



rise

REVITALISING INFORMAL
SETTLEMENTS AND
THEIR ENVIRONMENTS

Building hope

RISE Annual Activity Report 2023



When informal settlements thrive, **whole societies** thrive

Ketika pemukiman informal berkembang, seluruh masyarakat pun ikut berkembang

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Front and inside cover: residents come together for a Community Planting Day to embed plants in newly constructed wetlands.

Photos by Architect and Community Facilitator Adrianto Hidayat and Communications and Engagement Specialist Ina Rahlina.

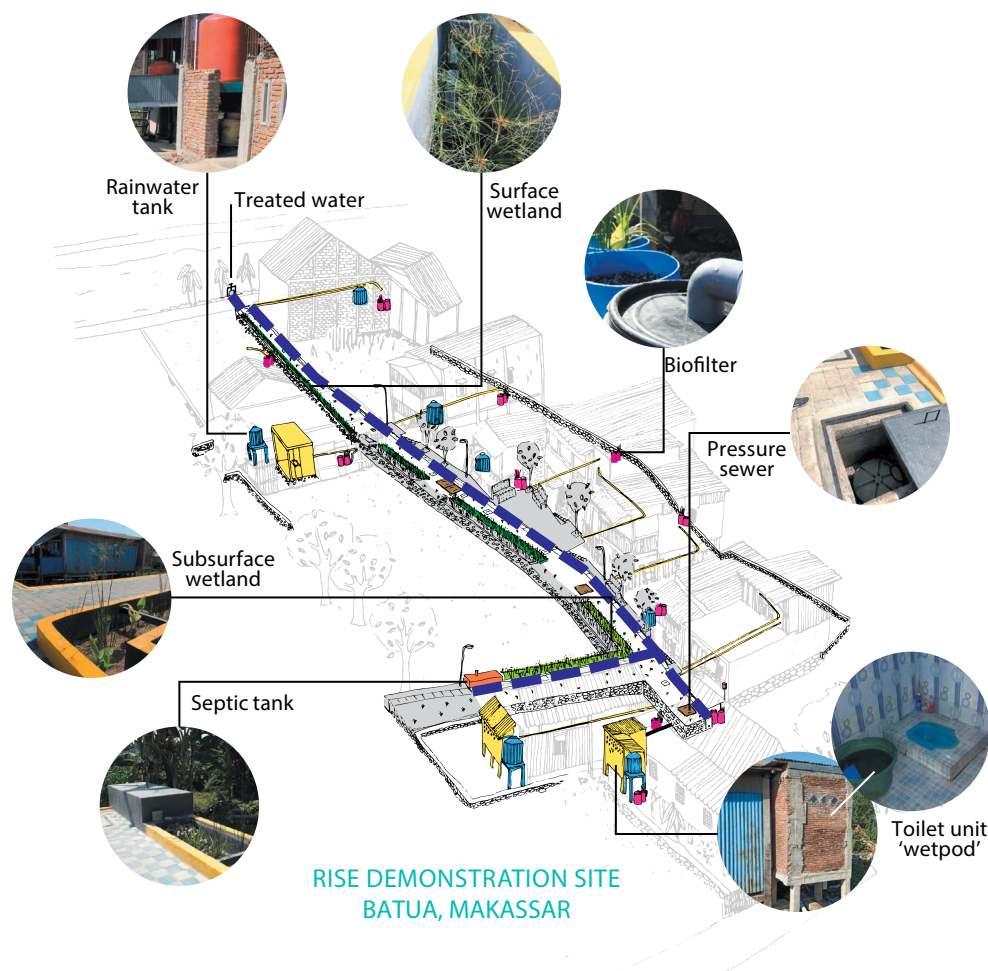
What is RISE?

Informal settlements are home to more than one billion people worldwide who face adverse living conditions and suffer from poor health and wellbeing as a result of inadequate water and sanitation services, and environmental exposure to pathogens, pollutants and disease vectors.

Our vision is to improve the health and wellbeing of residents of urban informal settlements across the developing world by improving the environment in which these communities live. To achieve this, RISE is trialling a holistic water-sensitive approach to upgrading sanitation, drainage and climate resilience through a randomised control trial (RCT) randomising 12 informal settlements in Suva, Fiji, and 12 settlements in Makassar, Indonesia — half of which are being upgraded as ‘intervention’ settlements under the RCT, and the other dozen ‘control’ settlements to receive upgrades following completion of the RCT.

THE INTERVENTION

RISE utilises a water-sensitive cities (WSC) approach to upgrade informal settlements, co-designed at the household- and neighbourhood-scale with the community to ensure that the upgrades meet community needs and respect existing land uses, tenure, livelihoods and community dynamics. The upgrades are a holistic combination of drainage and flood mitigation measures, pathways and access, and smart, green, nature-based approaches for sanitation and pollution management — such as constructed wetlands for wastewater treatment, rainwater harvesting, and biofiltration. This approach delivers critical water and sanitation services, while also improving climate resilience to transform the health and wellbeing of the community and restore the natural environment and the productive capacity of lands and waters.



PODCAST EPISODE:

How can we revitalise informal settlements?
Wellcome Trust

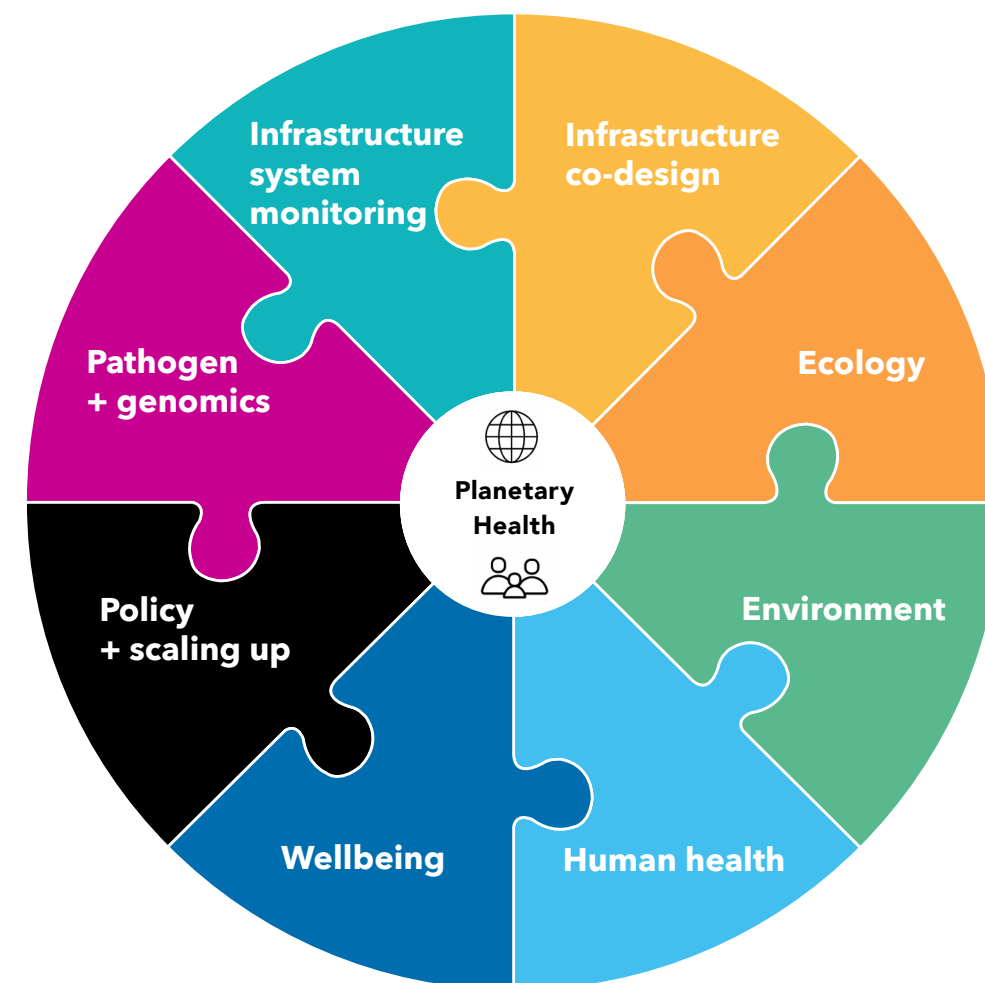
OUR PLANETARY HEALTH RESEARCH

RISE aims to collect the first-ever rigorous scientific evidence of the human and environmental impacts of a water-sensitive revitalisation approach in urban 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, and treatment system performance and water quality, as well as the socio-economic evidence that policy-makers will find most compelling to scale up the water-sensitive approach.

RISE recognises that the problem and its solution are multi-disciplinary and multi-dimensional, and that a planetary health approach is needed to inform policies and investments to improve living conditions for residents of informal settlements around the world.





From the Director

We can create the cities of the future that we want, if we view informal settlements in a fundamentally different way.

When RISE took the first steps of our mission in 2016, we knew that repairing degraded conditions and improving health in informal settlements would be a deeply complex endeavour. But we also understood the need to embrace that complexity in order to unleash the full potential of these communities. We believe that when informal settlements thrive, whole societies thrive. So, on the RISE program we choose to approach settlements as vibrant centres of innovation and resilience, in order to create fairer, more liveable, thriving communities.

2023 has perhaps been our most impactful year since our program began. It is the year we have physically transformed multiple informal settlement communities in two vastly different cities in the Asia-Pacific with life-changing sustainable water and sanitation systems.

Just a few years ago, these systems were ideas, concepts — sketches, at most — conceived of in partnership with our participating communities and our visionary Fijian and Indonesian teams. Today, 73

households have new toilets, with dozens more existing bathrooms undergoing renovation; pressure tanks are pumping wastewater from those bathrooms out to 31 wetlands for natural treatment before discharging it, cleaner, back into the environment; and 3,600 m² of new paved pathways are raising residents up out of floodwaters.

As we build, we continue enlisting our participating communities to refine and offer ideas for operations and maintenance, emphasising agency over their own lives.

We have a global coalition of partners helping make these solutions a reality. They understand the human advances that can be unleashed when communities have access to critical infrastructure. With RISE as the vehicle, the Australian and New Zealand Governments, together with the host governments of Indonesia and Fiji, are solving land and development challenges — complex issues that have previously been too difficult to solve. Until now.

The ability to prove that there are alternative, better approaches to address challenging conditions in informal settlements is thanks to our principal funder, the Wellcome Trust, who supports us to generate rigorous evidence on the implementability, impacts and viability of the RISE approach — this evidence will allow us to unlock the political will to invest in these solutions in the future.

We also deeply value and share Wellcome's belief in capacity building. This drives our model of locally derived evidence generation. From laboratory technicians and fieldworkers, to data scientists, engineers, architects and our extraordinary community engagement specialists — our on-the-ground teams in Fiji and Indonesia know better than anyone the community dynamics and local complexities that are so critical to the success of RISE, and it is with their leadership and guidance that we collaboratively shape the solutions.

With more people than ever before moving to informal settlements, this isn't just a global-scale problem; if we

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At its very core, RISE's research impact lies in its mission to achieve positive change for the benefit of communities around the world. This is only possible by being part of a dedicated alliance of organisations who share a strong commitment to address the biggest global challenges of our time.



Professor Susan Elliott AM
Interim President and Vice-Chancellor
Monash University

Professor Rebekah Brown
RISE Program Director
Deputy Vice-Chancellor (Research) and Senior Vice-President, Monash University

Wellcome Trust's 2023 global RISE tour



Suva



Melbourne



Makassar



From our principal partner

The Wellcome Trust supports science to solve urgent health challenges. RISE is using evidence to drive action.

Scientific solutions are needed to address pressing health challenges that face everyone. To advance these solutions, Wellcome funds discovery research across a broad range of disciplines, including social sciences and the humanities, giving researchers the freedom to explore life, health, and wellbeing, and seek insights that can inspire future improvements in health.

We bring together expertise across science, innovation and society to confront three urgent health challenges: mental health, infectious diseases, and climate and health. Embedded in all of our discovery research is a mission to improve diversity, inclusion and research culture.

The mental health programme seeks to transform the ability to intervene as early as possible in mental health problems that affect the most people — and include the most disabling conditions. The infectious disease program focuses on achieving the long-term outcome of a 'reduced risk and impact of infectious diseases' by targeting the factors leading to escalation.

In our climate and health work, our mission is to put health at the heart of climate action. We aim to support transformational advances in ensuring research and evidence on the direct and indirect impacts of climate change are widely available and accessible at local, national, regional, and global levels; we support the accessibility of climate change mitigation actions that notably benefit health; we facilitate accessible pathways for climate change adaptations that safeguard the health of vulnerable communities; and we support a

global 'climate and health' research, policy and practice community that uses evidence to inform policy and drive urgent action.

RISE's focus on informal settlements aligns with our mission to prioritise those most affected by health challenges. Using dynamic transdisciplinary science to solve real-world problems, the program is, in itself, evidence of how research can improve lives in a way that engages with disadvantaged communities, generating location-specific solutions in the process.

For research to unleash its full impact, it must be locally anchored and driven. RISE collaborates with communities, governments, local leaders and partner institutions, reflecting Wellcome's approach of partnering with key decision-makers to ensure scientific evidence influences health policy. We have also seen the program rise to the challenges of the pandemic by changing its ways of working to be more equitable and even more impactful.

Through RISE's experience we are getting a much better understanding of how locally derived evidence generation can lead to impact through both policy change and capacity building. The long-term ambition to expand the RISE approach to improve the lives of millions aligns well with Wellcome's commitment to support research towards equitable and accessible solutions at scale.

Madeleine Thomson
Head of Climate Impacts, Wellcome Trust

Our development partners

Taking water-sensitive infrastructure — which has been proven over decades to deliver improvements in developed countries — and delivering it in informal settlements is a critical step toward addressing complex urban challenges with new solutions.

The Australian and New Zealand Governments as our construction funding partners for our respective Makassar and Suva community development programs, are committed to ambitious and practical action on climate change, shared prosperity, and supporting resilient communities in the Indo-Pacific.

Australia and New Zealand are helping turn vision into reality — that there is a better way to provide critical services to millions living in informal settlements.

Together we are showing it is possible; that the approach can utilise local expertise and materials, can align with local government policies, and can be economically effective.

With this greater clarity on the future, our partners are seeding the pathways for upscaled programs such as RISE to have whole-of-country impact in Indonesia and Fiji, and the wider region.



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Water and sanitation infrastructure planned and implemented in partnership with communities is critical to achieving sustainable public health improvements and for communities to thrive.

Benjamin Smith
Deputy Director, Water & Sanitation
Indonesia Australia Partnership for Infrastructure (KIAT)

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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.

Mohammad Ramdhan Pomanto
Mayor of Makassar



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RISE is a great example of community-centred development that is already having a positive impact in Makassar. Australia and Indonesia are strong partners in responding to shared climate challenges and improving water and sanitation systems.

Todd Dias
Australian Consul-General in Makassar

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Carrying forward lessons from the demonstration site Tamavua-i-Wai, RISE is ensuring that this project stays community-driven, is sustainable, and works within Fiji's existing development systems.

Sarah Nisbet
First Secretary
New Zealand Ministry of Foreign Affairs and Trade



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RISE is an important partner assisting the Ministry to identify new approaches and best practices for upgrading and developing informal settlements in Fiji.

Manasa Lesuma
Permanent Secretary
Fiji Ministry of Housing and
Community Development

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We are pleased to be working alongside RISE to improve conditions in informal settlements. The program complements the Fiji Government's efforts to ensure the sustainable future of our lands.

Filimoni Vosarogo
Fiji Minister for Lands and Mineral Resources



The year in review

Our collective ambition and can-do spirit pushes us to meet daunting challenges with creative solutions.

With our feet firmly planted in a post-pandemic world, 2023 was a powerful surge forward for our program in terms of construction progress, research innovation and capacity building, and setting ourselves up for the next few years of our research trial.

A wet start to the year did not dampen the resolve of our community fieldworkers to get started collecting ecological and environmental samples from our informal settlement communities. Our lab teams in Fiji and Indonesia were quick to get to work processing the samples, identifying the first bacterial detections for the year.

Flooding in both Suva and Makassar was an early reminder of the adverse conditions our communities live in, and the challenges it would pose for our construction efforts. Despite this, our determined construction teams set out on the enormous undertaking of building our decentralised water and sanitation systems across a dozen communities. All this, as our teams set up processes to safely navigate shared spaces for residents' daily routines, sample collection and live construction efforts.

We rounded out the first quarter with the thrilling opportunity to host the Wellcome Trust for a tour of our hubs in Fiji, Indonesia and Australia. This not only gave us the chance to showcase the research elements of our program — our laboratories and data collection methods — but also to reinforce our connections with our dedicated teams, our committed local partners, and most importantly our partner communities. Rarely do circumstances align for such human connections, bringing different project parties together to connect over an ambitious collective goal.

Following the momentous tour, our teams wasted no time rolling out a major child health sampling campaign — the first since the pandemic. With refresher training from University of Santa Cruz-based maternal and child health specialist Dr Audrie Lin, our fieldworkers were well-equipped to collect anthropometry information, and blood and faeces samples from children under five. The lengths our teams went to to keep guardians informed and create child-friendly spaces was a testament to the immense care, time, and trust our teams invested in sensitively gathering samples from our youngest participants.

Publications flowed, bringing new evidence from informal settlements at the intersections of health, environment, water, sanitation and climate. Papers this year explored the effects of RISE's co-design approach on social capital;

the pandemic's impacts on women's mental health in Makassar, Indonesia; complex soundscapes in informal settlements and how they influence peoples' health; and the critical role children play in infrastructure planning.

As some published, other colleagues took to the airwaves, podcasts and conferences to raise public understanding of RISE's work, meet with media and policy-makers, and strengthen research networks.

A highlight of the year was a dedicated campaign of RISE 'Open Days' that our Fiji and Indonesia teams ran with our participating communities. Taking place on the weekends to engage with residents in their spare time, these Open Days were a chance to reconnect with our communities beyond the periodic collection of human health and environmental samples.

These incredible days were filled with information sessions, program updates, games, and 'mobile labs' bringing our laboratory equipment out to residents to demystify the journey our samples undertake from collection, to our labs, and the resulting planetary health analysis. Most importantly, it was a chance for our teams to forge deeper connections with our communities, and express gratitude for their continued support that is at the heart of our program's progress.

As we approached the end of the year, whole communities in Suva and Makassar have their water and sanitation upgrades complete, with construction continuing in the remaining sites into 2024.

At the same time, a group of colleagues from Fiji, Indonesia and Australia have recently represented RISE at the Conference of the Parties (COP28) in Dubai, advocating for collective action on behalf of informal settlements who are on the frontlines of climate change impacts.

RISE's strength has always been our people. Our team members approach each year driven by a higher mission to create a better quality of life for people living in informal settlements. We also do not shy away from the ambitious, challenging and sometimes difficult steps it takes to turn this vision into a reality. Whether a laboratory technician in Fiji, a settlement community leader in Indonesia, a social science researcher in the United States, or an operations coordinator in Australia — every person on RISE plays a vital role in the mission, harnessing their skills and investing themselves in this global team effort to create a thriving future where nobody is left behind.



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This year our team met challenges head-on by working hard, staying positive and supporting each other. Our priorities were construction, and supporting community members to stay enrolled in our research program. In the process, our team has grabbed training opportunities to learn and build our capacity. Our sense of fun, enthusiasm and commitment made our achievements possible in 2023.

Fitriyanty Awaluddin
RISE Country Manager Indonesia



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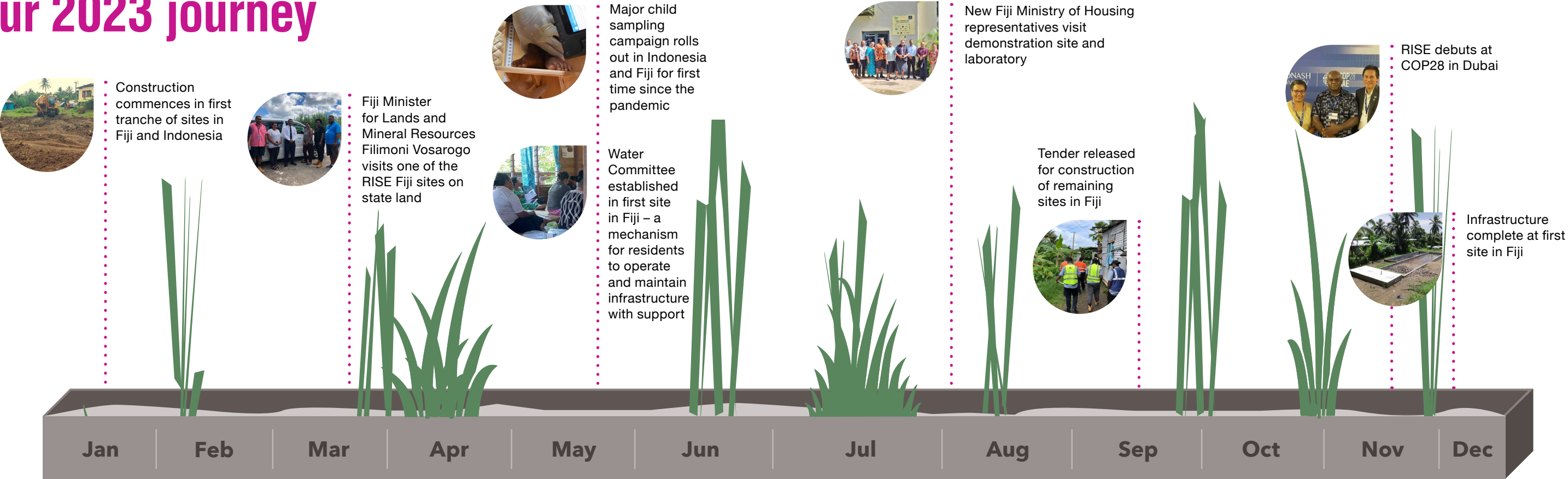
2023 has been a 'trying' year, but also one of growth. A highlight has to be our RISE Open Days; they were a breath of fresh air reconnecting, strengthening relations with our Community Engagement Committees and residents, and our partners too. Navigating challenges continues to strengthen the culture we have developed, not only in Suva, but across Melbourne and Makassar too.

Isoa Vakarewa
RISE Country Manager Fiji



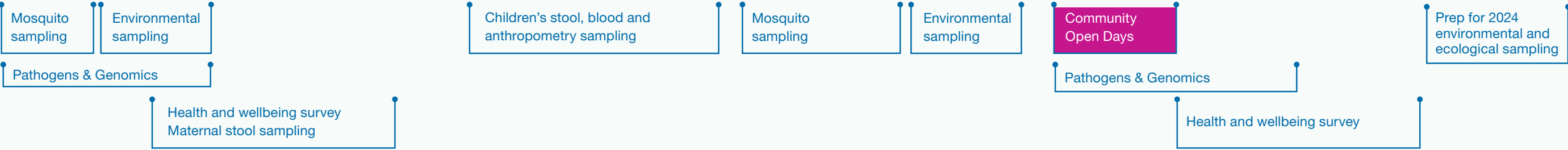
The RISE international team at the RISE Annual Workshop in December 2022 held at Monash University in Melbourne.

Our 2023 journey



Data collection campaigns

INDONESIA



FIJI



Community engagement highlight: RISE Open Days

A highlight of 2023 was a dedicated series of RISE 'Open Days' — conceived of and run by our Fiji and Indonesia teams. The weeks-long series ran on weekends to fit in with residents' free time — carved out for dedicated community engagement beyond the periodic collection of human health and environmental samples.

Our teams went above and beyond to make the Open Days a memorable experience, curating informative and fun sessions at each community.

Information sessions and program updates were brought to life with 'mobile labs' — where children and adults had the chance to get hands-on looking down microscopes, inspecting samples, speaking to our lab technicians, and engaging with laboratory equipment. The popularity of the lab tents was a testament to the curiosity and enthusiasm of residents to learn about the journey RISE's samples take once collected from settlements to being assessed in our labs.

As well as demystifying the research process, it was a chance to socialise with the communities, reinforce our shared commitment to the vision of RISE, and create an opportunity for community leaders to sit down with government representatives and officials. In Fiji, our teams partnered with the police, the Ministry of Housing and Department of Lands. In Indonesia, the team's mobile clinic was busy from morning until evening, with staff offering residents free health check-ups, including blood pressure and cholesterol readings.

Most importantly, the Open Days were a platform to connect and strengthen the relationships between our implementing teams and our partner communities.

The communities we work with are just as invested as our teams in our program's success, which is a testament to the collaborative spirit at the core of RISE.

“

We've never had anything like this done in our community.

Fijian resident



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We are willing to wait [for the infrastructure] because we know you keep coming to us.

Fijian resident



Engagement and outreach

In 2023, our team members presented at global conferences, took part in podcasts and conducted media interviews, bringing our findings and lessons to global audiences. By engaging in public discussions, we can

raise awareness of informal settlement challenges, and the new ways we can tackle these complex issues with evidence-based solutions.



CONFERENCE HIGHLIGHTS:

-  **COP28**, November, Dubai, United Arab Emirates
-  **UNC Water and Health Conference**, October, North Carolina, USA
-  **Australian Health Economics Society Conference**, September, Adelaide, Australia
-  **Pacific Urban Forum**, September, Suva, Fiji
-  **Pacific Islands Health Research Symposium**, September, Nadi, Fiji
-  **Celebrating 70 Years of The Double Helix: Advancement, Challenges and Opportunities**, July, Jakarta, Indonesia
-  **Australian Society of Microbiology National Meeting**, July, Perth, Australia
-  **International Academy of Health Preference Research**, July, Perth, Australia
-  **Applied Bioinformatics and Public Microbiology**, May, London, United Kingdom
-  **2nd Global Forum on Childhood Pneumonia**, May, Madrid, Spain
-  **International Conference on Disaster Resilient Infrastructure**, May, New Delhi, India
-  **Water and WASH Futures 2023**, February, Brisbane, Australia

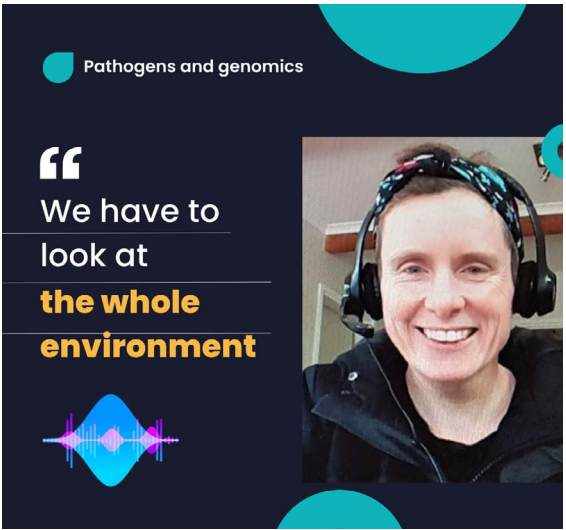
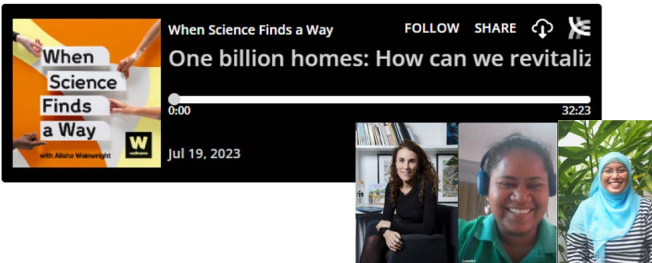


“My recommendation to the Forum is to be inclusive of youth in planning and policy-making – so that their needs and wants are met when planning for a sustainable future.”

Engagement and Safeguards Officer Raniyah Muhammed at the Pacific Urban Forum in Suva, Fiji

“Sharing my experiences helps build trust with community members. They start feeling that it’s their [infrastructure] system and that it’s something that they can take ownership of, which is very empowering.”

Co-design Facilitator Losalini Malumu on the Wellcome Trust’s ‘When Science Finds a Way’ podcast



“We are looking at what’s in the environment, in humans, in animals, and understanding what’s out there. And we are putting in sustainable technologies – like wetlands and green infrastructure – to treat and clean the environment.”

Pathogen and Genomics Project Lead Dr Rebekah Henry on 3RRR radio

Our built infrastructure and co-design approach



Each day, over 183,000 people are building homes in informal settlements, mostly in developing countries, in pursuit of a better life. The sooner we recognise and embrace the principle that informal settlements are integral to a city's make-up, the better chance we have of making our cities fairer, liveable and thriving places.

Taking a lens that focuses on supporting people in-place demands that we re-think critical services, and favour solutions that, quite literally, meet people where they are at. This is the basis of the RISE approach — an approach that is as much about the social as it is about the technical — as much about people as it is about infrastructure.

Our co-design process is based on honouring and respecting where settlement residents are at, which, at a basic level, includes their needs for clean water and sanitation. We have been building for just over a year, but have been working together for the last six; community members are not only the recipients of infrastructure interventions — they are the creators of ideas and plans that, together with local materials, are literally shaping the way things are delivered.

These are some of the ways RISE is forging pathways for governments and funders to see that new decentralised infrastructure is indeed not only possible, but also desirable. And our partners recognise and support this. They know that new types of infrastructure require new ways of operating and maintaining, and must be sustained from within communities. RISE is empowering our Fiji and Indonesia teams to get on with delivery, construction, implementing safeguards, OH&S and ongoing community engagement.

We are essentially striving for a system where Monash University and other partners from the Global North are made redundant over time — local sustainable hubs will rightly drive these approaches.

The transition has already started. The rigorous scientific evidence RISE is generating on the impacts of this infrastructure can give governments and funders clarity that these types of approaches can be implemented to supplement conventional infrastructure systems.

With this evidence in hand, there is great promise for community-based infrastructure to be replicated at scale, and that fills me with hope for the future.

Professor Diego Ramirez-Lovering
Director, Intervention
Monash University
Faculty of Art, Design and Architecture



Building in Indonesia

2023 was the year that upgrades to RISE settlements began in earnest with five sites under simultaneous construction in Makassar and the first sites under construction in Suva.

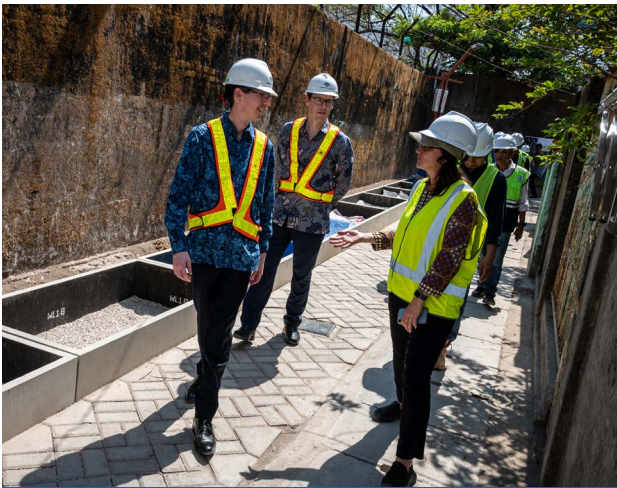
Each day on-site has thrown up lessons on building in dynamic, evolving settings not typically experienced by ‘traditional’ infrastructure projects. Flooding events and prolonged heat waves have tested construction timelines, understanding land boundaries and negotiations between neighbours have required sensitive navigation, and retrofitting infrastructure into existing occupied and continually evolving residential spaces has demanded constant creative thinking.

The communities we are working with in Makassar and Suva are deeply invested in the designs, and how they impact their homes and neighbourhoods. So, our Indonesian and Fijian teams have had to continue

to adapt in order to accommodate changing design preferences, while also maintaining construction progress. Although challenging to design and iterate as we build, we believe accommodating community visions and priorities is what will make the infrastructure benefits last — which is possible thanks to the deep care of our invested teams on the ground.

In preparation for construction in Makassar to be complete next year, we are starting to plan our ‘post-intervention’ research — a multi-year program which will gather evidence on the impacts of the infrastructure on the health of people and their environments.

Based on learnings from our demonstration site, we are also planning workshops for ongoing operations and maintenance, to ensure that systems can be effectively operated and maintained with community support and within local government frameworks.



BENEFITS OF MODULAR INFRASTRUCTURE

In some locations RISE is trialling the use of pre-fabricated modular wetland units. The units — glass-fibre reinforced concrete (GRC) planter boxes — are strong and durable, and have many benefits, including faster installation, smaller footprint, reduced on-site safety risks and improved quality control. The components can also be removed or relocated as community needs change. Manufactured domestically in Yogyakarta, Central Java, the GRC planter boxes are improving RISE’s adaptability by testing different construction methods to see what might work best in these dynamic environments.



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Australia is committed to working with Indonesia on climate action and enhancing resilience. Working together on projects like RISE, we can unleash the potential of people today, and future generations.

Fenni Rum
Program Manager, Economic Governance and Infrastructure, Australian Embassy Jakarta



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Working with communities is one of the most dynamic elements of the build process. It has been critical to balance changing expectations with design plans, schedules and budgets. It has also been thrilling to watch residents see their neighbourhoods transform based on what they helped plan in the early stages of co-design.

Nur Intan Putri
Architect and Community Facilitator



SAFETY IN OUR PRACTICE AND POLICIES

Child protection and ensuring a safe working culture continued to be one of our highest priorities in our year of construction. Trainings have enhanced staff understandings of safeguards and dealing with challenging situations on construction sites, and our policies are explicit on child protection and prevention of harassment and assault at RISE locations. Ensuring the RISE communities understand their rights and how to make complaints has been a focus during construction. Having Fiji Safeguards Manager Savu Nofomuli attend the trainings in Indonesia enabled learnings to transfer between countries on this critical work.



Wetlands



Septic tanks and wetlands



Pressure tanks



Paved pathways and drainage



Bathroom units



Rain water tanks

“ There has been good collaboration with contractors, community members, and our Build Team. I'm proud of the team's commitment to continued improvement of our safeguards processes – from visitor briefings, to posters in communities, contractor and staff trainings, and complaints handling mechanisms.

Dr Ihsan Latief
Chief Investigator – Indonesia Build



Indonesia demonstration project

Batua, Makassar

Batua is an invaluable 'live learning site' offering lessons on how nature-based solutions, co-designed with the community, can function in an Indonesian informal settlement.

On-site weekly, our Indonesian colleagues have captured years' worth of data, including wetland water samples, mosquitoes from surrounding water sites, as well as community perceptions of the infrastructure. This diverse data is setting RISE up to provide the evidence-base on how this type of infrastructure can be rolled out in more informal settlements across Indonesia.

WHAT ARE WE LEARNING?

Our monitoring shows that the nature-based wetland in the community is effective at reducing chemical and biological contaminants. This is an important finding, as reduced environmental contamination from wastewater can have positive implications for both human and ecological health.

We are testing water quality at multiple points along the 70-metre-long system to better understand how the wetland works. We are finding that these decentralised infrastructure systems are economically competitive compared to centralised urban wastewater systems, and acceptable to the community.

These lessons on implementability and economic viability continue to inform the ongoing design and construction in our first group of intervention settlements.



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I find the whole lifecycle of investigating wetland water quality fascinating. I especially enjoy connecting the dots between our lab and construction teams: it's a continuous process of monitoring, making infrastructure tweaks, and observing the impacts of those tweaks, in the hopes of getting the best water treatment results for the community.

Maghfira Saifuddaolah
Batua Monitoring Lead and
Laboratory Technician



SETTING INFRASTRUCTURE UP FOR THE LONG-TERM

For more than a year, our Indonesian team members have been leading community meetings to find out what residents need to effectively operate water and sanitation infrastructure.

Having co-designed the infrastructure, it's vital our communities continue to voice maintenance issues, and have space to solve problems together.

These sessions ignite conversations on who amongst community, government officials, and utility representatives are best-placed to carry out operations and maintenance of various parts of the systems, and workshop ideas about future arrangements together.

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The vision of Makassar aligns with that of RISE, so we are proud Makassar is RISE's Indonesia pilot project, and we are invested in supporting collaboration with government. As Chair of Makassar City's Project Management Unit for RISE, we can see valuable lessons that can be used for other projects city-wide.



Helmy Budiman, S.STP, MM
Head of Makassar Planning and Development Agency (BAPEDDA)



LESSONS FOR COMMISSIONING AT OTHER SITES

Batua has provided the opportunity to develop our commissioning processes, and take lessons into the other sites under construction. Wetland plants should be put to work treating wastewater as soon as possible after planting, making the prior commissioning of toilets and pressure sewer tanks especially important.

Working in lower-resource settings can make it challenging to commission systems in the right order. But the team has taken responsibility for the commissioning process, and managing operations and maintenance with different parties.

Left: Batua community leader Ibu Suneti discusses her experiences with RISE's infrastructure with the RISE team and KIAT Safeguards Advisor Anne Wuijts.



Building in Fiji

Delivering water and sanitation solutions in Fiji's informal settlements has required a systems-based approach to transform peoples' living conditions, driven by a capable team. Our aim is to create more sustainable, efficient, and adaptable systems that not only meet current needs, but also consider future challenges and changes.

Our designs and construction methods are based on looking at communities as a whole — to target high-risk areas with the goal of reducing contamination pathways across settlements. We can already see, for example, the benefits that formal drainage and moving still or stagnant water away from residents can achieve.

Improving the quality of life in informal settlements is actively on the government's agenda, and the RISE program complements the initiatives of the Ministry of Housing and Community Development to identify new approaches and best practices for upgrading and developing informal settlements in Fiji.

The solid relationships with government that RISE has established is a testament to our Fijian team's consistent engagement with authorities and stakeholders to resolve tricky issues — issues that RISE as a development program is not alone in facing.

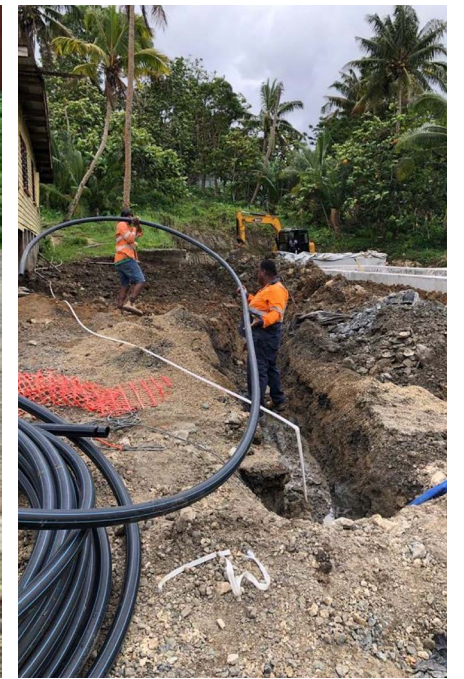
Our team's unwavering commitment also extends to the communities we work with, and generating the best outcomes for them. These special connections enable mutual trust and advocacy for one another. Community members are willing to stay enrolled in the RISE mission, and publicly back the program as one they want to be part of. Likewise, our teams make use of government connections to advocate for the needs of our community members.



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Managing construction in our informal sites is not just about improving existing infrastructure or building new systems; it's about the bigger picture. To develop the skills to manage the community dynamics and resources to ensure the safe delivery of our projects.

Neumi Tuisinu
Construction Project Manager



Geo-synthetic clay liner (GCL) installation, wetland plastering, setting up electricity meter boxes, and laying pressure pipes.



CROSS-COUNTRY CONSTRUCTION LEARNINGS

In October, the Build team installed the impermeable base layer for a 25-metre wetland in one of the RISE communities in Suva. For this part of construction, RISE is using a geo-synthetic clay liner (GCL) made with bentonite clay. GCLs are often used in water projects, as the bentonite powder swells quickly and helps create a self-healing water-resistant layer. RISE is using GCLs as a more effective and longer-lasting alternative to plastic-based water-proofing products or full concrete in certain locations.

Indonesia Build team members Noor Ilhamsyah and Ikram travelled to Fiji to be part of the GCL installation process ahead of similar installations to occur in Makassar. Of the learning mission, Ilhamsyah said, “Discovering RISE in varied conditions broadened my understanding of local contexts. Someday if the RISE systems are replicated globally, I'm optimistic that people will turn back to nature-based solutions, because in the end nature will prevail.”

“

The collaborative efforts between the RISE program and Fiji's Ministry of Lands have significantly amplified sustainable development initiatives, demonstrating a concerted approach towards resolving land-related challenges, while fostering socio-economic growth in the region.



Dr Raijeli Taga
Permanent Secretary
Fiji Ministry of Lands and Mineral Resources

Fiji demonstration project Tamavua-i-Wai, Suva

The community of Tamavua-i-Wai is the first informal settlement in the Pacific to be upgraded with RISE's decentralised, nature-based sanitation infrastructure, improving water quality and sanitation.

The infrastructure — including 200 m² of wetlands for wastewater treatment, drainage to address flooding events, 450 m² of paved pathways, bathroom units with rainwater tanks, and more — is servicing 40 households.

These community-scale systems aim to reduce exposure to contamination by treating blackwater, and managing contact pathways with contamination from external environments, including runoff from uphill catchments.

The learnings from observing the infrastructure in-situ are deeply practical for scaling up the approach to more informal settlements. We are already implementing them in our other sites that are currently under construction.

We have learned, for example, that standalone meters and electricity billing systems set up under a singular community entity is more reliable than assigning connections to individual households in these dynamic, ever-changing environments.

We also successfully engaged local youth and unemployed residents in infrastructure planning and delivery as a model we hope to adopt where appropriate at the remaining sites.

Our Fijian colleagues are regularly monitoring the nature-based treatment systems to see that they function as designed and ensure discharged water meets local treatment standards. They also collaborate with the community and authorities to rectify any aspects of the sanitation system. RISE deeply values the support and custodianship by the community and partners as the pioneering site for this new type of infrastructure in Suva.

“

I believe communities playing an active role in decision-making contributes to the long-term sustainability of infrastructure. A sense of connection and collective ownership also creates a platform for intergenerational learning — where elders pass on knowledge about systems to younger generations. We would be happy to see this pride and ownership live on beyond RISE.



Savu Nofomuli
Safeguards Manager



WATER COMMITTEES FOR SHARED RESPONSIBILITY

RISE's establishment of a Water Committee at Tamavua-i-Wai is a model we are exploring to help operate and maintain the decentralised nature-based treatment systems, in association with local authorities and stakeholder partners.

Community representatives have been elected by the residents and have been meeting monthly. They are being trained and supported to manage community feedback about the infrastructure systems, manage finances raised through household levies to fund power and billing expenses, and

facilitate connections with water authorities to address technical issues.

The Water Authority of Fiji is working closely with the Committee. WAF has experience working with water committees in rural areas, which is a common practice for general maintenance and reporting.

This collaborative approach — underpinned by community engagement, proactive training, and boosted connections with local authorities — not only aims to safeguard the infrastructure, but also foster a sense of shared responsibility.

Rolling out this model in our demonstration sites in both Fiji and Indonesia has also enabled our teams to share ideas and lessons to support communities with infrastructure operations and maintenance.

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Partnering with RISE provides WAF a useful avenue to test alternative approaches of decentralised, nature-based sewerage systems. These systems can improve sanitation, safeguard the environment, and uplift the standard of living in our informal settlements. Collaborating with RISE is strengthening our capacity to deliver on the National Agenda of increasing coverage of safely-managed sanitation throughout Fiji.



Dr Amit Chanan
Chief Executive, Water Authority of Fiji





Our transdisciplinary research



Planetary health acknowledges that human health does not exist in a vacuum. Everything is connected. Our environments shape the quality of the air we breathe, the water we drink, the food we eat, our exposure to infectious diseases, our sense of wellbeing and our connection with others. Unravelling the complex links — particularly in informal settlements, where people, animals and

environmental systems interact so intensely — is key to understanding and enhancing holistic health and wellbeing.

Untangling these connections is difficult, and RISE's ambitious planetary health research endeavour would not be possible without the sustained commitment of our Fijian and Indonesian colleagues. Year on year, our laboratory technicians have taken on increasingly complex sample analyses: dedicated training programs now see our technicians skilled in DNA extraction and pathogen identification using cutting-edge detection methods, and early work on in-country genomic analyses has just begun in Makassar.

Our data teams have led the set-up and implementation of a Laboratory Information Management System. This allows us to have real-time check-ins of every data point collected from the field — surveys, soil, water, mosquitoes, human samples and more. This enables errors to be immediately identified and rectified, enabling us to have confidence in the integrity of our results.

The commitment and care for work extends to our incredible field teams. Their dedication and respect for the residents we work with maintain the community trust that is so vital for our program. The learnings are two-way: the community members we work with are resilient, insightful and engaged. RISE is as much a platform for them to voice their needs and desires for improving their lives as it is for us to help build infrastructure that assists them to achieve this.

This is one of the key aspects that excites me about RISE's responsible approach to research: given the chance, future initiatives can be driven by local teams that are best-placed to lead them. With our planetary health approach untangling the multiple dimensions of health, and being driven by local capacity and expertise, I believe the benefits of RISE extend well beyond our randomised control trial.

Professor Karin Leder
Director, Assessment
Monash University
School of Public Health and Preventive Medicine
Faculty of Medicine, Nursing and Health Sciences

Our local research partners

RISE is only possible thanks to the partnership, collaboration, support and vision of our institutional partners in Indonesia and Fiji.

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.

Under the leadership of RISE Chief Investigator and Indonesia Lead Professor Ansariadi, and with the support from UnHas Rector Professor Jamaluddin Jompa, we have been gradually developing and building the capacity of the RISE laboratory and research platform as an important regional resource.

In 2023, RISE installed and commissioned a Nanopore genome sequencer to expand the laboratory's analytical capabilities. Through advancing staff training, and enhancing the state-of-the-art TaqMan Array Card (TAC) machines for detecting pathogens in human and environmental samples, the collaboration between UnHas and RISE has established a prominent planetary health laboratory in the region.



“

‘Leaving no one behind’ means we have an obligation to be inclusive in defining challenges, developing solutions, and ensuring equitable outcomes. RISE is a unique platform, building the capacity of our researchers, and embracing the priorities of communities at the heart of its endeavour.

Professor Ansariadi
Indonesia Lead and Chief Investigator,
Director, Partnerships
Hasanuddin University



“

Our coastal communities are at the frontlines of climate change impacts, but they are also hubs of innovation leading adaptation strategies. Through RISE, Fiji National University is conducting cutting-edge planetary health research, which will not only help mitigate risks, but also build long-term resilience in Pacific communities.

Dr Amelia Turagabeci
Fiji Lead and Chief Investigator
Associate Professor, Environmental Health
Fiji National University

FIJI NATIONAL UNIVERSITY

Fiji National University (FNU) has also been a partner of RISE since the program's inception in 2017. Operating out of FNU's Tamavua campus to the north of Suva city, RISE is part of the College of Medicine and the Fiji Institute of Pacific Health Research (FIPHR). Led by RISE Chief Investigator and Fiji Lead Dr Amelia Turagabeci, with the support of the Associate Dean of Research Dr Donald Wilson, RISE has established a state-of-the-art laboratory and field research program that is the only operation of its kind in the Pacific.

Our lab at FNU provides the RISE team as well as Fiji's planetary health researchers and students exposure to the whole sampling process — from collecting samples in informal settlements, to running analyses and interpreting the data to uncover the scientific links between the environment and human health. Aligned with FNU's 'One Health' initiative, the RISE lab and the trained and experienced staff our program is producing will be a lasting legacy for both FNU and Fiji.



Design and engagement



Professor Diego Ramirez-Lovering
Monash University
Faculty of Art, Design and
Architecture

The 2030 deadline of delivering on the Sustainable Development Goals is looming, and not enough progress has been made on the ground. Climate change is increasingly showing its impacts. This sense of urgency is what drives RISE to short-circuit traditional lengthy processes between research and real change and impact on the ground.

RISE is taking a unique approach to engaging with communities to design water and sanitation infrastructure. Not only are we co-designing the infrastructure together with communities, we are also rigorously analysing this participatory design process. By serving as our own ‘critical friend’, this research is already benefiting our program rollout, and holds great promise for new ways of conceptualising and implementing other informal settlement revitalisation projects.

Through our intensive co-design workshops, we have been able to deliver more context-specific infrastructure options that better respond to the very particular contamination challenges in each informal settlement location. We have studied these workshops and other activities, identifying the

key ingredients to engage diverse communities on similar projects (see next page).

Considering the wider urban development context, and the means that people have to adapt, is critical. For example, household-led construction practices, and the ways that rapid, incremental urban changes unfold, all affect upgrading programs. They must be considered to effectively assess the impact these programs have on peoples’ lives.

“
Our early trials and successes show operations and maintenance requires a combination of supported communities and local authorities to be involved.

We are exploring new models for operating and maintaining decentralised infrastructure.

This is especially important where resource-stretched governments need support in managing new servicing options.

Working with communities and governments in the cities of Makassar and Suva for the past six years, the learnings have been many. By collaborating with governments at all levels, we are understanding more about how investment frameworks, like grant schemes, can adapt to incorporate new interventions.

Turbo-charging these learnings into practical implementation is possible only because of the

most engaged and passionate Indonesian and Fijian colleagues. Their connections, and expert and thoughtful ways of working have enabled RISE to navigate complex issues like land tenure and land conflict. This has allowed us to crack intractable challenges and actually deliver critical services that have, to-date, been too hard to implement in informal settlements.

Iterating and improving while learning, we are forging new pathways for governments and funders to deal with infrastructure provisioning and servicing in novel ways that, most importantly, service those communities most in need.



RISE IN THE MEDIA:

Bringing better water and sanitation to informal settlements
The Environment magazine



RESEARCH HIGHLIGHT

ENGAGING DIVERSE PEOPLE IN COMMUNITY DEVELOPMENT

Within community development work, ‘participatory approaches’ are increasingly promoted, as participants are experts on their own experiences, and because people should determine what takes place in their homes and communities.

But the ways in which participatory approaches engage diverse people is not well-documented. This research project set out to document the key participatory activities and approaches the RISE program used to engaged diverse people, specifically women, men, children, older people and those with a disability, when planning water and sanitation infrastructure for their neighbourhoods.

The research team hoped that by documenting these activities and approaches, future programs similar to RISE might be better-informed about how to include diverse people in their programs.

Our research identified four mechanisms that are key to engaging diverse people in RISE, and could be applicable to similar programs:

- 1. Engaging with residents at multiple levels, from the community to the household and individual level.** Community-level events are great for visibility, while household-level interactions allow for more personalised and tailored communication styles that build trust and rapport, and allow for everyone to feel included and heard at the pace, and in the communication style that suits them.
- 2. Incorporating flexibility and adaptability throughout the program,** to be responsive to community needs and interests. One example was RISE distributing food during COVID lockdowns. This was not part of the official intervention, but RISE staff were able to identify specific community needs. It served to build community trust in RISE staff and commitment to the RISE program.
- 3. Having a diverse team,** for example having male and female staff members of different ages and who could speak the language(s) that residents were comfortable with. This meant it was easier for the staff and residents to communicate with each other, trust each other, and for a wider range of residents to feel included.
- 4. Maintaining regular contact and positive rapport between staff and participants.** RISE staff are frequently in the communities, so are familiar faces who are known and trusted. Importantly, the staff do not just arrive in a community, collect data, and leave. They spend time with people and have real conversations, which contributes to rapport and trust.
An important contribution that this study made was through the use of the Consolidated Framework for Implementation Research (CFIR). This framework is typically used to document the key elements of interventions that take place in medical settings, such as hospitals or clinics. Our research applied this to the context of informal settlement communities. We demonstrated that CFIR is applicable to these research settings, with some adaptations.

Read more:

Francis, N., Batagol, B., Meo-Sewabu, L., *et al.* Key mechanisms of an intersectional gender and socially inclusive community engagement and participatory design approach in the RISE program in Makassar, Indonesia and Suva, Fiji. *PLOS Water* 2 (11) (2023).

DOCTORATE SPOTLIGHT



Situated Transfers: Coordinating water-sensitive in-situ upgrading with inhabitant-led housing development in Indonesian urban *kampung*

PhD thesis by Dr Brendan Josey, Monash University, Faculty of Art, Design and Architecture

A significant proportion of the global population currently resides in cities and urban areas, and in developing countries up to 50 per cent of the population live in informal settlements. The conditions surrounding, contributing to, and emerging from, informality are increasingly being recognised as important components of sustainable urbanisation.

My research examines the intersections between resident-led housing development, and water-sensitive upgrading in urban informal settlements (*kampung*) participating in the RISE program in Makassar, Indonesia.

Existing studies on the physical characteristics of resident-led housing development are relatively few. While existing studies provide an excellent basis for categorising the different types of housing adaptation, they do not explore how

this gradual growth interacts with infrastructure upgrading, or provide insight into the rate of change that occurs during a project’s design and implementation.

To address this gap, my research examines how ‘top-down’ water-sensitive revitalisation interventions are best coordinated with ‘bottom-up’ resident-led housing development processes. In doing so, it asks three questions that examine:

- 1) the existing physical dwelling conditions in six RISE *kampung*,
- 2) patterns of resident-led dwelling changes over the course of RISE’s design of infrastructure, and
- 3) the interactions between resident-led development processes identified by the study, and the proposed RISE water-sensitive intervention.

“My research seeks to understand how rapid incremental urban changes may affect the applicability and implementation of in-situ urban upgrading and revitalisation of vulnerable communities, particularly through a water-sensitive approach.”

My study employs repeat photography of the built environment to build a dataset of resident-led change between March and November 2019, and from this

I analyse resident-led housing changes against the proposed RISE infrastructure intervention.

My study finds that 42 per cent of dwellings in the RISE *kampung* that were studied in my thesis demonstrated resident-led change over the study period, and 32 per cent of dwellings that changed overlap with RISE’s planned infrastructure works.

These findings show the importance of coordinating resident-led development with in-situ upgrading, and the potential this can have for improved water-sensitive project outcomes.

My study proposes a practical framework with strategies to manage, plan for, and incorporate resident-led development into prospective in-situ upgrading projects. My research reveals ways in which resident-led *kampung* development (including incremental dwelling additions, adaptations, and ad-hoc infrastructure construction) interacts with the design and planned implementation of the RISE infrastructure. It provides an evidence base to strengthen decision-making for in-situ revitalisation interventions, and to support strategic thinking for future resident-led adaptation in Indonesian *kampung*.

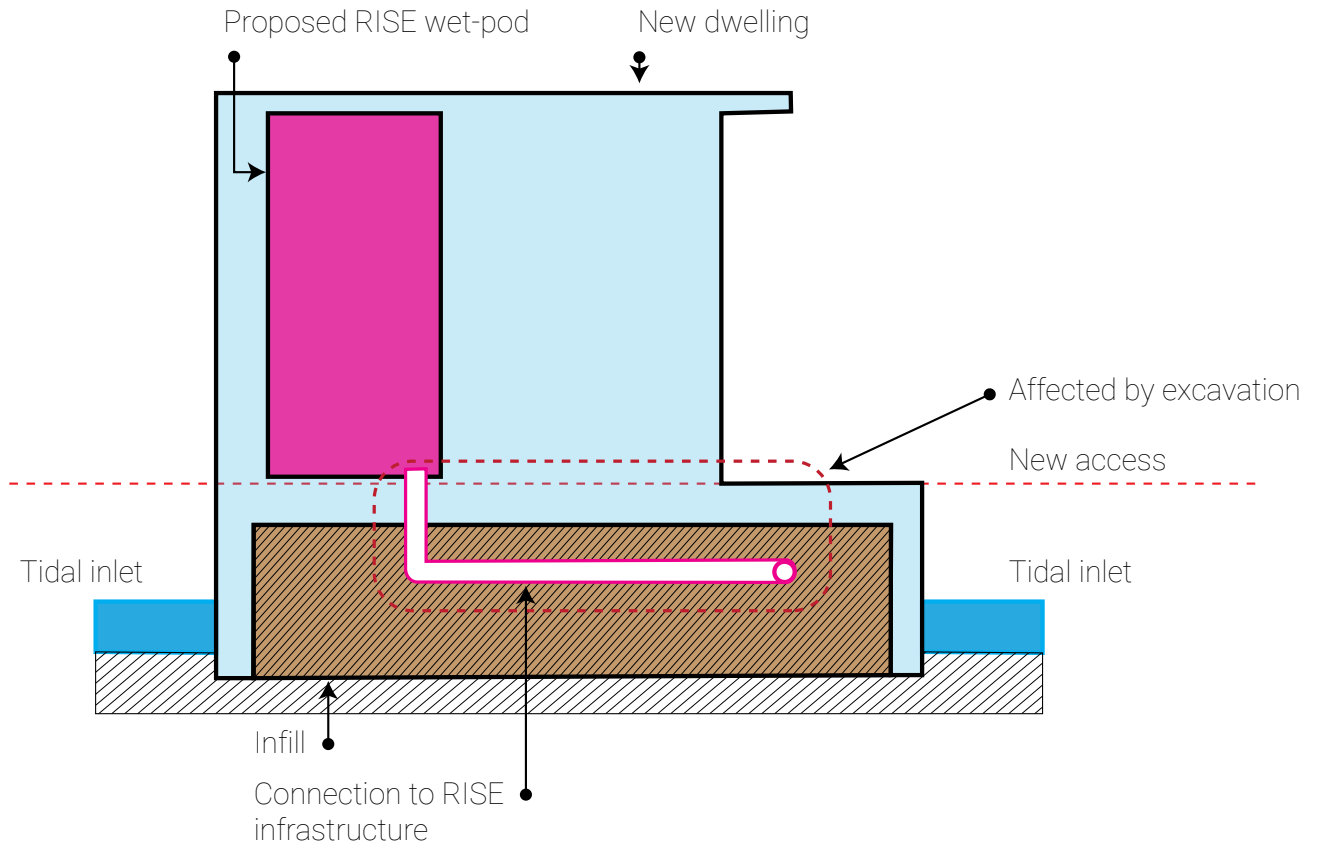
This thesis will have restricted access in 2024.

Read more:

Josey, B., Ramirez-Lovering, D., (Temporary) Appropriation (of Space), Makassar, and Urban Kampung. *Temporary Appropriation of Cities*, 171-193 (2019).



Dwelling development between March and November, 2019.



An example of interaction between planned RISE bathroom unit and newly-developed dwelling.

Ecology and climate



Professor Steven Chown
Monash University
Faculty of Science

We live in a world that has not turned out as we had hoped. The few have been privileged over the many. Both in society and in nature. All as a consequence of our actions. Therein lies the solution: our actions provide the means to undo our disappointment. But we have to change those actions, swiftly. RISE is a science-implementation program that provides an exemplar for how we might make that change.

Within RISE we seek to improve the lives and livelihoods of those who have not had privilege. We are testing ways to even the odds. Not just for those who live with insecure tenure and a daily struggle to service their needs with dignity, but also for the world around them. The world that is theirs and which deserves to be a healthy, diverse, interesting and sustainable place to live.

Where we live determines how we live. Stewardship of our neighbourhoods leads to better outcomes. These outcomes propagate: the local determines the global. Within RISE we recognise this connectedness. We live on one planet: our planet. And, as the pandemic compelled us to appreciate, we all share in one health: our health.

Delivering environmental information through RISE is as much a central construct of the program as every other element. That's what makes our program so remarkable. A different angle reveals a different centrality — there's no one special feature. Taking care of coming heat stress risks and reducing the burden of vector-borne disease are

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The RISE communities show a remarkable diversity: of settings, lives, life, and options for mitigation in the face of the climate crisis, underpinned by a general enthusiasm for change.

as critical as gaining partner trust, and without that trust we cannot understand and assess the risks and burdens.

The RISE renaissance has thrived on this diversity and enthusiasm to deliver fresh insights and fresh approaches. New techniques — in acoustics, genomics, design — and thoughtful approaches to co-design are providing foundations for the change.

As we embark on assessment of our renaissance, we will do well to recall that our very approach has delivered change, for good. We are showing the way to reverse the disappointments of the last half century. Irrespective of the outcome, we have succeeded. We have constructed a fresh path to the future that people and nature deserve. One where society's few and many are no longer distinct: one planet, one health, one future.



Community Fieldworker Jonati Kitekitoga collects a BG trap with mosquitoes from a resident's home in Suva, Fiji.



RESEARCH HIGHLIGHT

CLASSIFYING URBAN SOUNDSCAPES

Sound is an underappreciated environmental factor with profound influence on our health and wellbeing. While frequent exposure to excessive noise (such as loud traffic) is associated with a range of poor health outcomes, hearing the sounds of nature during our everyday lives, even within highly urbanised areas, can have positive effects on our physical and mental health.

Most people live in cities where they are continually surrounded by complex mixtures of sound — or 'soundscapes' — that can include both natural and human-generated sounds.

These soundscapes, and the relative balance of natural to human-generated sounds within them,

change throughout the day and across seasons. As result, they are challenging to quantify for scientific study. In this paper, we develop a generalisable system for classifying soundscapes to enable quantitative comparisons within and among different settings (for example, different countries).

Our classification system successfully discriminates seven soundscape classes differing in relative dominance of natural versus human-generated sounds that reflect differences in the physical and temporal environment.

Furthermore, our classification system was developed within an often-overlooked urban environment — urban informal settlements. Over one billion people live in informal settlements worldwide, but we know little of soundscapes in these settings or how they influence the health of residents. We begin to address this knowledge gap by using

the output from our classification system to describe and compare the prevalence of different soundscape classes within informal settlements in Fiji and Indonesia. When used in combination with health and development data, our classification system will allow us to evaluate the role soundscapes play in efforts to improve the lives of people in these settlements through upgrades to the physical environment, including increased green space and other natural elements.

This research highlight originally appeared in Relational Thinking, the People and Nature blog.

Read more:

Fleming, G., ElQadi, M M., Taruc, R., et al. [Classification and ecological relevance of soundscapes in urban informal settlements](#). *People and Nature* 5 (2) (2023).

Environment and water



Dr Brandon Winfrey
Monash University
Faculty of Engineering

In the Environment team we are monitoring faecal contamination in the environment in order to determine whether the interventions address this contamination. As such, we have undertaken extensive water, soil, and faecal sampling in informal settlements in Fiji and Indonesia to understand the degree of contamination.

Data from our environmental water samples reveal widespread faecal contamination, which varies spatially and temporally. The lack of a clear pattern of faecal contamination further reinforces the need for community-wide interventions that address pollution control from multiple sources in the environment.

We are also building the capacity of our teams in Fiji and Indonesia to carry out the monitoring and assessment. We have developed protocols for collecting, processing, and analysing water, soil, and faecal samples. These protocols are designed to ensure consistency and data integrity. The challenges of implementing a robust monitoring program vary between countries. Perhaps the most important findings of our work so far are related to the consistent, meaningful knowledge transfer activities associated with capacity building.

These informal settlements are incredibly challenging environments to work in. The environments are complex, the sources of contamination can change seasonally, or with behavioural changes, and floods can spread contamination in unexpected ways. The teams based in Fiji and Indonesia have an excellent understanding of their environments,

“Our work highlights the pressing need for solutions to tackle various pollution sources in communities. We are dedicated to sharing knowledge across borders, and aim to expand environmental justice to underserved communities worldwide.”



Community Fieldworker Mohammad Hatta collects soil samples at a settlement under construction in Makassar, Indonesia.

and all of this information needs to feed into the monitoring program. When we engage in capacity building, we are not simply providing a step-by-step protocol for collecting samples and maintaining chains-of-custody. Team members in Australia, Fiji, and Indonesia are working in concert to deliver RISE outcomes — in-person and remotely. The teams in Fiji and Indonesia are taking on responsibilities that will ultimately secure opportunities to expand the work of the RISE program to more areas.

One outcome from RISE that excites me most are the lessons from meaningful knowledge transfer. Australian RISE researchers are working with teams in Fiji and Indonesia, gaining experiences that will result in lessons that can be translated to other settings. I am heartened that these lessons from RISE can be adopted in other informal settlements in the Global South, expanding ‘environmental justice’ to more under-served communities.



Community Fieldworkers Syaidah Syamsul, Rosnaena and Mohammad Hatta collect water samples.

RESEARCH HIGHLIGHT

ASSESSING WATER-BORNE FAECAL CONTAMINATION IN INFORMAL SETTLEMENTS

RISE has been leading the way on understanding the scale of water-borne faecal contamination in informal settlements. Our researchers have employed novel techniques in a developing country context to identify the presence of *E. coli* and total coliforms (colony-forming bacteria) in different water sources within our communities in Fiji and Indonesia.

Interventions that aim to reduce exposure to harmful pathogens are crucial for creating safer, healthier and more resilient urban communities. RISE is working to identify and measure possible sources and causes of infection and disease within informal settlements, such as human and animal faeces.

Contemporary ‘enzyme substrate’ methods offer valuable tools for quantifying faecal levels globally. However, no studies had evaluated the use of these methods in the highly variable and contaminated environments found within informal settlements.

Using water samples collected from a constructed wetland, municipal, bore wells, wells, environmental and wastewater sources in Makassar and Suva, RISE researchers employed Idexx Colilert and TECTA™ methods to assess *E. coli* and total coliform levels. *E. coli* and coliforms are bacteria found in human and animal digestive tracts, which provide a strong indicator of faecal contamination and possible presence of pathogens.

We found that municipal water samples consistently contained the lowest levels of *E. coli* and coliforms, with a positive and statistically significant correlation between both methods of detection. However, the ability of the detection methods to produce consistent results varied across the other sources, with a lack of correlation between the

two methods when measuring wastewater. This highlights the importance of testing different methods side-by-side in different contexts and communities, before deciding which is most appropriate.

The research successfully compared two enzyme-substrate methods to detect faecal contamination, shedding light on their advantages and disadvantages in a developing country and informal settlements. The results will assist other researchers and practitioners to determine which techniques are most appropriate for assessing faecal contamination in highly-contaminated and variable environments, noting the need to move beyond a one-size-fits-all approach.

This work provides a foundation for answering future research questions on the impacts of climate change on water quality, opening avenues for further investigations. It also demonstrates the broader benefits of the RISE approach, resulting from close cross-country collaboration and capacity building between our research teams.

DOCTORATE SPOTLIGHT


Dirty work: Investigating diarrhoeal disease from contaminated surface soils within informal settlements.
PhD thesis by Dr Lamiya Bata, Monash University, Faculty of Engineering

It is well-established that diarrhoeal diseases pose a substantial public health challenge, with a disproportionate impact on vulnerable populations, especially young children. These diseases are primarily spread through the various arms of the F-diagram (pictured), historically emphasising only water, food, and hands in intervention strategies.

However, the role of contaminated soils as a potential exposure pathway has been overlooked in existing research. For young children, who often engage with dirt and soil during daily play activities, this pathway may be important to consider.

Current soil monitoring methods are largely spot-based, offering a limited snapshot of contamination within larger areas. To gather representative information across an entire settlement, researchers would need to collect and analyse hundreds of soil samples! Standard

spot-based soil methods also do not reflect how children interact with their environment, which mainly involves the surface layer of soil.

My PhD research focused on testing and validating a composite method to collect surface soils to address the spatial limitations of traditional spot sampling. By covering a larger surface area, bootsock sampling increases the likelihood of capturing contamination hotspots - thus improving our ability to get an overall picture of surface soil contamination levels across a settlement.

“

I cannot overstate my appreciation for the RISE Fiji and Indonesia teams for their support, and for the communities who continue to welcome researchers into their world. These learnings provide invaluable real-world context to pathogen transmission in peoples' environments.

Over the past few years, I've had the privilege of collaborating with our teams in Indonesia, Fiji, and internationally to test and optimise this method. The ongoing participation of communities within the program has been invaluable,

allowing samplers to walk in their yards wearing funny blue socks.

This collaborative effort has resulted in the development of the bootsock method, which has demonstrated heightened sensitivity in detecting bacteria, worms, and protozoa. Bootsock samples generally measure higher estimates of *E. coli* when compared to spot samples from the same community.

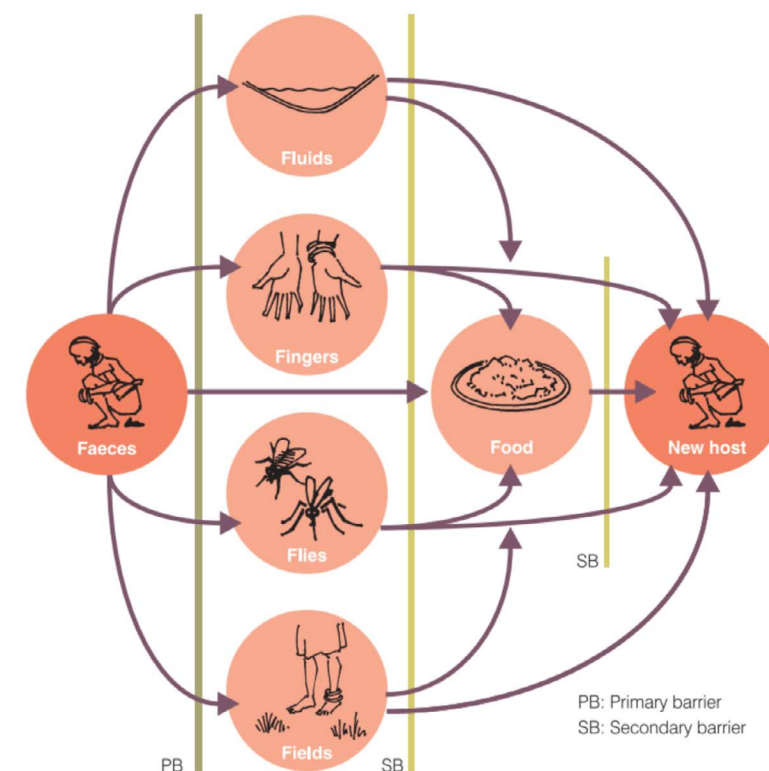
Furthermore, a post-hoc power analysis conducted across 15 transects demonstrated that a smaller number of bootsock samples (average $n = 2.9$) were needed to measure *E. coli* levels of a transect, in comparison to standard spot samples (average $n = 4.9$). This initial evidence suggests the bootsock method as both spatially representative and cost-effective.

This research significantly contributes to the RISE program by advancing our understanding of surface contamination, and its implications for public health, especially in vulnerable communities.

By introducing innovative sampling methods and addressing associated uncertainties, this work paves the way for more effective contamination assessment and control. It also highlights the economic advantages of employing such sensitive composite monitoring techniques, particularly in high-risk, resource-constrained areas.

Ultimately, the goal is to provide well-informed strategies for combating microbial contamination and, in turn, enhancing health outcomes in various settings, both within the RISE program and globally.

This thesis will become publicly available in 2024.



The F-Diagram is a tool that illustrates the main transmission routes and the potential barriers to prevent faecal-oral transmission.

Source: WELL (1998), adapted from Kawata (1978); copyright 1998, London School of Hygiene and Tropical Medicine, UK, and Water, Engineering and Development Centre, Loughborough University, UK, via Creative Commons (CC BY-NC-ND 4.0), via the International Federation of Red Cross and Red Crescent Societies.



Community Fieldworker Meiva Setoka conducts surface-soil sampling with bootsocks in a settlement in Suva, Fiji.

Human health



Professor Stephen Luby
Stanford University
Woods Institute for the Environment

The global population is growing. People are moving to cities, and disproportionately moving to informal settlements. People are settling in these locations to be close to job opportunities and new possibilities for their families. These are not desolate depressing places — they are dynamic and entrepreneurial, with capable communities who bring skills and capacities to collaborative partnerships.

If we intend to improve the health of these communities, we need to work in the settings where they actually live, rather than beginning with a model of high-income middle-class communities as our cognitive and normative model.

RISE is interested in bringing the benefits of the sanitary revolution, which occurred in high-income country cities over 100 years ago, to informal communities in lower-income countries. We know that cleaning up the environment can improve health, but it is difficult to implement standard strategies in settings where most low-income people live.

Understanding the health benefits of an environmental intervention can allow governments and development partners to make better-informed

decisions on sound strategies. So, our Human Health team aims to rigorously evaluate the health consequences of the remarkable co-created RISE intervention.



Understanding the health benefits of an environmental intervention can allow governments and development partners to make better-informed decisions on sound strategies.

Among pre-intervention samples, we are finding a lot of human pathogens in the environment, and a lot of the same pathogens within children living in these communities. Most assessments of environmental interventions look at indicator organisms, rather than real pathogens. We have been surprised by the breadth and frequency of pathogen identification both in the environment, and in the stool

samples collected from children living in these communities.

Taken together, these data confirm that these communities are highly contaminated, and the children who live there are carrying a heavy burden of infectious disease as a result. These are precisely the type of communities that could benefit from interventions that reduce environmental contamination.

RISE is implementing an ambitious intervention in the real world. It has assembled a unique combination of components: nature-based water purification, co-creation with community, neighbourhood-level sanitation and steps to reduce the impact of flooding — all in coastal informal communities. I am proud of the combination of the creative approach to the engineering and architecture components of the intervention, with the genuine community co-creation and ownership.

The recognition that working in these places requires a socio-technical intervention is brilliant. And we are hopeful that showing improved health of people and their environments can help unlock the political will to invest in these types of infrastructure solutions in these dynamic places.



RESEARCH HIGHLIGHT

METHODS FOR DETECTING SOIL-TRANSMITTED HELMINTHS IN FIJIAN INFORMAL SETTLEMENTS

Soil-transmitted helminth infections can cause a range of health problems. Globally, over 260 million preschool-age children are infected. Heavy infections can lead to diarrhoea and abdominal pain, malnutrition, and impaired growth and child development.

Soil-transmitted helminth infections affect some of the lowest-income communities who lack access to clean water, sanitation and hygiene services.

One of the important ways we are assessing the impacts of RISE's water and sanitation on reducing

environmental contamination is by monitoring the prevalence of soil-transmitted helminths. Our researchers are assessing the detection of soil-transmitted helminths in the faeces of children under 5 years-old, in urban informal settlements in Suva, Fiji.

Large-scale deworming programs are being used to eliminate soil-transmitted helminths in certain endemic settings. To contribute to elimination efforts, sensitive diagnostic tests are required to detect all positive cases of infection. Kato-Katz is a microscopy-based method that is commonly used to identify soil-transmitted helminth eggs in stool. But especially in low-intensity settings, Kato-Katz may miss certain helminths.

For example, hookworm eggs may degrade before they can be identified in the lab. The TaqMan Array Card (TAC) is a quantitative Real-Time Polymerase Chain Reaction (qPCR) approach and can be used as a potentially more sensitive way to

detect soil-transmitted helminth DNA in stool samples.

RISE Fiji Laboratory Team lead Silvia Vilsoni tested for the presence of soil-transmitted helminths in 363 human faecal samples using the TAC and Kato-Katz methods. Vilsoni found that the TAC method detected a higher number of positive samples compared to the standardised Kato-Katz microscopy method.

Overall, TAC is a robust method that could be used to detect soil-transmitted helminths in other research settings similar to RISE. However, the Kato-Katz method is simpler to perform using much less sophisticated specialised equipment and lab member training, making it a cheaper option in cost-prohibitive settings.

RISE is now implementing consistent testing method across human and environmental samples from both Fiji and Indonesia. We recommend TAC as an alternate approach to identifying soil-transmitted helminth infections.

Pathogens and genomics



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

Each year, diarrhoea kills over half a million children under the age of five globally. A significant proportion of diarrhoeal disease can be prevented through reducing environmental exposure to disease-causing microbes through the provision of safer drinking water, sanitation, and hygiene. Central to RISE's inquiries is the fundamental question: 'Does enhancing water and sanitation infrastructure lead to improved health outcomes for children under five?' Our research, specifically focusing on examining gastrointestinal microbes in both the environment and children's stool, will help provide new insights and answers to this question.

With so many different microbes potentially contributing to disease in informal settlements, it can be challenging to determine their source, which is fundamental to determining how to optimally intervene to minimise exposure and disease burden. RISE has taken up the challenge of looking at pathogens and bacterial communities using uniform methods for environmental specimens (water, soil, bootsocks, animal faeces) and people. Not

previously conducted by other randomised control trials, or to this scale, this complimentary approach reduces bias and helps researchers tease apart complex transmission networks.

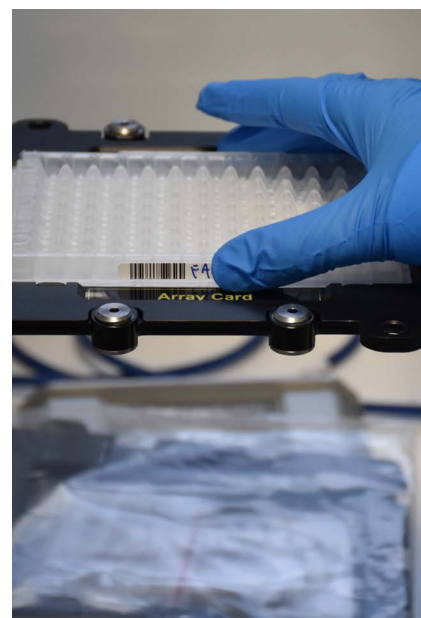
RISE teams have established that the TaqMan Array Card (TAC) method is capable of simultaneously detecting more than 30 pathogens across RISE's core specimens. Additionally, the emerging bacterial community data, which is obtained using metagenomics and targeted amplicon sequencing, is adding another layer to this picture: early results are beginning to show us the complexity and dynamics of source inputs into these environments.

“Through rigorous examination of environmental microbes and children's health, we are understanding more about disease transmission and the efficacy of our intervention.

We are just now beginning to add further knowledge with our teams leading in-house sequencing to start understanding antimicrobial resistance within bacteria isolated from core samples. The overall richness and magnitude of the data that RISE is accumulating across multiple settlements in different countries is truly ground-breaking.

The analytical system we have created is also unique in its ability to effectively deal with large, complex data sets, bringing together diverse data into one secure place. Scientists from our different disciplines will be able to access and analyse the data to answer both questions we've already considered, and ones we haven't yet thought of — a remarkable feat only possible because of RISE's scientific ambition and transdisciplinarity. Our data is also stored and organised in a way that is findable, accessible, interoperable and reusable — embodying 'FAIR' principles for data management.

Our Fijian and Indonesian laboratory and technical staff will continue building capacity and lead pathogen analyses, and we will soon begin developing integrated models to understand microbes, climate and health interactions. It's thrilling to see this work and our people evolve beyond expectations.



Pathogen and Genomics Coordinator Andi Zulkifli AS is one of the team members leading genomic sequencing in Indonesia.

RESEARCH HIGHLIGHT

UNRAVELLING THE COMPLEXITIES OF THE HUMAN–ENVIRONMENT HEALTH ECOSYSTEM

In many places around the world where resources are scarce, the health of humans, animals, and the environment are closely linked. About a billion people live in informal settlements, lacking basic services like clean water and healthcare. This leads to a higher risk of diseases, not only from diarrhoea-causing pathogens, but also from parasites contributing to malnutrition. Understanding how these diseases spread requires a comprehensive approach called One Health, which considers the interconnectedness of people, animals, and the environment.

To grasp the prevalence of disease-causing microorganisms in these settlements, RISE's Pathogen and Genomics team is using advanced technologies. One such tool is the TaqMan Array Card (TAC), which identifies and measures pathogens in various sample types, from human samples to animal faeces. Analysing over 1300 samples from Indonesia and Fiji, the team found significant differences in the types and amounts of pathogens: in Fiji, 30 microbes were shared between humans, animals, and the environment, suggesting a constant cycle of transmission due to ongoing contamination. In contrast, Indonesia had only 15 shared microbes, indicating more distinct contamination pathways.

The team has also embraced the use of R scripts — a set of instructions which are pivotal in data quality control, streamlining processes and improving efficiency. This transition has enhanced the evaluation and automation of data, ensuring accurate and reliable results. By using 16S rRNA amplicon

sequencing to identify and count the different types of bacteria present in a sample, the team gains insights into the bacterial complexity of samples, providing a deeper understanding of connections between humans, animals, and their environments.

As RISE's Pathogen and Genomics project progresses, the focus is on building capacity in Fiji and Indonesia. In 2024, the team plans to further implement nanopore sequencing platforms — allowing our scientists to uncover the complete sequence of DNA strands — and analysis pipelines in-country, alongside existing molecular and genomic technologies. This move aims to gather essential data on bacterial virulence, antimicrobial resistance, and transmission patterns in RISE communities, guiding future interventions.

The collaborative effort, supported by secure frameworks and bioinformatics tools, empowers our research teams to access and analyse genomics data, fostering regional capacity in the fight against infectious diseases.

Wellbeing



Professor David Johnston
Monash University
Faculty of Business and
Economics

In informal settlements, periodic or insufficient access to clean water, sanitation, and other essential services results in pronounced environmental and health adversities. Analysing these adversities, coupled with assessing the efficacy of the RISE interventions in mitigating them, is critically important research. But wellbeing is more than physiological considerations. Emotional health, social relationships, personal safety, community cohesion and economic security are also crucial factors that shape a person's overall quality of life.

Recognising this, our Wellbeing team are leading research that encompasses these important dimensions of life. The research purpose is dual-pronged: to provide a deeper understanding of RISE's transformative effects on household and community welfare, and to lay the groundwork for more effectively designed community upgrading programs in the future.

Traditionally, attempts to secure funding for community upgrades and related programs in informal settlements have focused mainly on tangible outcomes, such as the number of established sanitation facilities and reductions in disease

incidence. This approach often overlooks the more nuanced aspects of human life in these communities, and the associated benefits that investment could create. RISE is amending this perspective by emphasising the significance of more intangible aspects of wellbeing.

Research led by the Wellbeing team has shown that settlement residents place a high priority on

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By accounting for these broad-based benefits, the cost-benefit proposition of informal settlement programs becomes not only about infrastructure, but about transforming lives in their entirety.

broader aspects of wellbeing - such as their economic security - often more so than reductions in environmental stressors and improvements in physical health. Our research has also demonstrated that improving environmental conditions and restricting environmental hazards can cause a meaningful improvement in residents' wellbeing. Importantly, these improvements in individual wellbeing can have a ripple effect. For instance, in the right circumstances, they can lead to improved economic productivity, community cohesion, and child development.

By adopting this more holistic view, RISE is highlighting the importance of broader wellbeing impacts, in addition to vital physical improvements. In doing so, we are able to present a more comprehensive and compelling argument for why programs like RISE are so crucial.



Research Field and Laboratory Assistant Taniela Waka conducts a health and wellbeing survey in Suva, Fiji.



Community Fieldworker Herlina conducts a health and wellbeing survey in Makassar, Indonesia.

RESEARCH HIGHLIGHT

WELLBEING IN URBAN INFORMAL SETTLEMENTS IN THE WAKE OF ECONOMIC AND NATURAL SHOCKS

RISE conducts bi-annual health and wellbeing surveys in informal settlements. This longitudinal data allows us to perform rigorous studies on how economic and natural shocks impact residents, and identify factors that make them more resilient to shocks.

It has been widely recognised that urban informal settlement residents are especially vulnerable to the negative effects of the COVID-19 pandemic. Crowded living conditions, limited access to necessities, and dependence on daily informal earnings worsened existing poverty and food

insecurity challenges. Analysing data collected before, during, and 'after' COVID-19, we assessed the impacts of the pandemic on residents' economic wellbeing in the settlements.

To understand changes in economic wellbeing, we used household survey data from 2018 to 2022 in Indonesia and Fiji — providing insights from two different geographical contexts. Both countries experienced a decline in the economy, but Indonesia's economy recovered faster.

Our findings indicate that the pandemic substantially reduced economic wellbeing in both countries. In Indonesia, the negative effects were short-lived, returning to pre-pandemic levels by 2021. In Fiji, wellbeing remained low in 2022. These changes appear to be more influenced by economic downturns than illness. Notably, households with higher wealth and stronger pre-pandemic social networks exhibited greater economic resilience, experiencing smaller initial declines and quicker recoveries.

Residents in informal settlements are also highly vulnerable to climate events due to a lack of hazard-reducing infrastructure, poor housing quality, and limited ability to respond effectively. In a separate study, we used RISE health and wellbeing survey data from Makassar, Indonesia to analyse how changing rainfall patterns affect living conditions, physical and mental health, and wellbeing. Higher rainfall led to deteriorating living conditions, including muddy pathways. These adverse conditions resulted in declines in physical health and wellbeing. However, residents with greater wealth and better housing, and those in less flood-prone areas, showed higher resilience to varying rainfall levels.

This research shed light on how different shocks impact the health and wellbeing of residents in urban informal settlements. Understanding these effects and the underlying mechanisms can help policy-makers and stakeholders develop targeted interventions and strategies to enhance the resilience and wellbeing of these residents.

DOCTORATE SPOTLIGHT



Essays on the economic and health effects of environmental shocks

PhD thesis by Dr Michelle Escobar,
Monash University, Centre for Health Economics

Climate change is a substantial public health threat that could endanger the health, wellbeing and economic welfare of billions of people around the globe. With it, extreme weather shocks such as large floods and heatwaves are set to increase in frequency and intensity over the coming decades.

The aim of my thesis was therefore to explore how these environmental stressors affect the health, decision-making, and liveability of vulnerable people living in tropical developing countries such as Indonesia and Fiji.

This knowledge is key in order to accurately quantify the adaptation costs of climate change, and inform policy-makers on how to best target limited public resources in cost-effective and pro-poor ways.

To this end, I conducted three independent studies answering the following questions: first, how lasting are the physical and mental health effects of floods among the Indonesian urban poor, especially

those living in informal settlements? My findings show that floods can significantly increase the incidence of self-assessed poor health and acute morbidities such as cough, nausea and diarrhoea, even five months post-flood. These effects dissipate when assessed by 10 to 11 months. In contrast, mental health effects on both adults and children remain significant beyond the one-year mark.



Flooding events leave a lasting mental toll; temperature fluctuations affect economic decisions. Understanding climate impacts on health, wellbeing and decision-making can help us shape better risk reduction measures to support vulnerable communities.

Second, does heat affect peoples' ability to make good economic decisions? What are the mechanisms, and who suffers most? To answer these questions, I combined longitudinal household surveys from Indonesia and temperature records from NASA. My research shows that high night-time temperatures can alter people's decision-making abilities by

increasing economic impatience and irrational behaviour. Disturbed sleep, leading to lower math skills, likely drives these effects. People with the least ability to adapt to heat, bear the largest toll.

Lastly, I investigate what are the health effects of heat stress among informal settlement residents and the mediating effects of wealth for thermal exposure inside their homes. My research shows that even in tropical countries, where heat is ubiquitous, short-term temperature spikes can significantly increase poor health and lethargic symptoms, affecting the quality of life and productivity of some of the most vulnerable urban poor populations. I show that dwellings in the settlements provide no protection against outdoor heat.

Since completing her doctoral studies in 2023, Michelle has joined the University of Melbourne's Department of Economics, where she continues to study how health, psychological outcomes and cognition interact with poverty and environmental stressors in developing countries.

This thesis will become publicly available in June 2024.

Read more:

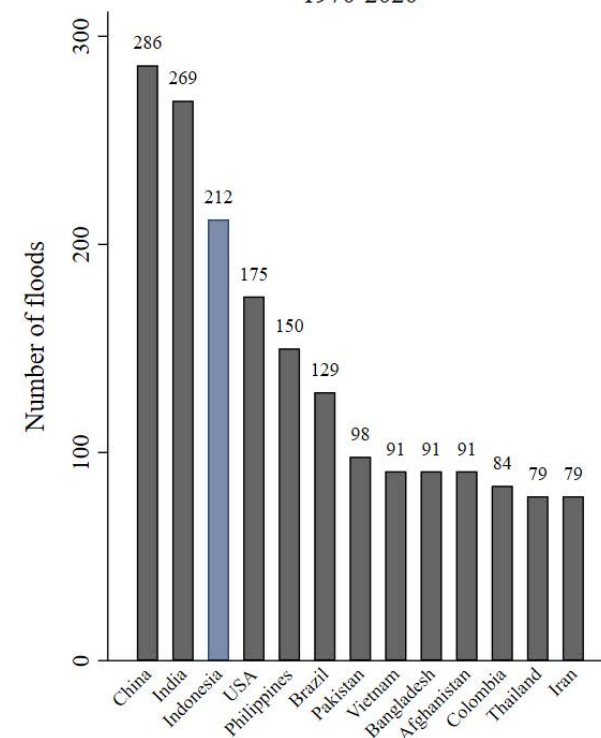
Escobar Carias, M S., Johnston, D W., Knott, R., *et al.* [Flood disasters and health among the urban poor](#). *Health Economics* 31 (9) 2072-2089 (2022).



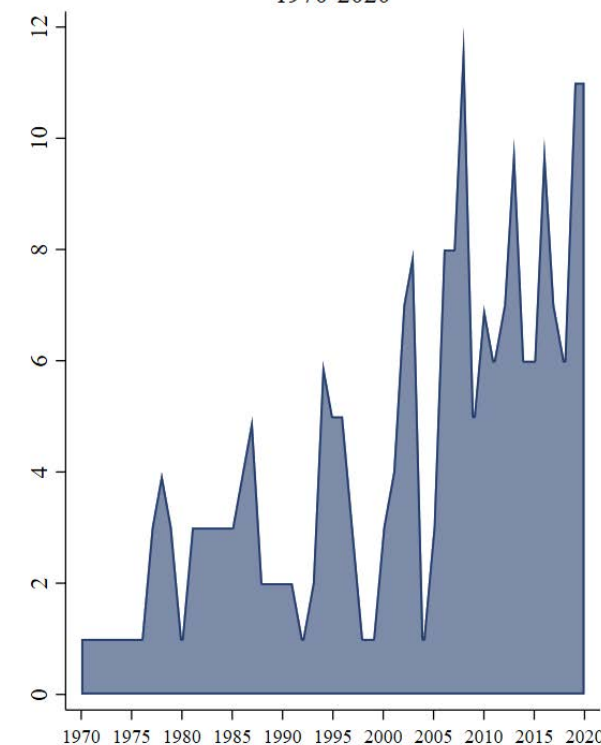
RISE IN THE MEDIA:

[Can we work with nature to make our cities more prepared for climate change?](#)
The Straits Times

(a) Number of floods by country 1970-2020

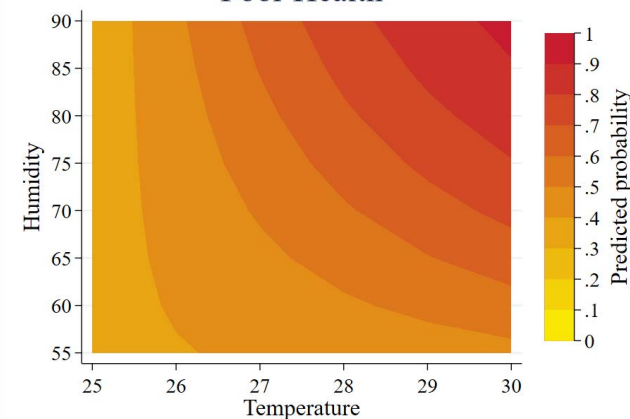


(b) Floods in Indonesia over time 1970-2020

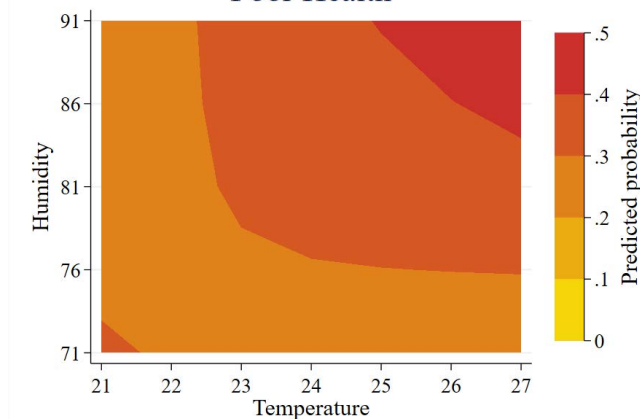


Graphs created by authors based on flood occurrence data by country available at the Emergency Events Database (EM-DAT) by the Université Catholique de Louvain (UCL), CRED, D. Guha-Sapir.

Poor Health



Poor Health



Predicted increases in self-reported poor health among RISE residents as a function of temperature and humidity. (Left: Makassar, Indonesia. Right: Suva, Fiji).

Policy and scaling up



Professor Thomas Clasen
Emory University
Rollins School of Public Health

The focus of the Policy and Scaling up Team is on policies to support scaling up the RISE intervention. We have shown in a published review of the drivers and barriers to water and sanitation interventions in informal settlements, the case for scaling up RISE depends largely on rigorously demonstrating its beneficial effects on the ecological, exposure, health and social wellbeing outcomes. At the same time, however, we are also working with our Fiji and Indonesia-based investigators to assess the effects of the project on other important outcomes that will impact policy-maker decisions on scaling up: improving gender equity, enhancing collective efficacy, and building climate resilience.

Our team's work on gender equity has included the development of a toolkit and policy brief that provides guidance on increasing the quality, inclusiveness, and sustainability of water and sanitation infrastructure projects in urban informal contexts.

Future research will rigorously measure the extent to which the RISE intervention improves the special health and wellbeing risks of women and girls, while empowering them to mitigate those risks.

Collective efficacy is a social construct that represents a group's

shared beliefs in its capacity to organize and execute a course of action. Together with social capital and social cohesion, collective efficacy is increasingly used in public health research to estimate a community's readiness to embrace an intervention, and measure intervention effects.

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We hypothesize that the RISE intervention will build collective efficacy, both through its co-design efforts and the agency it engenders, while also strengthening a sense of empowerment that will extend to other priorities for the community.



Co-design in Fiji.

We are also working to determine the effects of the RISE intervention on climate resilience. A major review, currently under peer review, examines the various domains characterizing climate resilience at the community-level, and the development of tools to assess resilience in the field. We will use these tools to assess the extent to which RISE actually builds climate resilience in our study communities that are among the most vulnerable to heat waves and flooding.

I'm proud that RISE has embraced these important outcomes as part of its overall evaluation of the impact of the intervention. Investigators are developing rigorous methods to assess effects in each area, still a major research gap. Demonstrable gains in gender equity, collective efficacy and climate resilience will not only address important vulnerabilities, but also contribute significantly to the case for scaling up the intervention.

RESEARCH HIGHLIGHT

COVID-19 IMPACTS: HOW JOINT FOOD AND WATER INSECURITY HEIGHTENED WOMEN'S DEPRESSION IN MAKASSAR'S INFORMAL SETTLEMENTS

As primary caregivers, women tend to be most affected when household resources are limited. They are more likely to make sacrifices like skipping meals to alleviate financial stress for their families. Global crises such as the COVID-19 pandemic can exacerbate such gender disparities, particularly in resource-limited environments such as urban informal settlements.

In our investigation amid the pandemic, RISE researchers uncovered profound insights into the intersection of food and water insecurity as they relate to women's mental health. Interestingly, while each insecurity independently affected the likelihood of depressive

symptoms, the convergence of both wielded a multiplicative effect — where the factors interacted in a way that their combined impact was greater than the sum of their individual effects — notably amplifying women's experiences of depression.

This revelation underscores the need for a unified approach to address food and water insecurities. Traditionally public health and development interventions have treated food and water insecurity outcomes in silo. Our study illuminates the inter-relationship with these resource insecurities and highlights the need for holistic strategies to combat these challenges in informal settlements, especially during crises like the pandemic.

Further, there is a strong body of evidence demonstrating that women face a disproportionate burden of food and water insecurity globally; this study not only adds to that body of research, but underlines the importance of nuance when designing gender-sensitive initiatives. Within the framework of initiatives like RISE, which focus on addressing various community challenges, considering the causal and often gendered pathways of these challenges in research and program design is crucial to maximize impact.

Recognizing how water initiatives might shape the food environment, and vice versa, alongside how women uniquely interact with these environments, can support improved health outcomes for women, forming a crucial facet often disregarded in current practice and projects.

The implications extend beyond this study, inviting further exploration in diverse settings spanning other urban informal settlements globally, and non-urban contexts as well.

Researchers can delve deeper into these relationships, broadening the scope for better understanding of resource insecurities and their impact on wellbeing.

Practitioners can also benefit by incorporating insights from our findings into their work addressing food and water insecurities. Adapting these considerations into practical interventions holds promise for more effective and nuanced strategies, catering to the complex needs of vulnerable communities worldwide.

Read more:

Charles, I., Salinger, A., Sweeney, R., *et al.* [Joint food and water insecurity had a multiplicative effect on women's depression in urban informal settlements in Makassar, Indonesia during the COVID-19 pandemic.](#) *The Journal of Nutrition* 153, 1244-1252 (2023).





RESEARCH HIGHLIGHT

PARTICIPATORY
DESIGN BRINGS
COMMUNITIES
TOGETHER,
INFLUENCES SOCIAL
CAPITAL

Social capital can be thought of as the shape and function of a person’s network or relationships within a community, including their participation in groups, relationships with leaders, perceptions of trust, belonging, and norms within that community.

Improving sanitation requires collective action; the majority of residents in a community must all use improved sanitation in order for any one of them to see health benefits. Social capital is a ‘catalysing ingredient’ that can enable people to come together and act at a community level to improve sanitation.

Evaluations of community-based sanitation interventions show that communities that start off with more social capital tend to be more engaged in program activities, and have better program outcomes, both in terms of toilet construction and behaviour change.

With this in mind, is it possible for intervention activities introduced early in the program cycle to intentionally bolster social capital? We evaluated the effect of participatory design and community engagement activities on social capital among urban informal settlements in Suva, Fiji and Makassar, Indonesia enrolled in RISE.

We found that participatory design and community engagement was positively related to social capital in Indonesia and negatively related in Fiji. The observed positive relationship in Indonesia is encouraging. And while there are several possible explanations for the negative effects observed in Fiji, the results point to the need for practitioners to carefully consider

the social dynamics of communities they intend to work with to optimize program outcomes and avoid unintended consequences.

RISE has produced a series of publicly available, evidence-based resources: a toolkit and policy brief that aim to help WASH professionals and policy-makers do just that. The toolkit includes methods and approaches for assessing context (with a particular focus on gender and social inclusion) to inform the design of inclusive water and sanitation projects in urban informal settlements around the world.

Read more:

Salinger, A., Charles, I., Francis, N., *et al.* “People are now working together for a common good”: The effect on social capital of participatory design for community-level sanitation infrastructure in urban informal settlements. *World Development* 174 (106449) (2024).

DOCTORATE SPOTLIGHT



Development and validation of household resilience measurement scales in the context of urban, coastal, informal settlements in Makassar, Indonesia and Suva, Fiji

PhD thesis by Dr Hemali Oza, Emory University, Rollins School of Public Health

My research addresses the critical need to enhance resilience among low-income populations in the face of escalating environmental challenges and socio-economic disparities. This work focuses on developing and validating measurement tools for assessing urban household resilience in informal settlements in Makassar, Indonesia, and Suva, Fiji. It offers vital guidance on resilience measurement and practical tools for monitoring and evaluating resilience-building initiatives. This research holds significant implications for designing effective programs and interventions aimed at enhancing resilience in low-income urban communities.

My proudest achievement is the development of scales for measuring resilience as a latent construct. These scales measure the hidden, complex dimensions of resilience, emphasizing the importance of this approach over traditional asset-based or indicator-based methods. This innovation recognizes that resilience is a multi-dimensional



Severe weather events, environmental shocks and stressors, and socio-economic challenges mean there is an urgent need to build resilience among low-income populations.

concept that extends beyond surface-level observations.

While not explicitly designed to improve household resilience, the co-design approach may foster resilience through social cohesion, and infrastructural interventions may enhance resilience through water supply diversification and flood management. It provides validated measurement tools for assessing resilience within the urban informal settlements studied by RISE. By collecting baseline resilience data, we open the door to post-intervention assessments that can gauge the impact of the program on household resilience.

Furthermore, the development and validation of the economic and social resilience scales have significant

implications for practitioners, researchers, and policy-makers. These tools offer a reliable and valid way to measure household resilience in often-overlooked urban informal settlements. This empowers practitioners to pinpoint areas of low resilience, and design tailored interventions to bolster resilience in these communities.

Policy-makers can also benefit from these scales, making data-driven decisions related to environmental risk reduction and resilience-building efforts, particularly in resource-constrained, low- and middle-income countries and informal settlements.

This thesis will become publicly available in 2024.

DOCTORAL RESEARCH



Leah Barrett
Faculty of Engineering

I am a second year PhD candidate using a multidisciplinary approach to combine data collected through multiple RISE objectives. My research focuses on the potential use of microbial source tracking (MST) within informal settlements, and how this may be used to infer and quantify human health risks. I have been looking into the performance of different MST markers in diverse geographic settings, as well as conducting fieldwork to understand the growth, decay and survival of MST markers under different environmental conditions typical of tropical and informal locations in comparison to disease causing enteric pathogens of human health concern. I'm optimistic that this research will help us to better understand the risks of environmental faecal contamination in traditionally understudied and complex environments.



Hannah Pennington
Monash Sustainable Development Institute

My research is focused on flood adaptation and climate resilience - specifically exploring the adaptive behaviours and strategies employed by residents living in informal urban settlements in Suva, Fiji, and how these strategies impact household resilience. Through extensive research collaboration with the RISE Fiji team, 42 households have shared their knowledge and experience with the research team through qualitative interviews and the photography method known as 'photo-voice'. This research will provide critical insights into the key factors that influence flood adaptation and resilience in the Pacific.



Jane Wardani
Monash Sustainable Development Institute

My PhD aims to deepen understanding of the process of collaboration and develop a practice framework guiding transdisciplinary research for planetary health. RISE has offered a truly unique context as a case study, combining a vast variety of knowledge stakeholders: researchers and practitioners from the built environment and health disciplines, academic, government, community, and private sectors, as well as several countries across development contexts. I passed my final review milestone in May this year, with two publications accepted and one under review. I am deeply grateful to all my study participants in the project in Indonesia and internationally, who have contributed valuable insights in developing practice strategies that enhance collaboration outcomes for all stakeholders.

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Maintaining excellence in research and infrastructure delivery

International Scientific Advisory Panel

RISE’s International Scientific Advisory Panel comprises seven distinguished experts from a range of fields and institutions, who provide independent advice on the scientific integrity of the program. This year, once again, ISAP helped guide the RISE program through its many complexities, such as how settlement changes over time or incremental timing of build completion might be managed within the

randomised control trial (RCT) research architecture, and how best to leverage and disseminate the myriad learnings we have accumulated over the past six years above and beyond the core RCT metrics. Acknowledging the dedication and perseverance of the RISE team over the past six years, invaluable insights continue to be shared and debated in order to maintain the rigour of the RCT.



Ted Bianco (Chair)
Independent Advisor; Honorary Professor, Monash Sustainable Development Institute; former Director of Innovations & Acting Director, Wellcome Trust



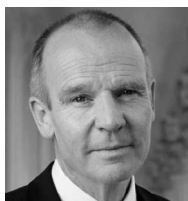
Madeleine Thomson
Head of Climate Impacts, Wellcome Trust



Karen Coelho
Associate Professor, Madras Institute for Development Studies



Diana Wall
University Distinguished Professor, Department of Biology; and Director, School of Global Environmental Sustainability, Colorado State University



Christopher Dye
Visiting Professor of Zoology, Oxford University; Former Director of Strategy, Office of the Director General, World Health Organization



Sarah Bell
City of Melbourne Chair in Urban Resilience and Innovation



Paul Hunter
Professor in Medicine, Norwich Medical School, University of East Anglia

International Development Advisory Board

RISE’s International Development Advisory Board provides strategic oversight to the construction implementation of the program’s water and sanitation infrastructure. Members bring a range of expertise at the intersections of international development, construction oversight and management. At this year’s meeting, the Board discussed the important role RISE’s evidence will play in evaluating

the success of the program, and opportunities to upscale the intervention. RISE’s nature-positive approach to protecting community health and wellbeing is seen as promising. The Board noted the importance of showcasing how the RISE approach is replicable, adaptable and sustainable, and how the approach can be optimised to local conditions, which will be priorities for 2024.



Matthew French (Chair)
Senior Director, Research Missions and Global Impact, Monash University



Alison Baker
Technical Director, International Development Assistance, GHD



Sumila Gulyani
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Global partnerships



MONASH
SUSTAINABLE
DEVELOPMENT
INSTITUTE



RISE is led by Monash University which is Australia's largest university and a member of the 'Group of Eight'. RISE incorporates diverse expertise from across the University, including six faculties: Art, Design and Architecture (MADA); Science; Medicine, Nursing and Health Sciences (MNHS); Engineering; Business and Economics; and Law.

RISE is anchored within the Monash Sustainable Development Institute (MSDI). As one of the leading research and education institutes for sustainable development in the Asia-Pacific region, MSDI is driven to find real solutions to some of the most significant challenges facing our world today. MSDI provides a cross-faculty, interdisciplinary platform to bring diverse partners together to collaborate, to educate, to take action — and to make a real difference.



Wellcome Trust

Wellcome Trust is funding the research components of RISE under the 'Our Planet, Our Health' program, which is exploring what makes cities healthy and environmentally sustainable, and how water management can be built into urban design. The Wellcome Trust is also a key advisory body for the program.



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 revitalisation projects for RISE's informal settlements in Suva.



Australian Department of Foreign Affairs and Trade

Australia's aid program focuses on sustainable economic growth and poverty reduction. The Australian Government is funding the construction of settlement upgrades in Makassar via the KIAT facility. Through its Water for Women fund, the Australian Government also funded a sub-study within RISE to generate evidence on how women and girls are engaged when designing water and sanitation services.



Indonesia Australia Partnership for Infrastructure

The Indonesia Australia Partnership for Infrastructure (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. Through KIAT, the Australian Government is supporting upgrades in RISE's first tranche of settlements in Makassar.



Fiji Ministry of Housing

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.



Hasanuddin University (UnHas)

UnHas, one of the largest autonomous universities in Indonesia, is a foundational partner of RISE through the Faculty of Public Health. UnHas leads the local delivery of the RISE assessment program in Makassar across all 12 settlements, hosts the RISE laboratory, and supports implementation of design and engagement through the Faculty of Engineering.



Fiji National University (FNU)

The FNU College of Medicine, Nursing and Health Sciences, through the Fiji Institute of Pacific Health Research, is a core foundational partner of the RISE program, hosting the RISE laboratory and leading the implementation of the research program in Fiji across all 12 settlements.



Stanford University, Woods Institute for the Environment

Stanford University's Woods Institute for the Environment is leading the human health study arm of RISE. The Woods Institute is focused on supporting sustainable and healthy communities and the provision of clean water and sanitation while stewarding the environment.



Emory University

Emory University leads RISE's policy and scaling up study and also plays a key role in gender and social inclusion. Emory, a leading research university, focuses on confronting global challenges, educating the next generation, creating knowledge, advancing caring and healing, and transforming society.



City of Makassar, Indonesia

With a population of more than 1 million, and 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 intervention is led by the City of Makassar through a Project Management Unit that provides direct support to the program.



Indonesian Ministry of Public Works and Housing

The Ministry of Public Works and Housing (PUPR) of Indonesia supports RISE through its governance of water resources management, road management, housing provision and development, wastewater and solid waste management systems, environmental drainage, and construction service development.



Indonesian Ministry of National Planning

Along with other ministries, the Ministry of National Planning (BAPPENAS) of Indonesia is a key supporter of RISE. As the institution leading Indonesia's national development plans, it is essential that RISE fits into the President's vision and mission into development priority programs and targets, for the country's sustainable development, based on evidence and new knowledge.



Water Authority of Fiji

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 operation and maintenance of the built interventions.



The University of the South Pacific (USP)

RISE is partnering with the USP School of Geography to support design and engagement research and the qualitative components of wellbeing studies, as well as supporting the implementation of RISE's Water for Women study.



Maxumise

Maxumise joined RISE in 2023 as a core delivery partner in Fiji. As a leading provider of human capital management in the Pacific, Maxumise serves as an anchor point for RISE Fiji.



Asian Development Bank (ADB)

The ADB is a foundational partner of RISE and supported the design and construction of the demonstration projects in Fiji and Indonesia, as well as co-publishing RISE's knowledge product series on RISE co-design and implementation.



LIVE & LEARN
Environmental Education

Live & Learn Environmental Education

Live & Learn Environmental Education (LLEE) is a foundational partner who helped established RISE in Fiji and supported the program through the pandemic. With strong community engagement practice and deep experience localising international development projects, LLEE has been instrumental in localising the RISE approach for the Fijian context.



The University of Melbourne

The University of Melbourne is providing support across the program on the statistical aspects of the research. As Australia's leading comprehensive research-intensive university and host to some of the world's most distinguished medical researchers, the University of Melbourne strives to make a distinctive contribution to society.



University of Cambridge

Working closely with the Wellcome Trust Sanger Institute, University of Cambridge is partnering with RISE to support the genomics work of the human and environmental research. Cambridge is committed to achieving excellence in research and scholarship, and to ensuring its research contributes to the wellbeing of society.



Wellcome Trust Sanger Institute

Alongside University of Cambridge, the Wellcome Trust Sanger Institute is supporting the genomics work on human and environmental samples for the RISE program. The Wellcome Trust Sanger Institute is a non-profit British genomics and genetics research institute, primarily funded by the Wellcome Trust.



South East Water

South East Water has considerable experience in decentralised wastewater treatment solutions, new technologies and innovations that are cost-effective and offer alternatives to big-pipe solutions. Alongside its subsidiary, Iota Services, South East Water's role in the RISE program is technical support and advisory services, primarily for design and engagement.



Iota Services

Iota Services, a commercial subsidiary of South East Water, supplies RISE's pressure sewers and OneBox systems as well as training for staff and informal settlement residents. Integral to the 'smart' infrastructure of the RISE intervention, the unit allows remote near real-time monitoring of RISE's pressure sewers.



Melbourne Water

Melbourne Water has extensive expertise in city-wide and city-region water-sensitive design, implementation and maintenance. Its role with the RISE program includes technical support and advisory services, primarily for design and engagement. Melbourne Water is a leader in world-class integrated water, sewerage, waterways and amenity management.



United Nations Human Settlements Programme

UN-Habitat is the United Nations program which promotes socially and environmentally sustainable human settlements and adequate shelter for all. UN-Habitat and Monash University are strategically partnering to advance the Sustainable Development Goals in the Asia-Pacific. With RISE a key vehicle to progressing a number of the Global Goals, the partnership is particularly focused on advancing urban planning, housing and land, water and climate change (SDGs 11, 6, 10 and 17).



United Nations University International Institute for Global Health (UNU-IIGH)

The strategic partnership with UNU-IIGH will assist with translating RISE lessons and findings into global policy dialogues. The partnership will focus on the human health and wellbeing dimensions of RISE, particularly qualitative research in wellbeing. UNU-IIGH was established by the United Nations University and the World Health Organization in 2000 to address issues of global health and public health delivery systems.



WaterAid

WaterAid is a global leader in water, sanitation and hygiene challenges, joining the RISE program as a strategic partner, End-User Advisory Panel member and strategic support provider. WaterAid is working towards getting water, toilets and hygiene to the millions of people still living without these basic human rights.



Oxfam

Oxfam is a global leader in poverty reduction, disaster response and development. Oxfam supports the strategic direction of RISE, both at global and country levels, specifically as a member of the End-User Advisory Panel, and the Fiji In-Country Stakeholder Advisory Panel.







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

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 SETTLEMENTS AND
 THEIR ENVIRONMENTS