RECHARGE

UTS Institute for Sustainable Futures

USP THE UNIVERSITY OF THE SOUTH PACIFIC

Water For Women

Resilience in a Changing Climate: Advancing Research on Groundwater for Equity (RECHARGE)

Pacific Learning Event

4-8 November 2024

Learning event themes

Groundwater

Climate change resilience

Safely managed rural water services

Gender equality, disability and social inclusion (GEDSI)

Objectives

1. Create and facilitate a space for Melanesian groundwater professionals to exchange experiences, challenges, opportunities, and learnings on groundwater-based water service supply in their countries.

2. Support Melanesian groundwater professionals to gain new knowledge on climate resilient inclusive water services, and how they might apply that to their work.

3. Present and discuss RECHARGE Vanuatu and Blue Pacific research findings and implications with Vanuatu and regional stakeholders.

The Pacific Learning Event was a three-day workshop exploring climate change, groundwater, Gender Equality, Disability and Social Inclusion (GEDSI), and safely managed rural water services.

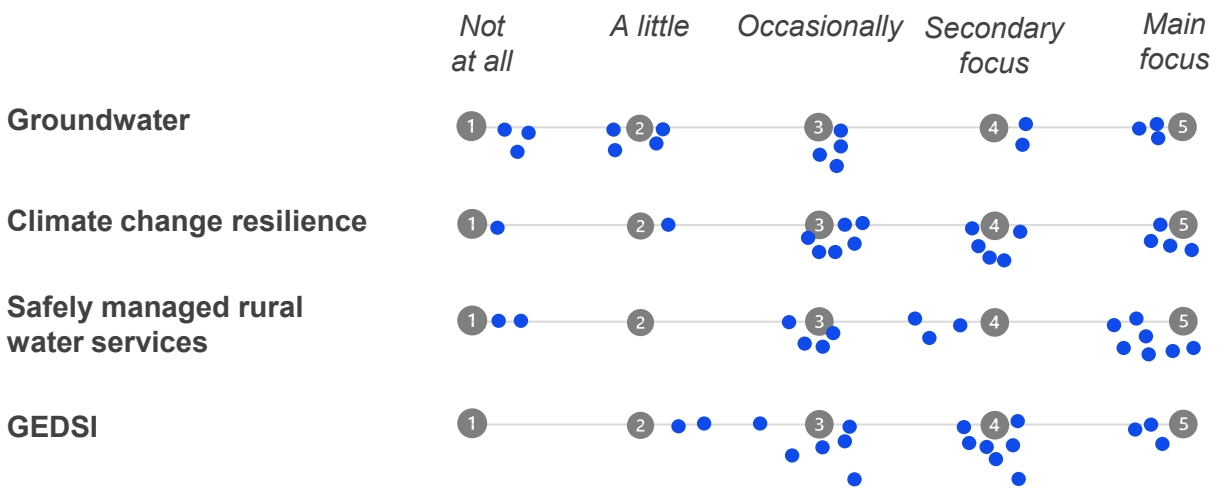
This document provides an overview of session activities, key discussions, and insights gathered through a participatory approach.

Organised by activity, the brief highlights the main ideas and discussions shared by participants.

Session 1 - Setting the scene: Climate change and inclusive rural water services in Pacific islands

Activity 1: Experience with the event themes

Individual participants were asked to rate their experience of the event themes (groundwater, climate change resilience, safely managed rural water services and GEDSI). The rating scale ranged from 1 (not at all), 2 (a little), 3 (occasionally), 4 (secondary focus) and 5 (main focus of work).



Work experience rating by participants on a scale from 1 (not at all) to 5 (main focus).

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Activity 2: Where does groundwater fit in the Pacific?

Participants were asked about the links between rural water services / groundwater / climate change / GEDSI, what they find most interesting and why. Group discussions explored the interconnections between the topics, focusing on key takeaways to prioritise for action across the Pacific.

The group discussions highlighted

- Improved understanding of groundwater is essential because climate change demands water sources and infrastructure that can withstand increasingly variable climate conditions.
- The importance of monitoring water quality on small islands to detect microbial contamination and saltwater intrusion into groundwater.
- The importance of strengthening governance frameworks for groundwater management and development at the national and provincial levels.

Key points

1. Necessity for effective governance structures and sustainable financing models
2. Necessity for strong legislative frameworks to support comprehensive water strategies, with a focus on GEDSI
3. Empowering local communities to manage and sustain their water resources and infrastructure
4. Integration of climate change considerations into groundwater management and water supply design
5. Special attention to the needs of vulnerable communities, ensuring they are adequately served and protected

- The need to focus on financing to achieve Sustainable Development Goals (SDGs) target 6 and the importance of sustainable community-level structures for financing.
- Importance of supporting vulnerable communities, particularly in the context of groundwater and climate change impacts. They highlighted the need for better understanding and empowering communities and ensuring infrastructure longevity.
- The need for stronger legislative frameworks that address GEDSI and the empowerment of communities.

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Session: RECHARGE Pacific's regional analysis of groundwater lenses

This presentation session focused on the overview of groundwater in the Pacific, covering topics such as hydrogeological environments, current groundwater use, vulnerability to climate change, and existing policy frameworks. Discussions included regional challenges, case studies, and future steps to enhance groundwater management and resilience.

Perceptions and awareness

In the Pacific, there is a **general mistrust towards groundwater compared to regions like Asia**. This stems from the lack of visual presence of groundwater and cultural perceptions that rainwater is healthier.

In **Vanuatu**, **rainwater is predominantly used for drinking**, even in urban areas like Port Vila, where there is a preference for rainwater and bottled water over groundwater.

In **Fiji**, despite the presence of farming, there is **resistance towards government drilling for groundwater**. There's a clear need for more awareness and education to help communities understand the benefits and resilience of groundwater.

Advancing policies and knowledge

Pacific island governments have interest in groundwater, but comprehensive policy work remains incomplete. Future steps include generating more knowledge on groundwater availability and development and developing policies for groundwater management.

There's a **significant gap in hydrogeological data and capacity for new geological surveys** in countries like PNG. Existing data is fragmented and outdated, emphasising the need for systematic approaches to gather and use groundwater information. Groundwater has potential but is not yet seen as the best solution due to these gaps.

Technical and environmental challenges

Technical challenges include surveying borehole site before drilling to avoid extracting water from the transition zone and causing saline water intrusion.

Volcanic regions face specific issues with groundwater quality, necessitating robust protection measures.

Earthquakes, which are common in Vanuatu, can **cause boreholes to collapse**.

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Session: Collaborative groundwater problem solving

Activity: Groundwater-related challenges and solutions

This group session focused on groundwater-related challenges and potential solutions. Participants shared their experiences, shedding light on issues spanning technical, governance, financial, and social dimensions.

Problem	Solution
1. Technical Challenges	
Lack of Expertise: Insufficient specialists and technical capacity for groundwater management.	Invest in training, community awareness, university curriculum, and capacity-building workshops.
Infrastructure Issues: High costs and maintenance challenges for groundwater systems like solar pumps.	Use durable, climate-proof infrastructure and encourage innovation in renewable energy solutions.
Water Quality: Risks from contamination and over-extraction.	Adopt Drinking Water Safety Plans (DWSP), integrate watershed management in groundwater policies, and follow good practice for borehole siting and installation.
2. Governance and Policy	
Standards and Guidelines: Absence of consistent groundwater management standards.	Develop and enforce clear policies, standards, and compliance mechanisms.
Land Ownership: Land issues complicate implementation and sustainability.	Collaborate with communities and government to negotiate cost-sharing and land-use agreements.
3. Financial Barriers	
Operational Costs: High O&M expenses and limited community financing options.	Develop and enforce clear policies, standards, and compliance mechanisms.
Revenue Models: Tariffs often insufficient to cover costs.	Review and update tariff systems to ensure sustainability while maintaining affordability.
4. Social and GEDSI Considerations	
Community Engagement: Traditional power dynamics, such as chief-led decision-making, limit inclusivity.	Persistently engage women and marginalised groups through targeted meetings, flexible timing, and economic empowerment.
Cultural Context: Address barriers to participation, like women not attending traditional meetings.	Use creative engagement strategies, e.g., pairing community events with consultations.
5. Data and Monitoring	
Data Gaps: Insufficient hydrological data hinders effective planning and GW management.	Mandate data sharing from private drillers, develop databases, and promote research to improve monitoring and decision-making.

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1 Capacity Building

Strengthening technical skills and community awareness is vital for sustainable groundwater management.

2 Policy, governance and integrated planning

Clear guidelines, land-use agreements, and compliance mechanisms are essential for equitable and efficient groundwater use.

3 GEDSI

GEDSI must be central to decision-making processes to ensure water access benefits all, especially women and marginalised groups.

4 Sustainability

Address high operational costs and integrate renewable energy solutions to improve infrastructure longevity and resilience.

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Session: RECHARGE Vanuatu deep dive

This presentation session focused on the Resilience in a Changing Climate: Advancing Research on Groundwater for Equity (RECHARGE) project. The presentations were structured according to the quantitative and qualitative components of this project. The key takeaways from the discussions with the participants have been captured in this section.

Quantitative components

1 Groundwater quality and contamination

- *E. coli* Contamination: There are significant issues with E. coli contamination in groundwater, particularly in boreholes located close to villages and latrines, making them vulnerable. High contamination levels were expected in shallow dug wells but were surprisingly high in boreholes too, as noted in Vanuatu and Solomon Islands.
- Implementation of DWSPs can help protect groundwater sources from microbiological contamination.

2 Water Protection zones

- Establishing Protection Zones: Urban areas in Vanuatu have established water protection zones. These need to be tailored to avoid agricultural and other conflicting land uses. Sharing of hydrogeological maps and studies can help other countries, such as Fiji, establish similar zones.
- Community Actions: Some communities have improved water quality by sealing well heads with concrete, though seasonal and localized contamination persists, as observed in Vanuatu.

3 Policy and legislation

- Need for Comprehensive Policies: There is a need for comprehensive groundwater management policies and standards. While Fiji has established water protection zones since 2011, the Solomon Islands are still developing their legislative frameworks.
- The Government of Fiji has an impressive groundwater development and management policy that provides a useful example for other Pacific Island Countries.
- Community Engagement: Encouraging community involvement in testing and managing water quality is crucial. However, perceptions about groundwater safety and the use of chlorine remain challenges, particularly in Vanuatu and Solomon Islands.

4 Monitoring and data Collection

- Fluctuations in groundwater levels are monitored through boreholes in places like Luganville, Vanuatu. More comprehensive data is needed. Feasibility studies are ongoing in Vanuatu, and current pump stations are being re-evaluated due to infrastructure projects.
- Lorentz pumps trialed in Vanuatu demonstrate how groundwater levels can be monitored remotely using an online platform.

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Session: RECHARGE Vanuatu deep dive

Qualitative components

1 Accessibility and inclusion

Physical access to water sources is a challenge for people with disabilities and those living far from taps. Policies in PNG focus on accessibility for women, people with disabilities (PWD), and the elderly, but theft of infrastructure like solar panels is a concern.

2 Perception and trust in water sources

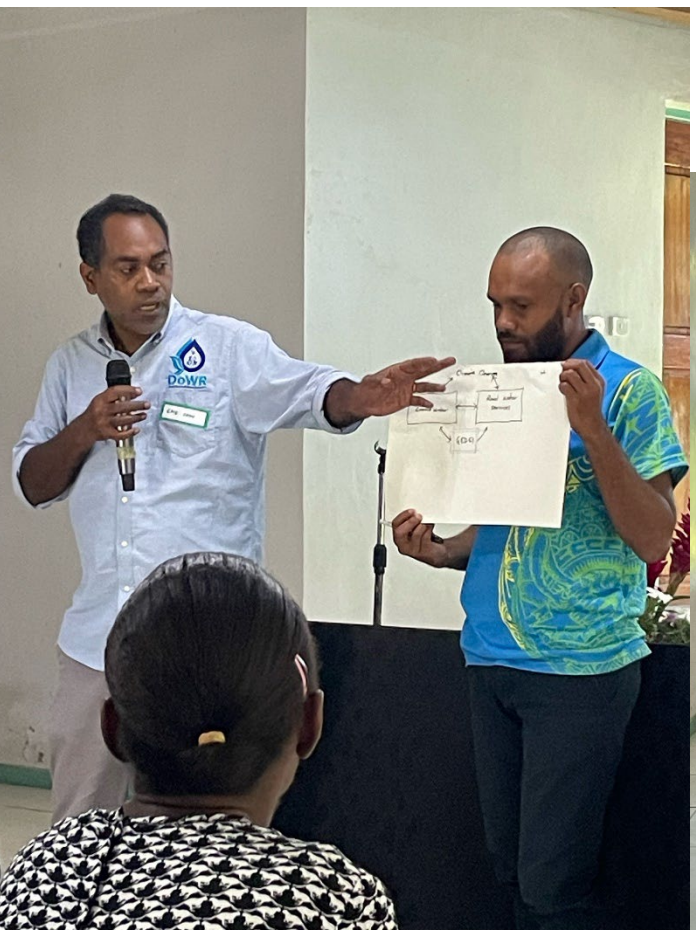
Communities tend to trust rainwater more due to its visible nature, whereas groundwater is less trusted despite potentially being more resilient during dry seasons.

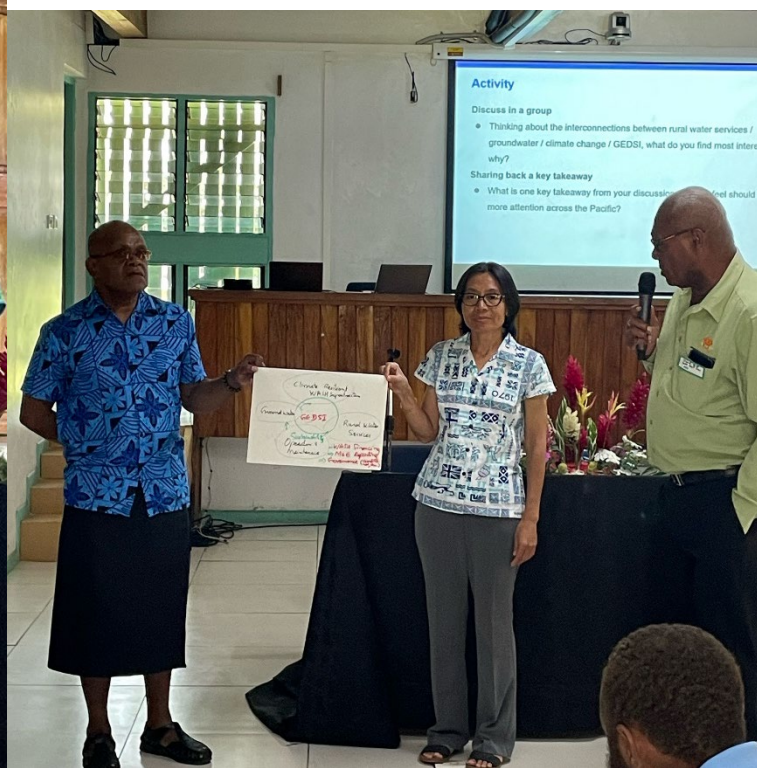
3 Climate resilience

Physical access to water sources is a challenge for people with disabilities and those living far from taps. Policies in PNG focus on accessibility for women, people with disabilities (PWD), and the elderly, but theft of infrastructure like solar panels is a concern.

4 Environmental and Technical Challenges

- Salinity and Chemical Leaching: Issues such as salinity from seawater intrusion and chemical leaching from construction activities pose significant challenges to groundwater quality in Vanuatu.
- Drilling Methods: A mix of drilling methods, including air hammer drilling, is preferred for better water quality in Fiji, though challenges remain with micro drilling in rocky areas.
- A copy of “Guidelines for Well Drilling and Groundwater Management” which provides technical guidance can be requested from the Government of Vanuatu Department of Water Resources.





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Session: Research implications

Group reflection on the relevance of RECHARGE findings to their experiences and communities, identify areas needing continued attention, and discuss potential next steps to further the research.

1 Water sources

- Relative Benefits: Groundwater, rainwater, and protected springs each have their advantages and challenges. Rainwater is highly seasonal, but easier to access. Groundwater is less affected by seasons but requires pumping to access.
- Desalination Units: Some rural communities have solar and diesel desalination units, but maintenance and supply chain issues can lead to breakdowns, as seen in PNG and Fiji.

2 Climate impact and water quality

- Rainfall Effects: Increased rainfall benefits groundwater, springs, and rainwater if distributed evenly. However, dry spells impact rainwater more significantly.
- Quality Concerns: All water sources face quality issues in Vanuatu. Rainwater and groundwater have similar contamination rates in rural Vanuatu, and construction faults may contribute to this. Intense rainfall events can contaminate all water sources, but unprotected springs and surface water are most vulnerable. Sea level rise can affect the salinity coastal groundwater sources.

3 Community preferences and challenges

- Preferences and Perceptions: Households prefer rainwater for drinking due to aesthetics and beliefs. Groundwater and rainwater are complementary, with rainwater used for drinking and groundwater for non-potable uses.
- Governance and Equity: Water committees for communal water sources often face governance challenges regardless of the water source. Governance issues are less problematic for self-supply systems like household rainwater harvesting tanks because the family decides how to manage it for themselves. But equity concerns arise as not all households can afford rainwater tanks, creating socioeconomic disparities.

4 Supply Chain and sustainability

- Technological Sustainability: Better pumps and solar panels are becoming more affordable and locally produced, improving sustainability. Desalination technology may follow this trend, with successful financial models potentially involving sharing costs between communities and utilities.
- Vandalism and Maintenance: Vandalism of water systems is a minor issue in Vanuatu. Ensuring the sustainability of new technologies requires addressing supply chain and capacity-building challenges.

5 Advocacy and awareness

- Groundwater Advocacy: In places like the Solomon Islands, abundant surface water reduces the perceived need for groundwater. More advocacy and awareness are needed to highlight groundwater's potential, especially in preventing water-borne diseases.
- Policy and Protection: Policies like WASH in the Solomon Islands recommend buffer zones around springs to protect water sources. Encouraging the use of solar pumping systems over diesel, despite higher upfront costs, can lead to long-term sustainability.

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Session: RECHARGE Vanuatu deep dive

Qualitative components

1 Cost and affordability

Diesel pumps are costly due to fuel expenses, while solar pumps have lower operating costs but have higher initial costs. There is a need for comprehensive cost analysis for different water sources over time to understand cost efficiency in the Pacific Island context.

2 Governance and water committees

Water committees face negative perceptions as fee collectors, and issues with leadership and accountability are common. In Vanuatu, training for water committees has improved system quality, but these committees often struggle with volunteer fatigue and lack of formal recognition. In PNG, a cashless system is being promoted to address trust issues.

3 Water quality concerns

Groundwater contamination with E. coli is significant, especially from boreholes near villages and latrines. Rainwater tanks are also susceptible to contamination during cyclones and heavy rainfalls.

4 Community engagement

Increasing community awareness and monitoring after implementing water supplies helps understand and address perceptions and practical challenges.

5 Government and community Support

There is a gap in community awareness about available government support and resources, leading to feelings of isolation. Stakeholder mapping can help communities understand who can support them.

6 Governance and infrastructure

Effective governance and infrastructure management are essential for ensuring reliable water supply. This includes establishing water protection zones and engaging Water Committees in maintenance.

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Session: RECHARGE Vanuatu deep dive

Activity: Kastom stories and traditional beliefs: importance for understanding the water context

Importance of kastom stories

Traditional stories and indigenous knowledge play a crucial role in water resource management. They provide valuable lessons on water conservation and respect for natural resources, as highlighted by various participants from Vanuatu, Solomon Islands, and PNG.

Christian and kastom Beliefs

In Vanuatu, both Christian and kastom beliefs influence water practices. For instance, water is seen as a symbol of cleansing, destruction, and healing in biblical contexts, which complements traditional views on water as a sacred resource.

Challenges in implementation

Integrating new technologies and water infrastructure must consider traditional beliefs and practices to ensure community acceptance and successful implementation. Resistance to changes in water management practices can arise if kastom stories and cultural norms are not respected.

Balance of tradition and modernity

There is a need for more education and awareness to help communities understand the benefits of combining traditional knowledge with scientific approaches to water management. Traditional knowledge should be respected and integrated into modern water management practices, as it provides context-specific insights that are crucial for sustainable water resource management.

Session: Communicating key messages about groundwater to the public and other stakeholders

Activity: Kastom stories and traditional beliefs: importance for understanding the water context

The group activity focused on identifying key messages for communities, governments, and donors, addressing the value of water projects, inclusivity, sustainability, and collaboration, while identifying barriers and effective communication methods like workshops, training, and localised materials.

1 Community Engagement and Empowerment

- Emphasise the benefits of groundwater projects to communities, including improved water access, quality, and resource sustainability.
- Build trust with landowners by securing goodwill and clarifying roles, ensuring projects align with community needs and cultural norms.
- Encourage active participation and understanding of best groundwater management practices to promote local ownership.

2 Influencing Government Policies and Decisions

- Provide clear, evidence-based recommendations to inform policies, improve budget allocations, and strengthen legislative frameworks.
- Highlight the importance of groundwater as a resilient water source and advocate for sustainable practices to protect resources.
- Address governance challenges such as nepotism by promoting decentralisation, transparency, and alignment with national and regional goals.

3 Donor Coordination

- Ensure projects follow community protocols, respect cultural norms, and focus on long-term sustainability.
- Promote better coordination between donors, governments, and communities to prevent duplication of efforts and maximise impact.
- Advocate for a balance between hardware (infrastructure) and software (training, education, and awareness).

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Session: Gender equality, disability and social inclusion (GEDSI) and groundwater training

1 Challenges for women and people with disabilities in water access

- Women bear the primary responsibility for domestic water management but face limited decision-making roles in water committees.
- People with disabilities face significant barriers in accessing water, including inadequate infrastructure, reliance on others, and additional financial burdens.

2 GEDSI-sensitive water system design

- Infrastructure must be inclusive, considering the diverse needs of people with disabilities, including distance, ease of use, and type of disability.
- Universal design principles and GEDSI-sensitive planning can ensure equitable access and long-term usability.

3 Empowerment through representation

- People with disabilities and women's participation in water committees can lead to empowerment and advocacy for their needs.
- Encouraging active roles in decision-making can transform access and social perceptions in communities.

4 Importance of community engagement

- Consultation and inclusion of people with disabilities and women in the design and planning stages are critical to ensure their needs are met.
- Awareness and advocacy can help address social stigma, improve understanding, and foster supportive environments.

5 WASH for All

- Access to water and sanitation should cater to everyone, recognising the social and practical challenges faced by vulnerable groups.
- Addressing the root causes of exclusion—such as stigma, governance issues, and infrastructure gaps—leads to more equitable and transformative outcomes.

6 Role of practitioners and policymakers

- Practitioners must advocate for universal design, social inclusion, and policies that prioritise equitable water access.
- Policymakers should ensure community-driven solutions, regulation, and capacity-building to support inclusivity in water and sanitation services.

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Call to actions

The activity involved country-specific group discussions (Vanuatu, Fiji, Solomon Islands, PNG) to identify, prioritise, and rank key actions for improving rural groundwater services into immediate, medium-term, and long-term needs, while mapping stakeholders essential for successful implementation.

Country	Immediate actions	Medium-term actions	Long-term actions
PNG	• Improve upon unprotected groundwater usage • Carry out hydrogeological surveys • Enforce GEDSI and climate-resilience in district WASH plans • Develop inclusive and climate-resilient WASH sector plan • Develop WASH standards and guidelines for groundwater	• Review current WASH policies to include climate-resilient WASH implementation plan. • Increase coverage of district MoUs from 13 to 26. • Raise funding under MTDPH • Establish a high-level WASH coordinating committee.	• Establish new regulations for groundwater • Increase funding for groundwater development • Implement recommendations from research
Solomon Islands	• Initiate data collection on groundwater • Begin community engagement, awareness and training sessions • Review current water policies • Develop climate-resilient plans	• Capacity building • Community engagement • Implement water policies and acts • Adequate planning and design	• Capacity building • Community engagement • Regular monitoring of water management practices.
Vanuatu	• Groundwater survey and exploration throughout Vanuatu • Sharing of country-wide data on groundwater • Identify potential sites for groundwater development • Consult with national government and share the report to relevant stakeholders		
Fiji	• Develop standard designs for groundwater services including GEDSI and climate-resilience • Technical training to technicians	• Land acquisition for groundwater development • Monitoring of groundwater resources • Establish water protection zones	

Participants

The learning event took place in 4 – 8 November 2024 in Port Vila, Vanuatu. This event united a diverse array of professionals from the water and WASH sectors across the Pacific. Participants included technicians, engineers, policy experts, and coordinators.

The learning event was made possible through funding from the Government of Australia's Department of Foreign Affairs and Trade (DFAT) via the Water for Women Fund.

Country	Organisation	Participant
Fiji	Mineral Resources Department (MRD)	Naomi Gade
	Mineral Resources Department (MRD)	Ilaitia Dokonivalu
Solomon Islands	Water Resources Management Division, Ministry of Mines, Energy and Rural Electrification	Richard Molea
	Solomon Water	Joe Hagabore
	Ministry of Health - Environmental Health Division	Brian Inomea
Papua New Guinea	WASH Programme Management Unit (PMU)	Takale Tuna
	WASH Programme Management Unit (PMU)	Edmond Bannick
Vanuatu	UNELCO	Florie Lesteour
	Ministry of Lands and Natural Resources - Department of Water Resources	Erie Sami
	Ministry of Lands and Natural Resources - Department of Water Resources	Abraham Tevi
	Ministry of Lands and Natural Resources - Department of Water Resources	Haines Dini
	Ministry of Education and Training	David-Henri Coulon
	The University of the South Pacific	Krishna Kotra
	The University of the South Pacific	Theophile Duduni
	ACE Group	Lisa Faerua
Australia	University of Technology Sydney – Institute for Sustainable Futures	Jeremy Kohlitz
	University of Technology Sydney – Institute for Sustainable Futures	Nabeela Nasim
	University of Technology Sydney – Institute for Sustainable Futures	Tim Foster
	University of Technology Sydney – Institute for Sustainable Futures	Melita Grant

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