst *solevaka* (working together on a project *as a community*) is the use of collective labour for *collective interests* (Gatty, 2009: 234). Today, *solesolevaki* is commonly used to refer to collective actions for the collective good, and is typically glossed simply as *soli*. *Kerekere* is an indigenous Fijian mode of exchange or "customary borrowing" (Belshaw, 1964:121) that refers to requesting goods or services from a relative. Many iTaukei feel that 'traditional' values of collectivism are being eroded in favour of Western individualism (e.g. Fiji Sun, 2015; Tevola, 2017), whilst others – inside and outside of Fiji – see such practices as detrimental to economic 'advancement' (cf. Farelly & Vudiniabola, 2016; Movono & Becken, 2018 for more on this debate). In many of our iTaukei case-studies, *soli* had only recently been re-invigorated as a regular communal activity, somewhat akin to community work (e.g. Daviqele, Rukuruku).

Across the case-studies, cooperation and self-help were generally considered strong by most respondents in the iTaukei communities, as well as in the Indo-Fijian settlement of Narara. However, older respondents tended to be more critical and frequently highlighted what they saw as the erosion of traditional values and life-ways (*vakavannua*) and rise of Western individualism. For example, in Bavu, an elder male stated, "There is no more *solesolevaki* nowadays because time has changed and the people are doing whatever they want to do, so it is not practiced anymore" (KII-B, LH-M). Note that

[15] Gatty (2009) writes that *solesolevki* "is probably one of the finest features of Fijian culture, when the people can work together at a task that might otherwise be onerous" (2009: 234).

Wailotua two and Bavu had the highest average mean community age of all the case-studies as well as the lowest average household size, which likely delimits *solesolevaki*. Moreover, in Bavu and Cobue, many people where engaged in waged work, and this would also impact the ability of people to engage in *soli*.

Narara had limited qualitative data, but according to both a younger and older female respondent, cooperation was strong and criss-crossed ethnic and religious boundaries. For example, "if there is a death in one family in the settlement, all the community members gather irrespective of race or culture" (KII-Nr, SW-F). However, an older male respondent highlighted that "There is still cooperation in the settlement, but not like before" (KII-Nr, LH-M). Similarly, in Cobue settlement, several respondents stated that there was good "relations with [the] nearby Indian settlement in Vatubogi and Cobue Indian settlement [and this is] something that the community of Cobue iTaukei Settlement will always cherish and value" (KII-C, LH-M).

Generally speaking, cooperation and self-help was notably 'high' in Galoa and Nabubu. The first week of every month in Galoa is '*solesolevaki*', where people clean-up the community and the surroundings and undertake other community 'uplift' activities. An older male noted that there has been a trend towards working in *vanua* and *mataqali* groups, whereas before it was undertaken by different groups with their own targets – "no restrictions on which working group you want to join" – and he saw this as one strength of *solesolevaki* in the past (KII-G LH-M). In Daviqele, *solesolevak*i was revived amongst women in 2013 (KII-D, LH-F) and, according to a community leader, had "improved a lot" across the whole community over the last decade (KII-D, VL-M). Similarly, in Nabubu and Rukuruku, it was noted that *solesolevaki* had been reinvigorated over the last decade.

In Rukuruku, the current TNK stated that *solesolevaki* had been recently instigated with the young male cohort in the community, especially the youth group, whereby they each plant 1000 *yaqona* [kava] plants, and from this 10 are given away - 5 to the community, 5 to the church (KII-R, VL-M). Numerous other respondents stressed that community cooperation in the community "is very strong" but did highlight that due to the "different denominations that are present in the community" there were sometimes "minor differences" which impacted harmony and cooperation (KII-R, LHC/VL-M).[16] Rukuruku recorded the third highest proportion of social issues, across the eight study sites, in the S-E HHS (see below).

3.6. Priority issues in communities

As part of the S-E HHS, respondents were asked to nominate what they viewed as the three "main issues" in their respective community. There were no prompts and the survey did not prioritise WASH-related issues. There were 26 different issues raised, which were re-coded and aggregated into 14 overarching issues. The top 10 issues raised across all eight case-studies are appended in Figure 3.8 (below).

The key WASH-related issues identified were discussed in detail in the WASH situation section (above), whilst responsibility for fixing them is engaged with in the CWM section (below). This section is only concerned with the key social issues elicited. Surveys are a useful adjunct to qualitative data as they are more anonymous and respondents tend give more open and critical appraisals.

Below (Figure 3.8) is a frequency count of the main social issues identified in the survey. Daviqele and Rukuruku – the two largest communities – recorded the highest number of social issues, Narara and Nabubu reported none.[17] Overall, the majority of social issues recorded (43%) were related to *community disharmony*, followed by *education issues* ("school drop outs") (29%). *Leadership/politics*

[16] Rukuruku had the greatest diversity of faith groups out of the eight study sites.
[17] Narara and Nabubu (along with Wailotua) were the smallest sites (16-20 HH's).

and *commitments/obligations* made-up 9% each. In terms of the latter, one comment specifically stated that there was "too much fundraising" in the community. *Alcohol/drugs* and *disrespect (from youth*) were cited once each.

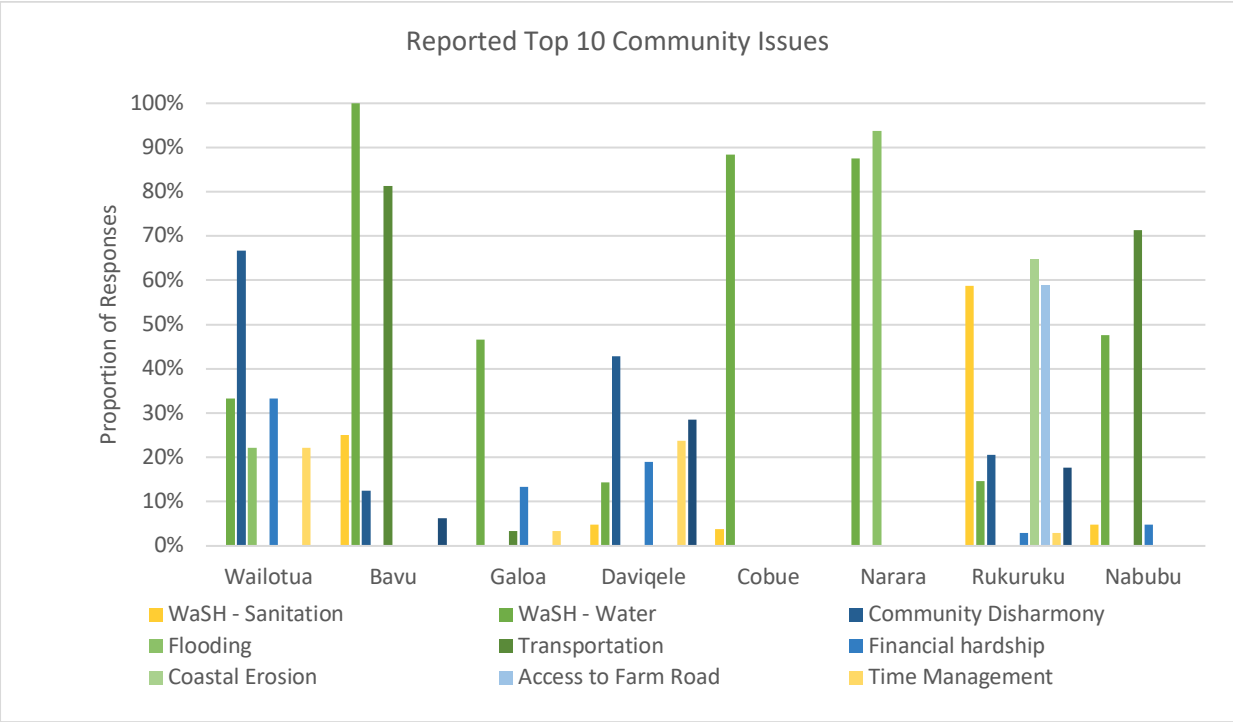


Figure 3.8: Top 10 reported main issues in each community (S-E HHS, n=173)[18]

The degree and type of issues identified in such surveys are useful indicators for WASH implementors to capture, as there are some correlations between the frequency and type of issues elucidated and CWM outcomes. For example, Galoa and Nabubu had the 'best' CWM and least amount of elucidated social issues; Daviqele, Rukuruku and Wailotua-two had 'poorer' CWM and the most social issues, with the majority being *community disharmony*).

Below (Figure 3.9) is a frequency count of the main *social issues only* identified in the survey, recoded and aggregated down to seven key overarching themes: *Community disharmony* (25%), *alcohol/drugs* (3%), *disrespect (from youth*) (2%), *leadership/politics* (5%), *commitments/obligations* (3%) [mainly the view that there are too many, with a few referring to people not attending meetings], *education issues* (14%) [referring to "school drop-outs"] and, *community boundary* issues (3%). Comparatively, Daviqele, Wailotua and Rukuruku recorded the *largest number and proportion* of social issues, whilst Narara and Nabubu recorded *none* at all.

[18] Percentages for this figure are based on the frequency of aggregated coded 'themes/issues' in each community, divided by the number of HH survey responses.

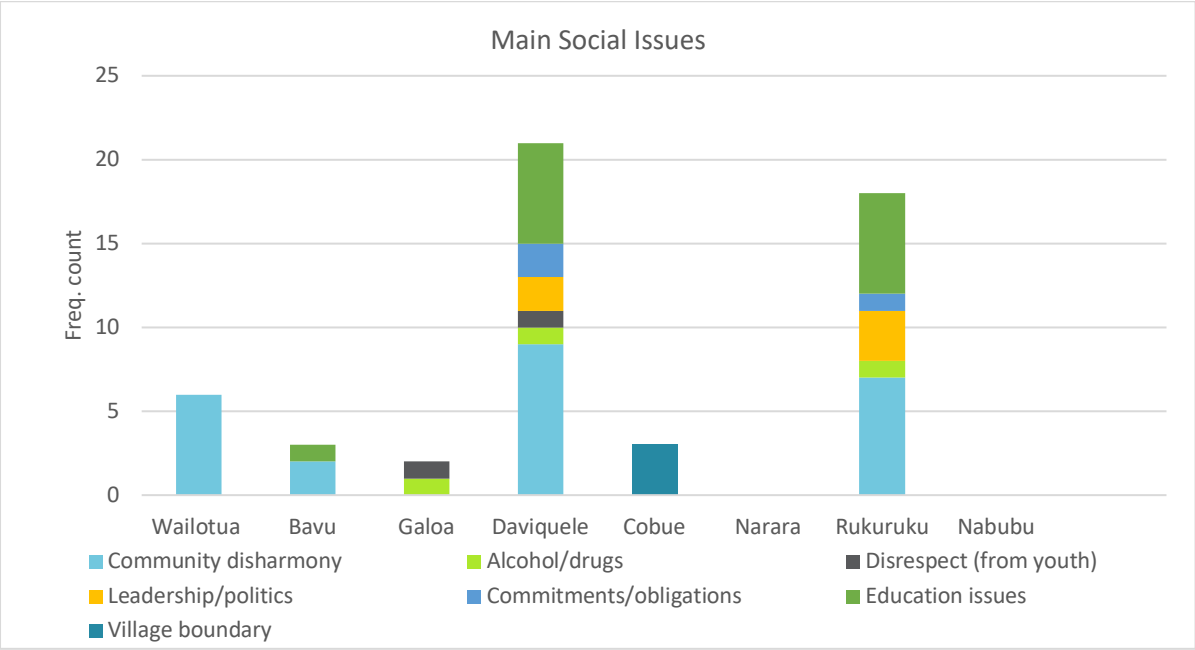


Figure 3.9: Main social Issues - frequency count (from S-E HHS, n=173; total social issue responses elicited, n=53)[19]

The degree and type of issues elucidated in such surveys are useful indicators for WASH implementors to capture as there are some correlations between the frequency and type of issues raised and CWM outcomes. For example, Galoa and Nabubu had the 'best' CWM and the least amount of social issues (as elucidated by respondents), whilst Daviqele, Rukuruku and Wailotua-two had less good CWM and the most social issues, with the majority being *community disharmony*.

3.7. Gender equality and social inclusion[20]

The status of women and youth in Fiji is complex and varies, somewhat, across the country.[21] There are deeply embedded inequalities present in iTaukei cultural norms and decision-making power structures (Kuridrani, 2014; IWDA, 2017; Vakaoti 2017; Yabaki 2006). In this section, we present the results of qualitative data gathered in the case-study communities concerning women, young people, and vulnerable or marginalised individuals.

Our prime research focus was on WASH and CWM, so the data on gender, equality and social inclusion (GESI) was not intended to offer an in-depth analysis of women's or young people's lived experiences but rather focused on capturing respondents' views about whether or not they felt they had a 'voice' in the community. Data on gender and age as it relates to women and young people's participation in community water management is discussed below in the CWM section. Note that insufficient data was gathered from Narara to undertake even cursory analysis.

In each case-study locale, a representative of the women's church group was interviewed, as were any female members of the water committee and other female community residents (youth, older women, community nurse, business operator etc.). Nearly all the female church group representatives in the

[19] There was a total of 310 responses coded, including WASH and development issues (road, transport, income etc.). This dataset only includes 53 of these identified as social issues, taken from the total of 173 S-E HHS

[20] Some of this introduction/literature review section includes information from an IWC Masters students thesis, supported by the PaCWaM project. Further data from the students research (interviews) concerning women and CWM is included in the CWM section.

[21] For example, IWDA (2017) found greater gender disparity in urban compared to rural areas – mirroring findings from elsewhere in Melanesia – and higher gender inequality in Bau, Malomalo, and Cakaudrove relative to other Provinces.

iTaukei communities stated that they believed that they, and women more generally, had a 'voice' in the community. Only one women, from Cobue, directly stated that she felt that "we have no say at all", whist several other respondents (Nabubu, Wailotua) replied that they have an allotted time for the women's leader to talk at the community meeting, one noting that the "leaders voice are heard occasionally in the community". In Bavu and Cobue women noted that they felt over burdened with domestic responsibilities, whilst in Galoa another gave an example of how some women are not allowed to attend church services as they don't have the requisite finances to contribute to the obligatory church contribution. In short, women's "voice" and agency is culturally prescribed, and it is primarily at community meetings that the leader of the women's group has an opportunity to speak and raise concerns that any members might have. Kinship is also important in terms of women's agency and voice. The wife of a chief or other community leader often takes up a leadership position amongst the women, whilst those who married in to a *koro* with maternal links to the community typically have more opportunity to have their voice heard than those who do not (this was raised, especially, in relation to community nurse's ability to speak-up at meetings). This underscores the importance of acknowledging that social inclusion (and intersectionality), in the Pacific context, must include kinship factors.

Across the case-studies, eleven "youth" representatives[22] were interviewed (5 F / 6 M), with four stating that they felt that they were "not often" heard (KII-B, YR-F), paid little "attention" (KII-B, YR-M), "not listened to at all" (KII-C, YR-F) or were "not given time during meetings" and thus "don't really have a voice" (KII-G, YR-F). A few were ambivalent, saying that while they had space at the community meeting to present their views, young people's perspectives were low "priorities" compared to everyone else's (KII-N, YR-F). This supports the contention that the strong reliance on the hereditary chiefly leadership system in Fiji, as well as iTaukei cultural norms more generally, downplays the role and contribution of young people in socio-economic and political affairs (Craney, 2019; Vakaoti & Mishra, n.d.). Interestingly, there was a clear pattern of contrast between female and male youth representatives' attitudes, with most females believing that youth were not listened to whilst most males believed that they were. This reiterates that youth agency and voice cannot be neatly separated from gender, and young women can face double discrimination.

People with disabilities are amongst the most marginalised in the world. There remains a dearth of information, but a national baseline survey in 2010 found that 1.4% of Fiji's population were persons with disabilities; however, it is believe that this figure would be closer to 10% if all areas of country were comprehensively surveyed (FNCP, 2010:17). In the past two decades, Fiji has seen dramatic increases in both the proportional and numerical size of its older population, raising various concerns about the welfare of the elderly and the impacts and costs of old age disability on families, the community, and the state (Panapasa, 2002). Across the eight case-study sites, six individuals were identified as vulnerable and/or marginalised, due to: old age, illness, being widowed, or suffering from a cognitive and/or physical disability of some kind. Individuals experiencing marginalisation for other reasons – e.g. single and/or young mothers, members of minority religious groups, LGBTQI people, or people identified as 'lower class' – were not explicitly sought out. Only two individuals with accessibility difficulties were interviewed; an elderly male from Daviqele (who requires assistance to access water and sanitation), and an elderly women from Rukuruku (who struggles but can complete most WASH-related activities). Both felt their voices were heard, that they were supported by family and community and they received some form of state assistance (e.g. welfare, CSO assistance). Nevertheless, due to such a low sample size, this should not be considered a representative finding across the study sites (and beyond).

[22] The national youth policy of Fiji defines "youth" as aged between 15-35 years (GoF, National Youth Policy, 4.1)

3.8. Mobile telephony

The emergence of new information and communications technologies (ICTs) in the Pacific islands over the last decade – and especially the last few years – has had a substantial impact at both the national and rural community level. Our case-study research specifically set out to explore community-level mobile phone ownership and use, as well as people's attitudes towards mobile phones and whether or not they used them for educational / informational or primarily social purposes. The rationale was to better understand the potential of using mobiles for community development purposes.[23]

In the communities, mobile phone ownership and Facebook (FB) usage varied considerably, but was above 49% across all sites. Analysing the total number of people with mobile phones (combing 'basic' and 'smart/internet enabled') and cross-tabulating this with the number of FB uses reveals: Bavu (80%), Wailotua-two (89%), Galoa (94%), Daviqele (84%), Nabubu (83%), Narara (57%), Cobue (63%) and Rukuruku (49%) (Figure 3.10).

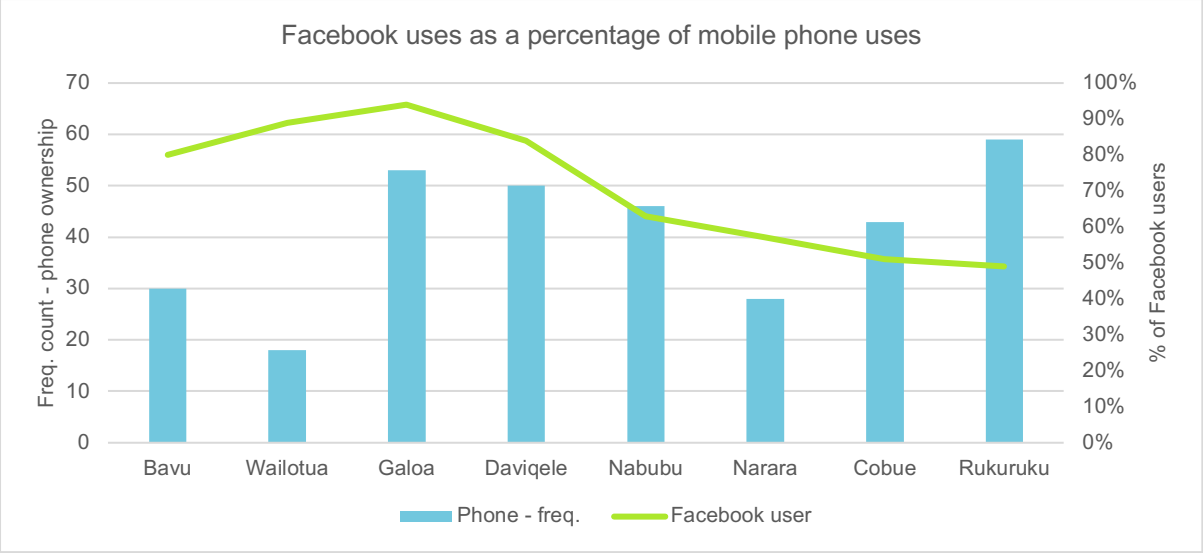


Figure 3.10: Mobile phone ownership and % of respondents that used Facebook in the research sites (S-E HHS, n=327 individuals)

Most respondents were *positive* about the introduction of mobile phones, even if they highlighted some negative aspects as well. The most commonly cited positive benefit of mobile phones was being able to communicate with family and friends and arranging or being informed of visitors to the village/settlement. Other benefits noted included: assisting with business (e.g. KII-D, BO-M); arranging transport (e.g. KII-N, YR-M); online banking (e.g. KII-N, T-F); organising medicine and emergency transport of the sick (e.g. KII-C, VL-M; KII-N, WCR-F); getting assistance from families abroad for "community development" (KII-N, VL-M); and, liaising with government (KII-R, VL-M). *Critical attitudes* towards mobile phones came mainly from a few older people, who said things like "it makes children not listen to their parents" (KII-B, LH-M) and people were sharing "confidential information" on social media – such as the death of a person – before family have been properly contacted (KII-B, VL-M; KII-C, VL-M; KII-W, RL-M).

In concert with the "Mobiles for Development" (M4D) trend, we were interested in exploring if anyone was using internet enabled phones to "learn new things". Generally speaking, in our cases, there were only a few concrete examples. However, teachers in both Daviqele and Nabubu stated that they use it for teaching and some people mentioned they used it when they were studying (e.g. KII-N, YR-F).

[23] Information Technologies for Development (ICT4D) and/or Mobiles for Development (M4D) is a new and growing area of development practice, including in WASH.

The challenge for government and CSOs interested in assisting with specific development objectives (such as WASH) through new technologies (such as social media) is how to effectively facilitate messaging that gets traction at the rural level. Producing content is one thing; getting people to actively access it and watch it is another. Any social media campaign must be well-thought through.

Women weaving baskets in Daviqele, Kadavu (Photo credit: D Gonzalez Botero)

4. PHYSICAL SETTING

To assist in identifying the type of factors or key determinants informing community water management outcomes, a further focus of the study design focused on a communities Physical Setting. Specifically, we were interested in whether environmental factors (e.g. water resource types and availability, land use practices), geography (e.g. location, distance to markets, settlement layout, topography), as well as community infrastructure characteristics (housing, power, mobile reception, health and education services), inform the WASH situation and CWM outcomes. Table 4.1, below, provides a summary of some of the key physical setting attributes associated with each community.

Table 4.1: Physical setting summary of each research site

Community (Division, Province & island)	Geography (distance to nearest market, town)	Community HH number	Power	Mobile coverage	Nurse / Hospital	Disasters experienced[24]	Land use practices (in catchment area)
Bavu (*koro*) Western Division Nadroga Viti Levu	Nadi / Sigatoka (50 min. drive)	MED - LARGE 57 HHs	100% EFL	Digicel Vodafone	Community nurse Sigatoka Hopsital	Cyclones Drought Climate change	*Borehole* located next to road and in middle of community. Horses, pigs, cows, chickens nearby bore hole & stream
Wailotua No. 2 (*koro*) Central Division Tailevu, Viti Levu	Suva (1:20-2hrs drive – 66km)	SMALL 20 HHs	78% EFL	Digicel Vodafone	Community nurse Nayavu Health Centre	Flooding Landslides Cyclones River bank erosion	*Surface water* Horses use the stream; Gardens; Wild pigs; Cutting down trees; Erosion; Road (impacts old dam only)
Galoa (*koro*) Eastern Division Kadavu Galoa island	Vunisea Govt. station, Kadavu island (10-15 mins boat) Suva Ship - Tues. & Friday nts. 5-6 hrs)	SMALL 25 HHs	87%[25] Solar	No reception on island, but available not far off shore	Community nurse Vunisea Hospital	Flooding Cyclones Climate change	*Surface water* Few to no human activities Native forest – all gardening / farming activities are below the dam
Daviqele (*koro*) Eastern Division Kadavu Kadavu island	Vunisea Govt. station, Kadavu island (1hr. 15 mins car)	LARGE 88 HHs (65 *koro* / 23 settlement)	95% Solar	Digicel Vodafone	Community nurse Daviqele Health Centre Vunisea Hospital	Flooding Cyclones Climate change	*Spring* Few to no human activities

[24] Earthquakes are also historically prevalent through most of Fiji.
[25] Additionally, Galoa has a community diesel power supply (used only on a need-as-basis). All but one HH is linked to the community diesel network (97%, n=29 HHs)

Nabubu (*koro*) Northern Division Macuata Vanua Levu	Labasa 2-3 hrs (via Lakeba) 2 hrs walk/1 hr boat to Lakeba, then bus to Labasa	SMALL 21 HHs	100% Solar	Vodafone Inkk	Community nurse Viisoqo Health Centre Labasa Hospital	Cyclones Climate change Sea level rise	*Surface water* Few to no human activities [water catchment protected through a conservation covenant]
Cobue (iTaukei settlement) Northern Division Bua Vanua Levu	Nabouwalu (33 km, 34 min drives) Labasa (100 kms, 2-3 hrs, bus)	SMALL-MED. 26-30 HHs	85% Solar (Gov. provided)	Mixed coverage	Community nurse Bua Health Centre Nabouwalu Hopsital	Flooding Cyclones Climate change	*Borehole & dam* Gardening; Animal grazing (cattle); walking track; open defecation; soil erosion / landslide logging
Rukuruku (*koro*) Eastern Division Lomaiviti Ovalua island	Levuka (2hrs drive) Buresala (boat)	LARGE 74 HHs	94% EFL	Vodafone Telekom	Community nurse Levuka Hospital	Flooding Cyclones Drought Climate change	*Spring* Gardening (incl. cash cropping) [manure / pesticide]; Grazing; Open defecation; walking track;
Narara (Indo-Fijian settlement) Western Division Ra Viti Levu	Rakiraki (8.5km, 17 min drive) Nadi (85km) Suva (86km)	SMALL 16 HHs	60% EFL 40% Solar	Vodafone Telekom Digicel	No nurse Rakiraki Hospital	Drought Cyclones Flooding Climate change	*Surface water* Few to no human activities Native forest – all farming activities are below the dam

4.1. Environment

Half of the case-studies were situated on the coast – Galoa, Daviqele, Nabubu and Rukuruku – the remainder of the sites were all inland communities. Rainfall varies significantly between the sites, and only two sites – Bavu (Western Division, dry side of Viti Levu) and Galoa island (Eastern Division) – experience significant water scarcity: Bavu – located on dry side of Viti Levu – experiences droughts for 3- 6 months a year, whilst Galoa island has no natural surface water on the island and (before water was piped from Kadavu island) historically relied on rainwater collection, shore line springs, wells, and – for a brief time – a borehole.

Many of the surface water infrastructure (e.g. dams, pipes and water storage tanks) are located in the hills above the communities and are somewhat exposed in terms of heavy rainfall, landslides and other potential damage from the physical setting. In addition, risks to water quality pollution are higher in communities that rely on surface water supplies, which are inherently located in sloping topography that is subject to surface run-off during rainfall. This was demonstrated in our research sites by the high to very high *E. coli* presence in a majority of the surface water samples, particularly from the surface water

off-take point (dam). These water supplies require specific management actions that are not as critical for communities that are not reliant on surface water (e.g. ground water and rainwater sources

Viti Levu has undergone the most substantial environmental change of all the sites, with industrial, commercial, agricultural and settlement expansion all resulting in land use changes, and affecting the water catchments, with Ra province undergoing the most substantive changes (Jupiter et al., 2012; RESCUE, n.d.). Fertilizer and pesticide usage is widespread in Ra, and an environmental hazard survey, funded by the World Health Organisation in 2005, identified that farmers in and around Rakiraki were high users of NPK fertilisers and pesticides (Litidamu et al., 2005:49-52). However, this is likely only affecting the river/stream and not the drinking water source for Narara, which is located at a high elevation above most local land use activities. In Nadronga, where Bavu is located, the community is close to both the Queens Highway and a large Fiji Pine plantation, which are both considered to have negatively affected (diminished) the water flow of the river/stream that dissects Bavu, as well as the productivity of the bore water. There has also been wildfires in the nearby pine planation. Run-off from road drains run into the creek at Bavu, with significant rubbish observed in local waterways.

All case-study communities experience natural disasters, most notably cyclones, especially those in Vanua Levu, Kadavu, and eastern Viti Levu (including Lomaiviti). Tropical Cyclone (TC) Ami (2003) and Tomas (2010) impacted Nabubu, as did TC Winston (2016), which also impacted Viti Levu. Earthquakes are also an irregular but destructive hazard. Flooding was also a recurrent issue in Narara (where the community is sometimes cut-off from the main road due to bridges flooding) , whilst, Wailotua No. 2 – central Division, Viti Levu – is located next to the Wainibuka river, which frequently floods in the wet season. Climate change was deemed an issue by respondents in most locales, especially in terms of changes in seasonality and rainfall, increased extreme weather events, sea level rise, storm surges and coastal inundation.

Both Nabubu and Daviqele have formal conservation activities in their proximal environment; Daviqele through Birdlife International (protecting a swathe of Mount Nabukelevu as an Important Bird Area) and Nabubu (Ridge to Reef conservation covenant with Seacology, a US-based NGO).

The natural environment surrounding a village/settlement informs residents livelihood options, e.g. availability and suitability of land for market gardening, cash cropping, animal husbandry and access to the ocean for fishing and gleaning. Examining only *natural resource-related income streams*, Figure 4.1 (below) provides a comparative snapshot of the main resources available to residents of the case-study sites. Note that a few residents in both Narara and Cobue also practice small-scale cattle grazing (not captured in figure).

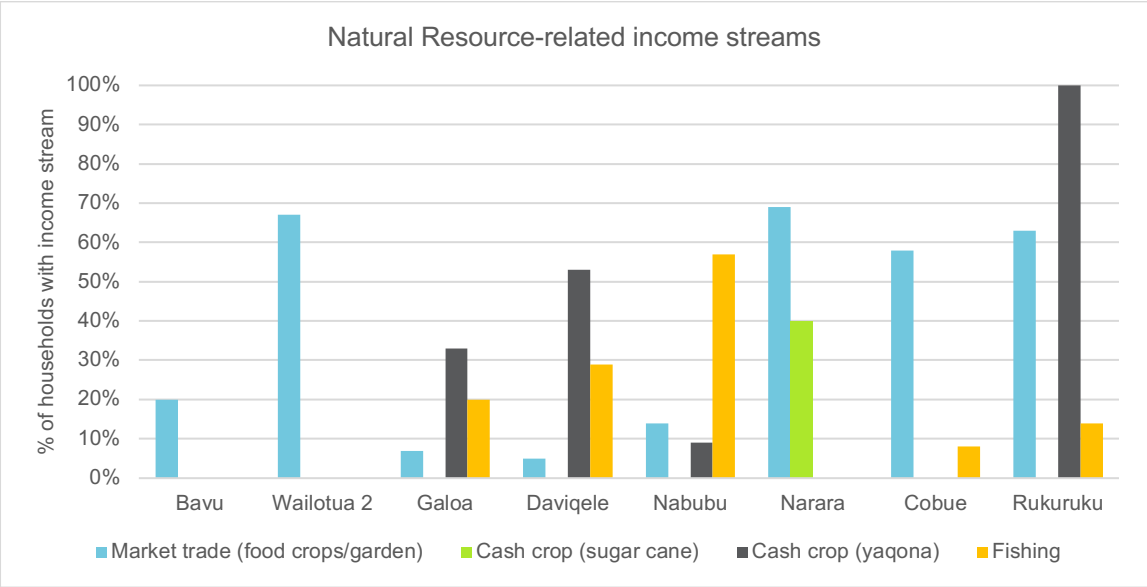


Figure 4.1: Natural resources income streams of case-study communities (S-E HHS, n=200)

Overall, gardening for market trade – e.g. mainly vegetables for sale at local markets (e.g. *dalo* [taro], cassava, etc.) – was the most common income stream across all sites, followed by cash cropping *yaqona* (kava farming) and fishing. Sugar cane was only an income stream in Narara and, as elsewhere in Fiji, is in acute decline.

The income opportunities provided by the natural environment in which a community is located can and does inform both the WASH Situation and CWM outcomes: through land use practices in the surrounding water catchment area (cash cropping and gardening activities), and/or by informing social cohesion and collective action opportunities (e.g. in locales where large proportions of the population have salaried work, they are less likely to be able to contribute to labour intensive collective mobilisation).. In Cobue, for instance, 89% of households had at least one family member working in the nearby sawmill, whilst in many people work part-time in the tourism/hospitality industry (Marriot hotel, which is located on a Bavu *mataqali's* land).

4.2. Infrastructure

Community infrastructure was mapped through observation, background case-study reviews and the S-E HHS. In sum, there was not a large degree of disparity between the sites: most HH's had access to power (solar power or EFL), most communities had mobile connectivity (except Galoa and parts of Cobue); and, all but Narara had a resident community nurse clinic (Table 4.1). In numerous sites, major community infrastructure – beyond Church and community halls, e.g. community footpaths, sea walls – were locally-led developments.

4.3. Geography

The case-studies included a range of sites with different transport and accessibility attributes. Galoa and Rukuruku were totally dependent on water transport to access key services, such as attending markets or accessing advanced health services, whilst in Nabubu the road is overgrown and people must walk or take a boat from nearby Lakeba community. The other communities all enjoy reasonable public and/or private transport opportunities.

An important but often undernoted aspect of physical setting concerns how the proximal environment, topography, and micro socio-spatial factors coalesce to inform community context and possibilities. The case-study communities were all relatively discrete and small-to-medium sized locales and, especially relative to our Solomon Islands sites (Love et al., 2020), were much more socio-historically established and homogenous and had few and generally only minor challenges associated with topography (e.g. households located on elevated land experiencing low pressure, different households relying on alternate water sources etc.). A key social geography factor of note is neighbours: Who resides in, near and/or has rights over a water catchment area has consequences for all the people who ultimately use the water resource. In our sample, Daviqele and Cobue are of most interest in this regard.

Daviqele was the largest case-study site with 88 households, 23 of which are located outside the registered *koro* boundary. Whilst socio-historically belonging to the two Daviqlele Yavusa's, some of the settlements are not connected to Daviqele's main water source (Dralau) due to governance reasons; hence, Kalou settlement uses the old/secondary community source (Kalou spring) whilst three small hamlets are connected to neighbouring community water systems (Qalira and Nabukelevuira). Combined with the fact that the reservoir and storage tanks are both located in neighbouring Nasau *koro* territory (without reports of conflict), this speaks volumes about the utility of Fiji's customary and state governance systems to ensure equity of access to essential resources, such as water. The other site of note is Cobue, which is situated near several Indo-Fijian settlements and shares a key source (a

bore hole water system) with the Veikale Indo-Fijian settlement. Whist not without its challenges (see CWM section), there is considerable inter-ethnic cooperation in evidence.

The key point here is that geography and the environment cannot be neatly disconnected from the social - they are deeply intertwined.

Kadavu Province, Fiji (Photo credit: D Gonzalez Botero)

5. ENABLING ACTORS AND POLITICAL ECONOMY

To help support our two key research objectives, a component of the research was designed to identify and explore some of the key external 'plus' factors that currently, or could potentially, shape community water management at the rural level. To this end, we examined the enabling environment and how external actors currently operate in regards to WASH programs. This section presents the results of this aspect of the study, specifically:

- analyses of attitudinal data gleaned from interviews with community-level 'project actors' concerning past projects – both WASH and non-WASH related
- a political economy analysis of WASH projects, based on interviews with stakeholders from government and CSOs
- a summary of external community relations; specifically, people's views on whether external community members ('town cousins') could or could not potentially be a useful medium for i) sourcing and/or distributing spare parts back to the 'home community'; and ii) promoting and disseminating WASH and WM messaging.

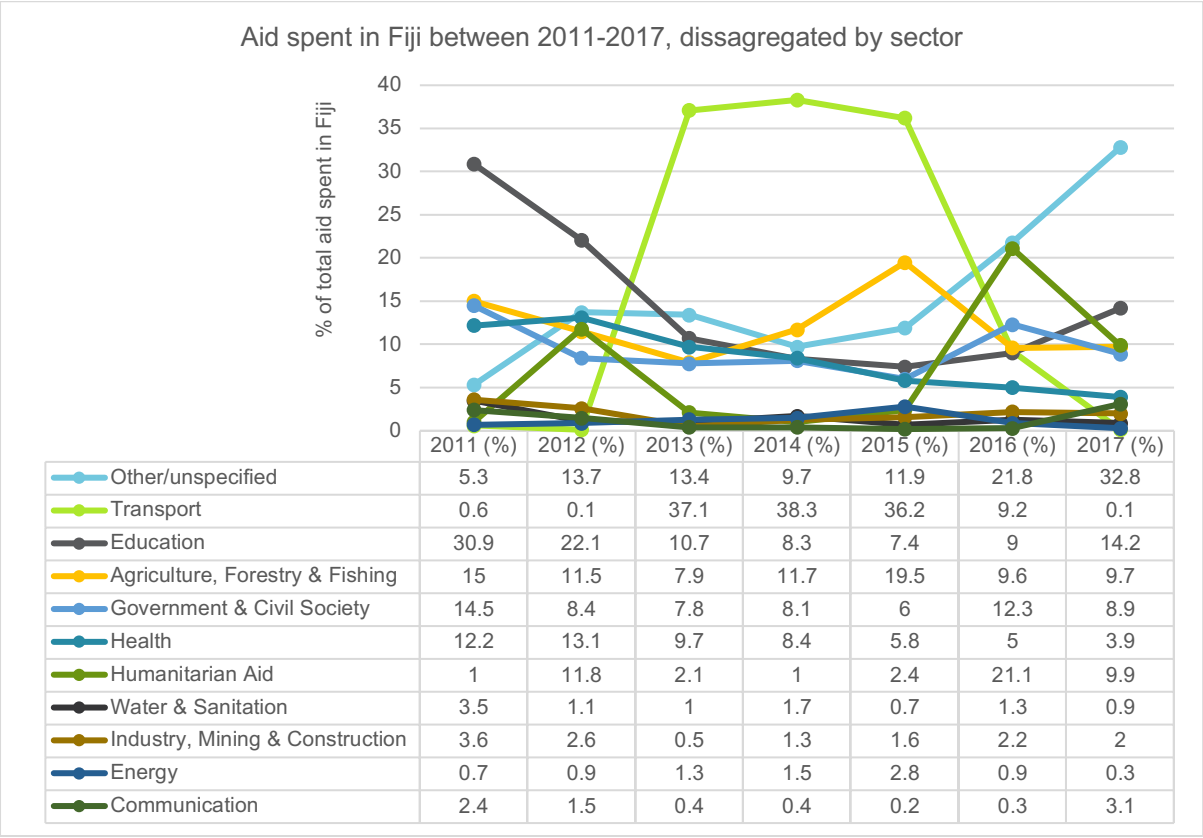
5.1. Rural WASH government policy

The Government of Fiji (GoF) is committed to the provision of clean water and efficient and effective wastewater services for every Fijian Household. This commitment is enshrined in the 2013 Fijian Constitution (GoF 2014, 24) and prioritised under the GoF's 20-Year National Development Plan (NDP) to achieve "100% access to safe, drinking water by 2030 and 70% access to improved sanitation systems by 2021" with "100 per cent access to clean and safe water will be realised by 2021 and for the rural and maritime areas by 2030" (MoIT in UNICEF, 2018).

Three ministries and institutions share the lead for drinking-water services in Fiji: Department of Water and Sewerage (DWS), the Water Authority of Fiji (WAF), the Mineral Resource Department (MRD), and the Ministry of Health (MoH leads hygiene promotion initiatives and has a number of responsibilities with regards to sanitation and water quality).

WAF, under the *Water Act 2007,* is responsible for both urban and rural water supply and sanitation. As is common globally, in rural Fiji water systems are managed by a water committee (MoIT 2016), which is handed responsibility from the WAF for the community's operation and maintenance of all water systems. It is the responsibility of the water committee to operate and maintain the water supply, often with limited technical and financial capacity. The basis for community water management derives from various DWS policies and guidelines, some of which are currently stalled or awaiting cabinet approval (see below).

In addition to the national government, various non-government organisations are active in the sector in both capacity support and water infrastructure implementation roles, whilst numerous state and multilateral donors are also active. There is little publicly available data on the degree of CSO implementation or donor activities across the country. However, in terms of gross aid by sector, WASH represented 2% of all aid money spent in Fiji between 2011-2017, making it one of the lowest financed sectors (Figure 5.1)



	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)	2017 (%)
Other/unspecified	5.3	13.7	13.4	9.7	11.9	21.8	32.8
Transport	0.6	0.1	37.1	38.3	36.2	9.2	0.1
Education	30.9	22.1	10.7	8.3	7.4	9	14.2
Agriculture, Forestry & Fishing	15	11.5	7.9	11.7	19.5	9.6	9.7
Government & Civil Society	14.5	8.4	7.8	8.1	6	12.3	8.9
Health	12.2	13.1	9.7	8.4	5.8	5	3.9
Humanitarian Aid	1	11.8	2.1	1	2.4	21.1	9.9
Water & Sanitation	3.5	1.1	1	1.7	0.7	1.3	0.9
Industry, Mining & Construction	3.6	2.6	0.5	1.3	1.6	2.2	2
Energy	0.7	0.9	1.3	1.5	2.8	0.9	0.3
Communication	2.4	1.5	0.4	0.4	0.2	0.3	3.1

Figure 5.1: Aid spent in Fiji by sector (2011-2017). Source: adapted from Lowy Institute – Pacific Aid Map: https://pacificaidmap.lowyinstitute.org/

At the community-level, water supply management is somewhat determined by each community/settlement, but ideally informed by and adhering to the policies and guidelines of the government, namely the *Rural Water and Sanitation Policy, Practical Guidelines for Rural Water Supply Management Plan;* and the WAF (2016) brochure entitled *Rural & Maritime Water Supply Scheme: What communities need to know when applying for the Water Supply Scheme* (see CWM section).

5.2. Projects as the means for external actor engagement

In this sub-section we offer a summary overview of community/settlement residents' attitudes about external engagement, based on interviews with a cross-section of respondents in each site.

The list below describes some of the relevant findings relating to WASH projects. However, there are a few general observations worth noting first. Locally, water supply implementation is not commonly viewed as a 'project' as such, unlike in other countries; the government is largely seen in a positive light (and deemed the 'proper' development implementor), and there is (generally) strong local ownership and initiative in evidence. Secondly, the 'local' versus 'non-local' binary often associated with community members is less applicable in Fiji, where many community emigrants generally remain involved in community water supply matters from a distance (for example, through fundraising). And lastly, from a CWM perspective, one of the most instrumental benefits of the customary system – in our case studies – is the assurance that customary land agreements (between water resource owners and uses) provide, and the minimal disagreements that seem to occur around such agreements. For example, the dam for the Galoa island system is located on the mainland (Wailevu, Kadavu island) and the pipes run through multiple *mataqali*'s land before reaching Galoa. Using customary and neo-customary protocols (i.e. gifts including whale tooth, mats, pandanus, bags of flour, sugar, rice, and FJD$3,000), Galoa island secured access to a reliable water source beyond their island. Moreover, to this day, women in Galoa annually

harvest, dry and supply pandanus to the community of Wailevu (where pandanus is far less plentiful) as part of the water access agreement.

Some relevant findings relating to WASH projects:

- Support from external family members were critical to supporting and/or sourcing project funding in several cases (Nabubu - Rotary Water for Life [water supply upgrade]; Seacology [water tanks for the school], Galoa [assistance from emigrants in Viti Levu]). Additionally, a WAF employee from Wailotua-two provided advice and assistance with their water project
- Ad hoc donations (e.g. water tanks) from emigrant community family members or friends are not uncommon
- The Rotary Water for Life program (upgrade of the community water system) came to Rukuruku through the efforts of an emigrant community-son who wrote the proposal
- The government is clearly seen as the 'proper' development provider in regards to fundamental infrastructure provision such as water
- In some locales – such as Nabubu and Rukuruku – there was a strong view that government were "non-responsive" (KII-N) to requests for support and there was a "lack of assistance" because "we are far away from the main town where all government officials are located and transportation to and from the community is not very often, and the fare is also quite expensive" (KII-R)
- During water supply implementation, "water committee members were encouraged to follow and contribute hands-on practical work without any formal training. This process assisted them in obtaining the basic knowledge of maintenance work" (KII-W).
- More assistance could have been "asked from the community members who are overseas and in the urban areas to assist in the project" (KII-G)
- WAF should have provided more "instruction and support" with regards to "drainage improvement" (KII-W)
- WAF promised to renumerate the youth for their labour in Cobue (FJD$5,000) but this has reportedly not happened, promoting considerable anger from some, which may indicate a communication and/or dependency challenge (KII-C)
- Two communities – Bavu and Rukuruku – have greatly benefited from overseas students visiting their community regularly (this has improved the WASH situation in both locales)
- WAF staff have their own personal and work agendas that contributed to project delays (KII-W)
- WAF provided some materials and ongoing funds for maintenance after the completion of the some systems
- Water-based sanitation was a key driver for improved water supply and remains a motivator for ongoing maintenance (e.g. Wailotua, Daviqele, Galoa, Narara, Cobue).

5.3. WASH political economy analysis

A political economy analysis (PEA) aims to situate development interventions within an understanding of the prevailing political and economic processes in society, specifically, the incentives, relationships, distribution, and contestation of power between different groups and individuals. The approach taken to the political economy analysis in our research was drawn from USAID's PEA framework (Figure 1.4, replicated below, Rocha Menocal *et al.*, 2018). This framework uses four pillars to investigate the structures impacting aid implementation:

- **Foundational (Structural) Factors**: The long-term structures that actors need to work within and around, because foundational factors either need a complete restructure of the way things are done to overturn, or are impossible to do so
- **Rules of the Game**: The policies structures and power dynamics that governance systems work through
- **The Here and Now**: Addresses current events and changes that impact how governance is done
- **Dynamics**: Refers to the interactions between the other three pillars and how they affect, reinforce or work against each other (Rocha Menocal *et al.,* 2018).

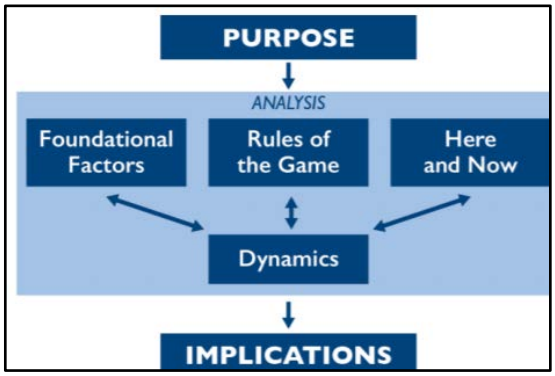


Figure 1.4: USAID's PEA framework.

Source: Rocha Menocal *et al.*, *2018.*

The PEA was based on 13 key informant interviews, consisting of: 6 national government representatives; 3 Provincial government representatives; 3 CSO representatives; and 1 International NGO (UNICEF) respondent.

Foundational Factors

The PEA analysis highlighted that the WASH sector is heavily influenced by long-standing **foundational factors** – especially government attitudes – that affect the ability of WASH actors to implement and maintain water and sanitation systems:

Capacity: It is very important to the GoF to demonstrate their capacity. Interviewees reported that the government has a strongly positive view of their own capacity to cater to its citizens' needs. However, both CSOs and government respondents recognised that more is achieved by collaborating with other (non-government) partners than working alone:[26]

> *"it took a few years to get government on our side. There was resistance in the sense that a lot of the ministries were set in their ways and they didn't really understand that government is not able to do everything […] they needed to work with the other partners in the sector…" (KII, UNICEF).*

UNICEF has a strong presence and history in capacity-building within the government, supporting and formalising a National WASH Coordinator position (within the Ministry of Health's Environmental Health Department). This demonstrates that the government are actively working to better coordinate and partner with CSOs in the WASH and emergency/disaster response sector.

Entrenched attitudes: The desire of the government to be seen as fully providing for and fulfilling citizens' needs has – in some respondents' view – led to creating community dependency. Examples included:

- WAF's policy of fully subsidising water carting "…impedes communities' self-organising" capabilities (KII, CSO respondent) and delimits "resilience" (KII, GoF rep);
- Progressive changes in the policy of funding new infrastructure, with the costs for public works no longer split between government and communities but rather fully-funded by the

[26] This echoes findings and recommendations from Chand and Naidu (2010) and Kumar (2010).

government, was said by many interviewees (GoF and CSO) to be further fuelling over-reliance on the government.[27]

Patterns of Exclusion: As reported by interviewees, some of the key perceptions around gender and social inclusion included:

- It is "easier to get female involvement" in Indian settlements than iTaukei villages. However, the kind of involvement expected and encouraged from women was generally only limited to providing food and accommodation to CSO and government workers visiting the community to build or repair infrastructure
- "Women are the main users of water, so it is important to include them in the decision-making;" however, including women in water committee doesn't always work due to cultural reasons (KII, CSO rep, KII, GoF rep)
- Gender inclusion and awareness is especially driven by international donors, and is a relatively new approach (KII, GoF rep).

Rules of the Game

In terms of **Rules of the Game**, the key findings were:

- There are multiple policies associated with the water sector, and some key policies are **currently stalled**:
  - *National Water and Sanitation Policy* is still in draft form and under consideration by Cabinet, may be combined with *National Water Resources Policy*
  - *National Implementation Plan* is not yet implemented (driven by UNICEF and other government, donor and CSO stakeholders)
  - *Rural Water Supply and Sanitation Policy* (shelved since 2015, "restarting the clock" and will take a long time to approve)
- **Community 'contracts'**: used by WAF to set common grounds, expectations and financial commitments. Put in place in 2016 after experiencing communities not fulfilling their commitments over time
- **Overly complicated bureaucracy:** Numerous and complex administrative structures and procedures mean that communities often do not know who to approach or talk to for support.
- **iTaukei villages:** Only the Roko Tui has the authority to enforce most Acts and legislations in registered villages. For example, a health inspector from the MoH, cannot enforce the *Public Health Act* in a registered village, only provide assistance and advice. The twin customary and state entitlements associated with iTaukei village legal status creates a duality of governance structures for managing water resources
- **Community selection for water projects:** For GoF, community selection is conducted in consultation with other government departments, but with CSOs, selection is greatly influenced by donors and their agendas or points of interest.

Here and Now

Current events, the **here and now,** most influencing the WASH sector include:

- **Changing policies and actors:** Government policies and agencies display considerable flux:
  - Ministry of Health used to be solely responsible for WASH, but now other ministries are engaged

[27] For example, in 2015/16 Wailotua raised and gave FJD$12,000 to WAF, but then had their community financial contribution returned.

    - A decision from the 2018 WASH Summit was to set up a WASH Sector Steering Committee, which would be the overall coordination body chaired by DWS. WASH Cluster will remain active, but focus on emergencies
    - The idea of setting up a WASH Steering Committee has been around since 2014, but can't be implemented until the National Water and Sanitation Policy is approved
- **Government-specific challenges**:
    - Rapidly changing government structures, priorities, plans (can be a bit “volatile”)
    - Lots of demand and expectations from communities
    - Promises made on behalf of government departments, but not enough budget to cover these promises. This, in addition to the government now funding 100% of new infrastructure, as mentioned earlier.
    - Loss of senior staff for different reasons, mean loss of essential knowledge and capacity
    - Generally understaffed[28]
    - The bureaucracy of procurement and moving financial resources
- **CSOs Challenges**:
    - Changing people’s mindsets
    - Funding and resourcing for projects
    - Community accessibility
    - Ensuring sustainability of initiatives and projects
    - Maintenance of facilities and lack of capacity in the community.

Dynamics

The **dynamics** within the WASH sector were punctuated by:

- **Sector coordination:** The predominant focus of sector coordination is around emergency preparedness and response, although there were mixed opinions about how good sector coordination is during emergencies
    - **Collecting & sharing data:** Sector coordination and sharing efforts were triggered during the MDGs era and concomitant reporting requirements. When the National WASH Coordinator position started in the MoHMS, it was very difficult to access data, and different stakeholders and actors had their own data (water quality, etc.) with no agency collating them. By creating WASH Coordinator position, it encouraged everyone to work together. DWS is also promoting greater data sharing amongst different actors
- **Community-external engagement:** Stakeholder views (GoF and CSO) on the 'town cousins' hypothetical of working with community networks in urban centres were mixed:
    - Positive:
        - "The town cousins idea could work because often transportation is a challenge. I think it’s a great idea to have that kind of connection to the community" (KII, CSO)
        - There are established committees from communities in main towns, like in Suva. They are already providing support to communities through fundraising, so this is a reasonable idea
    - Negative:
        - There is risk of manipulation and misinformation by town cousins. There could be an issue around land consent

[28] Resource constraints (human and financial) have been flagged in independent sector reviews (e.g. WHO, 2015).

    - "…don't know how often people from town go back to the community. They might only go once a year, or even less, if [the] husband and wife are from different places"
    - Need to be careful not to overburden the people living in town
- **International influence:** Donors have been reported to drive much of the policy reforms within Fiji. MDG and SDG agendas (United Nations) set policy priorities and highlighted the need for sector coordination, strengthened capacity, and good monitoring systems.

Implications

Based on this analysis, the **implications** for how government, donors and CSOs seek to improve rural CWM include:

- Water resources are governed by many different actors and policies and lack clear, systematic and effective coordination; although efforts are being made to address this el
- Bureaucracy is complex and shifting, making it difficult for communities to easily access support
- There is a growing reliance on, and community expectation for, government-supplied water at no cost to users
    - This is led by the current government's agenda rather than sound policy and is arguably delimiting community resilience, fuelling dependency, and – in the long term – threatens the sustainability of strong CWM at the rural level.
- There are some self-sufficient communities that manage their own water systems well. External actors need to work different depending on leadership strength and community capacity, and give people confidence in being able to solve their own problems
- There is good community-level awareness of external projects and monitoring progress, exit strategies, and satisfaction from communities
    - The accountability of project implementers and government mechanisms in place for lodging complaints are innovative and important
- There is a confluence of management systems – "traditional" and "western".

In regards to the last point, the codification or 'tradition' and duality of governance structures in iTaukei communities informs how GoF and CSOs can and do work in communities with regards to CWM. This has strengths – e.g. it can provide land tenure assurance and a means for negotiating access to water resources (e.g. Galoa) and provides a normative means for community financial and human support to be leveraged to support ongoing CWM (e.g. community financial contributions, group work [*solesolevaki*]. On the other hand, the codification of 'tradition' also promotes challenges, with cultural norms delimiting the active involvement of women and youth in meaningful WM roles, Indo-Fijians have less security over land, etc.

5.4. Community-town relations

In exploring what other 'plus' factors inform CWM in the Pacific islands' context, we investigated community-town linkages; both current and potential. There were a number of kinds and types of generative community-town linkages identified during our research. Below is a **summary** of the most relevant examples:

- In most our case study communities, family members now residing elsewhere maintain strong links with their home community, (mainly Suva, but also Labasa, Nadi and other locales in Fiji as well as overseas). Through these forums family members often assist at not just household but also *yasana* (iTaukei only) and at village/settlement-wide levels though partaking in fundraising, *soli* activities, as well as other means (e.g. contributing to paying the Provincial levy [*soli ni yasana*], assisting with the construction of a church, school, community footpaths

etc). Unlike in Islands (cf. Love et al., 2020), this also included WASH-related developments, such as assisting with writing NGO funding proposals (e.g. Seacology, who provided five rainwater tanks for the school at Nabubu), paying for community tanks (Nabubu [but destroyed in TC Winston]), writing letters to government and assisting with fundraising (e.g. women in Viti Levu with regards to both the community hall and the community water supply project in Galoa)

- In some contexts, community emigrants are highly organised through formal village development committees, but also through other means, e.g. Galoa has a structured committee in Suva (a youth group made-up of tertiary students and working emigrants) who raised funds over several years and returned to Galoa to build footpaths throughout the community. The village women's committee also have networks in Viti Levu.

In each case study location, selected respondents were asked: *In your view, is there a way that government (& MPs) or NGOs could work with community people residing elsewhere to better share information or direct resources to help the community?* Note that these 'town cousins' would be the middlemen with material support, not money. Below (Table 5.1) is a summary of responses by community.

Table 5.1: Attitudes towards the concept of 'town cousins' as middlemen

	Positive	Mixed	Negative
Bavu	●●●●●●		
Wailotua	●●	●	
Galoa	●●●●	●	
Daviqele	●●	●	
Cobue	●●●●	●	
Narara	●●	●	
Nabubu	●●●●	●●	
Rukuruku	●●		●

Overall, the majority of respondents were generally positive of using 'town cousins' as extra-local conduits or middlemen for supporting water management in the community/settlement (e.g. spare parts, sharing information). However, the question was not always asked the same way, nor are we confident that all respondents understood the question.

As described above, government and CSO representatives had mixed views about the idea of using 'town cousins' as middlemen to provide support back to communities. As 'town cousins' themselves, some had concerns about over-burdening the community emigrants living in big towns, while others thought that it was a good way of reaching difficult-to-access communities.

The community members consulted expressed mixed views on government and CSOs as development partners, with some respondents highly critical of the government – mainly a "lack of government assistance" (Rukuruku) and being "non-responsive to queries and requests for assistance" (Nabubu) – whilst others were critical of CSOs.

There was a suggestion by one respondent that all communities should have a "development plan" and…

> *"…people in Suva should form a committee that monitors the development plan and at the same time works with government & CSOs in assisting" community development, based on the development plan priorities (KII-W, WCR).*

There was also evidence of national and provincial days (e.g. Bavu Day, Fiji Day) operating as trigger points for galvanising support from community emigrants to help meet community development aspirations.

This question and hypothetical were primarily included to explore ways that both spare parts and information could be distributed. Mobility between town and rural communities is a regular occurrence – especially at Christmas – and given that capacity constraints are an issue, exploring alternative means of distributing parts and information through existing networks was considered a worthy avenue for exploration.

Bavu village, Viti Levu (Photo credit M. Love)

6. COMMUNITY WATER MANAGEMENT

Central to our research objective is better understanding the current water supply system activities, challenges and enablers associated with achieving sustainable and 'good' community-based water management in the rural Fijian context. Whilst we have noted there is no single example of what constitutes successful or good CWM, this section describes a range of water management processes and activities that allow for a fulsome characterisation of the critical factors that tie together all the elements of 'good' CWM.

6.1. Water management institutions

Water management can be broadly defined as people being organised and undertaking water management activities. We deliberately did not assume that a water committee was an essential component of water management, but as per government guidelines there was a water committee present in all the case-study locales where the research as undertaken. The basis for community water management derives from various government policies and guidelines.[29] It is the responsibility of the water committee to operate and maintain the water supply, often with limited technical and financial capacity.

As advised by the Fiji Government, there is no set water committee structure other than the *Turaga ni Koro* must be a member and there should be at least one female member. There was significant variation in general Water Committee structure and membership across the case-studies. The size of the water committee also varied, from a total of four members in Bavu through to elven in Nabubu.[30] Some water committees had a treasure and/or secretary, whilst others simply had a chairman (or President) and members. In Rukuruku, for example, the Chairman was also the treasurer. Neither Daviqele nor Nabubu had a secretary or treasurer. In both Galoa and Nabubu, the committee is made-up of two representatives from each *mataqali*. Seven of the locales had a resident community nurse, but only in three communities (Wailotua, Rukuruku and Nabubu) were they said to be members of the water committee.

From a CWM perspective, one of the most instrumental benefits of the customary system – in most of our case studies – is the assurance that customary land agreements (between water resource owners and uses) provide, and the minimal disagreements that seem to occur around such agreements.[31] For example, the dam for the Galoa island system is located on the mainland (Wailevu, Kadavu island) and the pipes run through multiple *mataqali*'s land before reaching Galoa. Using customary and neo-customary protocols (i.e. gifts including whale tooth, mats, pandanus, bags of flour, sugar, rice, and FJD$3,000), Galoa island secured access to a reliable water source beyond their island. Moreover, to this day, women in Galoa annually harvest, dry and supply pandanus to the community of Wailevu (where pandanus is far less plentiful) as part of this agreement.

6.2. Community water management, gender and social inclusion

The WC membership attributes assessed in our case-studies show that 21% (13 out of a total of 62 individuals) were female. Bavu and Daviqele were the only committees that had no female members, although Nabubu also appears to have no *active* female membership in practice; the community nurse

[29] E.g. Rural Water and Sanitation Policy and Practical Guidelines for Rural Water Supply Management Plan.
[30] Total water committee members: Bavu (4 [4 M]); Wailotua-two (8 [4 M / 4 F]); Galoa (9 [7 M / 2 F]); Daviqele (8 [8 M]); Nabubu (11[10M / 1 F]); Cobue (7 [5 M / 2 F]); and Rukuruku (7 [5 M / 2 F).
[31] This is in stark contrast to Solomon Islands and Vanuatu, where disputes over land tenure regularly impeded development activities, including water supply systems.

in Nabubu was reported to be a member by some respondents, but the nurse herself rejected this stating "I was a member a couple of years back" but since becoming a nurse she has "never attended or been invited to a Water Committee meeting" (KII-N, VN-F). Wailotua-two had the most female representation (50%), followed by Cobue and Rukuruku (29%), Narara (25%), and Galao (22%).

From the detailed committee attributes collected, only one female had an executive role – the Secretary/Treasurer in Cobue – and she is the wife of the WC Chairman. In Rukuruku, one of the female members was the community nurse, the other a leader of the Women's [church] Fellowship Group. The women's church groups in all locales reported that they have no role in water (or sanitation or hygiene) in any of the villages or settlements.

There was little to no evidence of women in any of the communities engaging with the water committee; most of the active engagement seems to be around cooking at the time of water supply implementation or supporting communal work (e.g. Rukuruku). In short, women's roles in community water management remain clearly gendered. This echoes other findings concerning gender and WASH in the Pacific islands (e.g. Mommen et al., 2017 [Vanuatu]; UNICEF 2019 [Solomon Islands]).

The ethnicity of members of the water committees in the two settlements is noteworthy. In Cobue, the borehole water committee have one Indo-Fijian (male) member, whilst Narara is split 50/50 with four iTaukei and four Indo-Fijian members. As already elucidated, while there are inter-ethnic challenges – especially in regards to supply demand issues in Cobue – there is significant evidence of constructive cooperation and harmony.

Across all sites, there was evidence of an inter-generational gap within the water committee. The average age of male water committee members was 48yo, whilst for women it was 24yo. It is clear that youth are valued as "the hand of work" but not as active, constructive contributors to CWM more widely (e.g. management strategy formulation, administrative responsibilities, problem solving). As Craney (2019) and Vakaoti (2017) recommend, more inclusive youth representation is needed in decision-making across community, provincial and national levels. With youth making-up half of Fiji's total population, and given the mean age of water committee members, there is a need to explore how both Government and CSO's might better engage young people in water management into the future.

6.2.1. Stakeholder perspectives on CWM and gender

As part of the PaCWaM project, a Master's student – Emma Pankhurst – undertook a research project focused on women, water management and culture in Fiji.[32] The research hinged on four key questions:

- (RQ1) In what ways do women currently influence CWMCWM?
- (RQ 2) How does local culture limit women's influence in CWMCWM?
- (RQ 3) How does local culture support women's influence in CWMCWM?
- (RQ 4) What do women think about their ability to influence CWMCWM?

Drawing and extending on Agrawal's (2001) levels of participation for decision making in natural (marine) resource management, Ms Pankhurst identified seven types of potential participation (Table 6.1):

[32] Emma Pankhurst (2019) 'Women, Water & Culture: An analysis into the influence of Fijian culture on women's participation in community-based water management'. Final Project undertaken as part of the Masters in Integrated Water Management, International WaterCentre.

Table 6.1: Characteristics of different participation types (adapted from Agrawal 2001)

PARTICIPATION TYPE	CHARACTERISTICS
IMPLICIT	No membership, indirect influence or influence through others
NOMINAL	Present, membership only
PASSIVE	Informed, listening to decision-making
CONSULTATIVE	Able to provide an opinion, may or may not influence decision-making
ACTIVITY-SPECIIFC	Undertaking specific tasks for decision-making
ACTIVE	Solicited or unsolicited opinions, initiative taking
INTERACTIVE (EMPOWERING)	Having a voice and influence group decisions

Thirteen KIIs (9 F / 6 M) were conducted with an assortment of stakeholders (CSOs, government, and local university researchers) in July/August 2019 in Suva, in addition to a literature review. Ms Pankhurst also explored the PaCWaM+ qualitative dataset (Key Informant and Group Interviews).

Below is a summary overview of key findings. Note that the bulk of the data and subsequent analyses are derived from government and CSO stakeholders and university researcher perspectives, and not rural dwelling residents *per se*.

In what ways do women currently influence CWMCWM?

- *iTaukei* women are rarely empowered and able to have rich engagement and quality participation in decision-making around water resources within their communities, with responses indicating either implicit, nominal, consultative or passive participation and only some examples of active and interactive (empowered) participation
- There are opportunities for women to influence CWMCWM across local spheres including household, community and within the Water Committee, however these opportunities are limited and overall, women's ability to influence decision-making is less than men's. This is consistent with other findings
- Women's influence at the household level seem to be greater (albeit an indirect influence) than within the community context and/or Water Committee
- A key reason for women's participation in Water Committees is due to the quota system; enforcing women's participation does not always lead to women having influence on decision making
- Women's positions within Water Committees were varied with many just seen to be a support network for men's work, with any "lead" roles usually secretary or treasurer.

How does local culture limit women's influence in CWMCWM?

- Socio-cultural norms are the largest obstacle to women's influence and decision-making ability over CWMCWM; the power, status and decision-making authority is overwhelmingly with men
- The church has had a major negative? influence over iTaukei women's ability to be active in CWMCWM. Christian ideals of women and femininity promotes women as supporting roles within the household, and men as the key decision-makers (Leckie 2000)
- The social constructs of the *vanua* and traditional land ownership, coupled with the strong influence of the Church, have shaped power-gender relations by defining status within the community in a way that favours men, establishing a culture of respect (i.e. silence) that prevents those without status from speaking out, and reinforcing the triple burden of women
- Given water systems are tied to the land, this results in the exclusion of women's decision-making authority over water resources (unless they own the land).

How does local culture support women's influence in CWMCWM?

- There are opportunities within i*Taukei* culture that are supportive of women having greater influence in CWM. These rely on leaning into existing *iTaukei* social structures, socio-cultural norms and the core Fijian ways of being such as *bula vakavanua* - the three pillars of government, religion and *vanua*
- Men's attitudes are changing positively towards women's participation in committees, and decision-making roles, as women's successful development initiatives (often through Women's Committees) are seen to benefit the whole community
- Awareness within communities of Gender, Equality and Social Inclusion (GESI) issues was shown to be a major driver of change towards more positive community attitudes towards women's participation in CWM
- Despite having relatively limited power and ability to influence water management within their community, women find other strategies to gain influence (through implicit participation).

What do women think about their ability to influence CWM?

- Some women wish they had the technical skills to fix everyday water supply issues such as broken pipes in the household, or the water pump. As they are the main water users, some KIIs noted women's frustration at not being able to quickly fix these issues as they arose, instead having to wait around for the men in the community to fix them.

Based on this analysis, as well as the wider PaCWaM+ research findings relating to social inclusion, the **implications** for how government, donors and CSOs can seek to improve women's active participation in CWM, include:

- Provide guidelines to accompany the quota mandate. This should aim to include evidence-based, practical strategies that Water Committees can implement to strengthen women's influence in CWM. For example, given that women married to influential men, and those who have extant maternal linkages to a community, have more legitimacy and agency to participate in decision making, a key action to include in pre-implementation Community Profiling / Diagnostics activities would be to determine which women are more likely to have influence than others
- Engaging with the community Women's Group Leader who, typically, speaks on behalf of women within the *vanua*, would be a key action for Water Committees to institute on a regular basis. Moreover, including this in guidelines and pre-implementation Community Profiling / Diagnostic activities would be beneficial. Prompting Water Committees to consider gendered obligations by, for example, ensuring that committee meetings do not coincide with meal preparation and school start/end times etc., would assist in facilitating greater female participation
- Stronger, more meaningful and active linkages between community health workers/nurses and Water Committees are required. This could also include Women's Church Group leaders/members and teachers, and encompass activities that build capacity and enable greater knowledge sharing. For example, women could be part of an observational 'risk assessment and management process' that captures water-borne illnesses, diarrhoea occurrences, hygiene practices, etc., and report back to Water Committees, Women's Group and/or the wider community at the *Bose Vakoro.*

6.3. Water system maintenance activities and risk management

All case-study locales had evidence of *reactive* maintenance activities, such as cleaning-out dams after heavy rain or flood events, cleaning and flushing the storage tank, and fixing leaking, burst, or blocked

pipes. Youth (younger males) and the *Turaga ni Koro* are typically central to these tasks. Based on surveys, interviews, and observation, Galoa, Rukuruku and Nabubu displayed the most operation and maintenance action (Table 6.2, below). Only a very few case-studies showed evidence of sustained *proactive* maintenance activities, such as regular (monthly) dam cleaning (Galoa, Nabubu, Rukuruku), cutting and weeding around tap stands and drains (Galoa), clearing the path to the dam (Nabubu) etc., but this was not the norm across all locales. [33] In Nabubu, there was a view that the youth were not especially active and it was primarily left to the older men to undertake the bulk of operation and maintenance activities (e.g. Gp. Int.-N, W).

Regarding **rainwater tanks**, few household or communal tanks were reportedly cleaned regularly, and a number did not have a mosquito screen. This maintenance deficit was evidenced in the water quality results, with only one of the eight tanks tested being "low" in terms of presence of *E. coli*.

Table 6.2: Level of water system maintenance activity in each community

	Bavu	Wailotua-two	Cobue	Daviqele	Galoa	Narara	Rukuruku	Nabubu
Maintenance activity	🟡	🟡	🟡	🟡	🟢	🟡	🟢	🟢

🔴	VERY LOW
🟠	LOW
🟡	MED
🟢	HIGH
🟢	VERY HIGH

Most water committees displayed some, but limited, awareness of **risk mitigation measures**. For example, a lack of drainage around tap stands was evident in Bavu, as was inadequate fencing of tap stands and/or animals (also Bavu). When in evidence, typical risk management measures included rules/norms regarding activities/animals above the drinking water source (e.g. dam) (Galoa, Daviqele), managing rubbish and waste (Bavu), maintaining community and tap stand drainage before and after rainfall events (Galoa), and minimising / prohibiting animals near community water sources and/or access points (e.g. tap stands) (Cobue).

6.4. Water committee community engagement and collective action

There was generally minimal ongoing **cooperation with additional community committees**, other than during the initial construction phase when women and youth groups typically assisted with water supply system construction: Women groups (and/or nominated households) cooked and supplied food to workers, whilst Youth groups provided the labour. Informally, youth are still regularly the 'hand of work' for the WC, cleaning the dam and assisting with labour intensive repairs (e.g. Daviqele). In Rukuruku, the WC have some tangential linkages with the Health Committee and Sanitation Committee in terms of messaging at community meetings, but evidence of active or regular coordination could not be verified. Nevertheless, there is a formal institutional structure in Rukuruku that seeks to encompass other sectorial committees though having the leaders of the Youth Group, Women's Fellowship and Men's Fellowship on the Water Committee, as well as the community nurse (note that this goes against WAF instructions to have members who are "not active" in other groups). In Wailotua there is reportedly a female and male youth member, but the active involvement of the female youth rep was not supported through triangulation across all interviewees. In Daviqele, a youth representative complained about the lack of formal youth engagement in the Water Committee, stating that "youths must be involved as members, as the current water committee are getting old." (KII-D, YR-F).

As previously highlighted, other than in Rukuruku there was a paucity of Water Committee linkages with the community nurse and Health Committee, e.g. in Wailotua the community nurse is classified as a

[33] For example, in late 2018 in Rukuruku, the community had a major water disruption event that lasted 2-3 months (and people resorted to using the river for washing and a spring near the water tanks for drinking. It was eventually discovered that the cause was a blockage of the main pipe by leaves and debris closer to the dam (Gp. Int., WC-R). This illustrates inadequate proactive maintenance as well as slow reactive maintenance.

member of the WC but has never been invited to a meeting (KII-W, VN). Similarly, in Nabubu, the WC is made up of two members from each *mataqali* and, according to one Water Committee representative, the community nurse; however, she stated that she has never been invited to a WC meeting in practice. In Daviqele, there is no link between the community nurse and Water Committee. Likewise, in Galoa, the community nurse is not a member but thinks that she "should be" (KII-G, VN). The absence of linkages between the Water Committee, Health Committee and/or nurse is a missed opportunity, especially given that community nurses and Health Committees are considered formalised elements of all iTaukei communities across Fiji.

An interesting factor informing the involvement of the community nurse in Water Committees is culture; women with maternal links to a community are customarily more legitimately positioned to give input – that is, have agency – than those married-in who have no kin linkages. Hence, in Rukuruku, the nurse has maternal linkages and thus is "not afraid to speak out", whilst in Galoa and Wailotua they do not. Directly engaging with this challenge during the community engagement phase of water system implementation – **is worthy of attention by Government agencies and CSOs.**[34]

Water Committees undertake numerous types of **awareness activities** in all communities. According to household respondents in the WASH HHS, this appeared to be most evident in Narara (88%) and Galoa (81%) (**note** that Narara is a recent system) (Figure 6.7). Daviqele, Nabubu and Bavu reported the most "no", "don't know / unsure" responses to this question, suggesting minimal outreach by the Water Committee.

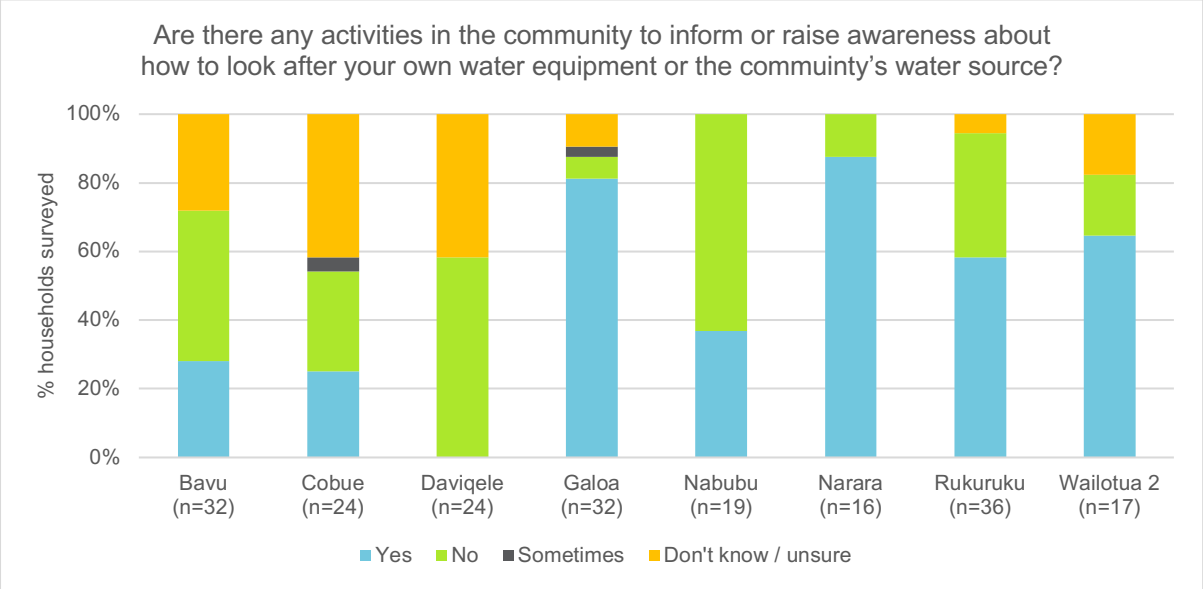


Figure 6.1: Water management awareness activities (n= 200 HHs)

Examples of general **awareness raising** undertaken by Water Committees include:

Cobue: "Borehole water is not allowed to be used for tending animals or washing the car; water should be stored properly; good usage of water; do not misuse water".

Rukuruku: "Water should be treated properly; contribute $1/week (to support maintenance); communal work to clean the water dam; treat the water properly so that it is safe for the community".

[34] Not attempting to change culture per se, but simply addressing this reality and highlighting the value that community nurses can offer a Water Committee.

Galoa: "Close the tap properly after every use; all waterways and tap stands need to be maintained well so there is no disruption; water should be well stored and well kept; don't waste water; monitor tap stands to prevent damage; manage water wisely and don't waste or misuse it in any way".

6.4.1. Collective water management action

Managing a water system is typically taken as "common pool resource" (CPR) issue that poses a "collective action problem", which describes a situation in which multiple individuals would all benefit from a certain action, but this action has an associated cost that often makes it implausible that any individual can or will undertake and solve it alone. Water systems and communal tap stands are an example of a "commons problem".

In terms of collective water management actions, and not including financing, wider collective water management actions – at community, area and/or household levels – were mixed. Beyond the Water Committee alone, high or very high levels of collective action were generally rare and limited; however, as noted there was considerable evidence of collective action during the implementation phase (all locales) and, in some cases, in relation to applying for a water supply project (e.g. Galoa). Not including financing (see below), other collective water management actions – at community, *mataqali*, area and/or household levels – were mixed (Table 6.3).

Table 6.3: Summary rating of collective water management action

	Bavu	Wailotua-two	Cobue	Daviqele	Galoa	Narara	Rukuruku	Nabubu
Collective WM action	🟡	🟠	🟡	🟡	🟢	🟡	🟩	🟡

🔴 VERY LOW
🟠 LOW
🟡 MED
🟩 HIGH
🟢 VERY HIGH

Based on surveys, interviews, and observation, Galoa, Rukuruku and Nabubu displayed the most (non-economic) collective water management action. In Galoa and Rukuruku, there is monthly community *soli* (first week of the month), when the community (ideally) clean the dam. In Galoa people work together (generally grouped by *mataqali*) to undertake tasks, such as cutting grass around the central community drain and tap stands. However, not all water management actions are collective. In Galoa, it is primarily the Water Committee chairman (and – sometimes – one other committee member) that take a boat to the mainland, walk 1.5 hours up the mountain range to the dam box, and then drain, clean, flush, and scrub the intake filter. Back in the community, he then inspects and flushes any mud from the pipes at the reservoir tank. The chairman stands as an example of a 'water champion', and whether or not someone else would be as diligent in maintaining the system is an open question.

Elsewhere, such as Nabubu, Rukuruku, and Daviqele there is collective action to fix disruptions (blockages, burst and/or leaking pipes etc.) but these tend to be reactive actions. There were some indications of monthly dam cleaning (e.g. Nabubu) but this was not clearly supported through triangulation.

6.4.2. Responsibilities

When asked whose responsibility it was to fix WASH issues, the "whole community" (38%, *n*=36) and "government" (37%, *n*=34) were the most cited responses. The "Water Committee" was the next most frequent response (19%, *n*=18). Two respondents from Bavu nominated "community leaders" (specifically the *Turangi ni Koro*) (Figure 6.2).

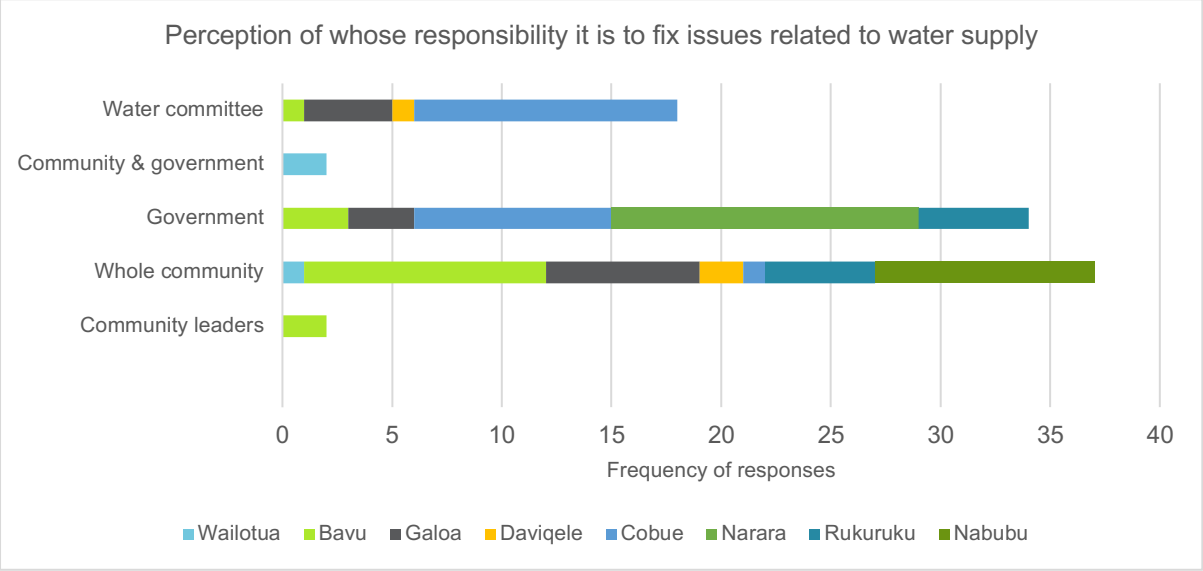


Figure 6.2: Perception of whose responsibility it is to fix issues related to water supply (n=89)

A comparative community-by-community analysis reveals the following:

- **Bavu** recorded the most diversity of responses, nominating *leaders*, *whole community* and *water committee*; however, whole community was the most frequent response (*n*=11) with the Water Committee only nominated once. The main water issue in Bavu was the desire for a new borehole, and it is perhaps noteworthy that respondents identified the community as the prime agent for solving this challenge rather than the government (which was cited by only 3 respondents)
- *Government* was nominated most frequently in Narara (*n*=14), followed by Cobue (*n*=9) and Rukuruku (*n*=5). In **Narara**, there was a strong desire for a filtration system, whilst in **Cobue** water issues hinged on a general desire for an improved system (given the volume and sharing issues with the neighbouring Indo-Fijian community). Given these aspirations, it is no surprise that in both **Narara** and **Cobue** felt the government was responsible; however, in Cobue there was also a strong emphasis on the *water committee* (*n*=12). In **Rukuruku**, the main water issues were general problems (quantity) and "abuse of water". Why HHs in Rukuruku saw the government as responsible for 'water abuse' is unclear, but likely is informed by the high number and type of social issues identified by respondents ("disharmony" and "leadership" issues)
- Overall, *Water Committee* was only nominated in half the sites: once in Bavu and Daviqele, four times in Galoa, and twelve in Cobue.

Unlike in Solomon Islands, there was *no mention* of church or NGOs and limited and specific mention of the government. This (arguably) reflects the more structured and organised capacity of rural communities in Fiji relative to Solomon Islands, as well as the improved sanitation situation. Moreover, where the government was mentioned in terms of water issues – mainly Narara, Cobue and Rukuruku – reflects the nature of the problem in each case, e.g. Narara (filtration), Cobue (more quantity/improved system). The low mention of both the Water Committee in regards to water issues, and the Heath or Sanitation Committee in relation to sanitation, is noteworthy. In regards to the **water committee**, this may reflect the nature of the issues (i.e. deemed the government's responsibility) or, perhaps, speaks to a low opinion of the current WC's capacity/activeness.

6.5. Water system financing

Most respondents in the WASH HHS (77%), across all communities except Nabubu and Daviqele, stated that there was a system in place for community/settlement residents to financially assist supporting water system operation and maintenance (Figure 6.3). Nabubu, Daviqele and Cobue

recorded the most "no" answers (42%, 29% and 8% respectively). Cobue and Daviqele recorded the only "don't know" responses. Lastly, "sometimes" was most frequently reported in Nabubu (42%), Galoa (9%) and Daviqele (4%).

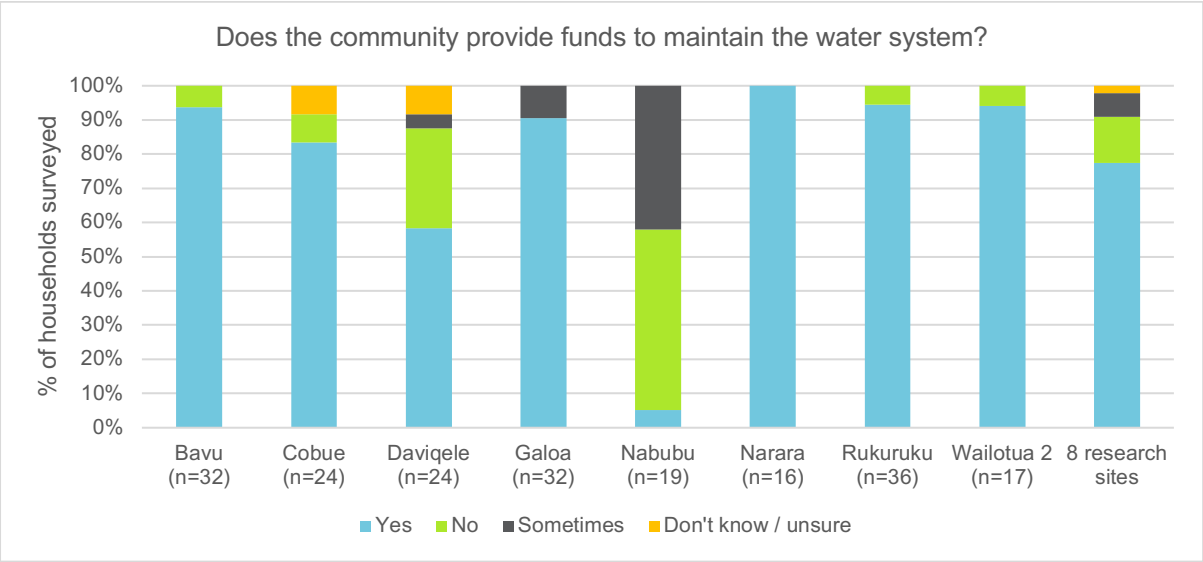
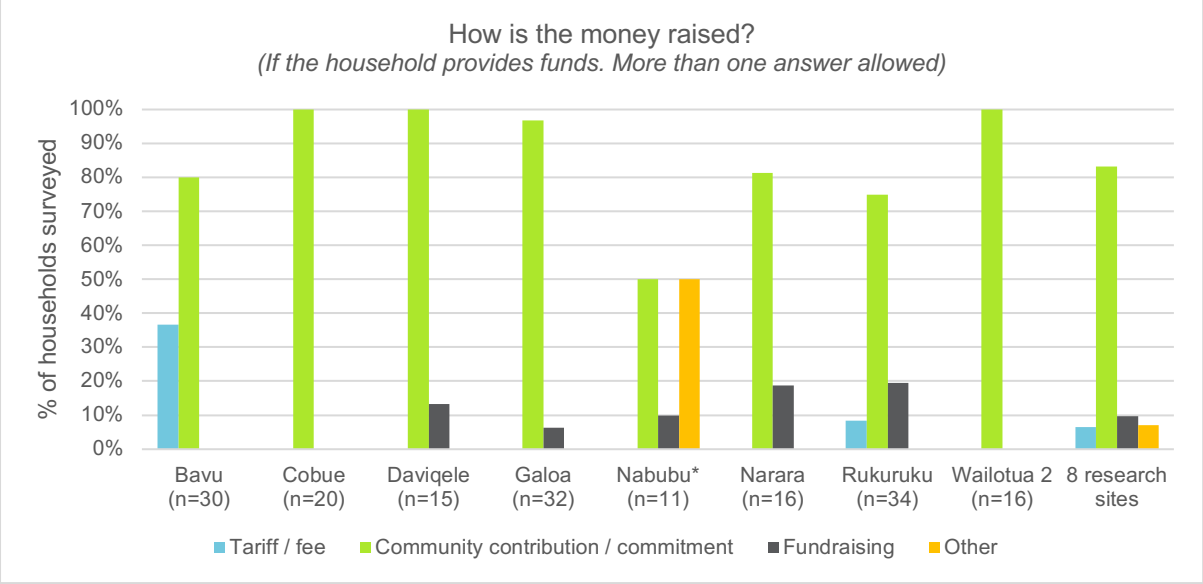


Figure 6.3: Does the community provide funds towards the water system? (n=200 HHs)

The households that responded "yes" to contributing funds were asked how the money was raised (Figure 6.4). **Community contributions** were the most common means of providing funds – 83% on average across all sites.



Note: Nabubu was the only community to report "other", which referred to "funded by the community cooperative"

Figure 6.4: Community water system fundraising methods (n=174)[35]

Water tariffs, as a means for supporting water system management, was only cited in Bavu (37%, n=11) and Rukuruku (8%, n=3). In Bavu, since 2012, there has been a monthly water fee of FJD$5.00 per household to pay the electricity bill for the borehole pump to Electricity Fiji Limited (EFL). All households reported paying the fee, yet most HH respondents nominated this as akin to a community contribution rather than a fee. In Nabubu, a $1.00 fee was introduced in 2012 as "financial backing for

[35] Note: Answers for how money was raised was only collected if respondents had answered "yes" or "sometimes".

spare parts", but it came to a halt in 2013 (KII-N, WCR-M). Rukuruku has a weekly $1.00 household fee (due on each Saturday), but most people reported this as either a community contribution (73%) or fundraising (19%). In Cobue, during interviews, various respondents suggested there was a monthly FJD10.00 per HH fee, but not everyone pays. Most monies to support the water supply in Cobue are raised through community contributions (referred to as monthly fundraising in interviews).

Additionally, there is also active **fundraising** that occurs outside the Cobue settlement from external residents. Recently, the Water Committee had to raise funds to purchase a new generator for the borehole, and each household was responsible for contributing FJD$100.00 (including households in the neighbouring Indian settlement). Fundraising for water issues were cited by a handful of households in Daviqele (13%), Galoa (6%), Nabubu (10%), Narara (19%) and Rukuruku (19%). In Nabubu, it was also reported that funds for maintaining the water system were raised through the **village cooperative**.

It is noteworthy that raising funds though means other than a set water fee did not appear to be a significant challenge or point of contention (especially relative Solomon Islands). This likely reflects the wealthier status of Fiji, the more institutionalised character of collective financial self-help, and the more homogeneous nature of iTaukei villages relative to Solomon Islands. In Narara – where the water system is new – the absence of a water fee was cited as a "risk" into the future by one Water Committee member, who further noted that without a fee people may be more likely to "abuse" the water system (WCR-Nr, M).

6.6. Perceived water management challenges

Most interview respondents were asked what they thought were the **main challenges** associated with water management in their respective communities. Table 6.4, below, is a summary of the key challenges elicited from this direct question, with a frequency indicator of how many times a given issue was raised by different respondents in each case-study locale.

Table 6.4: Water management challenges (frequency summary as elicited from respondents) (n=45)

	Bavu (n=8)	**Wailotua-two** (n=4)	**Cobue** (n=8)	**Daviqele** (n=6)	**Galoa** (n=7)	**Nabubu** (n=8)	**Narara** (n=4)	**Rukuruku** (n=5)
Lack of community &/or HH cooperation	●●	●●●●	●	●	●	●●●●		●
Lack of WM planning						●●		
Water pressure - inconsistent flow				●	●		●	●●
Money	●	●●●	●●		●●●●●●	●	●●●	
WM Knowledge / awareness (e.g. training, reporting to WC)	●			●		●		
Water wastage (broken taps / miss-use)			●	●●	●			
Spare parts/ resources (incl. labour & time)				●●	●	●●	●●	●
Supply (not enough water / storage)	●●●●●●●		●●●●●●					●●●●

Flooding was an issue in many locales, as were cyclones, but Nabubu was the only locale where cyclones were directly mentioned. Additionally, blocked pipes and muddy water after wet weather events were ubiquitous across sites except Bavu.

A lack of community and/or household **cooperation** was cited in every case except Narara, and most frequently in Wailotua and Nabubu. These related to social cohesion and collective action issues (e.g. people not turning up to assist or listening to instructions from the Water Committee). In Bavu, a lack of HH cooperation referred to some HH's not consistently paying the water fee. A **lack of planning** was mentioned, or implied, only in Nabubu. **Low water pressure** was a recurrent challenge in half the sites. **Money**, for purchasing spare parts, was explicitly cited as a challenge in all communities except Daviqele and Rukuruku. This issue was often tied to multiple challenges, e.g. “There is hardly any spare parts and…..there’s no money to get the spare parts…There is a halt in fundraising for parts…due to laxity]" (Gp-Int.-W, Nb). A paucity of WM knowledge and awareness was cited as an issue in two locales. In Cobue, one respondent mentioned that farmers were using water from the borehole to water gardens and animals, and noted that "this is a waste" (KII-C, PA-M), whilst in Daviqele broken taps (and not reporting the issue to the Water Committee) was a key concern. Spare parts and resources – regularly linked to financial constraints – was cited in 75% of locales. A **lack of supply or storage capacity** was regularly cited as a challenge in Bavu (water shortage due to bore issues), Cobue (shortage of water due to supply management/sharing issues with the neighbouring Indo-Fijian community), and in Rukuruku (the need for more storage and shortages during holiday seasons when the population grows).

6.7. Water management satisfaction

Community satisfaction with current water management was ascertained through the WASH HHS and qualitative interviews. In Bavu and Wailotua No.2 – the pilot sites – management satisfaction was 69% and 88% respectively (n=49) (Figure 6.5).

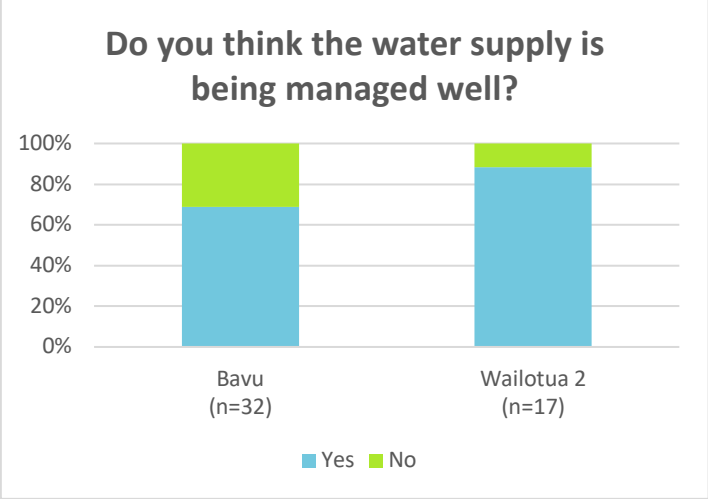


Figure 6.5: Water management satisfaction in pilot sites (n=49 HHs)

In the six other sites (where the question response wording was broadened from a binary "yes" or "no" answer to "not managed well", "managed mostly well" or "managed very well"), 64% of all respondents reported that they believed that their water supply was "managed very well" (Figure 6.6). Cobue recorded the most negative responses, with 67% of respondents stating that it was "not managed well", followed by Nabubu (16%), Rukuruku (11%) and Daviqele (4%). Nabubu also reported the most mid-range responses ("mostly well").

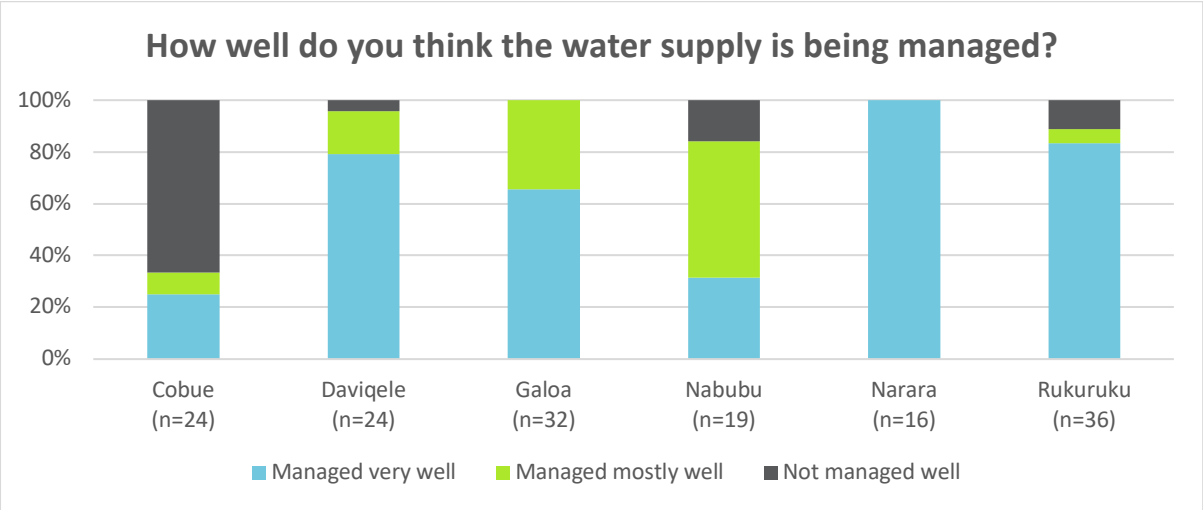


Figure 6.6: Water management satisfaction in the remaining sites (n=151 HHs)

Reasons given for respondents' evaluation are instructive. In Cobue, the majority of "not managed well" or "managed mostly well" responses were justified on the view that "water isn't available at the right times or when needed". In Nabubu, the majority of critical and medium ("mostly well") evaluations pivoted on the view that the water committee "at times don't do their work' and "most people don't listen to certain instructions…". This was also the case in Wailotua. In Rukuruku, most complaints were associated with disruption issues.

6.8. Summary of Community Water Management findings

The objective of this research was to learn lessons from communities where community water management was considered to be 'good'; that is, supporting good WASH outcomes including resilient, sustainable and inclusive water supplies (as defined in the WASH section) and also considered by community members to be 'good'.

Some notable **strengths** include:

- The existence of land agreements with neighbouring communities where the water source is located and an absence of land disputes
- Evidence of proactive and regular maintenance in some cases (e.g. regular dam cleaning and keeping communal tap stands free of weeds and rubbish)
- *Soli*-related community work and fundraising – as well as cultural obligations to assist with community development activities – were common and critically enhanced community well-being, both within and beyond the realm of WASH and CWM
- There was, overall, regular and effective systems of financial contributions. The absence of a set water fee did not appear to correlate with better or worse CWM outcomes
- Strong WASH-related linkages with town cousins in some locales
- Despite a range of WM challenges, people were fairly satisfied with 64% of all the respondents in the WASH HHS reporting that they believed that their water supply was "managed very well" and 20% "mostly well".

However, it is clear that although there were some strengths in particular aspects of community water management, all eight study sites were struggling with critical aspects of community water management. This is not a surprise given the global evidence that communities left to manage water

systems on their own will typically struggle to sustainably deliver inclusive, reliable, available, safe water systems. Some of these persistent challenges include: .

- Water Committee (or other responsible people) not doing enough ***proactive*** **maintenance** (e.g. leaky pipes, blocked pipes and dam, not cleaning dam frequently enough)
- A lack of funds are an impediment to good CWM outcomes in some cases (e.g. spare parts, up-grading systems)
- There is a paucity of supply and demand planning and management (especially in Cobue, Bavu and Rukuruku)
- HH water wastage/mismanagement is a problem in some places (Galoa, Daviqele, Cobue)
- Cross-committee linkages are lacking – especially between the Water Committee and Health Committee/nurse – and seems to be a widespread and recurrent issue
- WC and community/HH cooperation and communication is typically weak (e.g. Rukuruku, Daviqele, Cobue)
- Age disparity is an issue in all water committees (negatively impacting knowledge transfer, institutional resilience)
- Knowledge of old sources – such as shoreline springs/wells – is not always passed on, delimiting community resilience into the future (e.g. Galoa)
- Lack of knowledge and skills to deal with all WS maintenance, including some specific technical problems
- The prevalence of water piped directly into the house is, in some people's eyes, contributing to water wastage (e.g. Galoa)

Water management

- Water Committees were often struggling to operate and maintain their water supply, often due to limited technical capacity – even for simple issues
- Water Committee collective action varied across sites. In the strongest case (Galoa), maintenance activities were primarily driven by a motivated individual (water champion)
- Water Committees displayed a range of organisational structure and member attributes. A lack of prescribed governance structure (e.g. executive roles, number of members etc.) did not appear to be an issue or impact management actions
- In many cases, there was a lack of active linkages between the Water Committee and community health workers/health committee
- No locales reported having clear formal (codified) polices or guidelines that they followed for regular WM operating and maintaining activities, but some still had fairly prescribed and organised maintenance and operation schedules
- Surface water contamination during wet weather was prevalent, but there were usually only rudimentary control measures in place (e.g. makeshift filters)
-
- There is some evidence that there is a level of dependency on WAF that is not in line with current community-led water-management policy (e.g. reactive rather the proactive operation and maintenance, a reliance on WAF for water delivery (Bavu) and a strong desire for WAF-treated water)
- Levels of maintenance activities varied across the communities. All case-studies had evidence of *reactive* maintenance activities, such as cleaning out dams after heavy rain or flood events, cleaning and flushing the storage tank and fixing leaking, burst, or blocked pipes, but proactive maintenance was less wide-spread (e.g. monthly cleaning of dam)
- Most Water Committee's displayed limited awareness of risk mitigation measures, with risk management and risk awareness observed to be generally poor across all the communities
- Limited evidence of planning for supply constraints such as might be experienced during disasters, or in planning for future demand

- The main water management issues identified through the WASH HHS related to lack of community or household co-operation and money
- There is a critical need to strengthen Water Committee linkages and communication with other committees or groups in communities (particularly with community health worker/nurse, Health Committees, Sanitation Committee, and possibly Church groups.

Gender equality and social inclusion

- Women were rarely directly consulted about WM issues
- There is a clear age disparity in Water Committee membership that does not reflect the national reality - Youth are valued as the "hand of work" but are not valued as potentially constructive contributors to CWM more widely
- There is a lack of diversity in water committee membership (age and gender)
- In terms of equity of **access to water**, most community respondents felt that everyone had equal access to water, although in practice some households did not due to the physical location of their house, which may be related to underlying forms of marginalisation.

Water committee chairman, Galoa, cleaning the filter at the dam (Photo credit M. Love)

7. WHAT IS 'GOOD' COMMUNITY WATER MANAGEMENT IN FIJI?

Returning to the objectives of this formative research phase of the project: The research sought to identify features of ‘good’ community water management and characterise the influential factors of CWM (social context, external/enabling environment, physical settings), to identify and offer guidance about what types of support and engagement by external enabling actors, such as governments and civil society, might best contribute to improved CWM to support resilient, sustainable and inclusive WASH outcomes.

As noted in the WASH and Community Water Management chapters, there was a range of experiences within the eight study sites, with some communities achieving better outcomes than others and displaying differing strengths and weaknesses. Given that these communities do not currently benefit from ongoing support for community water management, their varying experiences has provided an opportunity to identify persistent challenges – features of community water management that communities have struggled to manage on their own, even those considered to be amongst the ‘stronger’ performing communities. These persistent challenges offer insights about which features of CWM communities might need support with – the PLUS requirements of "Community Water Management PLUS" - bearing in mind that not all may be features that external actors are able to directly influence.

Furthermore, the inclusion of data describing social and economic context and physical settings has allowed the research to explore whether, and how, these foundational settings are aligned with Community Water Management. Some of the foundational factors shaping CWM are structural – difficult to change within the short-term nature of community development projects – and therefore they must be navigated during community development initiatives. Identifying the status of these structural factors early in the community engagement process would productively inform the nature of further engagement.

7.1. Features of ‘good’ water management

Water management can be broadly defined as people being organised and undertaking water management activities. We deliberately did not assume that a formalised water committee was an essential component of water management. Based on existing literature, our key research questions and the results from our Phase 1 research, we have identified key features of what constitutes 'good' water management, based on the strengths observed and problems encountered in our case study sites (i.e. evidence of inadequate WASH, or factors identified by community members). These features of 'good' water management are clustered under three core areas: i) **Actions by a water management group** (e.g. water committee); ii) **Actions by all water users** (across different socio-spatial levels); and iii) **External actors role** (in each community relating to WM).

Actions by a water management group/committee:

The existence of an organised group of community members to drive community water management actions is critical. There are many functions this group would perform for ideal water management outcomes, and thus the capacity of this group is also critical; a diverse membership is important, not only from the perspective of increasing representation and participation of the diversity that exists within communities, but also to increase the diversity of skills and knowledge useful in managing water systems, as well as creating some redundancy and spreading responsibilities amongst more people to ensure continuity of water services.

The functions and actions of this group, in undertaking ‘good’ water management, include:

- **Maintenance** (proactive, timely, innovative) to ensure the functionality of water access points (e.g. communal and household tap stands) for accessible and reliable delivery of water
- Managing / promoting **drinking water quality risk management** (identify and mitigate hazards e.g. promote sanitation, maintenance, treatment/promoting HH treatment of poor water)
- **Planning and managing supply** (multiple sources, storage capacity, plan for future demand and changes)
- Managing **demand** (supply strategies with multiple water sources, awareness activities, community messaging about why, when and how to conserve water)
- Efforts to achieve **inclusion** – physical accessibility, participation of gender, youth, vulnerable, all parts of community
- Use of **policies and rules** (formal, informal)
- **Managing finances** transparently and competently
- **Monitoring** to guide improvements and report to community, support finances
- **Consulting with and reporting** to community for transparency and accountability
- **Linkages, coordination and leverage** between community committees/groups
- Ways, means and capacity to **access external support**
- Motivate and coordinate **collective action**.

Actions by all water users:

In addition to actions by a water management group, all water users have a role to play in achieving resilient, inclusive and sustainable community water systems. *Collective action* is required on several levels – individual, HH's/family, group/area, community-wide – and include actions such as:

- Collective action (from all individuals, or other levels of organisation within the village such as households / families, groups / zones), such as:
    - Maintenance: either conducting regular smaller-scale maintenance, or reporting maintenance needs to the management group, as agreed
    - Operating / using the water system as agreed e.g. conserving water use and using multiple sources.
- Collective action from water users, in the form of financial contributions to community water management

Actions by external actors

In addition to maintaining a supportive enabling / governance environment, external actors such as government, civil society, and the private sector, have a role to play in assisting with managing community water systems directly, such as:

- Provide technical advice at appropriate times and in appropriate formats, such as for specific maintenance problems, or with other water management group activities listed above
- Supplement finances: assist with financial costs, such as with capital costs, and potentially some maintenance costs
- Provide access to appropriate spare parts
- Monitoring of WASH outcomes.

From a synthesis of this formative research with literature, these are the key features that we believe most influenced WASH outcomes in our case-studies and, we propose, constitute and support 'good' community water management in Fiji.

It is important to note that eight sites is a small sample; a larger sample may add further features, or alternatively dismiss some features as not so important for good community water management.

We have applied this list of 'good' CWM features to assessing the eight case study villages, to assist in identifying and summarising relative strengths and weaknesses, in those eight atypical communities. Features that were consistently difficult to achieve in even these communities are a guide to the features that enabling actors might consider providing support. Figure 7.1 (below) is a summary snap-shot of key indicators used to represent the strengths and weaknesses of the i) **Actions by group**; and ii) **Actions by all users**, for each of the eight case-study communities.

This assessment is not intended to rank or assess the performance of individual communities, but rather to (i) offer a guide to persistent challenges faced by communities, (ii) identify stronger communities from which lessons can be learned (i.e. to support a strengths-based approach to improving CWM actions).

Table 7.1: Key features of good CWM in Fiji, strengths and weaknesses across the eight study communities.

	Assessment criteria	Bavu	Cobue	Daviqele	Galoa	Nabubu	Narara	Rukuruku	Wailotua-two
COMMUNITY WATER MANAGEMENT	Water committee / nominated people								
	Water point functionality (observation)								
	Maintenance activity								
	Drinking water risk assessments (scores)								
	Risk management (awareness, actions)								
	Supply management								
	Demand management actions								
	Inclusion (processes, actions etc)								
	Policy/ rules/ norms								
	Monitoring								
	Consulting, reporting to community								
	Linkages to other committees/ groups								
	Capacity to access external support								
	Collective action: financial								
	Collective WM action - other								

From this assessment, it appears that most communities had water committees or designated groups of water managers, and water points were mostly functional. But note that in terms of the **inclusiveness** of the water management group, the inclusion of youth and women does not necessarily translate as their having gained agency and being active participants, and this should be given due attention.

The actions that were consistently poorly achieved across most/all communities include assessing and managing risks to water quality, planning and managing supply and demand, and engaging with the broader community and other committees/groups in the community. Even the strongest communities – those with the most high ratings (Galoa and Nabubu) appear to have persistent difficulties achieving these actions.

The remaining actions/features of good community water management were achieved to differing levels of success in different communities – this emphasises the futility of using a single-approach to working

with all communities; communities differ in their strengths and weaknesses, and support by external actors needs to reflect the unique capacities of each community.

It is important to qualify the assessment with the following points:

- Some features were not as deeply explored during fieldwork due to time constraints, ethical reasons, methodological challenges, and/or because they have emerged as features/needs during analysis after data collection, e.g. frequency of WC meetings (in many cases the data could not be triangulated); financial accountability (ethically problematic to directly scrutinise, and thus was only included if it came-up)
- As with qualifications regarding the water quality tests, these CWM features were identified through case-study assessments at one point in time. As elucidated above, CWM actions tend to wax and wane overtime - an active WC today may be weak in a year or two.

7.1.1. Contextual influences

As noted above, there are different strengths and weaknesses in different communities, as each *koro* or settlement has its own unique context (socio-economic, physical setting) and thus will do things differently. They will therefore require different kinds of external support. Some examples of how the *physical setting* and *social context* intersect with and informs both the WASH situation and CWM status, are summarised below:

- **Physical Setting:**
  - Communities with varied topography will often struggle to achieve inclusive access with a gravity fed system, often resulting in some households having poor function (Galoa, Cobue)
  - Land use practices such as logging and intensive agriculture can impact the water system (Bavu, Narara), affect infrastructure and water quality, and are out of the communities control
  - The water source may be located on land where non-village/settlement residents have primary rights (Daviqele, Cobue)
  - The environment in which a community is situated informs livelihood activities, which in turn influence social dynamics (economic status, human resource availability).
- **Social context:**
  - Smaller communities typically tend to have stronger bonding social capital (e.g. Galoa, Nabubu), but not always. For example, Bavu, Wailotua and Cobue are small communities but a variety of indicators suggested that they experienced numerous cooperation challenges
  - Galoa and Nabubu had the 'best' CWM and least amount of reported social issues (as elucidated by respondents), whilst Daviqele, Rukuruku and Wailotua-two had comparatively ‘poorer’ CWM and the most reported social issues (with the majority being community disharmony)
  - Context informs economic collective action: water-fees worked well in some contexts (e.g. Bavu), whilst in Cobue and Nabubu organised fundraising to support CWM negatively impacted people's ability and/or willingness to maintain the monthly water fee.
  - Remittances and/or community-town linkages can be crucial to CWM performance (e.g. Galoa, Nabubu)
  - Wealth is not a driver of good CWM - of the comparatively wealthiest communities (Bavu, Daviqele, Wailotua-two, and Rukuruku) only Daviqele was in the top three 'good' CWM category
  - Poor past experiences and limited water options may be a motivator for strong CWM actions. For example, in Galoa (an small island with limited fresh water options) is likely

a motivator for maintaining their current water system, as (older) people remember the hardships of the past. However, this 'memory' is likely to wane over time as the older generation are replaced by the next generation, who do not have experience of such hardships.

7.2. Links between WASH and CWM features

An underlying assumption of this research, as well as the community water management and WASH literature more broadly, is that good WASH requires good community water management – other factors may in turn delimit good WASH outcomes, but in the context of rural community-managed systems achieving good WASH is not possible without good CWM.

Examining the key CWM features presented above and scrutinising this alongside the wider CWM assessment and the WASH situation is instructive, not least in exploring whether the features of good CWM identified above usefully represent good CWM. Table 7.2 (below) provides the summary assessments of the WASH situation alongside the CWM actions. The small sample size means correlations are not easily detected and any observations cannot be confidently extrapolated too far. A greater number and diversity of assessments of WASH with CWM is required to establish confident links between specific CWM features and WASH outcomes; however, some connections and potential correlations based on this limited dataset are worthy of further discussion.

The absence of communities with overall ‘good WASH’ limits our ability to confidently test the assumption that good WASH requires good CWM, however the data is generally supportive of this relationship. The communities with the better WASH situations (Daviqele, Galoa, Nabubu), did also appear to have the strongest CWM actions overall. And, the communities with the worst WASH situations had weaker CWM actions overall (Bavu, Wailotua-two).

The community with the strongest **identifiable water manager group** (e.g. Galoa), also had:

- Higher accessibility to water services, including from a social inclusion perspective
- Greater water point functionality
- High drinking water reliability and accessibility
- More maintenance activities
- Higher satisfaction with the water systems as a whole.

Notably, there was also strong collective action, both financial and in direct WM actions in this Galoa, which may be associated with a more active committee/group (or vice-versa), and, also had amongst the highest levels of external support.

The relationship between water management satisfaction and water committee/group is worth further exploration:

- There was a trend toward a higher management satisfaction levels when there was a ‘stronger’ water committee or group
- Communities with comparatively 'weaker' water management (Bavu, Wailotua-two and Rukuruku) all recorded lower management satisfaction levels
- There was a correlation between higher management satisfaction of community members in communities with the overall “better” water management (Galoa, Daviqele and Nabubu).

Community satisfaction with water management was also somewhat linked to both water point functionality and drinking water availability and reliability. Daviqele, Galoa and Nabubu all recorded “high” or “very high” scores in drinking water reliability and availability, as well as “high” or “very high” in WM satisfaction. Interestingly, water quality was not good in these communities with higher management satisfaction, indicating management satisfaction may be more closely linked to water availability than with water quality.

Table 7.2 Overview assessment of WASH situation of CWM in the eight case study sites.

	Assessment criteria	Bavu	Cobue	Daviqele	Galoa	Nabubu	Narara	Rukuruku	Wailotua-two
WASH SITUATION	SDG 6.11[36] - Drinking water service level	🟢	🟡	🟠	🟠	🟢	🟢	🟠	🔴
	SDG 6.2 – Sanitation	🟡	🟡	🟢	🟠	🟠	🟢	🟡	🟢
	SDG 6.2 – Hygiene service level	🟡	🟡	🟡	🟠	🟡	🟡	🟢	🟡
	Water quality (drinking)	🔴	🟠	🟠	🟡	🟠	🟡	🟡	🔴
	Drinking water risk assessments	🔴	🟠	🟡	🟡	🟡	🟡	🟠	🟡
	Perceived water quality (%HH perceived water as “very safe”)	🟠	🟡	🟡	🟠	🟡	🟢	🟢	🟢
	Water treatment (%HH that treat water at least sometimes)	🟢	🟢	🟡	🟢	🟡	🟢	🟢	🟢
	WASH-related Health	🟡	🟡	🟠	🟢	🟢	🟠	🟡	🟡
	Drinking water availability and reliability	🟠	🟡	🟢	🟢	🟢	🟡	🟠	🟠
	Accessibility (i.e. does anyone have difficulty getting water for themselves?)	🟢	🟢	🟢	🟡	🟢	🟡	🟢	🟢
	Water system functionality	🟡	🟡	🟢	🟢	🟡	🟡	🟡	🟢
	Satisfaction with water situation (%HH reported being “happy” with water source)	🟠	🟢	🟢	🟢	🟢	🟢	🟡	🔴
	Handwashing (aggregate indicator of behaviour)	🔴	🔴	🔴	🔴	🔴	🔴	🟡	🔴
COMMUNITY WATER MANAGEMENT	Water committee / nominated people	🟢	🟢	🟡	🟢	🟢	🟢	🟢	🟢
	Water point functionality (observation)	🟢	🟢	🟢	🟢	🟢	🟢	🟡	🟢
	Maintenance activity	🟡	🟡	🟡	🟢	🟢	🟡	🟢	🟡
	Drinking water risk assessments (scores)	🔴	🟠	🟡	🟡	🟡	🟡	🟠	🟡
	Risk management (awareness, actions)	🟠	🟡	🟡	🟡	🟡	🟡	🟡	🟠
	Supply management	🟠	🟡	🟢	🟡	🟠	🟠	🟠	🟢
	Demand management actions	🟢	🟡	🟡	🟠	🟢	🟠	🟠	🟠
	Inclusion (processes, actions etc)	🟠	🟡	🟡	🟢	🟡	🟡	🟢	🟠
	Policy/ rules/ norms	🟡	🟢	🟡	🟢	🟡	🟡	🟡	🟢
	Monitoring	🟠	🟠	🟡	🟢	🟠	🟡	🟡	🟡
	Consulting, reporting to community	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡
	Linkages to other committees/ groups	🟢	🟠	🟡	🟡	🟡	🟠	🟢	🟠
	Capacity to access external support	🟡	🟢	🟢	🟢	🟡	🟡	🟡	🟡
	Collective action: financial	🟢	🟡	🟡	🟢	🟡	🟡	🟢	🟢
	Collective WM action - other	🟡	🟡	🟡	🟢	🟡	🟡	🟢	🟠

Links between WASH-related health, perceived water safety and maintenance were also noted:

The colour-coded ratings applied to the SDG 6.1 indicator results were based on the proportion of population accessing basic and safely managed water services. SDG 6.1 indicator results were based on the location, type of facility and water quality of the primary source of drinking water identified by the household. However, water tests were conducted at one point in time (wet season), and water quality was not tested at every household surveyed but rather from a sample of ‘types’ of water supplies and extrapolated to all of similar types (e.g. results from 1 or more rainwater tanks were applied to all households using rainwater as the primary drinking water source). In addition, some households indicated different primary drinking water sources for wet and dry season; in these cases, the lower service level was used to represent overall service level. Therefore, the colour codes given in this table may vary throughout the year.

- Maintenance activity was *somewhat* linked to WASH-related health and drinking water reliability and availability, where the only two locales that scored “high” for WASH-related health (Galoa and Nabubu) also had observed greater proactive maintenance such as cleaning regularly around water sources (Galoa)
- “Better” drinking water reliability and availability was somewhat connected to better WASH-related health outcomes with Galoa and Nabubu indicated a ‘high’ scores in both. There were very few indications of WASH-related health issues such as diarrhoea, scabies and other water-related diseases that can be minimised though regular access to (safe) water sources
- There was some trend towards communities that have higher levels of collective action also displaying a stronger degree of maintenance activities (as indicated in Galoa and Rukuruku)
- Most communities treated their water (in the wet) including the communities that most strongly perceived their water to be very safe (Narara, Rukuruku and Wailotua-two). Similarly, the communities that perceived their water to be unsafe, also scored highly in water treatment (Bavu and Galoa).

7.3. Considering structural factors in achieving CWM PLUS

In section 7.1 we identified key features we believe constitute 'good' water management, based on the strengths observed and problems encountered in our case study sites. All these “good” water management features are important to achieve sustained, safe and functional water and WASH outcomes. Therefore, the *what* of good CWM has been identified; however, the *how* of CWM is critical to whether the PLUS is successfully implemented. For example, it is clear that mobilisation and motivation of a group of people (be it a formal water committee or an informal collection of individuals) is an important feature of good CWM, but how this is actually achieved must be informed by the contextual factors specific to each village.

Some of these are structural – unlikely or difficult to change within the timeframe of water or WASH project. These structural factors strongly influence CWM outcomes and thus need to be incorporated into the village diagnostic tool or pre-awareness activity *prior* to implementation of a water or WASH project.

Some key structural issues to be aware of include:

- **Demographic factors:** Population and size of the community; number of Mataqali; religious denomination(s); mobility and livelihood particulars (e.g. proportion of waged workers)
- **Governance**: Leadership specifics, dynamics, tensions; committee numbers, activeness, ability (and willingness) to potentially link with WM group
- **Potential WM group members:** Age, inclusiveness, other roles and responsibilities; willingness to link with other committees; ensure against redundancy (through mentoring and including young people)
- **WASH history:** Experience of water hardship, reliance on WAF delivery
- **Cultural norms:** Women's agency and ability to engage with WM group are informed by kinship dynamics (e.g. a lack of maternal linkages within a *koro* can delimit the community health workers ability to engage with the WM group); youth are not customarily given leadership positions in committees
- Extant **social issues** (e.g. "community disharmony") informs the scope of collective action possibilities and hence WM approach
- **Physical setting:** Topography, water availability, natural resource specifics (logging, animal husbandry, forestry practices) impact the WASH situation

Government and CSO engagement in the sector needs to focus on improving factors that can be influenced in a short-medium timeframe, whilst navigating around foundational factors that require

longer-term changes. To do this, the specific foundational / structural factors of a given locale need to first be assessed.

(Left – Right) Water Committee Chairman, WC member, and project RA [Albert Whippy], at Galoa dam (Photo credit: Mark Love)

8. CONCLUSIONS

Building on the strengths and weaknesses identified in this study, a number of recommendations can be made relating to the types of actions communities need support with, as well as the ways enabling actors engage with and support communities.

A range of actions undertaken by an identifiable water management group (e.g. Water Committee) were identified as important to support good WASH outcomes. Additionally, collective action by all community members and water users is also seen as critical to improving WASH, beyond the WM group alone. Assessing the capacity of a community to perform these actions would usefully guide a tailored approach to providing them with relevant support.

It appears that most communities in Fiji had water committees or designated groups of water managers, many of which were instigated through engagement by external actors, and which is now formally required as part of Fiji's rural governance models. The decree that there must be a water committee is helpful in the context of Fiji, where government regulations do influence people's actions at the village/settlement level. However we note: (i) the ways in which water committees work with the broader community and with other community groups could be strengthened for improved WASH outcomes; (ii) the make-up of Water Committees – who sits on the committee – requires greater consideration by communities and external actors; and, (iii) the inclusion of youth and women in Water Committees does not necessarily translate to them having agency and being active participants. We recommend specific activities be undertaken with communities and WC's to improve inclusiveness, participation, and the way committees work in communities.

The community water actions that were consistently poor across most/all case study communities were: assessing and managing risks to water quality; planning and managing supply and demand; and, engaging with the broader community and other village or settlement committees/groups. Even the communities with the highest achievement in the identified community water management actions appear to have persistent difficulties achieving these actions. We recommend enabling actors consider strengthening these aspects of their existing approaches.

Finally, in terms of the type of support required by communities, the capacity and context of each community influences its prospects to achieve a range of the factors identified as critical to 'good' water management. Assessing and responding to the specific strengths and challenges of each community – recognising that every village/settlement is different – will increase the effectiveness of interventions, and, in the longer term, also their efficiency. The support that is given by enabling actors needs to be contextualised to the community dynamics and specific needs and capabilities of each community.

Beyond providing support to address specific challenges faced by communities, enabling actors such as government and CSOs can further strengthen CWM outcomes by either *influencing* (through direct support) or by improving their *awareness* of community context prior to engagement (diagnostics and pre-awareness activities). Irrespective of the mode of support, interventions need to be pragmatic and place-based - where a balance is struck between fostering dependency (undesirable) and encouraging self-help (desirable).

The following are recommendations of actions and approaches that can be implemented for improving CWM outcomes based on the Phase 1 research:

Community specific diagnostics to better inform external actors about pre-existing factors that influence community attitudes and actions about water management. This may include:

- *Identifying and working with existing levels of social cohesion* where a community's multiple social structures (e.g. individual, household, clan and tribe, external family members) are leveraged as a strength. This is an example of 'working with the grain'

of existing and functioning social networks that are already active in collective action terms

- *Socio-economic context*: In some communities, a large proportion of people may be salaried employees, meaning they have limited capacity for collective action. Additionally, the level of fundraising in a community – as well as the community's size and socio-economic status – impacts the effectiveness and sustainability of using a water fee to support CWM
- *Consideration of past experience with external support* and the level of project dependency that a community might have (as this can potentially limit motivation for collective action)
- *Understanding past experience with WASH and water systems,* as positive or negative experiences can affect expectations and motivation.

Building and Maintaining a strong water management group/committee using education and motivation to form and maintain strong water/WASH management group/committee. This may include:

- *Mobilising the water committee* to reach out and tap into existing strengths within the community e.g. help them to better identify and make links that may not have been clearly mapped out before
- *Working with existing social capitals and community skills* to reduce redundancy and multiple responsibility fatigue within the water committee
- *Strengthening Water Committee linkages and communication* with other committees or groups in communities (e.g. community health worker, women's and youth groups)
- *Ensuring youth are engaged in WM planning and decision makings,* not just used as labour. The mean age of WC members is high and there is evidence that crucial information (e.g. the location of shoreline springs/alternative water sources) are not being handed down through the generations. Moreover, older WC members tend to have multiple responsibilities - engaging young people in more meaningful ways within WC's can better ensure sustainability and greater committee activeness
- Providing *guidelines* to accompany the quota mandate to include women in the WC. Engaging with the community Women's Group Leader who, typically, speaks on behalf of women within the *vanua*, would be a key action for Water Committees to more formally institute on a regular basis.

Strengthening technical capacity in the community to manage risks (through fostering proactive and appropriate maintenance rather than reactive and "band-aid" maintenance), including both water quality management and planning for and managing supply and demand. This may include:

- Providing *community-specific technical advice* about the community's water system and recurrent and emerging challenges. This could be achieved through a program of "Technical backstopping" or training workshops (see recommendation below regarding leveraging connections between communities and urban-based community members)
- *Adjusting existing water management training*, such as the Drinking Water Safety and Security Planning approach, and other community-engagement resource kits to include targeted and more effective training on:
    - Demand management (water conservation; fit-for-use approach to multiple sources);
    - Identifying and managing risks to water quality to promote 'proactive' maintenance and hazard management (e.g. water quality hazard identification).

Town to community knowledge transfer: Town-based community members are potentially rich agents for knowledge transfer in regards to CWM and WASH matters more widely. Identifying strategies

to engage with town-based community members – perhaps through village development committees – would not only facilitate capacity across multiple villages more cost-effectively, but would also encourage peer-based learning (sharing of lessons about specific CWM problems between communities). Such training workshops should be designed to combine structured learning on common situations and problems, with workshop opportunities for participants to seek advice on problems specific to their given community's system.

The recommendations described above are based on insights identified in the formative research component and are derived (primarily) from only eight communities, thus they may not all be relevant, suitable or achievable for implementation in all Fijian communities. Notwithstanding this, the recurring theme that emerged during the Phase 1 research was the need for more place-based understanding of the wider socio-cultural dynamics that were limiting (or enabling) functional, proactive and collective management of water systems. Successful delivery of the recommendations above, or any modifications of them, are best achieved through pilot implementation first, which is monitored and evaluated by the community as well as the implementers.

9. REFERENCES

Australian Agency for International Development (AusAID), 2012. *Social cohesion and social protection in Pacific Island countries*. AusAID Pacific social protection series: poverty, vulnerability and social protection in the Pacific. AusAID. Canberra, March 2012.

Belshaw, Cyril S. 1964. *Under the Ivi* Tree. London: Routledge

Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. 2010. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *Lancet.* 375(9730):1969–87.

Burnett, E., Dalipanda, T., Ogaoga, D., Gaiofa, J., Jilini, G., Halpin, A., Dietz, V., Date, K., Mintz, E., Hyde, T. and Wannemuehler, K., 2016. Knowledge, attitudes, and practices regarding diarrhea and cholera following an oral cholera vaccination campaign in the Solomon Islands. *PLoS neglected tropical diseases*, 10(8).

Chand, A and Naidu, S., 2010. The role of the state and Fiji Council of Social Services (FCOSS) in service delivery in Fiji: Some thoughts. *Fijian Studies*, vol. 8, No 1, pp. 129-143.

Craney, A., 2019. 'Youth leadership in Fiji and Solomon Islands: Creating Opportunities for Civic Engagement'. In Helen Lee (Ed.) *Pacific Youth: Local and Global Futures*, Australian National University, pp. 137-158.

Delaibatiki, N. 2015. ANALYSIS: Communalism Versus Individualism. *Fiji Sun online*, 17 March, 2015. https://fijisun.com.fj/2015/03/17/analysis-communalism-versus-individualism/

Fiji Bureau of Statistics (FBoS), 2018. Fiji Bureau of Statistics Releases 2017 Census Results. Fiji Gov. 10 Jan., 2018.https://www.fiji.gov.fj/Media-Centre/News/Fiji-Bureau-of-Statistics-Releases-2017-Census-Res

Farrelly, T.A. and Vudiniabola, A.T., 2013. Kerekere and indigenous social entrepreneurship. *Sites: a journal of social anthropology and cultural studies*, 10(2), pp.1-29.

Fiji Ministry of Health (FMOH), 2010. *Guidelines for the Diagnosis, Management and Prevention of Typhoid Fever*. Fiji Ministry of Health, Australian Agency for International Development, World Health Organization. Suva, Fiji.

Fiji National Council for Disabled Persons (FNCDP), 2010. *Making Women with Disabilities Visible*. Fiji National Council for Disabled Persons September 2010. http://www.fncdp.org/docs/WomenDisabilitiesSurvey.pdf

Gatty, Ronald. 2009. *Fiji-English Dictionary (with notes on Fijian culture and natural history).* Suva, Fiji.

Government of Fiji (GoF), 2014. *Constitution of the Republic of Fiji*. Available at: http://www.paclii.org/fj/Fiji-Constitution-English-2013.pdf

IWDA, 2017. Exploring Multidimensional Poverty In Fiji: *Findings From A Study Using The Individual Deprivation Measure*. IDM Fiji Study 2015-2016: Initial findings: July 2017. Funded by the Australian Government and implemented by the International. Women's Development Agency and the Fiji Bureau of Statistics.

Jupiter, S., Mcclennen, C. and Matthews, E., 2012. Vatu-i-Ra Seascape, Fiji. In *Climate and Conservation*, pp. 155-169. Island Press/Centre for Resource Economics.

Kumar, V., 2010. Water management in Fiji. *International Journal of Water Resources Development*, 26(1), pp.81-96.

Kuridrani, L.N.T., 2014. A socio-cultural investigation of Indigenous Fijian women's perception of and responses to HIV and AIDS from the two selected tribes in rural Fiji: Tabalesi na Dakua, Ukuwale na Salato. PhD Thesis, School of Population Health, The University of Queensland.

Love, M., Beal, C., Gonzalez-Botero, D., Bugoro, H., Panda, N., Roiko, A., Benjamin, C., Hagabore, J., Ooi, J., Magreth, C., and Souter, R.T. (2020). Pacific Community Water Management Plus: Phase 1 Findings Report for Solomon Islands. International WaterCentre / Griffith University: Brisbane, Australia; Solomon Islands National University: Honiara, Solomon Islands.

Leckie, J., 2000. Women in post-coup Fiji: negotiating work through old and new realities. In AH Akram (eds), *Confronting Fiji Futures*, Australian National University, Canberra, pp. 178-201. https://www.jstor.org/stable/j.ctt1bgzbq3

Litidamu, N., Young, T. and Valemei, I., 2005. *An assessment of health impacts from environmental hazards in Fiji*. World Health Organisation and the Fiji Institute of Environmental Health.

Massa, K., Kilamile, F., Safari, E., Seleman, A., Mwakitalima, A., Balengayabo, J.G., Kassile, T., Mangesho, P.E., Mubyazi, G.M., 2017. Contributing to the debate on categorising shared sanitation facilities as 'unimproved': An account based on field researchers' observations and householders' opinions in three regions, Tanzania. *PLoS ONE*, 12(11). http://dx.doi.org.libraryproxy.griffith.edu.au/10.1371/journal.pone.0185875

Ministry of Infrastructure & Transport (MoIT). 2016. National Water and Sanitation Policy. Department of Water & Sewerage. Fiji Government. November, 2016.

Moceituba, Atasa, and Monique Tsang (2015). Averting climate change's health effects in Fiji. World Health Organization. Bulletin of the World Health Organization, vol. 93, no. 11: 746-747.

Movono, A. & Becken, S., 2018. 'Solesolevaki as social capital: a tale of a village, two tribes, and a resort in Fiji.' Asia Pacific Journal of Tourism Research, 23(2), pp.146–157.

Narsey, Wadan, 2011. Report on the 2008-09 household income and expenditure survey / Wadan Narsey. – Suva, Fiji : Fiji Bureau of Statistics.

Narsey, W, Raikoti, T., and E. Waqavonovono 2010. Preliminary report : poverty and household incomes in Fiji in 2008-09. Suva, Fiji : Fiji Islands Bureau of Statistics.

Panapasa, S.V., 2002. Disability among older women and men in Fiji: concerns for the future. Journal of women & aging, 14(1-2), pp.149-162.

Prüss-Ustün, A., Bartram, J., Clasen, T., Colford Jr, J.M., Cumming, O., Curtis, V., Bonjour, S., Dangour, A.D., De France, J., Fewtrell, L., Freeman, M.C., Gordon, B., Hunter, P.R., Johnston, R.B., Mathers, C., Mäusezahl, D., Medlicott, K., Neira, M., Stocks, M., Wolf, J., Cairncross, S., 2014. Burden of disease from inadequate water, sanitation and hygiene in low- and middle-income settings: a retrospective analysis of data from 145 countries. Tropical Medicine & International Health 19, 894-905.

RESCUE, n.d. *Better Farming and Ranching Practices in Ra Province - Diagnosis and Action Plan*. SPC, University of the South Pacific. https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/de/deb854a0ba9f7f06190fbd3f4b8a4600.pdf?sv=2015-12-11&sr=b&sig=e9zorBHy4xMYUC563tv%2FUHBKGVD5%2B%2BxjShs0RG9PI4s%3D&se=2021-07-30T05%3A25%3A12Z&sp=r&rscc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%2Fpdf&rscd=inline%3B%20filename%3D%22Better_farming_ranching_practices_Ra.pdf%22

Rocha Menocal, A, Cassidy, M, Swift, S, Jacobstein, D, Rothblum, C & Tservil, I., 2018, Thinking and working politically through applied political economy analysis: a guide for practitioners. Centre of Excellence on Democracy, Human Rights and Governance. https://www.usaid.gov/documents/1866/thinking-and-working-politically-through-applied-political-economy-analysis

Singh, D., & Railoa, K., 2020. Microbial Analysis of Drinking Water from Nadi to Lautoka Area in Viti Levu Fiji. *Pacific Health*, 3.

Tintle, N., Heynen, A., Van De Griend, K. et al. (2019) Evaluating the efficacy of point-of-use water filtration units in Fiji. *Trop Med Health*, 47, 48 (2019).

Tevola, K. 2017. Collective vis-à-vis Individualistic Approach: Seeking Solution. Kaidravuni blog Dravuni Economy, Dravuni People. 4th December, 2017. https://kaidravuni.com/2017/04/12/collective-vis-a-vis-individualistic-approach-seeking-solution/

United Nations International Children's Emergency Fund (UNICEF), 2014. Water, Sanitation and Hygiene (WASH). Press Centre – Facts. https://www.unicef.org/media/media_45481.html

UNICEF, 2018. *Fiji Ministries and partners commit to 'WASH for Quality Life'*. UNICEF Pacific Islands, Press release, 25 May, 2018. https://www.unicef.org/pacificislands/press-releases/fiji-ministries-and-partners-commit-wash-quality-life

UNICEF, 2019. *Because She Is Important: Actions for Gender Equity in Rural WASH: Solomon Islands.* UNICEF, Government of Solomon Islands and CARE USA. Prepared by Kelly T. Alexander & Robyn Baron. October, 2018.

Water Authority of Fiji (WAF), 2016. Rural & Maritime Water Supply Scheme: What communities need to know when applying for the Water Supply Scheme. http://www.waterauthority.com.fj/en/brochures/

WHO, 2017. *Guidelines for drinking-water quality*, 4th edition, incorporating the 1st addendum. Geneva, Switzerland: World Health Organization; 2017. https://www.who.int/publications/i/item/9789241549950

WHO, 2018 *Guidelines on sanitation and health*. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.

WHO and UNICEF, 2017a. Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines. WHO and UNICEF, Geneva.

WHO and UNICEF, 2017b. *Safely managed drinking water: Thematic report on drinking water 2017.* Geneva, Switzerland: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

Vakaoti, P., 2017. Young people's participation in Fiji: understanding conceptualizations and experiences, *Journal of Youth Studies*, 20:6, 697-712.

Vakaoti, P and V. Mishra, n.d. *An Exploration of Youth Leadership Models in Fiji*. Pacific Islands Forum Secretariat, Pacific Leadership Program, supported by the Australian Government.

Yabaki, Tamarisi. 2006. *Women's Life In A Fijian Village*. PhD thesis, School of Education and Community Studies, Division of Communication and Education, University of Canberra.