

An aerial photograph of an informal settlement. The houses have corrugated metal roofs, some of which are rusted. In the foreground, there is a community garden with several raised concrete beds containing various plants, including orange flowers. A paved path with yellow and red tiles winds through the garden. Two people are visible in the garden. The background shows more houses and lush green trees under a clear sky.

rise

REVITALISING INFORMAL
SETTLEMENTS AND
THEIR ENVIRONMENTS

Transforming lives

RISE Annual Activity Report 2024



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Ihsan Latief (left) and Nur Intan Putri (right) run a Community Wetland Planting Day with a partner community in Makassar, Indonesia. Photo: Adrianto Hidayat.



1. INTRODUCTION

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What is RISE?

Informal settlements are home to more than one billion people worldwide. Residents experience some of the harshest living conditions, exposed to environmental contamination hazards affecting health and wellbeing, which are disproportionately exacerbated by climate change. Our vision is to improve the health and wellbeing of residents of urban informal settlements by improving the environment in which these communities live.

RISE is testing a community-scale approach to improving water management, sanitation and climate resilience. This is being done through a randomised control trial (RCT) in 12 informal settlements in Suva, Fiji, and 12 settlements in Makassar, Indonesia. Half of these settlements will receive upgrades as part of the trial (the 'intervention' settlements), while the other half will receive upgrades after the trial has finished (the 'control' settlements).

OUR INFRASTRUCTURE INTERVENTION

RISE is utilising a water-sensitive cities (WSC) approach to upgrade informal settlements. Upgrades are co-designed together with communities, and respect existing land use, tenure, livelihoods and community dynamics.

The suite of infrastructure upgrades are designed to address each community's unique stressors, providing access to essential sanitation and water services, and strengthening climate resilience to flooding and water shortages.

OUR PLANETARY HEALTH RESEARCH

RISE aims to collect the first-ever rigorous scientific evidence on the impacts of our water-sensitive revitalisation on human and environmental health in informal settlements.

Through the RCT, RISE is generating evidence across a range of disciplines on the complex links between human health and the natural systems on which it depends –

including assessment of human health and wellbeing, ecological changes, environmental contamination, pathogen microbiology and genomics, co-design, wastewater treatment system performance and water quality, as well as the socio-economic evidence that policy-makers will find most compelling to scale up this water-sensitive approach.

This integrated **planetary health** approach can guide policies and investments to improve the living conditions for people in informal settlements worldwide.



Drainage

Paved pathways

Constructed wetlands

Rainwater harvesting tanks and bathroom units

Septic tanks

From the Co-Directors



Karin Leder
RISE Program Co-Director
Monash University
School of Public Health and
Preventive Medicine
Faculty of Medicine, Nursing and
Health Sciences

RISE has entered a new era of impact.

We believe a better quality of life for people living in informal settlements is possible. We understand the conditions required to test, implement and scale up the types of solutions that can improve peoples' lives around the world.

With one in three people on the planet expected to live in slums or informal settlements by 2050, we urgently need to re-think how we provide basic services in the world's developing cities. RISE is generating evidence on the impacts of a new model to uplift the quality of life in our growing urban centres: a model that involves flexible infrastructure solutions, resilience in the face of a changing climate, and a model that is backed by multiple sectors. Above all else, the RISE approach is an investment in communities as the drivers of their own change.

In 2024, RISE successfully completed its first multi-neighbourhood round of innovative settlement upgrades utilising hybrid 'green, grey and smart' engineering and decentralised nature-based solutions. RISE has adapted technologies used in Australia and elsewhere and implemented these solutions for the first time in urban informal settlements in Indonesia and Fiji – paving the way for more equitable global access to critical infrastructure.

Technical systems are only part of innovation. True innovation to solve deep challenges in informal settlements is driven by the communities who live in them. Residents were the co-designers and co-producers of the RISE upgrades, and are now the owners of this transformational change. They are motivated to take on the maintenance and responsibilities of the built systems themselves in collaboration with local governments. This collaborative approach shows it is possible to disrupt the traditional role of communities as passive beneficiaries, redefining them as self-sustaining agents of their own change.

Life in informal settlements is complex and ever-changing; projects that adapt and refine their solutions based on real-world results have much greater chance of sustained impact. RISE is generating first-of-its-kind evidence on the



Diego Ramirez-Lovering
RISE Program Co-Director
Monash University
Faculty of Art, Design and
Architecture

impacts that our water and sanitation upgrades are having on the health of our partner communities and their environments. We invite you to explore the ground-breaking findings in this report that cut across the many complex dimensions of informal settlement life.

Projects can be catalysts for a coalition of partners to unite to achieve a common goal. Our principal research funder, the Wellcome Trust, shares in our mission to trial new approaches and take new learnings to transform the ways research and development is conducted globally. The Governments of Indonesia, Fiji, Australia and New Zealand, who funded the community upgrades, share our vision for creating more prosperous, resilient communities in the Indo-Pacific through community-led solutions. And Hasanuddin University and Fiji National University, as core program partners hosting RISE's local laboratories, are committed to dynamic science and capacity building to solve urgent health challenges in and beyond the RISE program. Stanford University experts are leading critical research into the impacts of environmental interventions on public health, and experts at Emory University are leading research on the gender and social inclusion outcomes of RISE. This powerful cross-sector alliance is united thanks to Monash University, who leads the RISE international consortium.

We extend tremendous gratitude to our founding Director Professor Rebekah Brown, who united diverse partners with the goal of transforming life in informal settlements with new, creative solutions.

Endless thanks – *terima kasih banyak, vinaka vakalevu* – to our communities, our partners and our incredibly committed global teams – we wouldn't be at this crucial point without you.

We now have an extraordinary opportunity to showcase the successes of the RISE model, and invest in communities to shape the cities they want to live in.



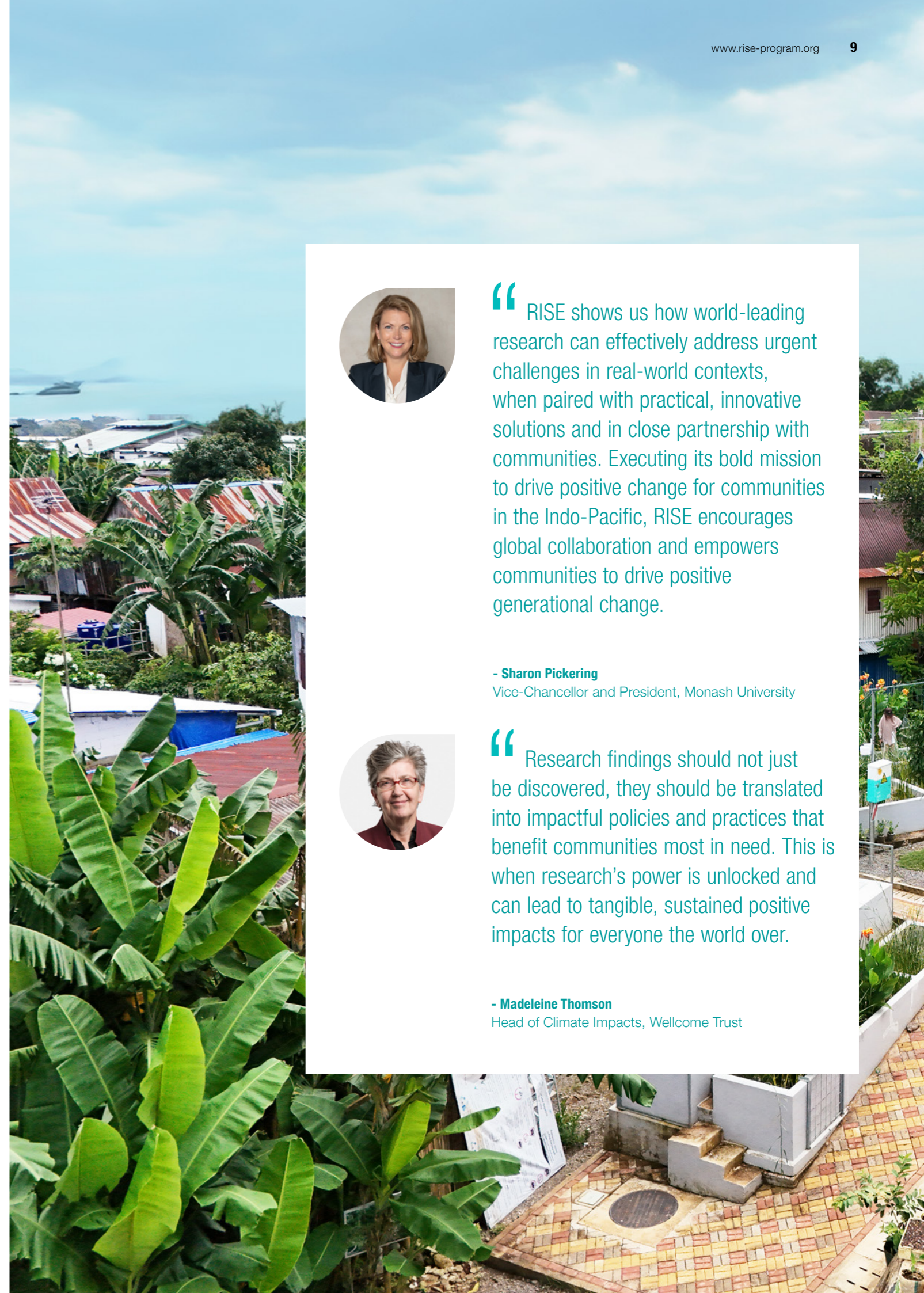
“ RISE shows us how world-leading research can effectively address urgent challenges in real-world contexts, when paired with practical, innovative solutions and in close partnership with communities. Executing its bold mission to drive positive change for communities in the Indo-Pacific, RISE encourages global collaboration and empowers communities to drive positive generational change.

- Sharon Pickering
Vice-Chancellor and President, Monash University



“ Research findings should not just be discovered, they should be translated into impactful policies and practices that benefit communities most in need. This is when research's power is unlocked and can lead to tangible, sustained positive impacts for everyone the world over.

- Madeleine Thomson
Head of Climate Impacts, Wellcome Trust



Partners

RISE is only possible thanks to the deep partnership, collaboration, support and vision of our institutional partners in Indonesia and Fiji. Additionally, the Australian and New Zealand Governments – our construction funding partners for our respective Indonesia and Fiji community development programs – are committed to ambitious and practical action on climate change, shared prosperity, and supporting resilient communities in the Indo-Pacific.



Australian Government

RISE's settlement upgrades in Makassar are supported by the Australian Government and implemented by the Indonesia Australia Partnership for Infrastructure (KIAT) facility.



KIAT is a partnership between the governments of Australia and Indonesia to support sustainable and inclusive economic growth through improved access to infrastructure for all people.



Hasanuddin University

Hasanuddin University, or UnHas, is one of the largest autonomous universities in Indonesia, with its main campus in Makassar. UnHas, through the Faculty of Public Health, is a foundational partner of RISE, leading the local delivery of the RISE assessment program in Makassar and hosting the RISE laboratory.



City of Makassar

As the largest city in Eastern Indonesia, Makassar has a vision to be a leading sustainable, thriving city in the region. With strong political partnership, the RISE infrastructure upgrades are led by the City of Makassar through a Project Management Unit that provides direct support to the program.



“ RISE is a great example of joint Australian-Indonesian research cooperation delivering local infrastructure based on a community-centred approach. Australia and Indonesia are comprehensive infrastructure partners working together to improve water and sanitation systems, and this partnership is having a positive impact on Makassar's economy and the health of its people.

- Todd Dias
Australian Consul-General in Makassar



New Zealand Ministry of Foreign Affairs and Trade

The New Zealand aid program invests in sustainable development, climate change mitigation and adaptation, and poverty reduction. The New Zealand Government is funding the construction of RISE's settlement upgrades in Suva.



Fiji National University

Fiji National University's (FNU) College of Medicine, Nursing and Health Sciences, through the Fiji Institute of Pacific Health Research, is a core foundational partner of RISE. FNU leads the local delivery of the RISE assessment program in Suva and hosts the RISE laboratory.



Fiji Ministry of Housing and Water Authority of Fiji

The Fiji Government, via the Ministry of Housing (MoH), is a core partner of RISE, and the anchor point within the government for implementation of community upgrades. The MoH is helping fund the settlement upgrades in Suva.



The Water Authority of Fiji (WAF) is a close working partner of RISE, responsible for the provision of safe, clean drinking water and sanitation to Fijians in urban and peri-urban areas. WAF is closely involved in the development of upgrade plans, and planning for the operation and maintenance of the built systems.



“ RISE aligns with New Zealand's commitment to a strong, resilient, and inclusive Fiji, where all citizens have the opportunity to reach their full potential. The programme is making a tangible difference through better access to clean water and sanitation, and the resulting health and wellbeing of Fijian families.

- Charlotte Darlow
New Zealand High Commissioner to Fiji

Our implementing teams

RISE could not be delivered without our skilled and dedicated local teams. Our Fiji and Indonesia Country Offices lead implementation of both the built intervention and the research as the local experts and practitioners of the RISE approach and planetary health research.

We are immensely proud of our laboratory, build, assessment, data, and program management teams in Indonesia and Fiji. Their passion, expertise and resilience is what makes RISE possible.



“ 2024 has been both challenging and rewarding for the Makassar team. Completing construction in our first group of communities is a testament to the team’s commitment, hard work and teamwork. We were proud to host the celebration event involving the city government, central government, researchers, collaborative partners, and our partner communities. Thanks to the team for their support and cooperation in achieving this milestone.

- Fitriyanty Awaluddin
RISE Country Manager, Indonesia



“ The successful completion of 2024’s activities highlights the strong team we’ve built in Suva. Despite challenges, the team adapted, leveraging relationships to forge a way forward. It’s exciting to see construction progress, capacity-building opportunities within our research team, and breakthroughs in our whole-of-government engagement strategies. We’re grateful for the partnerships formed and strengthened in 2024. Our success is thanks to our team and partners.

- Isoa Vakarewa
RISE Country Manager, Fiji

Highlights at a glance

ABOUT US

\$50M funding 

Through diverse partnerships

- Monash University
- Wellcome Trust
- Australian Department of Foreign Affairs and Trade
- New Zealand Ministry of Foreign Affairs and Trade
- Asian Development Bank
- Australian National Health and Medical Research Council

150+ 

people working at RISE globally

8,300 

informal settlement residents participating

1,650 

households

2 countries 

RESEARCH



2 planetary health laboratories at Hasanuddin University and Fiji National University

25 trained laboratory technicians in Fiji and Indonesia

21 household survey rounds assessing health and wellbeing

4,964 faecal and blood samples collected from children < 5

100k+ mosquitoes identified and processed

3,600+ water and soil samples collected



10 PhDs completed through RISE

34 publications to-date 



A GLOBAL FIRST IN 2 COUNTRIES

WATER-SENSITIVE REVITALISATION OF INFORMAL SETTLEMENTS

PUBLIC REACH IN 2024

161% increase media coverage since 2023

+1k new followers on social media


85.3k number of times RISE social media posts were seen

52 countries global readers of our newsletters

COMMUNITY UPGRADES TO-DATE

36 wetlands 

70 new toilets 

103 repaired existing toilets 

36 septic tanks 

320 rainwater tanks 

145 pressure tanks and OneBox systems

6,612 m drainage 

3,736 m² paved pathway 



Our 2024 journey

RISE showcases at Fiji Health, and Wetlands and Human Health expos, hosted by Ministries of Health and Medical Services, and Environment

Stanford University training for Suva lab staff on WHO-approved Anti-Dengue virus IgG ELISA kits – to enable accurate measurement of dengue virus IgG antibodies in humans

Installation of expanded clay balls at Makassar demonstration site, to trial environmentally friendly material for wastewater treatment in wetlands

World Bank and Asian Development Bank tour RISE in Suva as an example of water-sensitive management in informal settlements

Collaboration with Water Authority of Fiji on pressure sewer leak testing procedures, to ensure water efficiency and system performance

Asian Development Bank presents RISE as an example of climate resilience and sustainable community development at Urban Resilience Forum in Jakarta

Community Day in Makassar educating residents about operations and maintenance of RISE infrastructure into the future

RISE Symposium in Suva, drawing multi-sectoral support to amplify the program's impacts in Fiji



Pathogen exposure study pilot campaign rolls out in Makassar

RISE showcases at World Health Summit Regional Meeting in Melbourne

Community planting day in Makassar, for wetland functioning and educational empowerment

Milestone ceremony celebrating completion of infrastructure in Makassar

Suva colleagues present RISE's human and environmental health research at Pacific Islands Health Research Symposium in Nadi

RISE hosts World Toilet Day celebrations in Suva with Water Authority of Fiji, Ministry of Health and Medical Services, and UNICEF Pacific to raise awareness of importance of sanitation and health

Jan

Jun

Jul

Dec

DATA COLLECTION CAMPAIGNS

INDONESIA

Mosquito sampling and identification

Children's stool sampling

Health and wellbeing survey

Mosquito sampling and identification

Mosquito sampling and identification

Environmental sampling

DNA extractions of samples from Exposure Study pilot

Pathogens and genomics, and TAC analysis

Environmental sampling

Children's stool, bloods and anthropometry sampling, and health surveys with caregivers

Health and wellbeing survey, and pathogens and genomics

Pathogen exposure study pilot

ISO9001 product quality management system internal audit

Pathogen exposure sampling – full campaign

FIJI

Mosquito sampling and identification

Pathogens and genomics

Mosquito sampling and identification

Children's stool, bloods and anthropometry sampling, and health surveys with caregivers

Pathogen exposure study pilot

Environmental sampling

Puddle sampling pilot

Health and wellbeing survey, with new module on female empowerment

Environmental sampling

Health and wellbeing survey, and pathogens and genomics

Roll out of Albendazole mass drug administration



2. OUR BUILT INFRASTRUCTURE

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Our built infrastructure and co-design approach



Diego Ramirez-Lovering
RISE Program Co-Director
Monash University
Faculty of Art, Design and Architecture

Communities in informal settlements face a range of intersecting challenges that are often hard to see or understand in their totality. These include compounding environmental risks like extreme heat and drought, or flooding and an increase in vectors of disease, exacerbated by overcrowded living conditions and precarious housing that hampers waste management. Unstable employment and subsistence wages also leave little room to address critical issues like lack of sanitation and clean water infrastructure. To address these cascading risks, we must look beyond conventional approaches and embrace new solutions – solutions that can meet basic needs, and help unlock the potential of these growing communities.

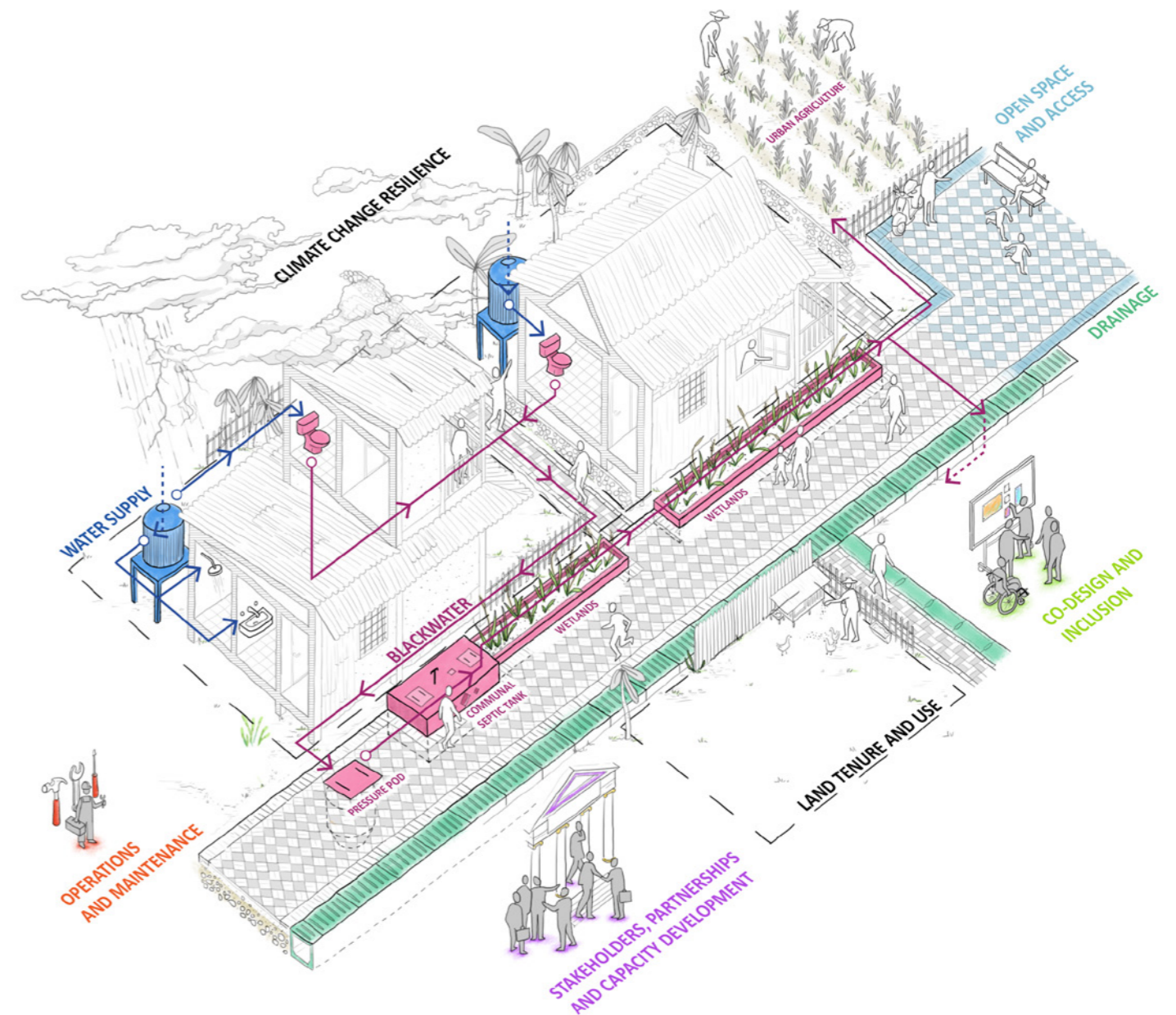
The infrastructure solutions RISE has successfully implemented in two contrasting cities in the Asia-Pacific region demonstrate that such innovation is possible. By combining traditional civil infrastructure with nature-based solutions and smart systems for monitoring water and waste flow, we have shown that transformational change can be made, even in challenging environments. Local materials, used at community-scale, and strong stakeholder support have made this transformation a reality.

Almost 4,000 residents across 776 households in the cities of Makassar, Indonesia and Suva, Fiji, have so far received RISE's unique blend of 'green, grey, and smart' solutions to improve living conditions. This achievement has been made possible through years of community trust-building, stakeholder coordination, and flexible implementation.

The importance of co-designing solutions with residents cannot be overstated. Our teams in Indonesia and Fiji have led deeply participatory co-design programs to create water-sensitive infrastructure tailored to meet each community's unique stressors. Installing new services in high-density areas, where land is scarce, required negotiating complex land agreements. Thanks to the trust built by our teams, we managed to identify and secure land, and coordinate with multiple landowners for constructing new infrastructure.

The results have been transformative. Seeing families' lives improved, while balancing the needs of residents and local authorities has been exhilarating. By adapting systems trialled in developed settings and applying them to informal settlements, we are demonstrating a scalable model that could revolutionise the sector.

Success offers a glimpse into a future where service delivery in informal settlements is both innovative and scalable – paving the way for a new approach to building equitable, liveable cities for years to come.



The main components of RISE's upgrading approach. RISE aims to improve services and resilience through urban infrastructure, addressing social and partnership considerations, and institutionalise the approach for long-term sustainability.

Upgrades in Indonesia

Makassar, the capital of South Sulawesi in Indonesia, is a rapidly growing urban centre. The city's informal settlements, known locally as *kampung*, are primarily located in coastal areas, riverbanks, and around the urban periphery, often in densely-populated neighbourhoods. The settlements are a result of rapid urbanisation and a growing population that the city's formal planning infrastructure has struggled to keep up with.

Makassar's informal settlement residents typically lack adequate sanitation, waste management, and access to clean water, leading to significant health and environmental risks.

“ In front of my house, the conditions were impossible. In the past if it rained for even one day, the water would stagnate in front of the house, and it would take three to five days before the water receded. Since RISE, thank God, the water is no longer stagnant even though it rains heavily... it flows into the drainage.

– Makassar resident




WHAT HAVE WE DESIGNED AND BUILT?


1,300 residents across

290 households benefiting from:

32 wetlands 

53 new toilets 

103 repaired existing toilets

33 septic tanks 

304 rainwater tanks

66 pressure tanks and OneBox® systems

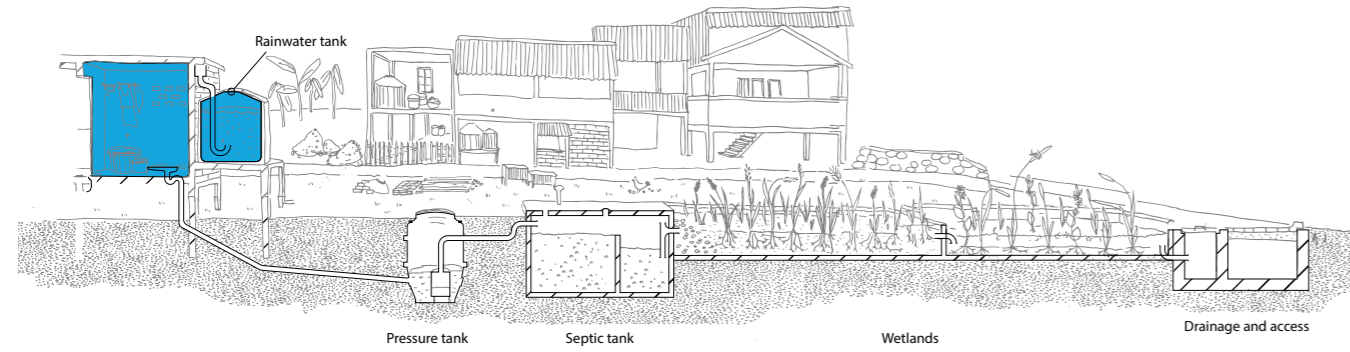
4,872 m drainage 

2,983 m² paved pathway

PRIVATE TOILET FACILITIES AND RAINWATER TANKS

Many residents either didn't have a toilet, were sharing a toilet with another house or family, or their existing toilets were failing to meet hygiene standards. Repaired and new private toilets are now providing household sanitation, located above flood level to prevent floodwaters from entering and contaminating the system.

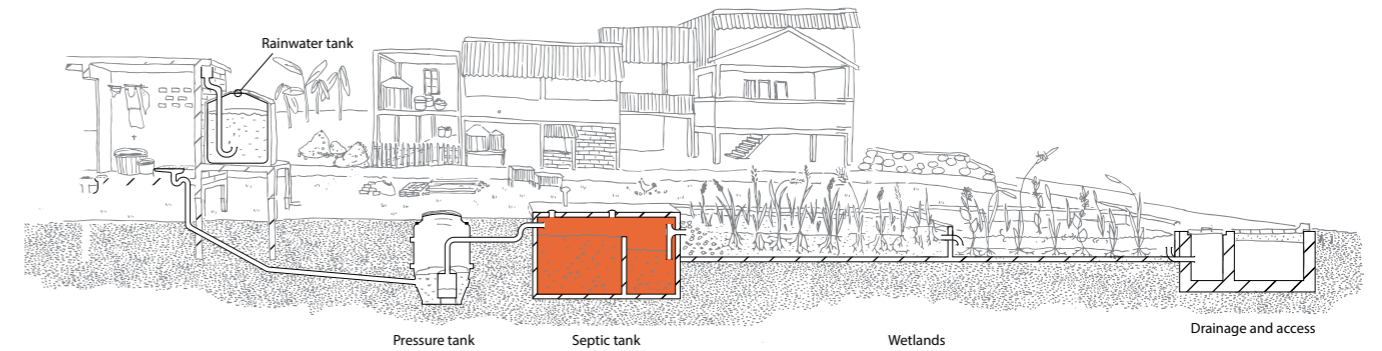
Rainwater tanks are also playing an important role in diversifying water supply options for households to increase climate resilience during periods of water scarcity.





SEPTIC TANKS

Homemade septic tanks or pit latrines in Makassar are usually built with holes at the bottom, allowing wastewater to flow out into the surrounding soil and groundwater. New communal septic tanks are fully sealed and adhere to national design standards, providing primary sewerage treatment to prevent contamination of groundwater.



“ Some septic tanks in the Makassar RISE settlements feature colourful diamond-shaped patterns, symbolising Sulapa Appa – a philosophy deeply rooted in Makassarese and Buginese cultures, which represents the universe's elements of wind, fire, water and earth.

We worked with the residents to integrate local cultural symbols into the infrastructure – to honour tradition, respect ethnic minorities and reconnect youth with their heritage. We wanted to ensure that the systems reflect local identity, while fulfilling functional needs.

- Nur Intan Putri
Build Project Coordinator

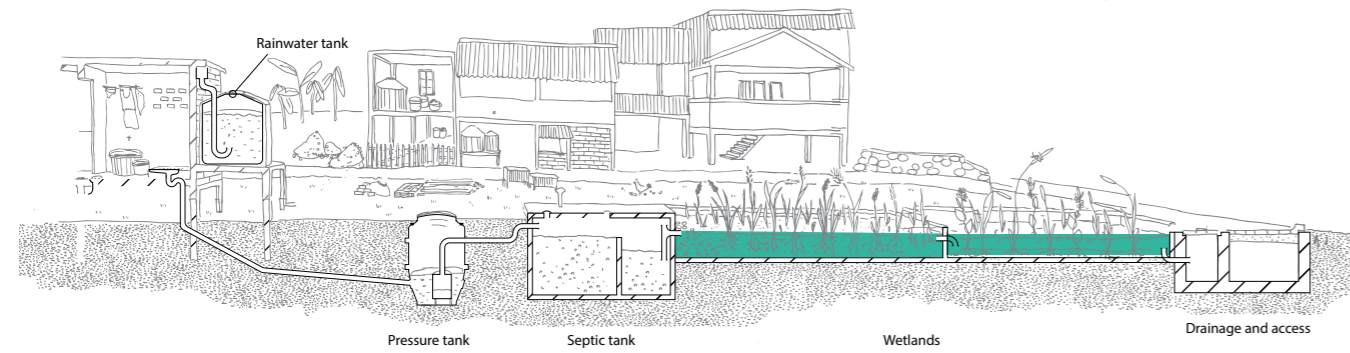
CONSTRUCTED WETLANDS

From septic tanks, wastewater flows through to constructed wetlands. These nature-based systems treat wastewater using natural filtration processes, where plants and gravel filter out contaminants, and treated water can be safely released into the environment.

Our wetlands are designed to be fully sub-surface, with water flowing beneath the surface of soil and gravel media. This minimises the risk of community exposure to wastewater, mosquito breeding, and the mobilisation of waste during flooding events.

Each set of wetlands differs in size, depending on the number of homes being serviced, and location, to best integrate into available community space.

Residents have been coming together to prune and maintain plants in the newly built wetlands. This collective effort and pride in keeping the environment clean highlights the importance of working hand-in-hand with communities for their buy-in and sense of ownership.



PAVED PATHWAYS AND DRAINAGE

Floodwaters spread contaminated soil and water, which can lead to poor health outcomes. RISE has built drainage systems and paved pathways to limit exposure to floodwaters and improve living conditions.

“ The children would be exposed to the pollution while playing. That was the negative impact. Now it's good because there is storage for the wastewater to go to, so it's managed.

– Makassar resident



Residents in one community identified that a clothesline would be beneficial as part of the community upgrades. This retractable drying solution enhancing use of community space is a simple yet significant outcome of the co-design process.

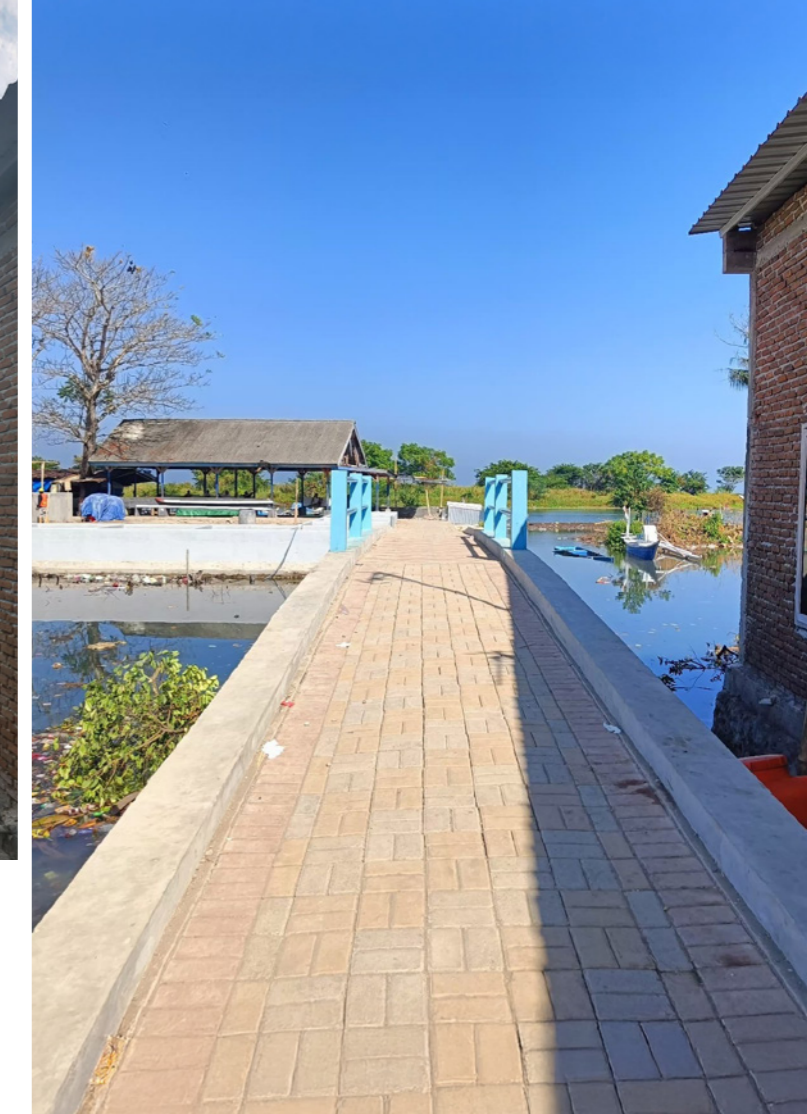




Creative landscaping with outdoor benches and a swing set is improving public amenity and activating space.



Village fishermen had been using an ageing bridge to transport fish in and out of their community. In order to transport materials to build wetlands, RISE upgraded the access bridge. While the wetlands are now treating community wastewater, the improved bridge will be a lasting piece of infrastructure enhancing transport and local trade.



Upgrades in Fiji

Suva, Fiji's capital, is the country's largest urban centre, and growing rapidly. Nearly one-quarter of Fiji's urban residents live in informal settlements, which are expanding in both number and density.

Land for housing is limited, and supply is not keeping up with demand. As a result, many settlements lack essential services: councils are attempting to extend support despite no rate collection, but the lack of a formal regulatory pathway due to informality is preventing connections to central sewage networks.

With many urban dwellers settling in flood-prone areas, residents are facing serious environmental and health risks due to inadequate sanitation, poor drainage, seasonal flooding, and challenging and unsafe access to homes.

“Ours is a village set-up, but we had never truly worked as a village until our wetland was built. It has enabled us to engage in communal activities, such as cleaning the wetland space together.”

- Suva community leader





UPGRADES TO-DATE (EXPECTED COMPLETION: 2025)

2,606 residents across

486 households benefitting from:


4 wetlands 

17 new toilets 

3 septic tanks 

16 rainwater tanks

68 pressure tanks

11 OneBox systems 

1,740m drainage 

753m paved and gravel pathways

COMMUNITIES WORKING TOGETHER



“ *Solesolevaki* is the Fijian tradition of working together in unity, where everyone comes together to accomplish a task.

We embraced this tradition of joining forces as a community to establish wetlands in one of our communities. Men, women, young and old, united to harvest, clean, sort, and plant the wetlands, embodying the spirit of collective effort. The activity strengthened community bonds, support for the RISE program, and points us in the direction of success and sustainability of the project.

- Alex Wilson
Senior Environment & Systems Sustainability Officer





CLIMATE RESILIENCE

RISE's upgrades have been co-designed and constructed to meet each community's unique water and sanitation stressors. One community in Suva is particularly badly affected by flooding during heavy rainfall, especially during king tides, due to its low-lying position next to a large, tidally-influenced river. After heavy rains, residents and children are forced to wade through contaminated floodwaters, blocking access to homes and restricting the ability to leave the neighbourhood for work and school.

In this community, RISE has built timber boardwalks raised above flood levels identified by the community. These boardwalks are lifting residents out of contaminated water in an effort to reduce exposure to faecal contamination and improve liveability.

“ Now that RISE has built boardwalks, I no longer have to carry a bucket of water to the road to wash my feet before getting on the school bus or a taxi. I'm so grateful that the boardwalk extends from my doorstep to the road — no more worrying about mud or dirty water.

– Youth from Suva settlement

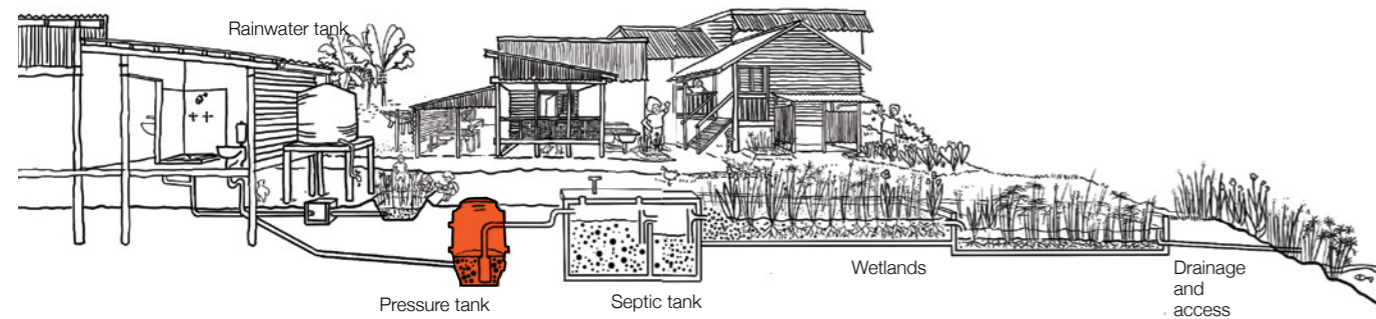


PRESSURE TANKS AND ONEBOX® SYSTEMS

Some settlements are located on low-lying terrain where sewage cannot flow easily, and can sit stagnant around homes. Pressure tanks pump sewage away from homes, transporting it to a communal septic tank for treatment. This process is monitored by OneBox® systems: these smart control systems regulate wastewater flow, optimise treatment performance, and provide real-time data for maintenance and management. RISE is running training with residents and local authorities on the operation and maintenance of these smart systems.



RISE staff identify and troubleshoot system issues, providing on-site training to residents and local authorities to ensure they have the skills to operate and maintain the systems for long-term sustainability.



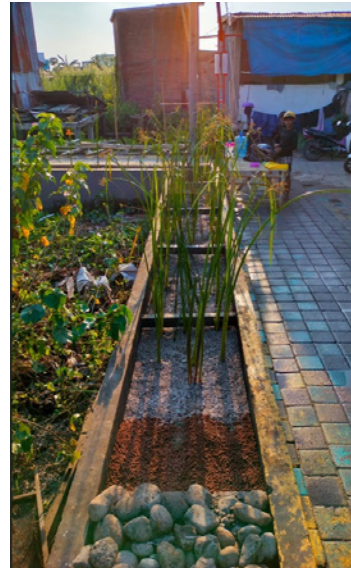
RISE Systems Sustainability Manager Meagan Zoing with Eamon Casey from Iota Services. Iota's smart OneBox® systems help convey wastewater to a wetland treatment system or the nearest sewer pump station.

Demonstration projects

The communities of Batua in Makassar, and Tamavua-i-Wai in Suva, were the very first settlements to be upgraded with RISE's water-sensitive systems.

Upgraded in 2019 and 2022 respectively, our teams remain engaged with the two communities, taking lessons about how green, grey and smart solutions function in informal settlements, and community engagement strategies. All of this continues to inform the way we work with our communities in Makassar and Suva.

BATUA, MAKASSAR



TRIALLING NEW INNOVATIONS

In 2024, team members trialled the installation of expanded clay balls in Batua's wetland system, replacing traditional washed river gravel. The use of clay balls, a more environmentally friendly alternative to traditional materials, seeks to prevent mosquito breeding by keeping water beneath the clay balls (sub-surface), and are more sustainable than traditional wetland media, aligning with broader conservation efforts.

SUPPORTING COMMUNITIES TO BECOME ASSET OWNERS

Batua is the first site to have run collaborative programs with residents and local authorities to ensure sustainability of new infrastructure. Our teams have worked closely with residents on best practice maintenance, sharing local knowledge, and exploring strategies like monthly contributions for system upkeep – and taking these engagement experiences forward when working with our other communities.



TAMAVUA-I-WAI, SUVA



MAKING USABLE PUBLIC SPACES

Tamavua-i-Wai's wetlands are providing benefits beyond wastewater treatment: the surrounding areas now serve as playgrounds and communal areas for gatherings like birthdays and weddings. Previously waterlogged, the wetland area remains mostly dry since the infrastructure was established, improving community access. Residents are maintaining the wetlands, pruning and clearing weeds to ensure their continued use and sustainability.



CREATIVE MESSAGING: CARING FOR SYSTEMS

Suva's Community Engagement Team has utilised creative tools to raise awareness amongst Tamavua-i-Wai residents on the importance of taking care of new wastewater systems. To reinforce conversations that taking care of wastewater systems begins at home, 'Do not flush' stickers have been distributed for people to put on their toilets as a reminder.





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Our transdisciplinary research



Karin Leder
RISE Program Co-Director
Monash University
School of Public Health and Preventive Medicine
Faculty of Medicine, Nursing and Health Sciences

Universities and researchers have a role in understanding and providing ideas and solutions to respond to the challenges society faces. While science has made significant contributions, there is a golden opportunity for it to evolve, to bring about transformative societal change.

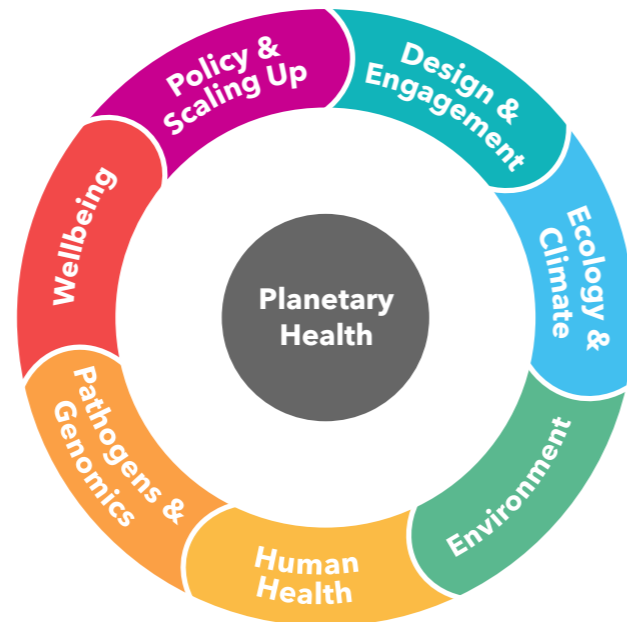
At RISE, our commitment to research excellence has kept our focus laser sharp on the primary research question we originally set out to explore: *Can water-sensitive infrastructure reduce exposure to faecal contamination and improve health in urban informal settlements?*

At the same time, I'm incredibly proud of the new methods we have developed to generate evidence that is applicable to real-world scenarios, and addresses the challenges communities are facing. Drawing on nearly a decade of experience working with informal settlement communities in two countries, RISE has created a fit-for-purpose approach to empirically test the impacts of practical, contextualised, and community-prioritised interventions.

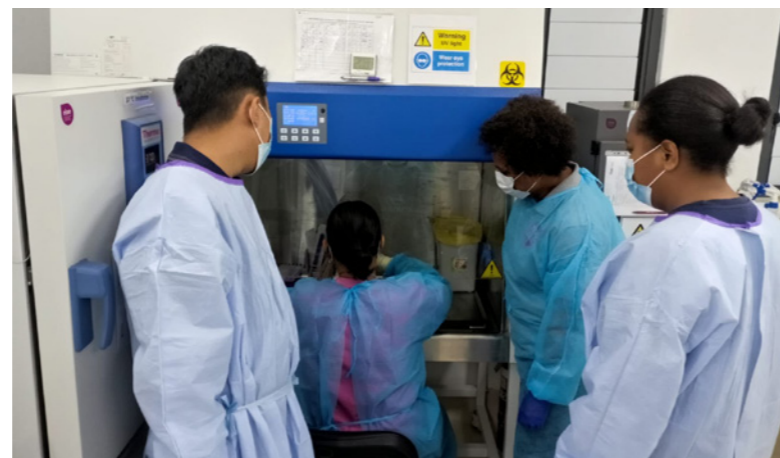
This year, operationalising our genomics pipeline marked a critical milestone, allowing us to analyse pathogen results that are central to understanding intersections between environmental and human health. Our pathogen exposure sub-study, funded by Australia's National Health and Medical Research Council, has expanded our focus to incorporate a more holistic view that now includes both indoor and outdoor environments. This integrated perspective will deepen our understanding of contamination sources and their impacts on health and wellbeing outcomes.

The water and sanitation infrastructure we have built is now not only servicing families in informal settlements in Makassar, but completing the infrastructure has ushered in RISE's next phase of post-intervention monitoring – a critical point in our randomised control trial (RCT) timeline. Ongoing monitoring will generate invaluable insights into the effectiveness of these systems.

Convening experts from diverse disciplines has allowed us to bring different perspectives to the complex challenges facing informal settlements. Our transdisciplinary, multi-faceted approach avoids siloed thinking by bringing in researchers, local community engagement teams, and government partners.



RISE is an exemplar program that shows it is possible to balance rigorous science with action-research and real-life complexities. While not every aspect of our program will unfold as originally planned, impactful science requires flexibility and a willingness to carve new paths, paving the way for solutions that can make a material difference in peoples' lives.



Andi Zulkifli Agussalim (left) travelled from Indonesia to share pathogen and genomics learnings with the Fiji Lab team Reema Kumar, Silvia Vilsoni and Vinaina Waqa.



“ Our purpose-built laboratory at the College of Medicine, Nursing and Health Sciences trains scientists in advanced analytical techniques for environmental and human health. This laboratory, along with the skilled staff RISE is producing, will be lasting legacies for both Fiji National University and the country.

- Donald Wilson
Associate Dean, Research, College of Medicine, Nursing and Health Sciences, Fiji National University



“ RISE is a leading example of Hasanuddin University's commitment to impactful research, community engagement and international collaboration for change. The program reflects our shared commitment to address urbanisation and climate change challenges through cutting-edge planetary health research to benefit the most at-risk communities.

- Jamaluddin Jompa
Rector, Hasanuddin University

Pictured: Senior Field Research Assistant Jonati Kitekitoga collects water samples in Fiji.



Design and engagement



Diego Ramirez-Lovering
RISE Program Co-Director
Monash University
Faculty of Art, Design and Architecture

Informal settlements, home to 15 per cent of the total world population, are growing rapidly. By 2050, it is projected that the percentage will double to 30 per cent. These communities face intersecting challenges like overcrowding, poor sanitation, limited access to services, and extreme poverty, exacerbating social inequities and health risks, while hindering economic opportunities and perpetuating cycles of poverty.

For water and sanitation infrastructure projects to bring about lasting change, understanding the challenges, and then creating solutions must be done together with communities with diverse perspectives and lived experience.

“ RISE seeks to deeply understand ways of living, then design holistic infrastructure that is community-driven, all supported by strong partnerships with local governments and authorities.

Our Design and engagement team is producing evidence to codify our approach.

One of our studies in Fiji highlights current community-driven strategies in managing climate risks, like flood adaptation. We find that residents have developed 240 unique strategies, demonstrating resilience, despite limited resources. Effective adaptation relies on local knowledge, social networks, and institutional support, with external interventions needing to be flexible and responsive.

In another study in Indonesia, we used citizen science to engage our partner communities in flood monitoring, with

residents sharing more than 5,000 photos. This approach highlighted the value of local knowledge, and the need to re-shape relationships between scientists and communities. It demonstrated how participatory flood monitoring empowers people, fosters collaboration, and contributes to effective environmental solutions.

Our findings show that programs should advocate for diverse participation and empower communities to self-organise. With our water and sanitation infrastructure now built in Indonesia and progressing in Fiji, our operation and maintenance (O&M) strategy focuses on inclusion, strong partnerships with local authorities, and a clear handover of responsibilities.

The success of community infrastructure depends on effective asset handover to local government or other responsible authorities. RISE is facilitating this with extensive training and legal documentation to ensure long-term system maintenance and shared understanding.

Resident involvement is key, with roles for maintaining sanitation systems nominated through community consensus, and our teams providing training in environmental sanitation management to all members. Community gatherings, meetings, applied learning on-site, and communal reflection is helping to align responsibilities.

These findings and more to come can unlock the potential for more effective water and sanitation projects when community-driven, participatory approaches are prioritised. By integrating local knowledge, fostering partnerships, and empowering residents to take ownership, projects can address the unique needs of at-risk communities, ensuring sustainable, context-specific solutions that improve resilience and long-term outcomes.



RESEARCH HIGHLIGHT

Building ownership: the role of communities and authorities in maintaining RISE sanitation systems

By Nur Intan Putri, Noor Ilhamsyah and Annisa Fildza Shaffira

As our infrastructure in Makassar's informal settlements transitions to the maintenance phase, this marks a new chapter of collaboration between our communities and local authorities. This phase is critical, as the sustainability of the RISE systems depend on the ongoing involvement of both groups.

Community members and local authorities play distinct but equally important roles in maintaining the infrastructure. While communities are the primary beneficiaries, local authorities provide vital policy support. As responsibility from RISE is handed over, ensuring the long-term functionality of the sanitation systems requires both groups to take ownership and work together on sustainability.

Our team's operations and maintenance (O&M) activities are designed to keep the infrastructure functioning well and prevent damage. Our key focus is empowering residents to incorporate best practices into their daily routines – and learn from their experiences as well. For example, in maintaining constructed wetlands, residents have shared insights on plant pruning and using clippings for compost.

Similarly, residents are helping prevent pipe blockages by avoiding the disposal of harmful items like plastic waste, wet wipes, and hair, which can obstruct pressure tanks. Our team complements this local knowledge by

advising against over-use of chemical cleaners, which can harm wetland plants.

Collective responsibility is vital for maintenance. Residents are discussing potential strategies like organising monthly contributions to cover electricity costs for pressure tanks and desludging septic tanks. Local authorities, such as the Public Works Department, are also learning how to monitor key infrastructure components and manage repairs effectively.

Empowering communities to take responsibility takes time. Our O&M engagement program started with activities like transect walks and community wetland planting to create strong memories for residents about the infrastructure connected to their homes.

Big gatherings and cluster meetings followed, which combined discussions, reflections, hands-on practise, and competitions for various age groups to make the experience fun and inclusive.

The involvement of *KePoLink* (Community Engagement Council) members and community champions has been crucial, helping manage events to ensure widespread participation.

Creative tools like illustrations, presentations and booklets were developed and tested based on community behaviour, and short videos featuring local influencers raised awareness about the benefits of the RISE systems.

Inclusive involvement at every stage – from planning, to construction, and ongoing maintenance – is essential for long-term sustainability. When communities take ownership, projects are more likely to thrive and overcome challenges, ensuring long-term success.



Residents help fill a wetland with plants, as part of RISE's Community Planting Day. Photo: Adrianto Hidayat.

RESEARCH HIGHLIGHT

Community empowerment through citizen science flood monitoring in Makassar, Indonesia

By Erich Wolff

Rapid urbanisation, inadequate drainage systems, and the city's low-lying coastal geography make floods a major challenge in Makassar, Indonesia. A new approach through the RISE program is putting communities at the centre of shaping solutions.

Citizen science is an innovative way of studying floods through meaningful partnerships. We conducted a community-centred flood-monitoring project within RISE that shows how we can reshape the relationship between scientists and society.

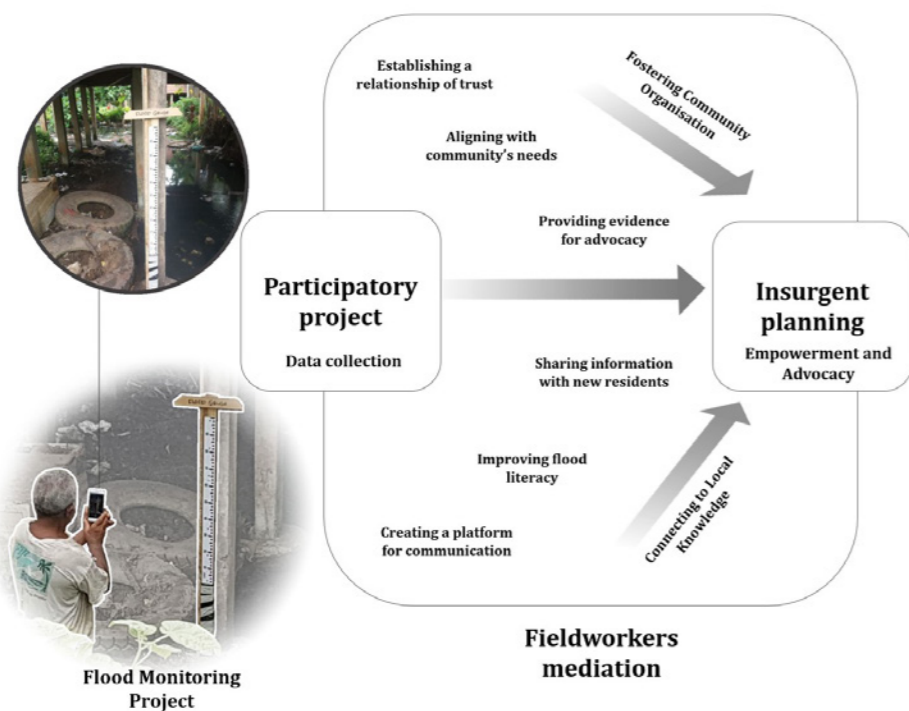
When RISE began in 2017, the environment in most of the informal settlements participating in the program was unstudied, making it challenging to design constructed wetlands for treating wastewater. Recognising the value of local knowledge and experience, the team partnered with community members to map floods and understand how the residents of Makassar interact with water. Between 2018 and 2020, residents captured over 5,000 photos of floods, providing valuable insights for scientists and engineers.

This collaborative experiment was facilitated by the strong bonds between RISE fieldworkers and communities. In addition to generating critical data, the project revealed how citizen science can be a platform for bonding and sharing knowledge, enabling communities to contribute to shaping solutions for their environments. The project also allowed us to reimagine the role of citizens in increasingly connected, digital cities.

These experiences showed us that participatory flood monitoring can not only be an accessible and engaging way of doing research, but also an opportunity to give voice to communities, creating opportunities for empowerment and collaborative knowledge production.

Wolff, E., Prescott, M., Ramirez-Lovering, D. From data collection to citizenship: Insurgent planning in a citizen science flood-monitoring project in Makassar, Indonesia. *Insurgent Planning Practice* (2024). [Link](#).

Wolff, E., French, M., Ilhamsyah, N., et al. Collaborating with Communities: Citizen Science Flood Monitoring in Urban Informal Settlements. *Urban Planning* 6(4), (2021). [Link](#).



Citizen science can serve as a pathway for insurgent planning practices by fostering community organisation, connecting to local knowledge, providing evidence, and operating as a platform for sharing information.

RESEARCH HIGHLIGHT

Local voices key to shape flood adaptation strategies in Pacific informal settlements

By Hannah Pennington (née Turner)

Community-driven strategies are critical to manage climate risks in urban informal settlements, yet they are often overlooked in policy decisions. Our study aims to fill a gap in research and funding models that often prioritise external solutions over locally relevant ones.

Some approaches to managing floods include using local social networks, strengthening community programs, and improving access to financial and institutional support.

Our research looked at how under-served communities in urban informal settlements in the Pacific are adapting to increasing climate risks, especially flooding – an area that has, to-date, been under-studied. We focused on how local communities are responding to these challenges, by amplifying their voices and needs.

By doing so, we aim to overcome the limitations of top-down strategies, which often ignore local knowledge and the deeper issues affecting adaptation.

Our research used a community-driven approach called photovoice, where residents captured their experiences and identified local needs. We found that residents of informal settlements in Fiji have developed 240 unique flood adaptation strategies and identified local needs.

This shows their creativity and resilience, even with

limited financial and political resources. We found that the ability to adapt is mostly shaped by the availability of resources, social networks, and support from institutions. Permanent solutions tend to be the most effective, but are often limited by financial constraints.

Residents' ability to organise themselves and implement flood protection measures is impressive. However, external support needs to be flexible and responsive to local dynamics, with local voices leading the adaptation efforts. Interventions should avoid being top-down or paternalistic – where one group, often in a position of power or authority, makes decisions for others – as these can undermine community-driven solutions.

The next steps for this research include assessing the long-term effectiveness of community-led flood strategies, and exploring how external institutions can support, rather than direct, these efforts.

Future research should focus on developing funding models that allow for flexible, community-driven approaches, and preventing paternalism in adaptation programs.

There is also potential to include local and Indigenous knowledge in wider climate adaptation strategies, to ensure they are both inclusive and context-specific.

Pennington, H., Rogers, B., Kneebone, S., et al. Nothing about us without us: harnessing local voices in shaping community-based adaptation in the Pacific. *Sustainability Science* (2025). [Link](#).



Ecology and climate



Steven Chown
Monash University
Faculty of Science

Over the course of the year, the Ecology and Environment teams, in collaboration with RISE members across the board, have unveiled several new findings that go to the heart of the integrated RISE approach.

First among these is a demonstration of how bats use the urban and peri-urban environments of Makassar, Indonesia. Using data from our ultrasonic passive acoustic recorders, Genie Fleming and her team demonstrated quite different sensitivity to the landscape across the city, with several species being sensitive to the urban core. Bats are especially sensitive to tree cover and inland water. Upgrades incorporating diverse green and blue spaces have the potential to enhance suitability of urban zones for both bats and for people. These microbats have important ecological roles because they feed largely on insects. Thus, nature-based solutions, which harness the ecological services provided by bats, are a reality for the kinds of changes being implemented to improve livelihoods in the urban core, especially in informal settlement settings.

Second, how these solutions interact with everyone's daily lives also came to the fore in our work analysing mosquito populations. The study, now under review, and again involving a sweep of capable RISE members, has illustrated how important environmental temperature, water sources, and water storage practices are for mosquito vectors. Critically, the ways in which these factors affect mosquito populations vary across environments, emphasising the importance of local context for broader interventions. This work should be available in 2025.

Third, Emma Ramsay, now at Nanyang Technological University in Singapore, delivered a critical piece of work with colleagues showing that humid heat stress has been overlooked for urban informal settlements because of the way in which meteorological observations are routinely undertaken.

“ Current data underestimates humid heat stress impacts on informal settlement residents because the extent of that stress is underestimated.

Luckily, implementation of cost-effective sensors in local settings can help to manage the risk of humid heat stress downwards. As climate change continues, with significant humid heat stress events expected, such monitoring will become critical, especially if used for early warning systems conveying adequate warnings and alert times to people in cities.

The Ecology and Environment teams are providing the kind of evidence that can lead to the improvement of life in cities, especially in informal settlements that have such high exposure to environmental stress. In essence, demonstrating ways in which people and nature can co-exist to each other's benefit, even in the heart of our cities.



Field Research Assistant Oni Lewakulati sets a BG trap in a home in Fiji to collect mosquitoes for laboratory analysis.

RESEARCH HIGHLIGHT

Sensitivity of insect-eating bats to urbanisation, and implications for sustainable development

By Genie Fleming

The island of Sulawesi in Indonesia is considered a global biodiversity hotspot hosting an incredible array of mammal species. This includes bats, which provide essential ecosystem services ranging from fruit pollination to insect control.

Over the past two decades, urban areas have dramatically expanded around Sulawesi's most populous city, Makassar, and growth is expected to continue. Rapid urban expansion is often associated with an increase in informal settlements bordering undeveloped land, and could pose a threat to Sulawesi's unique wildlife. Yet we do not know enough about how Indonesian bats respond to urbanisation to help us plan adequate conservation strategies.

Our paper examines foraging activity of different kinds of insect-eating bats around informal settlements in Makassar. We looked at whether the amount of urban foraging activity of different types of bats varied based on where and how the bats typically search for food, as well as in response to particular features of the urbanised landscape.

Similar to other parts of the world, we found bats that typically forage among tree canopies within forests generally had much lower foraging activity in the more densely built-up part of the city compared to bats that forage in open air or along the edges of forests. Nonetheless, even these 'urban-sensitive' bats were still able to use urban habitat, depending on a combination of landscape- and local-scale features, such as the extent of permanent waterways and abundance of trees.

Our findings suggest nature-based upgrading of informal settlements incorporating diverse green and blue spaces has the potential to aid bat conservation, particularly where settlements exist along wildlife movement corridors and planning is coordinated across a broad area. Such development practices could satisfy the dual aspirations of planetary health by improving living conditions for vulnerable urban dwellers, while also contributing to nature preservation.

Fleming, G., Ramsay, E., *et al.* Sensitivity of insectivorous bat foraging guilds to urbanization and implications for sustainable development. *Global Ecology and Conservation*, 51 (2024). [Link](#).



A Whiskered Myotis bat roosts in rolled up banana leaves. Photo: EcologyAsia.com.

RESEARCH HIGHLIGHT

Humid heat stress overlooked for one billion people in urban informal settlements

By Emma Ramsay

As cities expand, so does the relentless march of urban heat islands, especially in informal settlements often overlooked in heat analyses. Myself and a team from Monash University's Faculty of Science and Nanyang Technological University, have uncovered a critical discrepancy in the assessment of humid heat stress in tropical urban informal settlements. Global weather station networks underestimate the severity of humid heat stress, which leaves these vulnerable communities ill-prepared to tackle the escalating health and wellbeing challenges associated with rising temperatures.

Humid heat stress impacts all aspects of our health, wellbeing and economic livelihoods. The sparse distribution of weather stations across the tropics means that we rarely capture local heat stress exposure, especially in cities which tend to be hotter due to the urban heat island.

To fill this crucial gap, our team synthesised data from seven studies conducted across the tropics, including the RISE heat monitoring from Suva and Makassar, showcasing that the heat and humidity experienced in

informal settlements surpasses measurements recorded at the nearest weather stations.

Findings show there is a need for local heat stress monitoring, particularly in tropical cities, where informal settlements bear the brunt of extreme conditions. The study advocates for coordinated efforts to expand monitoring networks, emphasising the inclusion of informal settlements in climate monitoring and adaptation strategies. The findings underscore the importance of nature-based solutions to mitigate urban temperatures and early-warning systems to empower residents to prepare for extreme heat events.

Moving forward, we need to ensure that informal settlements are not left behind in climate adaptation efforts. More support is needed for national meteorological institutes in developing countries to enhance monitoring infrastructure.

The ultimate goal is to bridge the gap in understanding and addressing heat stress, thereby safeguarding the wellbeing of vulnerable communities in the face of a warming world.

Ramsay, E., Hamel, P., Chown, S., *et al.* Humid heat stress overlooked for one billion people in urban informal settlements. *One Earth* 7 (2024). [Link](#).



Environment



Brandon Winfrey
Monash University
Faculty of Engineering

We are uncovering critical insights into the underlying factors driving environmental contamination in informal settlements.

The Environment team has continued our baseline monitoring program in 2024, evaluating water and soil contamination in informal settlements. Having collected over 4,000 samples since the start of RISE, we are mapping water and soil quality in communities, and gaining deeper insights into the patterns driving faecal contamination.

Our data reveal complex contamination patterns. Water samples from household wells consistently show contamination levels above recommended guidelines, with significant variability both within and across communities. In contrast, soil faecal contamination levels were more stable and consistently high.

We're seeing hints that soil might be a persistent source of faecal contamination, potentially released through rainfall runoff. While the exact relationship between precipitation and water contamination remains unclear, these initial observations may point to some fascinating environmental and social dynamics.

Our team refined its monitoring strategy in 2024, carefully reassessing sampling locations to ensure they accurately represent environmental contamination in communities where RISE's new water and sanitation infrastructure interventions have been constructed. Our fieldworkers move along transects, recording data at various points along a line to observe patterns or changes in the environment. In some locations, our soil sampling transects are now taking place on new paved footpaths constructed by RISE – areas that were once dirt paths. Examining these same locations will provide useful insights into the impacts of this relatively simple intervention on faecal contamination and exposure pathways.

As we move into the post-construction phase of RISE, we're curious to see how infrastructure improvements might impact environmental quality. Community-scale footpaths and drainage, as well as household toilets connected into wastewater systems, offer real potential for meaningful change.

Our upcoming research will test whether these interventions can meaningfully reduce contamination in soil and water samples.

“ Consistently high soil contamination levels underscore the need for targeted interventions. Improved drainage and surface treatments could be key to reducing environmental health risks in these communities.



Laboratory Scientist Revoni Vamosi conducts microbial assessment of water samples in Fiji.

RESEARCH HIGHLIGHT

Boot sock sampling: a promising technique for estimating *E. coli* in soil in informal settlements

By Lamiya Bata

Soil can pose a significant risk to human health, particularly in areas with high environmental contamination, such as informal settlements. But accurately gauging contamination levels and associated health risks is challenging due to the limitations of current standard methods, which often focus on specific spots, and fail to provide a comprehensive picture. These methods overlook the broader distribution of pathogens in soil, making it difficult to fully understand the extent of contamination, and its impact on public health.

To address this gap, we tested the boot sock sampling method – where RISE community fieldworkers wore fabric boot socks over their shoes. This method is designed to cover more ground, and collect a composite sample of surface soils. It offers a more comprehensive view of contamination levels, and as a result, better reflects the way humans interact with contaminated

environments in real-world settings.

Our key finding was that the boot sock method provided more sensitive detection of *E. coli* and showed less variation between samples, making it a more efficient tool for assessing health risks. The approach also requires fewer samples to achieve adequate spatial coverage compared to traditional methods, offering potential improvements in time and cost efficiencies.

Further applications of this research could involve using the boot sock technique to study other pathogens and environments, improving its application in public health risk assessments.

Next steps may include adapting this method for broader use in diverse settings, like indoor environments, and expanding its application to guide interventions in high-risk areas with limited sanitation infrastructure.

Bata, L., Henry, R., Boyce, J., *et al.* Assessing *E. coli* levels in surface soils of informal settlements using boot sock and standard grab methods. *Science Advances* (2025). [Link](#).



Field Research Assistant Syaidah Syamsul conducts boot sock sampling in an informal settlement in Makassar, Indonesia.

Human health



Stephen Luby
Stanford University
Woods Institute for the Environment

RISE is well-placed to generate transformative evidence on the effects of water and sanitation infrastructure on community health and wellbeing in informal settlements.

Over the course of this year, the human health team has seen increasing evidence of a high prevalence of pathogen infection among children in the RISE informal settlement communities. We see many of the same organisms in the environment, suggesting a strong connection between environmental contamination and human infection. Residents face high levels of environmental contamination with human and animal faeces and intermittent flooding.

The sanitary revolution, which largely eliminated human faecal contamination of communities in high-income countries in the late 19th and early in the 20th century, has not arrived in informal settlements, nor to other low-income urban communities globally.

Beginning in the 1980s an increasing concern with cost-effectiveness and the difficulty of evaluating the health benefits of community-level infrastructure interventions moved health and development funding away from community-level infrastructure interventions, and towards household-level interventions. Although these household-level interventions are cheaper and easier to evaluate, they do not address community-level environmental stressors.

The community co-designed RISE infrastructure interventions are designed to provide community-level infrastructure to address the major community-level stressors. This infrastructure is a combination of built gray infrastructure (paved pathways and drainage), biologically-based green infrastructure to reduce contamination (wetlands), and social infrastructure to empower communities to improve the environment (education and co-design activities). These combined interventions aim to mitigate exposure to human and animal faeces, and reduce the impacts of flooding in communities.

The RISE project is assessing the impacts of this infrastructure by systematically capturing a broad range of outcomes. The teams in Australia, Fiji and Indonesia are deploying cutting-edge molecular methods to explore pathogen transmission, a key component of human health, as well as antimicrobial resistance – a large and growing threat.

The randomized design of RISE will allow us to confidently attribute changes in community outcomes to the intervention.

RISE is on track to offer a new model of working collaboratively with informal communities to co-develop fit-for-purpose infrastructure that improves health and wellbeing.

“ We are hopeful that the RISE results can catalyze a reconsideration of the broad benefits of investing in community-level infrastructure.



Field Research Assistant Sereana Seavula conducts a health and well-being survey with a resident in Fiji.

RESEARCH HIGHLIGHT

The role of garbage collection in reducing dengue risk in informal settlements

By Joelle Rosser, Audrie Lin and John Openshaw

The growing global problem of diseases spread by the *Aedes aegypti* mosquito, such as dengue, chikungunya, and Zika, is becoming more serious due to urbanization and climate change. Our team's research focused on how local conditions, like poor garbage collection and flooding, can impact the spread of these diseases in urban areas.

One way to measure how diseases are spreading is through acute febrile surveillance, a method which tracks reported cases of fever. However, this method often underestimates the true number of infections because it only captures cases that are reported and correctly diagnosed. This is a problem because diseases like dengue often have symptoms that are not specific, and diagnostic tests are not always available in many medical systems.

Another approach is cross-sectional serology studies, which look for antibodies to viruses in peoples' blood. However, these studies only tell us about past infections and cannot detect recent ones.

To address these gaps, our team used serology tests in young children, as they are more likely to show recent infections in high-risk areas. We tested children under five years-old in informal urban settlements in Makassar, Indonesia, looking for evidence of past infections with dengue, chikungunya, and Zika. By combining data on the presence of antibodies and the average age of infection,

we estimated how many new cases of dengue occur each year in these areas.

Three master's students from Hasanuddin University also took part in the research, learning about arboviruses and practicing laboratory techniques like the ELISA assay, which is used to detect antibodies.

The study's main finding is that regular garbage collection plays a crucial role in protecting young children in informal urban settlements from dengue. The study suggests that community efforts to manage garbage and flooding are key strategies for mitigating the spread of diseases like dengue, chikungunya, and Zika.

This research can help guide future efforts to develop effective interventions for preventing these diseases. It also points to the need for more research into other factors that could influence mosquito populations, such as how local flooding affects mosquito breeding, or how the materials used in housing might reduce the number of mosquitoes indoors.

Further studies are needed to better understand how these local environmental factors can be adjusted to reduce the risk of disease transmission in urban areas.

Rosser, J.I., Openshaw, J.J., Lin, A., *et al.*

Seroprevalence, incidence estimates, and environmental risk factors for dengue, chikungunya, and Zika infection amongst children living in informal urban settlements in Indonesia and Fiji. *BMC Infectious Diseases* 51 (2025). [Link](#).



Photo: Rizkyta Putri.

Pathogens and genomics



Rebekah Henry

Monash University
School of Public Health and Preventive Medicine
Faculty of Medicine, Nursing and Health Sciences

“ RISE is unlocking the potential for transformative health improvements by providing critical insights into pathogen transmission and the effectiveness of interventions.

In 2024, the Pathogens and Genomics team has seen the impacts of our multi-method approach to understanding the complex interplay between human, animal, and environmental health in informal settlements. These settings, home to approximately one billion people globally, face challenges like inadequate access to clean water and sanitation, leading to a high burden of enteric diseases. RISE aims to disrupt disease transmission pathways through water and sanitation interventions, ultimately improving health outcomes.

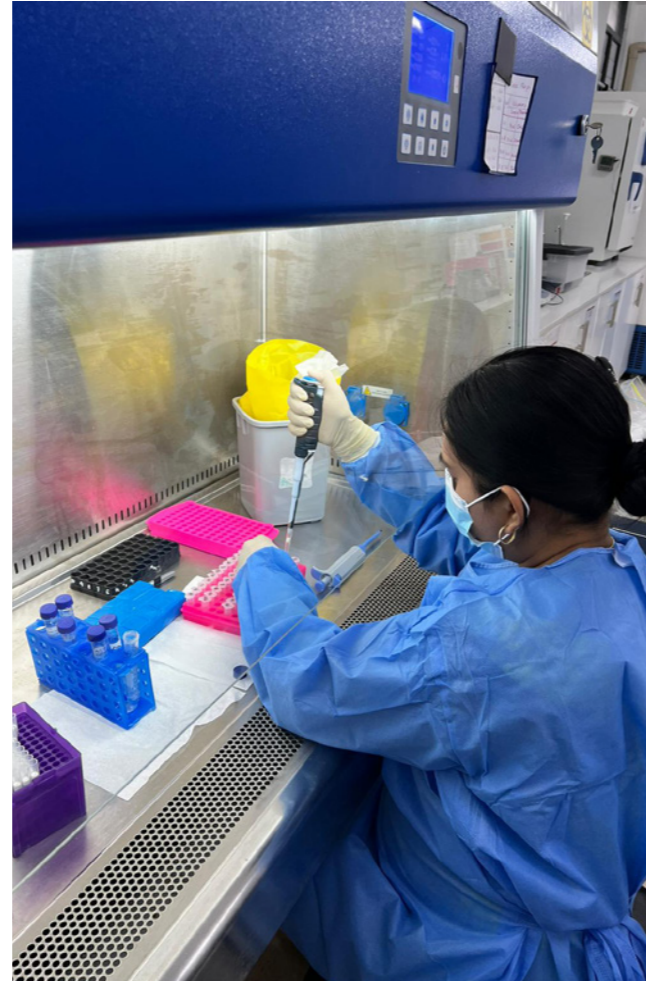
To assess the extent of entero-pathogen abundance within informal settlements, RISE has applied a unique approach that allows us to investigate both pathogens and broader microbial communities using uniform methods for specimens taken from the environment (water, soil and animal faeces) and human stool.

The team has established that the TaqMan Array Card (TAC) method is capable of detecting over 20 pathogens in environmental and human samples, while metagenomics and targeted amplicon sequencing provide valuable insights into the complexity of microbial populations. Oxford Nanopore Technology (ONT) sequencing, in particular, is revealing important information about sub-population of bacteria and antimicrobial resistance, a recognised global health threat.

This research has led to the creation of baseline datasets for Fiji and Indonesia, providing a deep understanding of pathogen presence and microbial diversity. Our team has built, tested and expanded data governance systems, and analysis from R to UNIX-based bioinformatic ecosystems, enabling interdisciplinary collaboration within secure data environments. This allows us to move from single researchers asking isolated questions to a collective effort addressing complex health issues.

In 2025, the team will expand its capabilities with the addition of an ONT sequencer in Fiji, enabling further data analysis in-country. Our forthcoming manuscript will provide baseline observations across RISE communities, offering significant evidence on how interventions can reduce childhood diseases in low- and middle-income countries.

Ultimately, RISE is helping us understand and address the environmental drivers of infectious diseases, making it possible to develop targeted interventions that can improve health outcomes in these under-served populations.



RESEARCH HIGHLIGHT

Improving public health through molecular profiling of pathogens and microbial diversity

By Andi Zulkifli Agussalim

RISE is a multidisciplinary research initiative aimed at understanding and demonstrating that improved community and environmental sanitation can lead to better public health outcomes and reduce harmful microbes in the environment.

We are employing molecular biology techniques, including Taqman Array (TAC) and Next Generation Sequencing (NGS), to detect DNA and RNA (genetic material) from viruses, bacteria, protozoa, and helminths (parasites) that are responsible for diseases in samples from humans and their environments (like water, soil, footprints, and animal faeces).

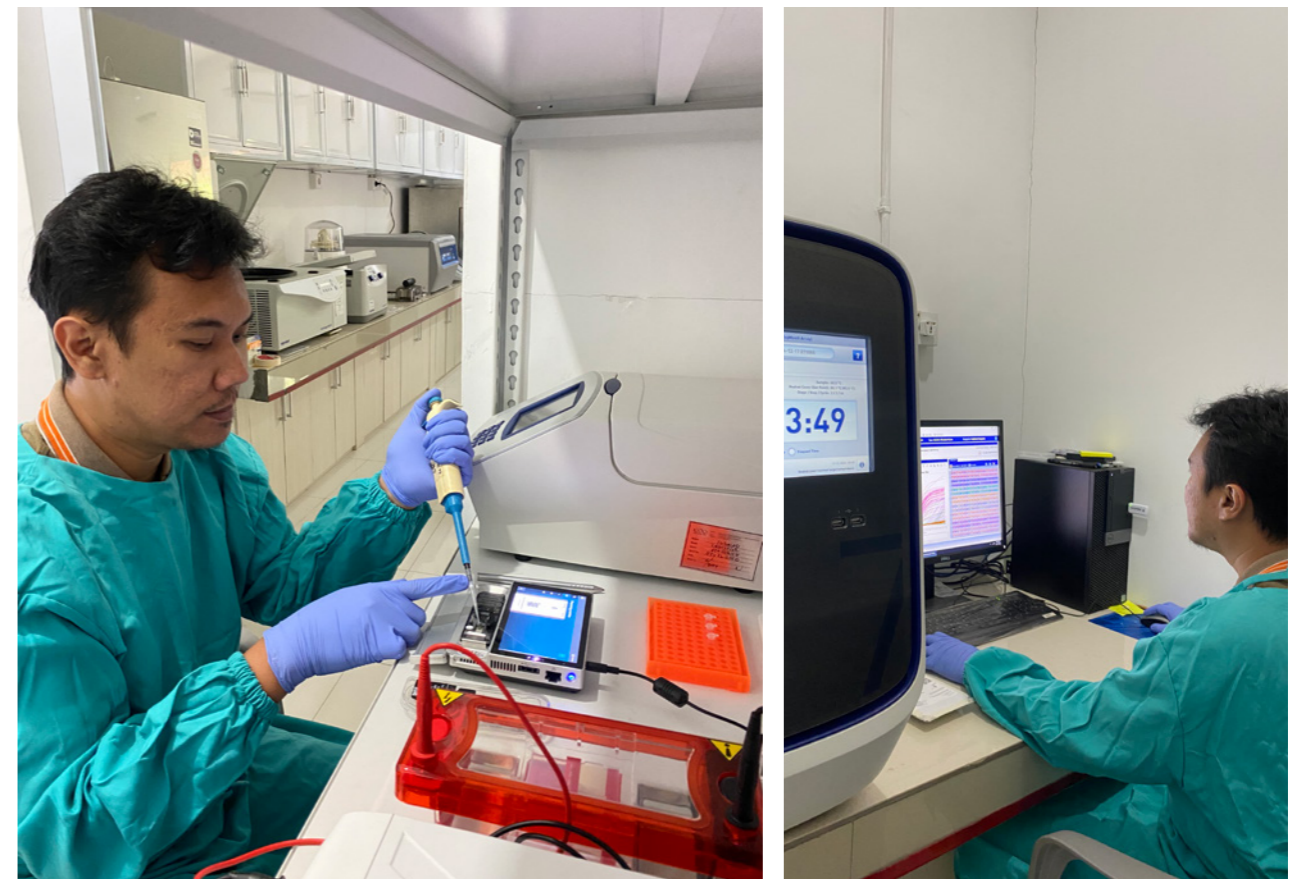
With NGS analysis, we are focusing on profiling specific RNA markers and metagenomes to learn about the diversity of microbes in a sample, without needing to grow the organisms individually. Profiling metagenomes allows us to understand the complexity of microbes that exist in

the sample, and the virulence genes that are active in microbes in the samples.

One challenge we have faced is the limited availability of samples for re-analysis confirmation testing, as well as ensuring the quality of environmental samples. However, we continuously strive to improve our testing methods both in the laboratory and during field sampling to ensure the accuracy of our results.

Our most recent analysis in 2024, which will continue in the coming years, involves metagenomic sequencing using Third Generation sequencing technology from Oxford Nanopore Technology (ONT). This enables us to study bacterial profiles and Antimicrobial Resistance (AMR) genes from humans and their environments. This work is particularly compelling as it allows us to map the types of bacteria, AMR genes, and virulence factors present in these microbes, providing insights into their potential spread and accumulation in human populations and the environment.

Reema Kumar (left) and Andi Zulkifli Agussalim (right) undertake molecular testing of samples in the laboratories in Fiji and Indonesia.



Wellbeing



David Johnston
Monash University
Faculty of Business and Economics



Field Research Assistant and Phlebotomist Abdul Rajab conducts a health and wellbeing survey with a resident in Indonesia.

Extreme heat is an increasing threat to health and wellbeing, particularly in tropical and subtropical regions. In urban informal settlements, this risk is amplified by unique vulnerabilities. The urban heat island effect causes temperatures in these areas to exceed those of surrounding areas, compounding the challenges residents face. Homes are often constructed from materials like corrugated tin and concrete, providing little insulation or protection from the heat; limited financial resources prevent investment in cooling technologies; and insecure tenure discourages upgrades to housing design and materials.

The Wellbeing team is investigating how these factors affect informal settlement residents participating in RISE. Using iButtons installed inside and outside of homes, we can

“ Immediate solutions could include planting greenery to reduce heat exposure, and improving home designs to promote ventilation. Longer-term measures include policies for secure tenure, improved infrastructure, and equitable access to affordable cooling technologies.

track hourly indoor and outdoor temperatures, revealing how heat builds and persists indoors. In parallel, we have been surveying residents to understand how heat impacts health, energy levels, and thermal comfort. By combining these data, we are developing a clearer understanding of how heat affects both physical spaces and peoples' wellbeing.

The findings reveal significant challenges. Indoor temperatures are consistently higher than outdoor temperatures, particularly during peak heat hours and at night. This is largely due to the materials used in construction, which trap and conduct heat. Survey results show that in Makassar, Indonesia, hotter weeks are linked to an increased likelihood of poor health, while in Suva, Fiji, higher temperatures are associated with greater lethargy and thermal discomfort. These effects are especially pronounced during periods of high humidity.

This research emphasises the need for both immediate and structural solutions.

Additionally, early warning systems and targeted support during heatwaves can protect vulnerable groups, such as children, the elderly, and outdoor workers.

As global temperatures rise, the risks to informal settlements is growing. Evidence from RISE communities can inform strategies to mitigate heat impacts and improve wellbeing. Future research could incorporate non-invasive biomarkers, such as salivary cortisol, and wearable technologies to measure heart rate variability and sleep disruptions. These approaches would deepen understanding of how heat stress affects chronic and infectious diseases in these communities.

RESEARCH HIGHLIGHT

Education and gender gaps in informal settlements

By David Johnston and Michelle Escobar

In many low- and middle-income countries, boys are falling behind girls in educational attainment, particularly in disadvantaged communities. Our research explores how boys and girls living in RISE settlements spend their time on education, work, and leisure activities, and how this may contribute to the growing gender gap in educational outcomes.

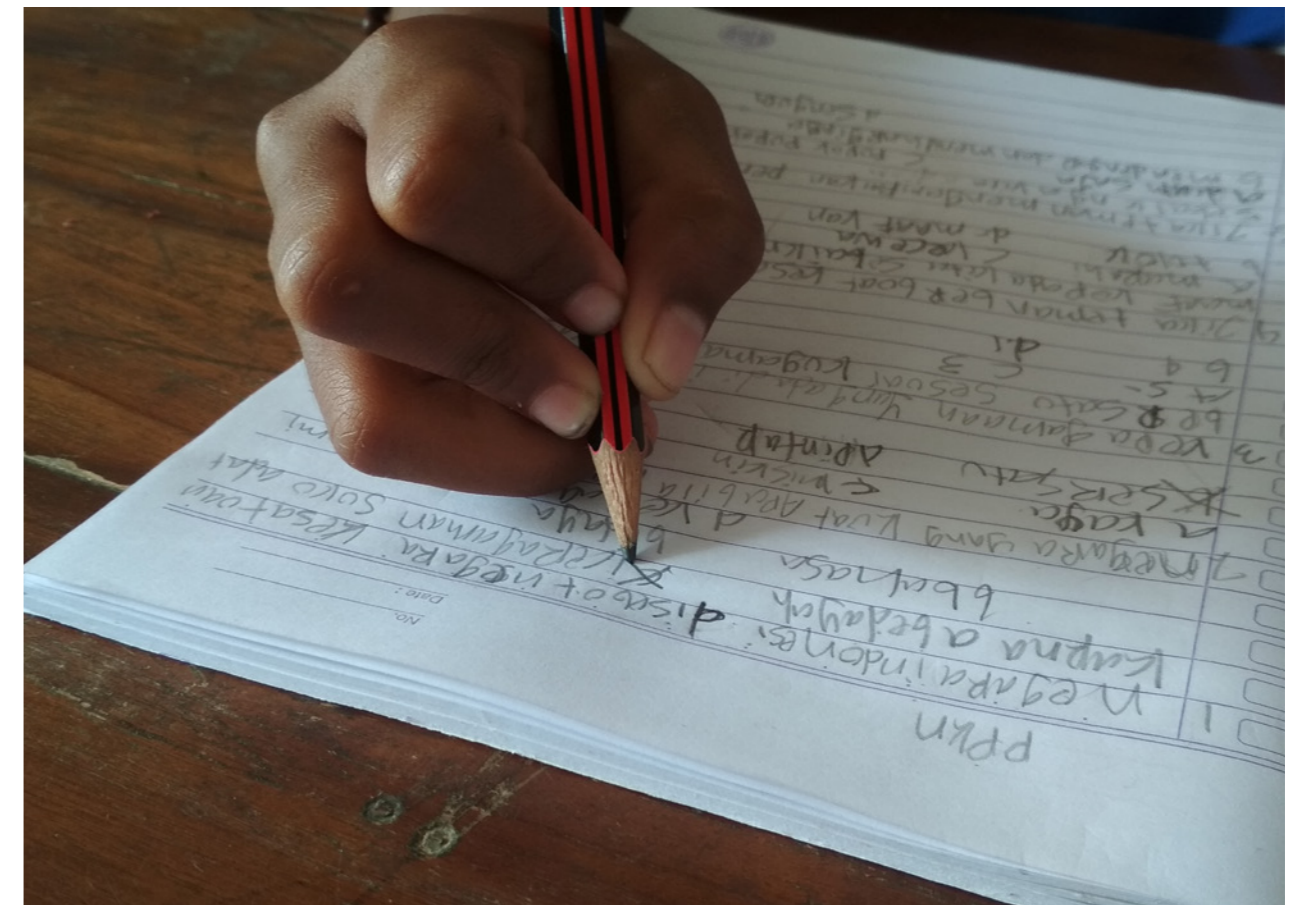
We find significant differences in how much time boys and girls dedicate to school and homework, with boys spending less time on education and more on leisure activities. In contrast, girls spend more time helping with household chores, which may explain why parents spend more time helping girls with their homework and reading to them.

The gaps are larger in families facing financial hardship, or where parents have lower levels of education, putting boys from the most disadvantaged backgrounds at even greater risk of missing out on educational opportunities.

These patterns could have long-term consequences. Boys who spend less time on education may face poorer job prospects and increased risks of criminal behaviour in the future. Raising awareness among parents about the importance of time spent on education could help reduce these gaps and improve outcomes for boys. School-based initiatives, such as tailored teaching strategies or classroom interventions, may also be needed to close these gaps in educational time investments.

Our future work will continue to track these children's time use. With new data, we will be able to assess whether the settlement revitalisations have influenced children's time spent on education, work, and leisure. This longitudinal analysis will provide a deeper understanding of how these changes can shape children's development in challenging environments.

Escobar Carias, M., Black, N., Johnston, D., *et al.* The gender gap in children's educational time investments in informal settlements. *Review of Economics of the Household* (2025). [Link](#).



Policy and Scaling up



Thomas Clasen
Emory University
Rollins School of Public Health

The Policy and Scaling up team focuses on positioning the program's water and sanitation infrastructure intervention for expansion into other populations and settings.

We do this by supporting research led by other teams on how to design and deliver the intervention, as well as evaluating its impacts on the environment, harmful exposures, and human health and wellbeing. Rigorous evidence on these outcomes will be critical to generate the necessary support and resources from policymakers, financial institutions and implementers to extend the RISE intervention. At the same time, we identify other key areas where the intervention can improve wellbeing, and we conduct research to generate evidence in these areas.

One critical area is climate change, both in terms of adaptation and resilience. Adaptation focuses on enabling a population to adjust to actual or anticipated threats arising from climate change, such as flooding and exposure to environmental contaminants.

“ The RISE intervention is well-suited to improve the adaptive capacity of informal settlements to flooding and other climate risks.

Resilience is a broader term that refers to a community's capacity to absorb, cope with, or adapt to a changing environment, while keeping its core structure, function, and identity intact. Resilient households and communities are better-equipped to withstand shocks and stressors, enabling them to recover efficiently and effectively. To evaluate the effects of the RISE intervention on resilience, we have developed, field-tested and implemented tools to measure residents' ability to absorb shocks (minimizing exposure and recovering quickly), adapt (making informed choices based on changing conditions), and transform (creating conditions for lasting resilience). Our work in these areas is the subject of several papers currently under peer review.

Our team is also investigating the effects of the RISE

intervention on empowerment. This includes key issues around gender, and especially how the project encourages and impacts the participation, agency and voice of women and girls. This has been the focus of several publications, both peer-reviewed research and policy-oriented circulars. We are also identifying and measuring the social and contextual factors influencing residents' individual and collective efficacy, and their assessment of their community's ability to implement community-level flood prevention, protection and response measures.

We have also published research evaluating the effect of participatory design and community engagement activities on social capital among urban informal settlements in Suva, Fiji and Makassar, Indonesia. This work is featured in the accompanying research highlight.



RESEARCH HIGHLIGHT

Community-level flood measures and the role of collective efficacy

By Allison Salinger

Collective efficacy is defined as a group's shared belief in its ability to organize, identify goals or shared interests, develop strategies, and carry out action in pursuit of those common goals. Communities and individuals with higher perceived collective efficacy have been found to fare better following natural disasters, including floods, and be better prepared for such events before they occur.

Our study explored what factors were influencing perceptions of collective efficacy among RISE residents of urban informal settlements in Suva, Fiji. Specifically, we wanted to understand what influenced residents' ideas about their settlement's ability to implement community-level flood protection, prevention, and response measures.

Our analysis revealed five key influences on residents' perceived collective efficacy:

- Formal leadership
- Shared needs or benefits
- Collective identity (e.g. shared religion, ethnicity or regional/kinship group)
- Past performance experiences (i.e., whether attempts at collective floodmeasures had failed or succeeded in the past), and

- Expectations around collective action, particularly around which tasks or goals warrant collective action and who is expected to participate.

Development programs that require community-level collaboration and that fail to account for community social dynamics, such as perceived collective efficacy, have shown poor outcomes—a reality that program participants living with the threat of sea level rise and increased flooding damages can hardly afford.

It is important to understand whether participants believe that program objectives reflect shared needs and whether those objectives warrant collective action according to the community's social expectations.

Where this is not the case, and/or where collective efficacy is weak, implementers may consider incorporating intervention techniques to strengthen collective efficacy, linking program objectives with other public goods for which communities are willing to collaborate, or selecting alternative intervention techniques that do not require collective action.

Salinger, A., D'Eramo, T., Turner, H., *et al.* 'When it floods, we work on our own': Exploring factors influencing collective efficacy appraisals for community-level flood measures among urban informal settlements in Suva, Fiji. *Journal of Community and Applied Social Psychology* 34 (2024). [Link](#).



Transdisciplinary impact

RESEARCH HIGHLIGHT

A framework to challenge Western-centric views in research

By Hannah Pennington (née Turner)

More scholars from multiple disciplines and geographies are focusing on interdisciplinary research, often aiming to address global challenges and inequalities. These researchers from different fields and places should consider how research is conducted and knowledge is produced. The way studies are conducted has the power to shape, reproduce, or control the forms of knowledge generated—whether intentional or unintentional. Our research introduces a framework to help researchers navigate, understand, and engage with diverse forms of knowledge — a challenge particularly relevant in addressing complex global challenges such as climate change.

This framework emerges as a critical tool against the backdrop of predominantly Western-centric perspectives in sustainability science and related studies, which often marginalises or overlooks global knowledge systems. By proposing a structured approach that encapsulates three contextual levels of influence, alongside nine guiding principles and a comprehensive set of 51 practical actions, our framework aims to change the way interdisciplinary research is approached and assessed.

Our research emphasises embracing multiple worldviews for sustainable and inclusive global solutions, challenging Western-centric paradigms.

The core issue addressed is the systemic undervaluation of diverse knowledge systems in sustainability science and north-south research. Our framework aims to provide a pathway for critical evaluation and enhanced engagement with various knowledge systems.

The potential applications of our framework extend beyond academic research, reshaping governance, policymaking, education, and community initiatives. In governance, the framework can guide institutions and policymakers to incorporate diverse perspectives, leading to culturally-sensitive policies. In education, it can help develop curricula that value multiple knowledge systems, fostering a globally aware and culturally competent workforce. For community projects, the framework can facilitate more meaningful engagement by recognising local knowledge in addressing community-specific challenges.

Moving forward, we hope the framework will be tested and refined in different contexts. This iterative process will not only enhance the framework's applicability and effectiveness but also contribute to a broader shift towards more inclusive and collaborative approaches to global challenges.

Pennington, H., Rogers, B., Kneebone, S., *et al.* An organizing framework to break down Western-centric views of knowledge in North-South research. *Sustainability Science* 19 (2024). [Link](#).



Left to right: Losalini Malumu, Savu Notoimuli, Autiko Tela and Alex Wilson (back) at RISE's annual workshop in Melbourne.

RESEARCH HIGHLIGHT

Responsible north-south research and innovation

By Karin Leder

Transdisciplinary research involves collaboration across various academic disciplines and with non-academic partners, such as local communities and governments. This approach is essential for tackling complex global issues like sustainable development. However, implementing such research is challenging, especially when it involves collaborations between high-income (global north) and low- and middle-income (global south) countries.

Key challenges include power imbalances, funding disparities, ethical concerns, and cultural differences. "Helicopter research," where researchers from the north conduct studies in the south with minimal local involvement, is particularly problematic. This can lead to unethical practices and inequitable benefits.

Our paper highlights the importance of "boundary-spanning integrators" and "pracademics" – individuals who bridge gaps between different groups and ensure practical application of research findings. These roles are crucial but often overlooked in current research practices.

Our team proposes a framework for implementing north-south transdisciplinary research responsibly. This framework includes five key domains:

- Collaborative leadership: Ensuring shared leadership and decision-making among all partners.
- Agile management: Being flexible and responsive to changing circumstances and needs.
- Flexible consortia: Building adaptable research teams that can effectively collaborate across boundaries.
- Researcher positionality: Acknowledging and addressing the power dynamics and biases that researchers bring to the project.
- Co-design and participation: Engaging local communities and stakeholders in the research process from the beginning.

By addressing these areas, the framework aims to support the development of equitable and effective research partnerships that can contribute to sustainable development goals. The study emphasises the need for reflexivity, critical reflection on power asymmetries, and the importance of building research capacities in the global south to ensure meaningful and lasting impacts.

Leder, K., French, M.A., Barker, F., *et al.* Responsible north-south research and innovation: A framework for transdisciplinary research leadership and management. *Research Policy* 53 (2024). [Link](#).



Meagan Zoing takes the stage at RISE's annual workshop in Melbourne.

DOCTORATE HIGHLIGHT



PhD thesis by Jane Wardani
 Monash University
 Monash Sustainable Development Institute

Towards a practice framework for transdisciplinary collaboration in planetary health

Despite growing recognition of the importance of transdisciplinary (TD) research in addressing complex sustainability challenges, in practice it has been much-hampered by persistent power inequities and disciplinary disconnect. Planetary health as an emerging field offers a unique lens highlighting the need for knowledge integration across the environment, health, and development nexus.

How can researchers across diverse fields collaborate, with renewed focus on dismantling power inequities, and transcending differences to accelerate progress towards the Sustainable Development Goals?

Drawing upon a meta-analysis of existing TD frameworks, a literature review of practices in these fields, and a case study of RISE, my PhD proposes a practice framework to guide the design and implementation of TD research in power-diverse settings (e.g. north-south partnerships).



RISE Science Days exemplified integration of different knowledge systems, a result of collaboration between community, government, and academic stakeholders. Trust was built over years thanks to the leadership of RISE's Indonesia team, and their culture of 'gotong royong' – a spirit of mutual cooperation.

A renewed focus on addressing power inequities at the start and throughout the process can help ensure stakeholders' perspectives and interests are equally valued, and potential solutions are not inadvertently excluded as a legacy of systemic power imbalance and shared global colonial history.

A set of questions is provided to guide reflection of some foundational considerations at each stage of the research collaboration.

It is an honour and a privilege to embark upon and complete this PhD. Sincerest gratitude goes to my supervisors, the RISE program, and Monash Sustainable Development Institute for their immense support.

This PhD research is dedicated to the RISE Indonesia team, "the engine of interdisciplinary implementation" – according to one of the research participants.

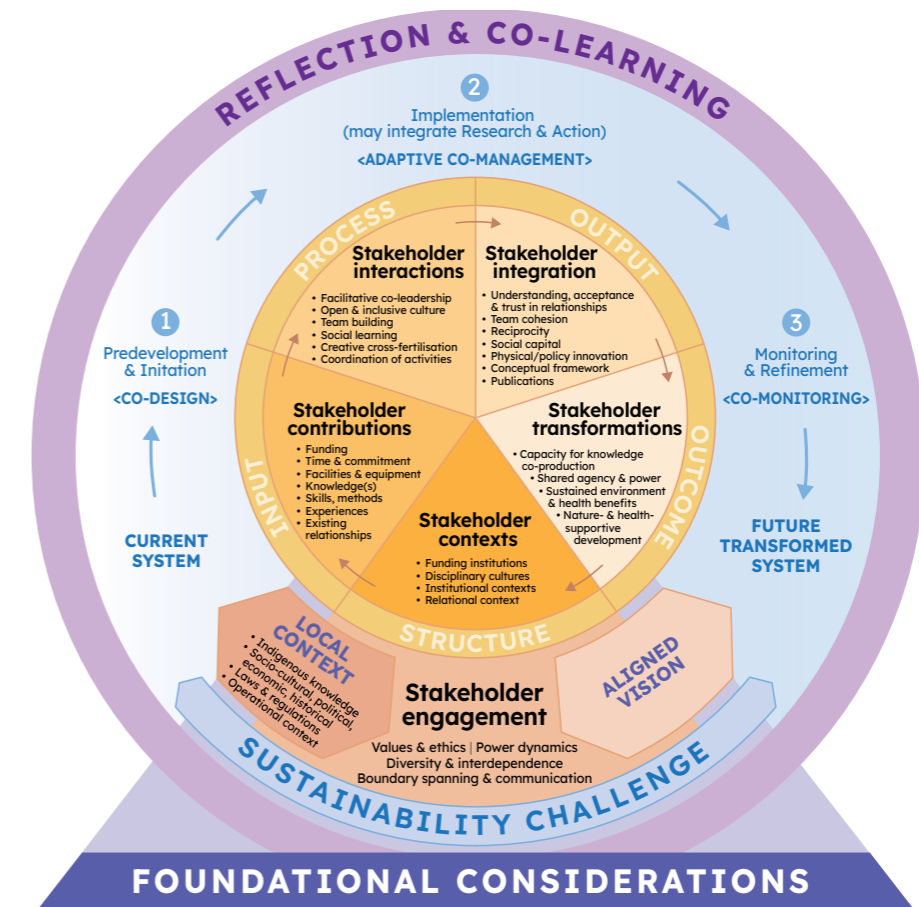
Honouring the research ethos of reciprocity, I humbly share the following outputs:

Wardani, J., Bos, J. J., Ramirez-Lovering, D., *et al.* From complexity to integration: Insights for process design from an empirical case study of transdisciplinary planetary health collaboration in Indonesia. *Earth System Governance* 23, 100233 (2025). [Link](#).

Wardani, J., Bos, J. J., Ramirez-Lovering, D., *et al.* Towards a practice framework for transdisciplinary collaboration in planetary health. *Global Sustainability* 1–53 (2024). [Link](#).

Wardani, J., Bos, J. J., Ramirez-Lovering, D., *et al.* Boundaries as spaces of knowledge integration: Learning from transdisciplinary collaboration on planetary health in Indonesia. *Journal of Climate Change and Health* 11, 100242 (2023). [Link](#).

Wardani, J., Bos, J. J., Ramirez-Lovering, D., *et al.* Enabling transdisciplinary research collaboration for planetary health: Insights from practice at the environment-health-development nexus. *Sustainable Development* 1–18 (2022). [Link](#).



A practice framework for transdisciplinary collaboration in planetary health

Reflection & co-learning	Stakeholder-centered process	Research process	Foundational considerations
Involves questioning one's values, assumptions, and perspectives, driven by humility, openness to context, and a willingness to engage with and be influenced by others.	Highlights collaboration stages which lead to mutual trust and increased agency for nature, health, and equity outcomes.	Starts with a shared understanding of the current system, through co-design, implementation, and co-monitoring.	Include understanding the sustainability challenge, local context, power dynamics, values, diversity, and aligning visions for transformation.

Doctoral research



Leah Barrett
Monash University Faculty of Engineering

“ My research investigates the performance of various MST markers across diverse geographic settings, and includes fieldwork to examine the growth, decay, and survival of these markers under environmental conditions typical of tropical and informal locations.

I am a final-year PhD candidate employing a multidisciplinary approach to explore the potential use of microbial source tracking (MST) in informal settlements and its role in quantifying human health risks.

By comparing MST markers to disease-causing enteric pathogens, my work aims to enhance our understanding of environmental faecal contamination in traditionally understudied and complex environments. Improved MST marker selection and use in these settings can greatly inform the development of targeted management and mitigation strategies, providing valuable insights into public health risk assessment improving both human and environmental health outcomes.



Hannah Pennington (née Turner)
Monash Sustainable Development Institute

“ My research focuses on flood adaptation and climate resilience by amplifying the voices of residents living in urban informal settlements in Suva, Fiji.

By engaging 42 households through qualitative interviews and the photography method known as ‘photovoice’, this research prioritises community perspectives, capturing the lived experiences and flood protection strategies directly from those affected. In collaboration with the RISE Fiji team, the research challenges traditionally Western-centric approaches by emphasising local knowledge and community-driven solutions. These insights will contribute to a deeper understanding of the factors that shape flood adaptation and resilience in the Pacific, ensuring that future strategies are grounded in local realities and prioritises the perspectives of those most impacted.



Shwetha Sukumar
Monash University Faculty of Medicine, Nursing and Health Sciences

“ My research focuses on understanding how children in informal settlements are exposed to pathogens from faecal contamination of surfaces around their homes and food.

This will involve mapping how pathogens are transmitted from outdoor to indoor areas, and identifying whether they originate from human, animal, or environmental sources. A key aspect of my work will involve collating and visualising this data to provide actionable insights for reducing exposure risks.

In 2024 I have been working on a review paper examining how environmental monitoring data from the Australian water and clinical sectors are visualised and can be integrated for enhanced public health surveillance. I also had the privilege of joining the team in Fiji to gain hands-on experience with sample collection and processing.



Shannon Zhong
Monash University Faculty of Medicine, Nursing and Health Sciences

“ I aim to investigate how climate change and environmental stressors impact on exposure to infectious diseases (such as those spread through faecal-oral routes).

Starting in 2025, my PhD research will explore the intersection of climate change and public health outcomes among RISE residents through a planetary health approach.

Using diverse data collection methods – like GPS trackers, mobile phones and surveys – I plan to analyse human movement and activities within RISE’s informal settlements to understand how the risk of disease changes over time and in different locations, and how these risks shift with environmental stressors and climate events. I hope to develop a comprehensive picture of climate-related infectious disease risk faced by RISE residents and contribute to effective adaptation strategies.

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4. LONG-TERM IMPACT

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The potential for scaling up RISE

Informal settlements are growing rapidly – here’s what we can do to improve them



Tony Wong
RISE Director, Scale-up
Monash University
Faculty of Art, Design and Architecture

More people than ever before are living in informal settlements, often known as slums. Many residents lack access to clean water, proper sanitation facilities, and effective waste management – which can result in water-borne diseases and poor living conditions. By the time we reach the Sustainable Development Goals deadline in 2030, an estimated 3 billion people worldwide will require adequate and safe housing. Not enough progress has been made on the ground.

But this isn’t just a global-scale problem; if we consider solutions in different and original ways, we can transform it into a global-scale opportunity.

Promising innovative solutions

Unlike traditional WASH (water, sanitation, and hygiene) approaches, the RISE program integrates meaningful, sustained community engagement, and addresses interconnected challenges to foster resilience and wellbeing.

The RISE approach is as much about people as it is about infrastructure. Innovative technical interventions include community-scale pressure sewer systems designed for flood-prone areas, constructed wetlands for wastewater treatment, and drainage enhancements to reduce contamination and mitigate flooding impacts.

Putting the people closest to the challenges at the centre is key, as communities – and the authorities responsible for safeguarding the wellbeing of communities – have the utmost knowledge of their challenges, and are invaluable in co-creating long-lasting, scalable solutions.

RISE’s randomised control trial (RCT) framework is assessing the effectiveness of our socio- technical co-design and infrastructure approach. Key indicators include the presence and abundance of pathogens in the environment as a measure of environmental health, and gastrointestinal health and antimicrobial resistance among children under five as markers of population health.

Leveraging successes

RISE has spent the last seven years developing and implementing community-centred innovative infrastructure

solutions in two geographically distinct cities – Suva, Fiji and Makassar, Indonesia – while conducting robust multi-disciplinary research on the impacts on human health and that of the natural environment.

We have progressively accumulated a substantial body of evidence to support the upscaling of the RISE approach.

We have shown, with growing empirical and qualitative evidence:

- The extensive environmental faecal contamination, and associated disproportionately high faecal-oral contamination of residents in informal settlements;
- The effectiveness of the community co-design process;
- Successful navigation of tenure and consent;
- Engineering designability and adaptability of interventions, and their approvability by city planners and public works authorities;
- Constructability of the infrastructure upgrades by local contractors;
- The effective capture and treatment of household wastewater; and
- Ongoing community organisation and pride of place that comes with neighbourhood revitalisation.

We anticipate the completion of the RCT at the end of 2026 will ultimately provide the empirical evidence of the impacts of the interventions on disease burden and physiological health.

The change in the quality of life for RISE’s beneficiary communities is already evident. We should not undervalue the significance of this – having improved the lives of residents in these communities. They now have functioning toilets, cleaner environments, significantly reduced exposure to contaminated floodwater, and vastly improved flood-safe and contamination-free access to their homes.

This evidence lays the groundwork for policies that guide ongoing actions, co-investments, and priorities across government agencies to improve health, the environment, climate resilience, and urban living.

Appetite for continued investment

Nearly a decade of collaboration with the Governments of Indonesia and Fiji has given us experience supporting their long-term development priorities, from city to central level. There is real enthusiasm to take the approach forward (see Aligning with government agendas).

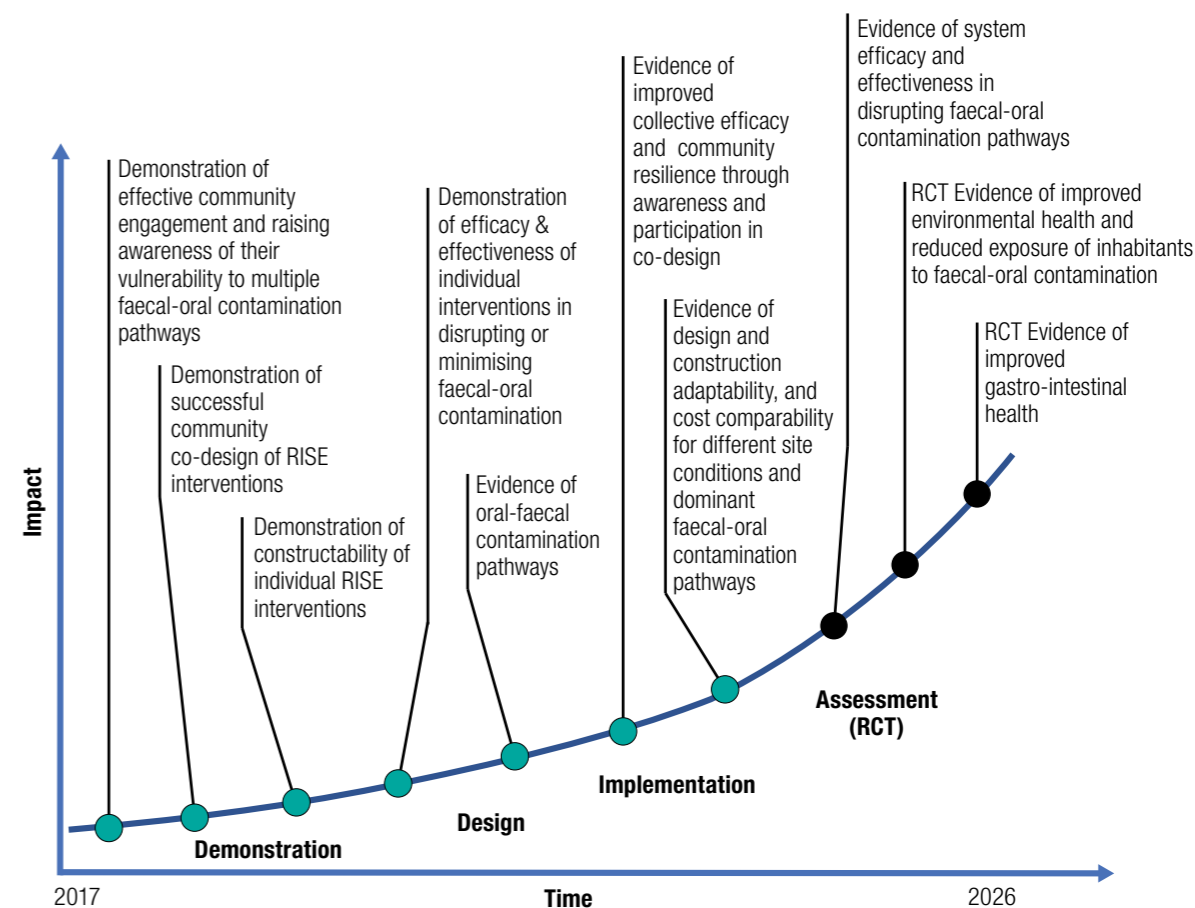
Backing by the Australian and New Zealand Governments as funding partners for the infrastructure in Indonesia and Fiji respectively shows strong global commitment to practical action on climate change, shared prosperity and supporting resilient communities in the Indo-Pacific.

The next phase for RISE will involve not just building upgrades for more communities, but continuing to build the local capacity and institutions needed for sustainable upscaling.

The early successes of this multi-sectoral approach support flexible financing options that could have transformative impact – like blended financing, and embedding informal settlement upgrading into government programs. Even greater development impact could be sped up with external government and philanthropic grants.

“ The benefits that we, the residents here, get from the RISE program are many. Children get health checked every three months. The benefits that we get from the infrastructure: in the past our roads were muddy, now they have been repaired by RISE... the roads are now good. Children can now play... They also get bathrooms, previously the bathrooms were not suitable for use, now they are good, the bathrooms are beautiful.

- Makassar resident



Aligning with government agendas

Makassar, South Sulawesi

Makassar City is a thriving, highly urbanised trading hub, and as the capital of South Sulawesi, it is Indonesia's fifth largest city. Over the next 20 years, the city's population is expected to grow to two million people.

To address the challenges of rapid urbanisation and support the Makassar City Government's vision to be a more sustainable and resilient city, RISE is helping prepare it to meet future urban challenges.

RISE is enhancing sanitation and water systems while providing climate-resilient solutions, such as nature-based wetlands and flood mitigation, addressing servicing challenges faced by the city's most at-risk communities. The City of Makassar's support for urban greening and better water management reflects its broader vision of fostering environmental sustainability and improving public health.

RISE's community-centered approach of empowering residents to co-design tailored solutions for their neighbourhoods also resonates with the city's goals for inclusive development.

Our ongoing research into the health and environmental impacts of infrastructure will support evidence-based policies for the city's long-term benefit.

“ We are a forward-thinking city that supports opportunities to create better health and wellbeing for all. RISE is an important part of our plans to implement sustainable, environmentally friendly solutions.

- Former Mayor of Makassar City
Mohammad Ramdhan Pomanto

Suva, Fiji

Suva, the capital of Fiji, is the country's largest city, and its main political, economic and cultural hub. Almost one-quarter of Fiji's urban population now lives in about 250 informal settlements, and with complex land administration challenges, residents are vulnerable to climate change due to poor housing quality, lack of infrastructure and services, and exposure to environmental hazards.

Cities are key to sustainable development in the Pacific, and Fiji is seeking to promote research, development and innovation, and adopt advanced technologies to accelerate economic growth and enhance wellbeing. The Government has included RISE in its National Water Strategy for 2050 as an opportunity for decentralised and nature-based systems for informal settlements.

RISE's community upgrades aim to benefit more than 5,000 Fijians, while generating important scientific evidence of the impacts of these upgrades, conducted at Fiji National University. This data will help guide coordinated responses from various agencies, and inform evidence-based policy for sustainable urban development and better public health outcomes.












“ These are families that don't have access to basic water supply, basic sanitation. Some don't have good road infrastructure. So, with RISE coming on board, it helps people to address some of the environmental and health challenges they face on a daily basis.

- Maciu Nalumisa
Fiji Minister for Housing and Local Government



Public engagement and awareness

CONFERENCE HIGHLIGHTS:

-  **COP28**, November, Baku, Azerbaijan
-  **World Toilet Day national celebrations**, November, Suva, Fiji
-  **Bioinformatics and Biodiversity Conference**, November, Bogor, Indonesia
-  **NIHR Global Health Research Centre for Non-Communicable Diseases and Environmental Change**, roundtable, September, virtual
-  **Pacific Islands Health Research Symposium**, September, Nadi, Fiji
-  **Asian Economic Development Conference**, July, Seoul, South Korea
-  **Australian Conference for Economists**, July, Adelaide, Australia
-  **World Health Summit Regional Meeting**, April, Melbourne, Australia
-  **QIAGEN Specialist Working Group**, February, virtual
-  **Makassar Low Carbon Metaverse**, February, Makassar, Indonesia
-  **Suva Health Expo**, January, Suva, Fiji



In 2024, RISE saw one of our biggest years yet for global media coverage, particularly with the release of topical research on heat stress in informal settlements, and the announcement of our completed water and sanitation infrastructure in informal settlements in Indonesia.

161%
MEDIA COVERAGE
INCREASE FROM 2023

“ Most informal settlements are located in the tropics. It is hot and humid year-round, but residents have few options to adapt to heat stress. Community-based initiatives such as urban greening and improved housing show promise to reduce urban heat. Investing in these solutions must be a priority of adaptation efforts.

- Emma Ramsay
Weekend Sunrise, Channel 7, Australia

Media highlight:

Former RISE PhD candidate Emma Ramsay's research in to heat stress in informal settlements was covered in major global outlets Forbes and Yahoo! News, and widely discussed on Australian TV and radio.

1.6+ million
PEOPLE REACHED ON CLIMATE
RESEARCH



“ As a GIS professional with most of my career looking at forests and terrains, to be able to bridge the connection between health and community made me feel satisfied about the work we do at RISE and how much of a difference we can make.

- Data Officer Waisale Rakusa
Pacific Islands Health Research Symposium, Fiji

RISE featured in Fiji's 2 national newspapers and TV

Completion of infrastructure covered in 51 news items in Indonesia







Together, we can transform human and environmental health in informal settlements.

Thank you to the people and organisations who support our program. Backed by evidence, our ambition is to expand our approach across the Asia-Pacific and the world, giving millions the opportunity to live healthier and safer lives.

rise-program.org/get-involved

rise

REVITALISING INFORMAL SETTLEMENTS AND THEIR ENVIRONMENTS

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