

## RESEARCH BRIEF

# Methods and key learnings from 2022

## Impact and Innovation Project:

### *Planning for climate resilient urban WASH in urban informal settlements in Melanesia*

DECEMBER 2022



## Project Overview

The **Planning for Climate-resilient Water, Sanitation and Hygiene in Urban Informal Settlements** research project, funded by the Australian Government’s Water for Women Fund was undertaken from January to December 2022. Past research, including by IWC, has indicated that access to WASH services in urban and peri-urban informal settlements across Melanesia is broadly inadequate<sup>4</sup>. In addition, there is little evidence to suggest that WASH services that do exist for urban and peri-urban informal settlements are future-proof – they are not planned with resilience to shocks and change in mind, such as climate change or the needs of changing populations within water catchments.

The key research objective was to investigate **how urban planning processes in Melanesia could be strengthened through participation and integration to improve the resilience of WASH service delivery in informal settlements within the urban footprint**.

By doing this, we seek to increase the inclusiveness of WASH planning in urban Melanesia so all residents can access more resilient WASH services.

### About Water for Women

Water for Women is the Australian Government’s flagship water, sanitation, and hygiene (WASH) program and is being delivered as part of Australia’s aid program. Water for Women invests in socially equitable, inclusive and climate-resilient WASH in Asia-Pacific.

Water for Women has a goal of promoting gender equality and social inclusion in WASH research.

### Research aims

- (i) Understand what existing urban planning processes are in place, and how urban planning and WASH can be better integrated
- (ii) Learn how shocks affect WASH services in informal settlements through the experiences of residents, and their preferences for different WASH services,
- (iii) Explore the relative resiliency of different WASH service delivery models to climate-related hazards in the Pacific region
- (iv) Investigate how spatial and non-spatial datasets relating to WASH service models and environmental data can be integrated and adapted

This study aims to provide regionally appropriate evidence about what kinds of processes and systems could be explored within different urban contexts in Fiji, Vanuatu, Solomon Islands and Papua New Guinea. The mixed methods research included literature reviews, household surveys, interviews, photovoice, and stakeholder engagement to understand existing WASH services and preferences, urban planning approaches and the existing political economy of the provision of WASH in the urban environment.

## Research partnerships

This research brought together a multidisciplinary team of local and international researchers and analysts, and consulted with CSOs, FBOs and government actors who combined expertise from WASH, environmental science, anthropology, data science, and community engagement, particularly in the Pacific. The research was led by a partnership of International WaterCentre at Griffith University, The University of the South Pacific and UACS Consulting.

## Research approach and methods

This mixed-methods research program had four components: an urban planning and policy review, community data collection and engagement, spatial analysis and processing, and political economy analysis. The variety of methods, and the number of activities undertaken, are included in the table below. Our approach to working with informal settlement residents was participatory and included household surveys, interviews and photovoice techniques alongside structured observations of WASH facilities and services. These were used to understand existing WASH services and alternatives, their preferences, and residents’ perceived resilience of those services. All field work and data collection were led by our partners at the University of the South Pacific in Fiji and Vanuatu. The photovoice process included sharing the photography of participants (with their consent) with the broader community and although not shared externally to the settlement at this stage, we considered this a successful trial to build upon in the next phase of our research. In addition, we conducted key informant interviews with government and water utility representatives across planning departments, WASH departments, and regional bodies.

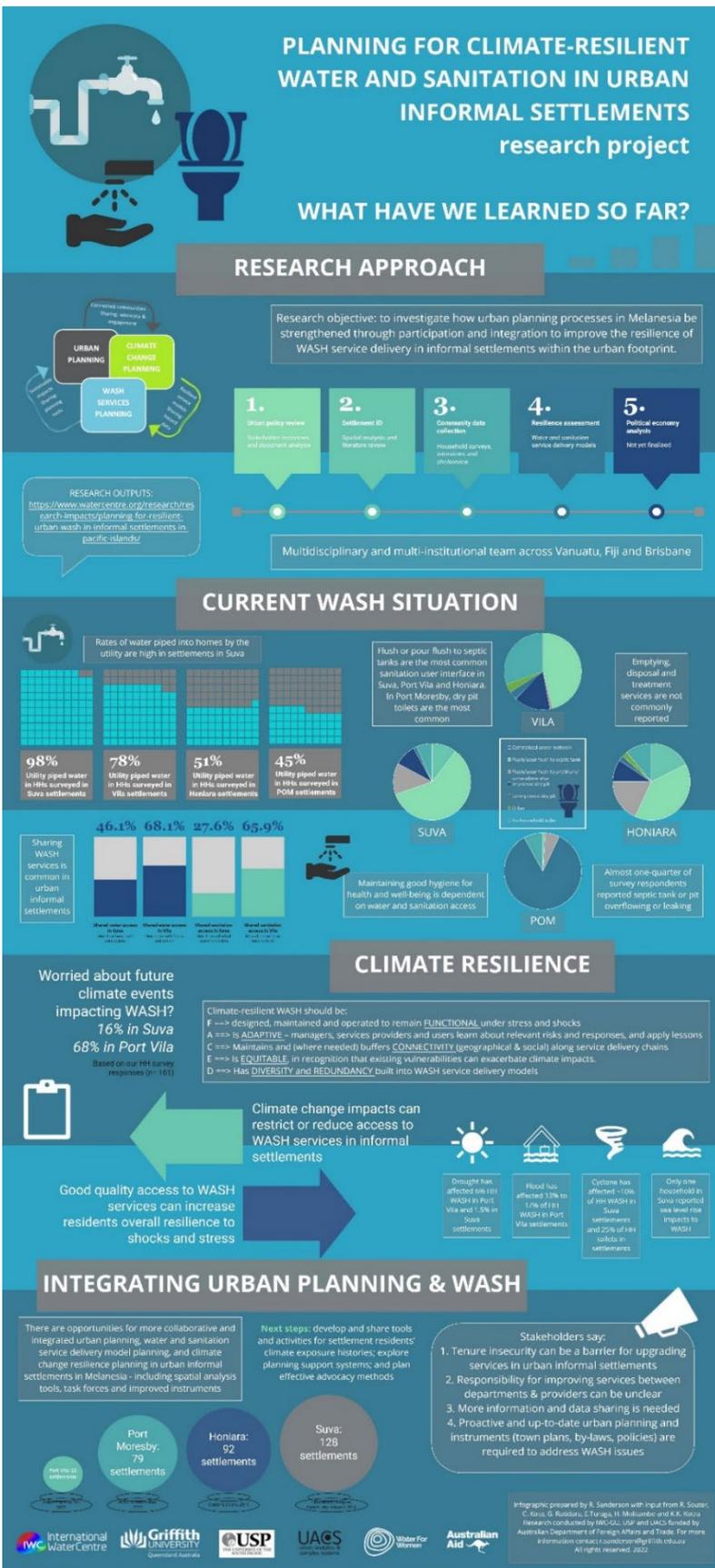
Our spatial analyses included using innovative automated remote sensing techniques and collation of both quantitative and qualitative information in the spatial domain. These types of characterisations and visualisations across cities and catchments are intended to help planners and residents conceptualise the linkages between WASH services and whole-of-catchment activities.

Research Method	Count	Research Method	Count
Documents analysed (policy review)	58	PEA literature & media review	117
Stakeholder interviews – planning focus	Suva – 5; Port Vila – 5	Stakeholder interviews – political economy focus	Suva – 5; Vanuatu – 7
Household surveys	Suva – 76; Port Vila – 85	Photovoice participants	Fiji – 9 (W1); 4 (W2)
Household interviews	Suva – 7; Port Vila – 10	Photographic observations	Suva – 295; Port Vila – 379

# Outputs

## KEY FINDINGS

1. Water and sanitation access in urban informal settlements should be considered as **service delivery models**, not just infrastructure. This **allows for better identification of risk from climate hazards and opportunities to adapt or mitigate those risks**, beyond just strengthening core infrastructure, such as robust conveyance networks, continuity in emptying services, and grey water management.



2. There is some **progress being made in Melanesian urban informal settlements with respect to formalisation and upgrading**: Fiji is currently formalising 46 settlements across the country including service provision, Solomon Water has connected over 2,800 households in settlements to piped water in the last year, Papua New Guinea's new Port Moresby Urban Development Plan describes their ongoing settlement upgrade process, and Vanuatu's urban wastewater taskforce is considering sanitation in urban settlements. Notwithstanding progress, **WASH services remain very unevenly distributed** across Melanesian urban centres, particularly in urban informal settlements.

3. There are opportunities for WASH service delivery, climate change hazard awareness and urban planning to become more integrated and planned in a collaborative way for urban informal settlements. This could include **taskforces, sharing of tools and processes such as spatial analyses, and clear advocacy**.

4. There is a **paucity of climate hazard data at the spatial scale required**, to guide identification of climate-resilient water and sanitation service options for particular locations. Combining **environmental data, with locally-derived data** (e.g. from residents) has potential to be a feasible and effective proxy.

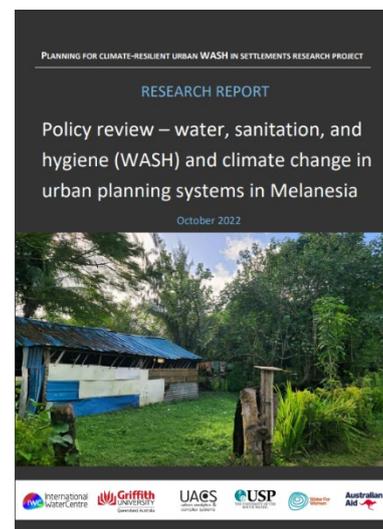
5. **Utilities** tend to have preferred a single service type across their service area, but in addressing service area gaps, or expanding into new areas, they **will need to offer a diversity of service models, or coordinate with other service providers to ensure city-wide accessibility to safe and climate-resilient services**. The combination of user preferences and location-appropriate services should guide resilient service delivery.

6. Tackling planning for urban informal settlements to increase social inclusion will require **political will, integration across key ministries and service providers, community ownership, and diversity in solutions**.

## RESEARCH REPORT: WASH & CLIMATE CHANGE IN URBAN PLANNING SYSTEMS IN VANUATU, FIJI, SOLOMON ISLANDS AND PNG

In our policy review across the four capital cities of Melanesia, based on document analysis and key informant interviews it is apparent that urban informal settlements are recognised, and there are clear objectives to better serve such areas where basic services (such as water and sanitation) are lacking. However, there remain some significant gaps in integrating citywide, climate-resilient WASH into urban planning processes. Some key findings include:

- For formal urban planning, zoning, leasing and development applications and approvals are currently handled at the local, city level in Honiara and Suva, but at the national level for Port Moresby and Port Vila.
- WASH provision in urban areas is often conducted by a commercial or state-owned commercial enterprise, and thus the responsible Ministries or Departments within national and municipal governments consider their responsibilities limited.
- Climate change impacts are recognised across the policy and planning documents, with sea level rise and increased intensity of extreme events usually the key risks highlighted. As it develops, there are opportunities to use planning to build resilience across multiple sectors. There is a lack local-scale climate hazard data.
- Stakeholders commonly raise the issue of fragmentation of roles and responsibilities for provision of services including water and sanitation in urban informal settlements. Notwithstanding, collaboration and inter-agency consultation is occurring on many matters, including discussions about settlements. The key missing piece is often the coordination role.

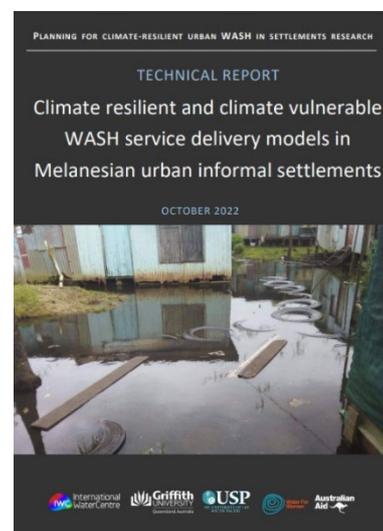


### TECHNICAL BRIEF: AUTONOMOUS IDENTIFICATION OF URBAN INFORMAL SETTLEMENTS

A challenge faced by countries and cities when addressing the needs of informal settlement residents is a lack of accurate, relevant and timely data to describe demographics and living conditions within the settlements. The research team undertook a pilot study based on machine learning techniques applied to remote sensing to autonomously detect urban landscape features from multi-spectral satellite imagery to assist in locating and mapping informal settlements. This pilot was intentionally designed as an accessible and low-cost process. It is conducted remotely without the need for in loco investigation using open-source data and programs. Techniques are simple to use and deploy, and have resulted in a new approach to map dense urban settlements in Melanesia. The pilot aims, methodology, results and future directions are detailed in the pilot study section of this technical brief. Results demonstrated the modelling approach provides a cost-effective method to detect dense informal settlements, although further refinement of the model is required to account for different types of settlements, particularly with respect to settlement density.

### TECHNICAL BRIEF: CLIMATE-VULNERABLE AND CLIMATE RESILIENT WASH SERVICE DELIVERY MODELS IN URBAN MELANESIA

This report aims to address the question of what sorts of water and sanitation service delivery models (SDMs) might provide a higher level of resilience to climate-related change for residents of informal settlements in Melanesia. Increasing the resilience of household access and use of water supply and sanitation in urban informal settlements across Melanesia is not just about adapting core infrastructure to improve its ability to withstand events. Resilient WASH access relies upon resilient WASH service delivery models – from end to end (where access to hygiene services flows in part from maintaining good water and sanitation access). No single approach for water service delivery or sanitation service delivery is going to be appropriate to all households across a city. Diversity exists between and amongst settlements, both topographically, geographically, economically and socially, including preferences for different services. Decentralised and transitional services can be part of a cost-effective and staged approach to upgrading WASH access in settlements. Transitional services allow for unfamiliar services to be introduced into a new area in way that new users can progressively become comfortable and confident in how they work and increase the demand for the improved services.





## POLICY BRIEF: OPPORTUNITIES FOR COLLABORATIVE AND INTEGRATED PLANNING PROCESSES FOR CLIMATE-RESILIENT URBAN WASH

This policy brief collects the existing status of urban planning, WASH and climate change integration across the urban centres of the research from our PEAs, interviews, community data collection and literature reviews, to ask the question of how urban planning, WASH service provision and climate change responses could be integrated for better outcomes. We wanted to provide policymakers with recommendations and ideas to consider when considering coordination and collaboration. Through this work, we highlighted that there are existing urban planning processes in Melanesian cities, however they are often reactionary, out-dated, and siloed from development requirements of specific sectors. Existing planning processes for WASH in urban Melanesia mostly don't integrate climate resilience and adaptation information, activities, and impacts.

Some of the opportunities identified include considering a combination of WASH service delivery options that suit local settings and user preferences in urban informal settlements, supported by effective urban planning instruments such as bylaws, construction codes and pro-poor financing options; making better use of spatial planning, datasets, and residents knowledge and experience of climate change; and identifying urban development and informal settlement advocates that WASH practitioners can collaborate and partner with.

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## COMMUNITY OUTPUTS: KEY FINDINGS AND PHOTOGRAPH DISPLAY

The research team collected and prepared a number of outputs for communicating our research with the informal settlement residents with whom the research was conducted. These included a writeup and photographic display of the photovoice activities, a presentation in Nanuku settlement, Fiji, sharing early survey data, and the infographic overview shown earlier in this document.

Feedback from Fiji was particularly positive. Participants in the photovoice trial (n=9 in first workshop, n=4 in second) were engaged and pleased with the outcomes of the work, and suggested the visual means of sharing stories could be useful when advocating outside their community. Printed copies of the posters were presented to the Turanga ni-koro who displayed them at the community noticeboard.



## JOURNAL PAPER (IN PREP): THE CLIMATE RESILIENCE OF WASH IN URBAN INFORMAL SETTLEMENTS IN SUVA AND PORT VILA – WHAT WE CAN LEARN FROM RESIDENTS

We are currently preparing a journal article for publishing in a peer-reviewed, open-source academic journal. The article will present the findings of our mixed-methods community data collection in four urban informal settlements each in Port Vila, Vanuatu, and Suva, Fiji. We conducted 161 household surveys, 17 household interviews, photovoice activities, and made photographic observations of 674 different elements of household water and sanitation service delivery models including water meters, water taps, toilets, and septic tanks/pits. We also collected rich data around residents' experiences with extreme weather and climate-related events such as floods, droughts, cyclones and sea level rise, and how these experiences interacted with or caused loss or damage to water and sanitation access and services for their households.

Our findings are presented in three key areas. Initially, we discuss the existing status of water and sanitation access across the settlements and the differences between that status and people's preference for WASH access. Importantly, what people prefer is not always what is expected by service providers and governments; for instance, we were told in some communities that the very real risk of damage to a sewerage pipe in their community, as experienced with damage to water pipes, was a deterrent for preferring piped and centralised sanitation services, even if they were available. Secondly, we discuss existing and preferred methods of sharing of WASH services in urban informal settlements in these locations, and how sharing of access, and sharing of time and expertise between family and neighbours to fix and maintain services, has advantages and disadvantages for improving the climate-resilience of WASH services. Finally, we present and discuss the climate experiences of residents, what their perceptions are of future risk to WASH services, and the ways in which they have, or would like to, change their current situations to improve the resilience of their WASH access in the face of a changing climate.

## POLITICAL ECONOMY ANALYSIS

To inform the research approach and future directions, a Political Economy Analysis (PEA) was conducted using the USAID framework which identifies four pillars of political economies: Foundational Factors, Rules of the Game, Here and Now, and Dynamics. These problem/issue level analyses considered the broader political economy around the question ***What are the main factors inhibiting the provision of safe and accessible WASH in informal settlements in Suva / Port Vila?*** The research was based on an extensive literature review, media analysis, and key informant interviews across local and national government, water authorities, NGOs/FBOs, the private sector and informal settlement households ( $n = 38$ ).

The full PEA analysis has not been publicly released; however, a high-level summary and key findings are provided below.

### Port Vila - summary

Land tenure falls into two main categories: customary ownership with Indigenous custom owners or public land held by the Government - both can be leased through a registered lease or sub-lease, an unregistered lease or sublease, or through informal occupancy arrangements. Informal settlement growth is a blunt consequence of a shortage of affordable housing in urban areas. As Day et al (2019) note, Port Vila's settlements are generally not vilified for their crowding, environmental pollution and poverty and not yet viewed as sites of lawlessness and a security risk for the rest of the city (2019:106). As one government respondent put it, *"informal settlements, according to our culture [...] we cannot really look down on them* (NG-4). This is, in large part, due to the strength of 'informality' and informal structures in Vanuatu that connect across social groups. However, one government stakeholder noted land tenure matters because *"...a lot of the time when we talk about supporting a community, if they are not on land that is secure then it becomes a problem. Basically, it stops whatever development that is planned to occur in a certain land..."*. The cultural importance of land in Vanuatu are well recognised: as elsewhere in Melanesia, land is central to individual social identity and a significant factor in the political economy of informal settlements.

Notwithstanding, a multitude of barriers were identified during the PEA which contribute to a weak enabling environment for the provision of climate-resilient WASH services to urban informal settlements in Port Vila. At the core is the lack of political will to improve services broadly, as well as a lack of clear leadership. The implications for WASH practitioners and policymakers are that there is a need to identify and support champions (political and non-political), explore how respected informal systems might be harnessed, and influence the urban planning processes to coordinate with WASH.

### Suva - summary

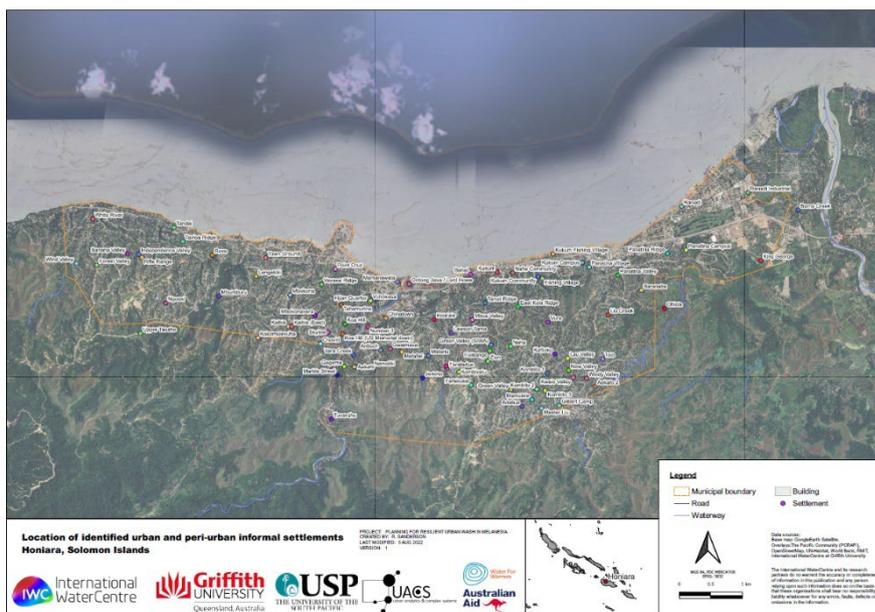
Land ownership and traditional relationships to land are foundation in Suva and Fiji more broadly, and this informs much of the public discourse about urban informal settlements. There is a tendency to categorise informal settlement residents as "good" settlers (requiring aid and charity) and "bad" settlers (those taking advantage), however the nuance of when these definitions applied appears to depend on the political or social objective. There are three types of land in Suva – that under customary title and subject to oversight by the iTaukei Land Trust Board (TLTB), state owned land, and freehold. Most land in the Greater Suva area is under customary title (72%), and there are many *vakavanua* (direct, customary, and informal) arrangements on this type of land. In this context, tenure insecurity informs the discourse on barriers to upgrading of settlement services and conditions.

However, there are two ways in which land tenure insecurity have been addressed to provide services such as water to settlements. The first is a change to the iTaukei Land Trust Act which removed the requirement for written consent from the TLTB for water connection developments, removing an additional administrative barrier on some land types. The second is that WAF can provide "temporary water connections" to residents in informal settlements because they have an arrangement where they accept government issued identification credentials in place of formal leases, and show agreement from landowners or Ministry of Housing. Fiji outstrips other Melanesian countries in provision of piped water to its residents including informal settlements and is recognised as such (ibid).

There is strong leadership in Fiji for water supply and to an extent, sanitation, through the Water Authority, which has a strong mandate across all of Fiji, not restricted by administrative boundaries. In this way, there is significant budgets allocated to water upgrades and progress can be seen. There are visible champions for water and clear interactions between the policymakers in the Department of Water and Sewage and WAF. There is not the same political or departmental leadership for urban planning policy, strategy or informal settlements in Fiji, which impacts upon progress to manage unconstrained urban growth and ensure vulnerable populations are not left behind. The political will to address informal settlements is not strong and is subject to short-termism depending on the mood of the electorate. In terms of implications for addressing WASH in informal settlements, influencing political will for urban strategies that address adequate is required, and should find willing collaborators in the existing strong water sector in Fiji.

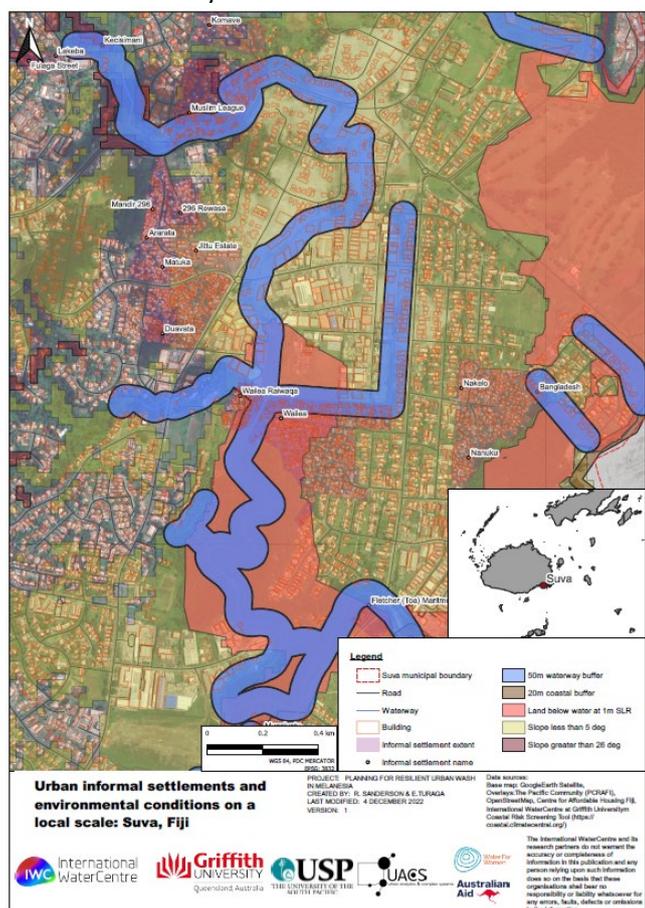
## MAPS - A. EACH URBAN LOCALE IDENTIFYING URBAN INFORMAL SETTLEMENTS, MARKETPLACES, AND AREAS IDENTIFIED FOR FUTURE URBAN EXPANSION

The first phase of our spatial analysis and mapping was to collate sources that named and located urban informal settlement areas across the four cities of Honiara, Suva, Port Vila, and Port Moresby. Data of this sort is limited and dispersed, sometimes held by government sources but more commonly contained in publicly accessible reports from entities such as UN-Habitat. Where possible, more than one dataset was used to cross-reference and confirm locations. It was also recognised some urban informal settlements expand and others emerge rapidly, so recent satellite imagery was manually analysed for areas not identified in available information sources. Extents of each settlement were ascertained where available (all cities except for Honiara) and using updated building count datasets from Open Street Map (REF), household numbers were estimated.



## B. EACH URBAN LOCALE IDENTIFYING AREAS OF VULNERABILITY TO CLIMATE CHANGE HAZARDS

The project recognised the lack of local-scale climate hazard data available and accessible for the four cities in Melanesia. There are some examples available, such as flood mapping prepared for Port Moresby and shown in the Port Moresby Urban Strategy, however these are not publicly available datasets. To compensate for this deficit, environmental data was sourced and processed to reflect some key environmental conditions that could increase the vulnerability of residents in those sorts of locations. These



environmental conditions included:

- Close to rivers or streams (flooding), represented by a 50m buffer around waterways;
- Close to the coast (coastal inundation and tidal storm surge), represented by a 20m buffer along the coastline
- Land below water given 1m of sea level rise, mapping sourced from the Coastal Risk Screening Tool<sup>1</sup>;
- Flat and low-lying areas, represented by land elevations with less than 5 degrees of slope; and
- Steep terrain, represented by land elevations with greater than 26 degrees of slope.

Not all datasets were available for all cities. The environmental conditions are reflected in the Technical Brief: *Climate-vulnerable and climate-resilience WASH service delivery models in urban Melanesia*.

The resultant spatial displays show informal settlement locations and building footprints and the environmental site conditions representing potentially hazardous areas. The purpose of these outputs was to demonstrate a proof-of-concept to contribute to further research in 2023/24, where additional datasets and analyses will link these site conditions to WASH service delivery model options mapping.

<sup>1</sup> <https://coastal.climatecentral.org/>

## Next steps

Several critical gaps in planning systems and the political economy for climate-resilient WASH in urban informal settlements emerged from this current research, and the investigation will continue with the support of the Water for Women fund through 2023-24. Our expanded regional research project is intended to strengthen systems for climate-resilient WASH services in UIS by exploring decision and planning support systems (PSS), advocacy methods, and ways of engaging with settlement residents to progress collaborative planning, specifically by: research and development on PSS (tools and activities) for integrated & collaborative planning for remaining gaps; including citizen science to assist with localized climate science; leveraging strengths of existing decision and PSS via cross-country regional learning and sharing; and, research to influence political and societal support for improved services to informal settlements.

Using a range of research methods including HH surveys and FGDs (women/men split), participatory-GIS (PGIS), photovoice (disability-focused), groundwater monitoring, spatial analysis using QGIS, stakeholder engagement, literature reviews, KIIs, workshop with rights-holder organisations and stakeholders to share findings and facilitate advocacy, the next phase of our research includes three key components:

1. Incorporating local climate science and WASH information to inform collaborative PSS under the following themes: (a) Community-generated data on climate impacts on WASH SDMs; (b) Localised climate and hazard data; (c) Climate hazard proxy data (d) Climate-resilient water and sanitation SDMs for settlements (e) Input to existing guidelines and/or by-laws for climate-resilient water and sanitation service delivery models.
2. Regional knowledge exchanges and skills development.
3. Political and societal attitudes to improving services to informal settlements

### ACKNOWLEDGEMENTS

The authors would like to thank those individuals and organisations who provided information and insight into this work, including The Fijian Government, The Vanuatu Government, and numerous other organisations 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: Fiji Roads Authority, Ministry of Health and Medical Services - Environmental Health Department, Department of Water and Sewerage, Suva City Council, Water Authority of Fiji, Ministry of Lands and Mineral Resources, Port Vila Municipal Council, Ministry of Health, Department of Urban Affairs and Planning, Ministry of Lands and Natural Resources, Public Works Department and UNICEF. We also acknowledge the contributions of our excellent research assistance team including Grace Ratidara, Emali Turaga, Aline Watt, Precila Wells and White Tougen.

This project was supported by the Australian Government Water for Women Fund and implemented by the International WaterCentre at Griffith University, Australia from 2021 to 2022. Water for Women is the Australian Government's flagship WASH program and is being delivered as part of Australia's aid program.

Disclaimer: This publication was funded by the Australian Government through the Department of Foreign Affairs and Trade. Views expressed here are the contributing authors' alone and are not necessarily the views of the Australian Government.

### ADDITIONAL RESOURCES

The publicly available outputs featured in this research overview can be found at:

<https://www.watercentre.org/research/research-impacts/planning-for-resilient-urban-wash-in-informal-settlements-in-pacific-islands/>. Outputs that are not publicly available may be provided on request.

### SUGGESTED CITATION

IWC and USP, 2022. "Research Brief – opportunities for collaborative and integrated planning processes for climate-resilient WASH" International WaterCentre, Griffith University. Nathan: Australia.

Cover images: Front – Sanitation plumbing in Nanuku settlement, Suva, Fiji.

#### RESEARCH PARTNERS



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