



rise

REVITALISING INFORMAL
SETTLEMENTS AND
THEIR ENVIRONMENTS

Stronger together

RISE Annual Activity Report 2021

**Creating lasting
change means
making space for
others to lead.**



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Cover: RISE Indonesia Architect and Community Facilitator Liza (Icha) Marzaman has helped lead community members through formal consent processes for RISE to construct water and sanitation infrastructure in their neighbourhoods.

Left: RISE Indonesia Laboratory Technicians Andi Zulkifli AS (left) and Maghfira Saifuddaolah (right) are uncovering links between informal settlement environments and human health.

From the Director

Is it possible to harness the challenges brought about by COVID-19 to improve international research and development?



This was the year RISE committed to answering this question. There is no doubt that 2020's challenges and hardships for our program, our staff, partners and study communities have continued to be felt this year. Every day, our thoughts have

been with those still being ravaged by the pandemic, whether through illness or the prolonged impact to wellbeing and livelihoods felt most keenly by those most disadvantaged. Our acute awareness of the millions of people still lacking access to adequate water and sanitation across the globe has continued to fuel us to keep striving for change through our pioneering research trial.

And so, in 2021, we have been determined not just to keep the lights on in RISE, but to embrace the new operating environment that COVID-19 has created, and use it to fundamentally improve and strengthen our program. This has meant developing new ways of delivering our transdisciplinary data collection and accelerating one of the core goals of RISE – to develop expertise and leadership in our Indonesia- and Fiji-based teams. It has been an opportunity to double down on our commitment to doing things differently, to building genuine, lasting capacity and expert knowledge with the local teams that traditionally host, but rarely benefit from, international research and development.

Our accelerated transition to a more strongly locally led model is giving greater agency to our research and implementation partners and creating even more

opportunities, such as establishing state-of-the-art PCR-based pathogen detection capacity at the RISE laboratories hosted at Hasanuddin University and Fiji National University, and instituting an ISO9001 quality management system across our international research platform. Such will be the lasting legacy of RISE – not just in the development of capacity and facilities, but in the new ways of working and the belief that, given the chance, such initiatives can be driven by those best-placed to lead them.

Thanks to the exceptional efforts of our Fijian and Indonesian colleagues and the tenacity of our global team, the progress of our scientific endeavour has been safeguarded and we have emerged stronger and more determined than ever. Looking ahead, I am excited for what we are set up to achieve in the next year: building sustainable water and sanitation infrastructure in our first tranche of settlements in Makassar and Suva, which will enhance our communities' resilience, not just to shocks like this once-in-a-century pandemic, but also the looming and omnipresent impacts of climate change.

Having come through the crucible of the pandemic, the importance and urgency of undertaking ambitious initiatives like RISE to reduce inequality and support the most vulnerable is all the more clear. I'm excited for RISE to keep proudly pushing our agenda of championing voices that deserve to be heard in international research and development.

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



Since its commencement more than four years ago, RISE has continued to be an example of a truly interdisciplinary research program. Through RISE, we have the expertise, capability and commitment to make a significant impact in advancing sustainable development on a global scale – and we are doing just that.

Professor Margaret Gardner AC, President and Vice-Chancellor, Monash University



In a year where we witnessed research and health systems crumble, years' worth of RISE samples from informal settlements were in jeopardy of being compromised or lost to shutdowns. Our bolstered laboratory preparedness and safety measures are long-term legacies of RISE's contributions to the university, and research resilience in the Pacific.

Dr William May, Acting Vice-Chancellor, Fiji National University



Leading the implementation of RISE's environmental and health research in Makassar, it has been essential for the program to progress through the pandemic. Just as RISE has remained an unyielding research endeavour this year, we too are committed to taking cutting-edge planetary health research forward in Indonesia as part of RISE, and beyond.

Professor Dwia Aries Tina Pulubuhu, Rector, Hasanuddin University



RISE has shown outstanding resilience over the past two years, maintaining its focus, energy and, above all, commitment to the communities it serves. In pursuing its trans-disciplinary research agenda throughout the pandemic, it has enhanced the training and engagement of local researchers to bring them ever-closer to delivering the core objectives of the program.

Professor Ted Bianco, Chair, RISE International Scientific Advisory Panel

The year in review

It takes a special team to not only continue implementing an international research and development program amidst a global pandemic, but to come through it even stronger.

The year 2021 threw everything at us. Having safeguarded our teams and the program through the impacts of the pandemic in 2020, this year was ushered in with torrential rain and flooding across both Makassar and Suva over the course of many weeks, with some communities repeatedly evacuated or severely impacted by floodwaters. Suva was hit by two cyclones and narrowly dodged a third. If there was ever any doubt about how climate change would disproportionately affect informal settlements, it was well and truly dismissed this year.

Then of course later in the year, both Suva and Makassar experienced severe COVID waves that heavily impacted our partner communities — again disproportionately so.

Yet despite these extraordinary challenges, our Fiji and Indonesia teams persevered, pivoted, adjusted and developed alternative ways to keep the program going.

In Makassar, where the team has until recently been working from home since the start of the pandemic, we conducted health and wellbeing surveys by phone, installed and started using our shiny new TaqMan polymerase chain reaction (PCR) machine at the lab in COVID-safe work bubbles, performed limited safe field sampling and equipment maintenance, kept up the momentum of the build by holding high-level meetings with our friend the returning Mayor of Makassar, and launched [our report series on water-sensitive informal settlement upgrading with the Asian Development Bank \(ADB\) in Indonesia](#).

In Suva, which had remained largely COVID-free up until April this year, we were able to get in a few rounds of field surveys before triggering an orderly transition to home working when the latest wave arrived. COVID had a particularly devastating impact in Suva, with the

livelihoods of many households in our communities struck out almost overnight. While our Build team continued their work, churning through infrastructure designs and finding alternative ways to engage with communities, and our lab team engrossed themselves in pathogen detection work using their newly installed instrument, our community field workers assisted with government aid distributions in informal settlements across Suva.

The year spent in and out of lockdowns was truly exhausting for our hubs across Fiji, Indonesia and Australia — scrambling our data collection timelines, delaying laboratory deliveries, and restricting access to our offices. We developed robust COVID safety protocols to keep our teams and communities safe, adding another layer of rigour to what are already logistically challenging activities.

But any feelings of frustration were tempered knowing the heartbreaking hardships our partner communities were facing everyday with ongoing pandemic challenges to their health and livelihoods. RISE's 'frontline heroes' in Makassar and Suva have delivered care packages with critical food and hygiene supplies to our pandemic-affected communities, all while juggling the needs and safety of their own families. An extraordinary effort in extraordinary times that is recognised across the program and beyond.

Leaping from one challenge to another, we used periods of forced pause to consolidate our findings thus far, and reconnect with our partner network too. We welcomed the [Australian Department of Foreign Affairs and Trade's \(DFAT\) expanded investment](#) with us to construct the water and sanitation infrastructure in our first six settlements in Makassar. This funding, through the Indonesia Australia Partnership for Infrastructure

Right: Filise Volavola, Mere Jane Sawailau, Meiva Setoka, Jonati Kitekitoga, Pita Tamani and Ilaitia Erene from the Fiji team complete the annual household survey and child stool sampling, just before a major outbreak hits the country.

Below: Mohammad Hatta, Rosnaena, Syaidah Syamsul and Ina Rahlina from the Indonesia team progress environmental sampling activities in settlements, backed by strong safety protocols.



(KIAT), builds on ADB's critical foundational funding and support for community design (co-design) and engineering, which has put RISE in a strong position to jump into construction.

If that wasn't enough, our teams also put in a herculean effort to get all of our well-refined processes and systems documented and recorded as part of our ambition to gain ISO9001 quality management accreditation for our research platform. After a rigorous series of audits in the latter half of the year, professionally supported by our expert teams in Fiji and Indonesia, we recently confirmed the award of accreditation. RISE can stand tall in the knowledge that we have put together a world-class international research platform.

At the same time, we committed to setting ourselves up for an eventual return to the field, continuously collaborating and adapting our safety protocols to match the situation on the ground on a weekly and even daily basis. So, when vaccination rates began to surge and infection rates fell, we were ready and eager to re-establish our research regimen and engage with our communities.

In the final quarter of the year, drawing on whatever was left in the tank, our teams have re-emerged with full field campaigns, collecting samples, analysing them in our labs, and preparing for next year's Build.

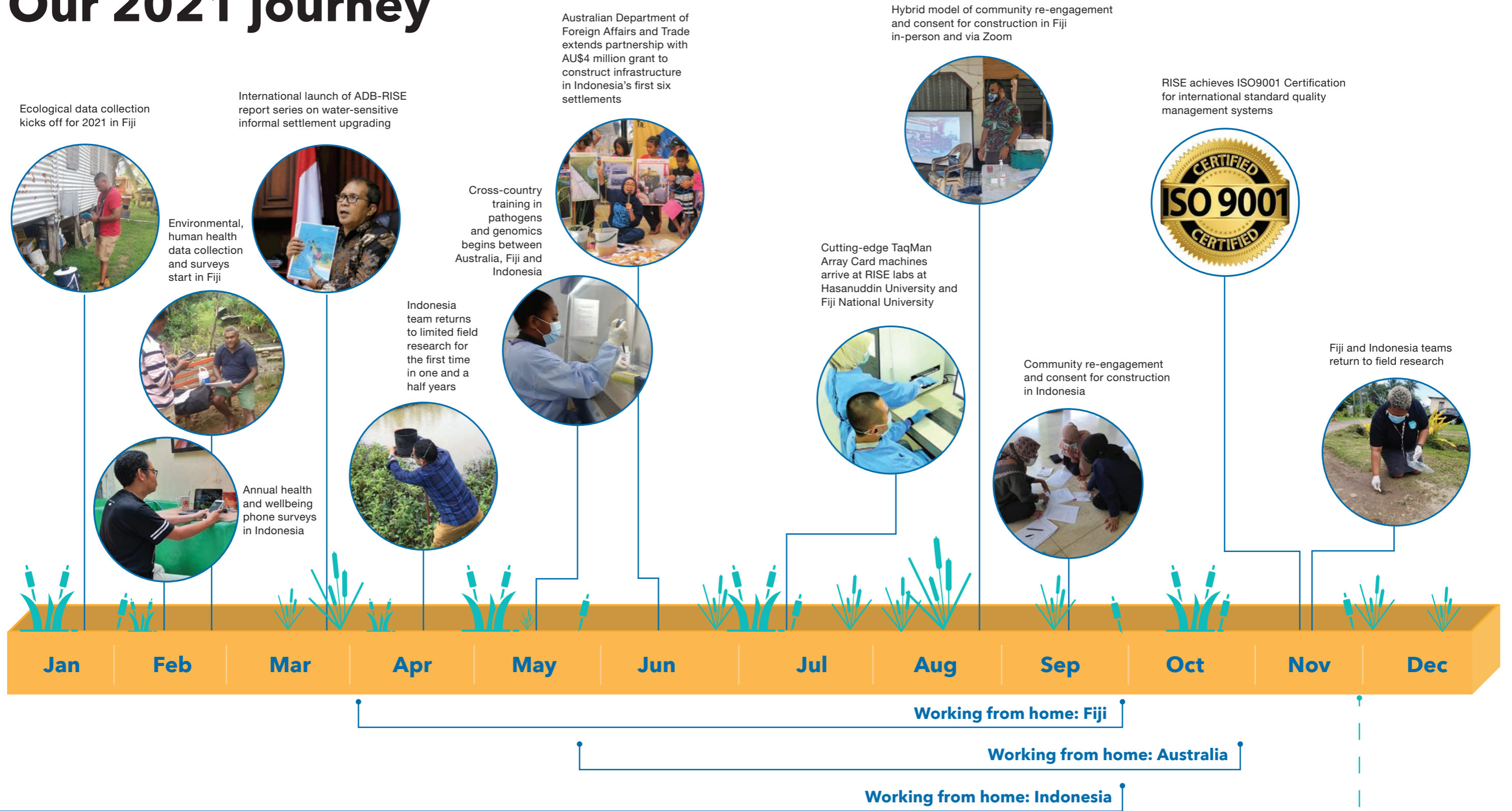
Our achievements this year come down to an unwavering commitment by our Fiji and Indonesia teams to

push research and implementation forward in creative ways, despite huge odds. They have stepped up and shown it's possible — preferred, even — to decentralise decision-making and have high levels of ownership over implementation in the countries in which research is being carried out.

This year has showed us that breaking down structural inequalities of international collaboration can lead to new innovations and efficiencies, and that research and development programs can be stronger because of it. ■



Our 2021 journey



 **No international travel**



Fiji recognises

- Nirai Ravulo**
- Mere Jane Sawailau**
- Meiva Setoka**
- Pita Tamani**
- Filise Volavola**
- Mosese Walesi**

Frontline heroes

The COVID-19 pandemic has placed already-vulnerable informal settlements under even greater pressure. Tenure insecurity, inability to isolate, limited assets and savings, children schooling from home, and job and livelihood insecurity has meant that informal settlement residents are highly vulnerable to the immediate and longer-term shocks of COVID-19.

This year we supported our participating communities in Indonesia and Fiji through difficult times by delivering aid and essential resources. Coordinated by RISE Fiji Coordinator Isoa Vakarewa and RISE Indonesia Coordinator Fitriyanty Awaluddin, our compassionate staff delivered food packs and hygiene kits, along with COVID-safety messages. It doesn't make up for chronic and lingering needs in the wake of the pandemic, but it is a symbolic demonstration of our commitment to the wellbeing of our partner communities.



Indonesia recognises

- Mohammad Afif Fikriaraz**
- Hamdan Habsji**
- Mohammad Hatta**
- Herlina**
- Adrianto Hidayat**
- Noor Ilhamsyah**
- Ikram**
- Liza (Icha) Marzaman**
- Nur Intan Putri**
- Ina Rahlina**
- Rosnaena**
- Syaidah Syamsul**



Left: Constructed wetlands using natural filtration processes will treat wastewater from homes at Tamavua-i-Wai.



7
pressure tanks

16
bathroom units

221+ m²
wetland area

182
people serviced

34
houses

Fiji demonstration project

Tamavua-i-Wai, Suva is now the very first community to showcase how RISE's water-sensitive approach can function in an informal settlement context in the Pacific.

Sitting at the bottom of a steep hill in a tidal zone, Tamavua-i-Wai is a difficult location for infrastructure to reach — which is exactly why RISE is needed here. With large trucks unable to access the settlement, cement has been hand-mixed; soft, unstable ground has been hard-filled for wetlands to stably sit on; and water stops installed to manage the tidal influx.

With Fiji's devastating COVID-19 outbreak in April, the value of setting up special COVID-safe protocols cannot be overstated: they supported our teams to feel safe to enter the community, and completion of the site would not have been possible this year without it. Our COVID-safe systems and constant communication with local leaders has meant that ongoing support from the community of Tamavua-i-Wai has been tremendous. As the custodians of infrastructure that they designed, residents and local government agencies will continue to be supported by RISE for ongoing operations and maintenance. ■



"The strength of RISE lies in its emphasis on genuine engagement, lately using a hybrid of methods, with all stakeholders. Through good times and bad, RISE communities are well-versed with the project and understand they are contributing to something bigger".

Mere Naulumatua, RISE planning specialist and President, Fiji Planners Association



"Tamavua-i-Wai is in a difficult location, and it was near impossible to access or work on wet days. This varied timelines for completion from one day to the next, and the team learned to be adaptable and efficient in order to complete the job".

Isikeli Buli, Senior Project Manager (Operations), Mega Construction & Civil Works Solutions



Left: Maghfira Saifuddaolah, Uhwan Subhan and Hamdan Habsji collect wastewater samples along Batua's wetland treatment train to monitor the system's performance.

2
pressure tanks

5
bathroom units

39+ m²
wetland area

9
rainwater tanks

44
people serviced

12
houses

Indonesia demonstration project

The **Batua, Makassar** demonstration site is successfully serving as a 'living lab' of water-sensitive revitalisation in an Indonesian informal settlement, with strong community ownership. It is enabling us to show that this approach can treat wastewater for the benefits of the community, and their environment.

Our Batua monitoring lead, site engineers and community fieldworkers found a regular rhythm collecting samples from our water and sanitation systems this year. Emerging results out of our Hasanuddin University (UNHAS) lab indicate that the infrastructure is performing as expected – treating wastewater from homes, before safely discharging it into the environment.

Batua also shows that maintenance of these sustainable systems, like wetlands, is also straightforward. 'Smart' systems have been a game-changer, RISE teams and community members are able to monitor sewerage systems remotely – almost in real-time – and attend to alarms quickly and efficiently.

Next year, urban development policymakers and practitioners will benefit from lessons codifying RISE's Batua experience: studies will reveal how green infrastructure can be contextualised in informal settlements, show that constructability is possible using local materials and construction methods, and highlight how sustainable infrastructure impacts the lived experiences of informal settlement residents. ■



"Our COVID safety meetings are well-attended by Batua residents, where they come and engage and ask questions. If

there are any issues with the sewerage systems, community members are very fast to respond and help rectify things. We are constantly in touch via WhatsApp, and meet in-person for more complex infrastructure discussions".

Muhamad Faisol, Batua Construction Manager, RISE Indonesia



"Now, we don't fear as much when the rain comes. [Before RISE built the drainage system] it was a life struggle. Because

water wouldn't flow out (of the settlement) smoothly, but now it does go out right away".

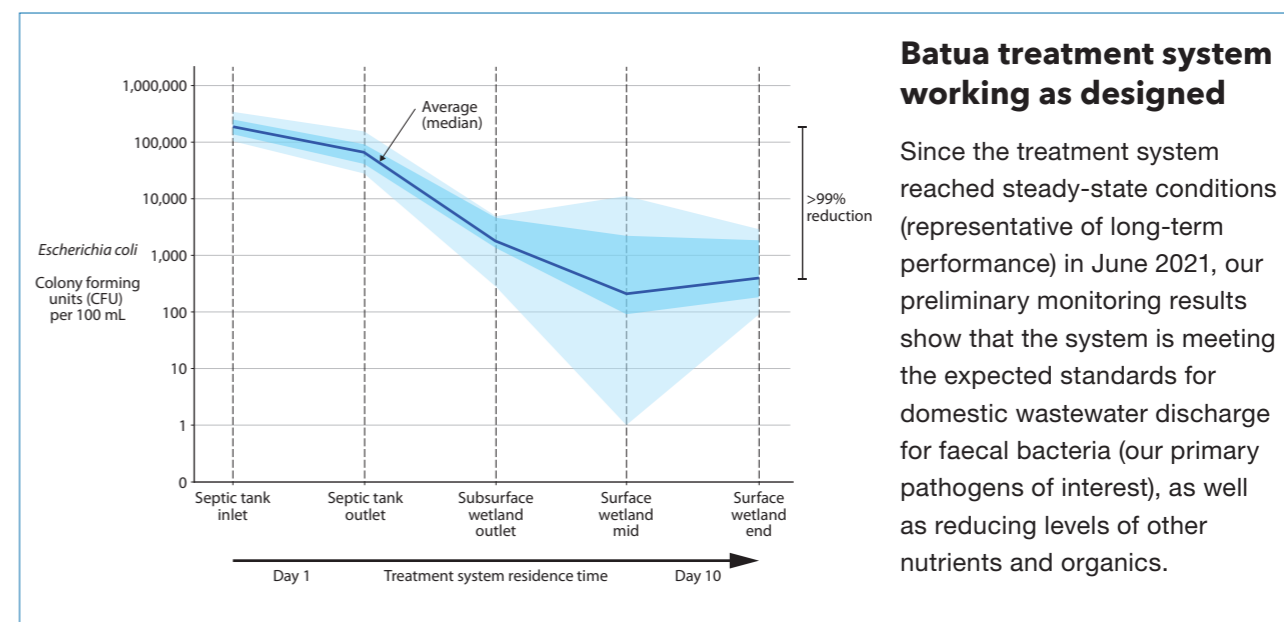
Batua resident



Signs of a well-functioning ecosystem

Along with water quality and odour monitoring, we are also checking for a range of insects in our wetlands. Dragonfly nymphs are among the species we have found calling our wetlands home.

Fearsome-looking under the microscope, these nymphs are often found during our sampling at Batua. They join a variety of fish, frogs and other organisms, indicating the presence of a healthy and diverse ecosystem within our constructed wetlands treatment system.





Possibilities, principles and best practices

Water-sensitive informal settlement upgrading

A report series bringing lessons from our demonstration site to policy formulation and city planning agendas.



Left: Makassar Mayor Mohammad Ramdhan "Danny" Pomanto has opened the city's doors to RISE since the program's start in 2016 to trial nature-based solutions in informal settlement contexts.

Universities, governments and funders came together in March to launch a report series advocating for smart, nature-based solutions to be used for resilient and sustainable urban development.

The report series, *Water-sensitive informal settlement upgrading*, produced by RISE, Monash University and the Asian Development Bank (ADB), explores the RISE experience of the past four years of trialling a water-sensitive cities (WSC) approach to upgrade 24 informal settlements in Fiji and Indonesia.

The series covers the key principles, community co-design, and the technical components of a WSC approach, and how this can come together with the ambition to deliver on the Sustainable Development Goals in an integrated and transformational way.

Speaking at the online global launch, RISE Program Director Professor Rebekah Brown said, 'Through the RISE trial, we are asking important scientific questions like, if we use more green, innovative infrastructure solutions, how do they materially improve the health of people — in particular the health of children, and their future prosperity? What do these systems cost, and how can we make them cost-effective and readily implementable for others? By trialling this infrastructure and generating evidence on the health of people and the environment, we are aiming to transform urban health and wellbeing.'

Makassar Mayor Mohammad Ramdhan "Danny" Pomanto (pictured left) said the demonstration site in Batua has been successful in trialling the solutions. 'I am proud that Makassar is considered a global pilot city of these technologies. Off the back of Batua's success, we are excited to make Makassar a more liveable city by rolling out this approach across RISE's next six sites in the city.'

Support from the Asian Development Bank, through the Urban Climate Change Resilience Trust Fund, enabled the design and successful delivery of Batua. ADB Vice-President for Knowledge Management and Sustainable Development Bambang Susantono said the benefits of the innovative approach are already clear. 'I visited the Batua demonstration site in 2019 and 2020, and I was heartened to see how the community has contributed knowledge to the project and taken ownership in the process. The infrastructure is technically innovative, and ADB's developing member cities across Asia and the Pacific are approaching us to provide them with the technical knowledge and means to implement it.' The report series is designed to bring lessons and evidence to the front of policy formulation and strategic agendas of cities and governments, so we can continue to improve life in our cities and ensure no-one is left behind. ■

[Explore the series.](#)

The Build takes shape

We are all set for the construction of RISE infrastructure in the first 12 settlements – six in Fiji and six in Indonesia – in 2022.



“Construction is carried out on occupied and unoccupied land. So, our safeguards protect the interests of citizens from various social, economic, and environmental impacts of the infrastructure that is built. The resulting conditions will help create a city that is comfortable and maintained in a sustainable manner”.

Sakka Pati, Safeguards Advisor, RISE Indonesia

FIJI



RISE Fiji Senior Co-design Facilitator Alex Wilson explains the elements of RISE's water treatment system to a participating community.

This year we set ourselves up for the build in 2022, and much of this work was driven by our capable Fiji colleagues.

Functional designs outlining our revitalisation plans are complete for all six sites, and detailed engineering drawings – detailing the final infrastructure specifications for contractors to take construction forward – are being finalised in sequence.

All households in the first settlement gave their permission for construction within one day of RISE's information sessions with the community's leaders – a testament to the connection our Fiji team maintained with our residents throughout months of lockdown. Community engagement will continue with the rest of our six communities into the new year before construction begins. ■



“Key to effective community engagement is taking the time to get to know your audience. Every community is different, and each individual brings a different level of experience or skillset. Tapping into these skills not only gives us an advantage, but encourages our community members to engage more confidently with us”.

Meagan Volau, Computer-aided Design (CAD) Manager, RISE Fiji

INDONESIA



RISE Indonesia Community Fieldworker Rosnaena walks through the land consent process with community members.

We are shovel-ready thanks to the Indonesia team's perseverance and close collaboration with our communities and the City of Makassar.

Our detailed engineering drawings for all six sites are ready to be handed to build contractors. They reflect residents' aspirations from our co-design workshops and the many changes that have occurred since then in these dynamic settlements.

Every household wanting to connect to RISE's infrastructure has signed all-important letters of consent – the result of immense preparation: the team used information sessions with small groups of residents outdoors to explain how they can give formal permission to build and to also explain our new COVID-safe protocols.

This year we also expanded the team with additional staff experienced in project management, safeguards and engineering to bolster the collective to deliver on construction. ■

Supporting the build

RISE has established an [International Development Advisory Board \(IDAB\)](#) to provide independent, strategic advisory support for the build work in both countries.

The international aid and development expert members serve the RISE Executive Team in risk management, managing legislative changes, overseeing safeguards, to governance and capacity building.

A 'sister' board to our [International Scientific Advisory Panel](#), our [Governance Advisory Panel](#) and [Data Advisory Panel](#), the IDAB rounds out these key forums, providing important support for the program.

Our robust research platform

TRANSDISCIPLINARY DATA MANAGEMENT

Data is, at once, the millions of puzzle pieces we are constantly collecting and managing, and the glue that binds these pieces of our program together, vital to revealing the bigger picture of our findings. Data underpins the evidence demonstrating our intervention's impact. Without it, RISE wouldn't be the ambitious research program that it is.

As we enter the 'build' phase (building our water and sanitation infrastructure in our first 12 sites in Fiji and Indonesia), our strategic focus is on maximising and safeguarding all the data we have already collected pre-intervention. With our data points spanning community engagement, ecology, environment, human health, wellbeing and more, the scope is vast. The end goal is to own a longitudinal dataset across these disciplines showcasing changes in time as a result of our intervention across the informal settlements taking part in RISE.

We are particularly proud of our Laboratory Information Management Systems (LIMS) based at the RISE laboratories at Fiji National University (FNU) and Hasanuddin University (UNHAS). This massive database, built and managed by our Indonesian Data Officer, covers every blood, faecal, mosquito, soil and water sample collected and frozen from our 24 settlements since 2018. ■

BEST PRACTICE SAFETY MANAGEMENT

With the advent of COVID-19, it has never been more important to protect the evidence we have collected. Our FNU and UNHAS laboratory teams, who were already well-practised in strict laboratory hygiene procedures, were the perfect trusted sources to transfer robust safety measures across the rest of the program: the lab is where our new COVID-safe protocols were born.

New protocols, updated weekly depending on the dynamic pandemic situation, not only made our teams feel safe when entering our communities, but our community members could see that we were taking our and their health and wellbeing seriously. This enabled us to continue safely collecting data, while maintaining our relationship with residents. ■



Our COVID-safe protocols were inspired by the strict hygiene standards already practised by our laboratory technicians. Above: Maghfira Saifuddaolah and Andi Zulkifli AS at the RISE laboratory at Hasanuddin University.

RECOGNISED QUALITY ASSURANCE



This year [RISE became ISO9001-certified](#). This certification is world-renowned and based on quality management processes and approaches which programs like ours already practise. Certification acknowledges that our research platforms and operations in Fiji and Indonesia meet the highest quality standards, and we have rigorous accountability to our 'clients' — from funding partners, to the residents we work with. Continuous improvement remains very much a journey that we will be on for the duration of our program. And most importantly, it will help grow the institutional and human capacity of our partner institutions in Fiji and Indonesia. ■



Vinaina Waqa, Autiko Tela, Silvia Rosova Vilsoni and Revoni Vamosi at the RISE laboratory at Fiji National University.

Collaborative data strategy

RISE's Data Advisory Panel provides expert advice on the program's research data strategy. The Panel strengthens the strategy through promotion of best practices and utilising fit-for-purpose research infrastructure — this ensures research data accelerates research activity, while also maintaining data protection and privacy in accordance with ethical and regulatory requirements.

Collaboratively steered by experts across information systems and technology, law, medicine and more at Monash University, the Panel drives cross-portfolio collaborations to enable the development of novel research infrastructure capabilities.



"This complex research trial requires us to break free of siloed information structures, while maintaining order and security. The RISE data platform brings together diverse datasets and will allow us to share data across teams, with high levels of security to meet our ethics obligations to protect the privacy of our participants".

Dr Fiona Barker, Research Fellow, RISE Data Manager

Our transdisciplinary research

DESIGN AND ENGAGEMENT

Our researchers analysed local perspectives in Fiji and Indonesia on a range of infrastructure-related topics — from their experiences with flooding, to experiences with RISE’s community design workshops, the impacts of rapidly changing urban environments on water and sanitation infrastructure, and urban planning and land governance strategies for scaling up upgrading programs.

It’s clear that water and sanitation infrastructure is as much technical as it is a complex social issue.

Making space for diverse perspectives around the table — especially knowledge that is ‘not traditionally scientific’ — not only better incorporates lived experiences into infrastructure design; it’s also critical to enable researchers and practitioners to reflect on their own power and privilege brought to research and development.

Our findings are already paving paths to improve the ways we design water and sanitation infrastructure, and how we engage communities in the process, with more PhD findings to come in 2022. ■

Read more

Mesgar, M., Ramirez-Lovering, D. [Informal land rights and infrastructure retrofit: a typology of land rights in informal settlements](#). *MDPI* **10**, 273 (2021)

Spasojevic, D. [Entangled with Water: Participation and design of water and sanitation infrastructure in Indonesia](#). Monash University **Thesis** (2021)



“Engagement is the key! It starts with engaging participants using the most common language to keep mutual transfer

of knowledge easier, using media that is easily recognised, keeping participants engaged by giving them related information back, and always reminding them how important their role is as a community”.

Noor Ilhamsyah, Architect and Community Facilitator, RISE Indonesia

ECOLOGY

Our teams are developing a framework to better understand the complex interplay between people, their natural environments, and the microbial dynamics within.

This year our dedicated Fiji and Indonesia teams continued, despite the pandemic’s challenges, to safely collect additional information on mosquito abundance, settlement temperature profiles, and local rainfall.

These baseline data are critical to unpacking vector dynamics and other environmental stressors within our informal settlements. Analytical results from Indonesia highlight how both environmental factors and human behaviour affect mosquito abundance — information that can help improve vector control measures. Measuring temperature and humidity, we’ve found that informal settlement communities suffer from chronic heat stress — with conditions well above internationally recommended levels for work, and even rest. In some instances, they approach the upper limit of human survival.

Our ecological research is broadening knowledge on the issues we need to consider to improve climate resilience for the most vulnerable. ■

Read more

Ramsay, E., Flemming, G., Faber, P. et al. [Chronic heat stress in tropical urban informal settlements](#). *iScience* **24**, 103248 (2021)



RISE Fiji Community Fieldworker Nirai Ravulo collects soil samples.



“With the continued day-to-day hardships that our participating communities are facing, we have been very conscious to try reduce the burden on residents taking part in our phone surveys. It’s been a balancing act this year between persisting together with our research, and being supportive from afar”.

Dr Rohan Sweeney, Research Fellow, RISE Wellbeing team

ENVIRONMENT

RISE’s water and sanitation intervention will significantly alter the physical environment of informal settlements — an environment upon which a wide range of organisms rely, like bacteria, insects, other animals. Understanding the links between contamination pathways and health is critical to designing interventions that can effectively reduce disease transmission.

Our ecologists are finding that rivers, creeks and soil in RISE’s 24 informal settlements in Suva and Makassar have a high concentration of *Escherichia coli*, indicating raw sewage contamination. We have spent the year trialling pioneering methods to collect soil samples from paved areas — difficult to assess with standard methods due to little soil particles, but critical to analyse given that pathways will form part of RISE’s infrastructure intervention.

Our Suva and Makassar teams have been dedicated to undertaking settlement visits in wet and dry seasons to collect samples with new COVID safety protocols, small working bubbles, and full PPE in hot and humid conditions. The global teamwork required to understand pathogen transmission in informal settlement environments cannot be overstated. ■



RISE Indonesia Community Fieldworker and Communications Officer Ina Rahlina collects water samples.

HUMAN HEALTH

This year, RISE prioritised balancing our commitment to continue collecting public health data in settlements, with capturing the health impacts of the pandemic, through a lens of support for our communities and staff.

Our Indonesia team stretched themselves to deliver health surveys by phone with communities fatigued by lockdowns. Our Fiji team was able to conduct surveys in person, and collect faeces samples with communities before the nation was hit with a major COVID-19 outbreak in April.

Collaborating remotely between three countries, together we developed new laboratory safety protocols, which have not only safeguarded the integrity of the human health samples we have collected, but have now safeguarded our laboratories at Fiji National University and Hasanuddin University for COVID-19 and future shocks.

The role taken by our Fijian and Indonesian laboratory teams to educate their colleagues and communities about COVID-19 safety has been a program highlight. Continued collection of data and samples has set us up to analyse the differential COVID impacts in baseline data across our 12 settlements in each country. ■

Read more

Leder, K., Openshaw, J J., Allotey, P. et al. [Study design, rationale and methods of the Revitalising Informal Settlements and their Environments \(RISE\) study: a cluster randomised controlled trial to evaluate environmental and human health impacts of a water-sensitive intervention in informal settlements in Indonesia and Fiji. *BMJ Open* 11, 042850 \(2021\)](#)

WELLBEING

Our surveys have us well-placed to assess the impacts of COVID-19 on household wellbeing. In doing so, we will be able to better assess the impacts of the RISE intervention in the future, accounting for the confounding factors caused by COVID-19.

From these surveys, we have been learning first-hand from communities that the impacts of COVID-19 on wellbeing and financial security are very real. We can see and measure this in our data. Having consistent pre- and post-COVID-19 measures of household wellbeing (longitudinal consistency) is critical to this reliable assessment of the impacts of both COVID-19 and the RISE intervention on household wellbeing.

Continued successful data collection in 2021 amid trying circumstances would not have happened without the full ownership of RISE Suva and Makassar teams. Their phone calls and visits continued to be answered by communities thanks to their special relationships. Going forward, we are increasing trans-disciplinary and cross-country research collaborations, for example, examining links between heat, rain, water quality and household building materials on wellbeing. ■

Read more

Vakarewa, I., Barker, F., Sweeney, R. et al. [The impact of COVID-19 in Fijian informal settlements: results of a rapid phone survey conducted in May 2020. *Pacific Islands Health Research Symposium* \(2021\)](#)



“In addition to assessing efficacy and cost-effectiveness of the Indonesia demonstration site, Batua, qualitative interviews have helped us understand how residents experienced RISE implementation, which intervention components they value, and what has changed in the settlement as a result. This information is key for understanding how to scale up to other RISE sites and beyond”.

Allison Salinger, Research Associate, RISE Policy and Scaling up team

Pictured from top: Monash University microbiologist Dr Rebekah Henry leads the pathogen and genomics training program, training RISE Indonesia colleagues Andi Zulkifli AS, Maghfira Saifuddaolah, and Ruzka Taruc, and RISE Fiji colleagues Silvia Rosova Vilsoni, Vinaina Waqa, Autiko Tela, and Revoni Vamosi.

PATHOGEN AND GENOMICS

The ways in which our Fijian and Indonesian laboratory colleagues are being set up to lead pathogen analysis and genomic sequencing makes this work one of RISE’s proudest examples of capacity building.

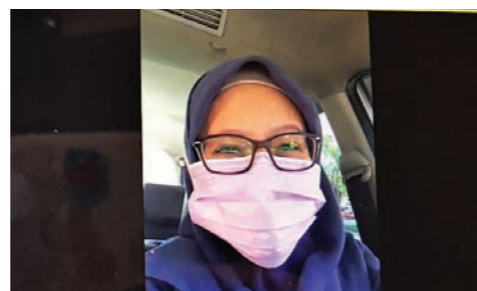
A cross-country training program for molecular analysis is setting them up to lead the way in detecting pathogens and environmental contamination for their countries. This is made possible with the successful delivery of two state-of-the-art TaqMan Array Card (TAC) machines to our Suva and Makassar laboratories, despite immense logistical challenges.

With human, animal and environmental samples collected from both wet and dry seasons across all 24 of our communities in both countries, our teams are skilled to screen dozens of samples for more than 30 different pathogens at once. They are already revealing a wide variety of enteric pathogens and extensive faecal contamination in informal settlements.

With these skilled scientists at Fiji National University and Hasanuddin University, the goal is for Monash University to no longer lead this work for RISE from Melbourne. ■

Read the study that made this work possible on pg 30:

Lappan, R., Henry, R., Chown, S L. et al. Monitoring of diverse enteric pathogens across environmental and host reservoirs with TaqMan array cards and standard qPCR: a methodological comparison study. *The Lancet Planetary Health* 5, 297–308 (2021)



POLICY AND SCALING UP

We are generating evidence that policymakers find most compelling to scale an intervention like RISE across the Asia-Pacific. This means understanding the critical social factor components of community resilience, and understanding communities’ experiences with the RISE program.

The COVID-19 pandemic has opened up new understandings of resilience, especially in the context of water insecurity. With data from our Water for Women sub-study, we are quantifying households’ experiences of water insecurity with a cross-culturally validated measurement tool – limited drinking water, inability to wash hands due to problems with water, to frequency of worry. This is allowing us to understand the relationship between shocks like COVID-19, water insecurity, and identifying inequities within communities.

The Suva and Makassar teams have been invaluable in helping make sense of data and insights from residents, the teams sharing their extensive knowledge of RISE, the context of settlements, and grounding our preliminary findings in indigenous ways of knowledge. Publications next year will highlight these important intersections of lived experiences and water-sensitive revitalisation. ■



“Learning TAC analysis using the Quant-Studio analyser to detect multiple microbiological agents by Real-Time PCR

with pathogens and genomics, has stretched me personally. This field is not extensively used in Fiji now, so to go on and share this knowledge and skills within Fiji National University will be exciting as we venture into the future with genomics”.

Silvia Rosova Vilsoni, Laboratory Technician, RISE Fiji

Research highlight

A planetary health model for reducing faecal exposure in informal settlements

Our RISE baseline findings from Indonesia have generated a new model of the connections between human health and the environment.

The intense interactions between people, animals and environmental systems in urban informal settlements compromise human and environmental health. While the full scope of risks and exposure pathways between human health and the environment are uncertain, a new paper co-authored by 40 RISE researchers presents a new planetary health model of health and the environment.

‘The risk factors that come with poor environmental conditions should not be considered alone, as it can be misleading in characterising a settlement’s environment and population,’ explains Ruzka Taruc, one of the paper’s co-lead authors. ‘We examine the inter-connections between the built environment, socio-economic wellbeing, human health and the ecological environment, which will pave ways to better design and monitor interventions.’

Colleagues at Monash University in Melbourne, Australia and Hasanuddin University in Makassar, Indonesia, developed the model by drawing on baseline findings from the RISE trial in Makassar. It comprehensively accounts for a wider range of variables affecting health in urban informal settlements than conventional exposure models that inform conventional water and sanitation approaches.

‘We know that reducing faecal-oral contamination will help children improve their development and gastrointestinal health. But traditional household-scale Water, Sanitation and Hygiene (WASH) models and interventions are not fit-for-purpose in high-density informal settlements, due to the pervasive exposure to pathogens, pollutants and disease in the communal environment outside the home,’ says Professor Karin Leder, the paper’s senior author.

Leder says there is increasing awareness of the need for a framework involving social, demographic and environmental factors that can better assess the effectiveness of water and sanitation interventions on reducing faecal-oral transmission among children. From a practical perspective then, interventions are needed that address water and sanitation needs from an overall environmental and human health perspective, using a systems view.

‘The data we collected over one year from 12 informal settlements across Makassar confirms poor health: among children under the age of five, almost half were experiencing stunting (44.3%), and almost half were underweight (41.1%),’ says Taruc. ‘But the planetary health model pushes further – it empirically aims to link poor health to environmental exposure to pathogens, pollutants and disease vectors in water, food, air and soil.’

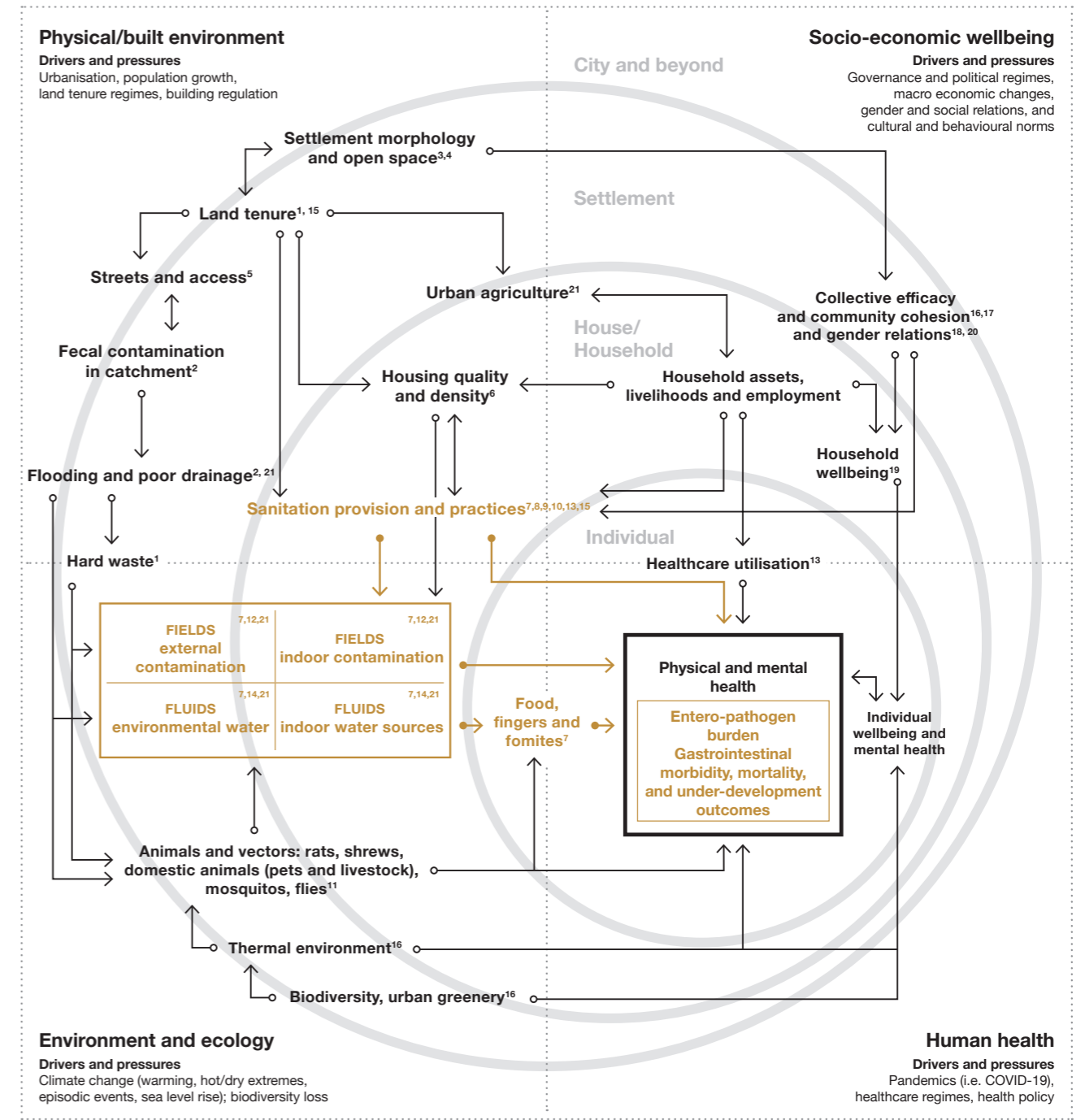
Initial results show high rates of potential risky exposures from swimming in waterways, eating uncooked produce, and eating soil or dirt, along with exposure to flooding and livestock.

Leder explains that ‘a planetary health model points us to innovative interventions that address environmental and human health at a range of scales, not only the individual- or household-scale but also the settlement and wider precinct scales.’

This first year of data is the critical point of reference against which RISE will assess the results of human and environmental sampling post-intervention (construction of sustainable water and sanitation infrastructure in the program’s 12 participating informal settlements in Makassar). RISE will continue conducting intensive sampling and surveys with residents once the intervention is built for a period of two years to understand the impact of the intervention and further refine this model. ■

Read more

French, M., Barker, F., Taruc, R., et al. [A planetary health model for reducing exposure to faecal contamination in urban informal settlements: Baseline findings from Makassar, Indonesia.](#) *Environment International* **155**, 106679 (2021)



Key
 - Spatial scales
 - Planetary health domains
 - Risk variables within the 'F diagram'
 - Causal relationship/pathway
 - Two-way causal pathway

Key references
 1 Satterthwaite, et al (2019)
 2 CRCWSC (2018)
 3 Corburn et al (2019)
 4 Friesen et al (2020)
 5 UN-Habitat (2015)
 6 Ezeh et al (2016)
 7 Wagner and Lanoix (1958)
 8 Contreras et al (2019)
 9 Cairncross et al (2010)
 10 Wolf et al (2019)
 11 Penakalapati et al (2017)
 12 Majorin et al (2019)
 13 Dreifelbis et al (2013)
 14 Clasen et al (2015)
 15 Sinharoy et al (2019)
 16 Satterthwaite et al (2020)
 17 Dey et al (2019)
 18 Ezbakhe et al (2019)
 19 Brown et al (2019)
 20 Winter, et al (2019)
 21 Raj et al (2020)

The planetary health model emphasises the drivers and pressures in multiple domains, across multiple scales, that must be considered to understand human health in informal settlements.



RISE Indonesia Laboratory
Technicians Andi Zulkifli
AS (left) and Maghfira
Saifuddaolah (right).

Research highlight

Monitoring diverse pathogens in informal settlements

RISE reveals a scientific method that will allow us to see whether the program's intervention is reducing faecal contamination in the environment.

People living in informal settlements have poor health and wellbeing, linked to environmental exposure to pathogens in water, food, air and soil. It is difficult to understand how people come into contact with these pathogens, but Dr Rachael Lappan's team at Monash University's [Greening Lab](#) has found an alternative technique proving effective for monitoring pathogens across the whole informal settlement setting — across humans, animals, soil and water.

'Because there are so many different pathogens that could be contributing to disease in these settings, it can be challenging to effectively detect them all,' explains Dr Lappan.

'We used the TaqMan Array Card to screen human, animal and environmental samples, to see if we could detect a large number of pathogens at once, and hence effectively monitor human health, as well as that of animals and the environment.'

An important part of assessing whether the RISE intervention is having an impact is to detect and monitor several different enteric pathogens. It is critical to look at these pathogens beyond just humans, as it will allow RISE to see if the intervention is reducing faecal contamination.

'The standard method for detecting pathogens, qPCR, is very sensitive and accurate, but it becomes more expensive and time consuming if more pathogens need to be detected. There are so many different enteric pathogens that it's not possible to detect all of them through qPCR alone,' says Lappan.

As Lappan recounts, many studies focus only on a few pathogens or target faecal indicators, which don't capture the information needed about different kinds of pathogens, and how they are being impacted by an intervention. The TaqMan Array Card is an ideal solution to this issue, as it uses the same underlying molecular analysis technique as qPCR, but is designed to cover a large panel of pathogens.

'We found that the cards are just as effective at detecting pathogens as the standard qPCR method. Screening human, animal and environmental samples for more than 30 pathogens at once, it revealed a wide variety of enteric pathogens and extensive faecal contamination in the informal settlements in Fiji.'

The TaqMan Array Cards will continue to be used in RISE as the program monitors the intervention once constructed, and it has the potential to transform other similar studies looking at the interaction between pathogens, people, animals, and their shared environment. ■



Research highlight

Gender-responsive design of water and sanitation services

A toolkit helping practitioners implement gender- and socially inclusive participatory design of WASH infrastructure in informal settlements.

Much water, sanitation and hygiene (WASH) infrastructure is designed and built without whole-of-community input. This can have inequitable consequences, especially for women and marginalised groups, who are often more frequent users of water infrastructure, but less likely to be asked about design.

Ensuring everyone in a community is included in co-design is not easy, but Dr Becky Batagol from the Monash Sustainable Development Institute and Monash Faculty of Law, and Dr Sheela Sinharoy from Emory University's Rollins School of Public Health are leading a team generating evidence-based resources for practitioners to improve gender-inclusive co-design of WASH infrastructure.

'Gender and social inclusion have not been sufficiently mainstreamed in research and development programs from beginning to end,' explains Sinharoy. 'Our research project is producing evidence-based, practical tools for

practitioners to implement gender-responsive design of WASH infrastructure interventions.'

The research, supported by the Australian Government's [Water for Women fund](#), is studying the gender- and socially inclusive participatory design approach that RISE is using across 24 informal settlements in Fiji and Indonesia to develop sustainable water and sanitation solutions.

Dr Batagol says diversity is infrastructure sustainability. 'Designers need to think about how they can design the infrastructure lifecycle and the collaborative process to ensure as many people as possible support, understand, and can operate, maintain and repair the systems.'

For Batagol, RISE's co-design activities are a valuable opportunity to assess what does — and doesn't — work in co-design from an intersectional gender perspective.

RISE has used a variety of inclusion strategies, and emerging findings out of Indonesia show these inclusive co-design activities have had a meaningful effect on social dynamics in these communities.

The research has also helped focus RISE on having a diverse and inclusive team — important for community members to see and feel comfortable.

'This research will benefit RISE, and also offer lessons and recommendations that will be much more widely applicable,' Dr Sinharoy says.

Dr Batagol agrees, highlighting the potential for change at the macro level too. 'We are sharing evidence that can be used freely by others in the sector, while also influencing policy at the local, national and global levels.' ■

Doctorate spotlight



Entangled with water: Participation and design of water and sanitation infrastructure in Indonesia

PhD thesis by Dr Dasha Spasojevic, Monash University Faculty of Art, Design & Architecture

Decentralised, nature-based water infrastructure systems are both things and relations. We know them as *‘things’* very well: how they are constructed, specific materials that influence their functionality, the effectiveness of their treatment processes.

However, their components (toilets, wetlands, biofilters, pumps, swales and others) are not only dependent on and connected to each other, but to the worlds they are about to inhabit: to houses and streets, to the water cycle and territory, to city development policies, to the lines of friendships and conflicts in a neighbourhood, to the ways water and waste are part of beliefs and sacred values.

How might we design these systems so they can integrate with all these worlds?



Embedded within the RISE Program, my research explored the tensions and contradictions of how water-sensitive cities design and technologies – widely implemented in the Global North – can be designed for informal settlement environments of the Global South.

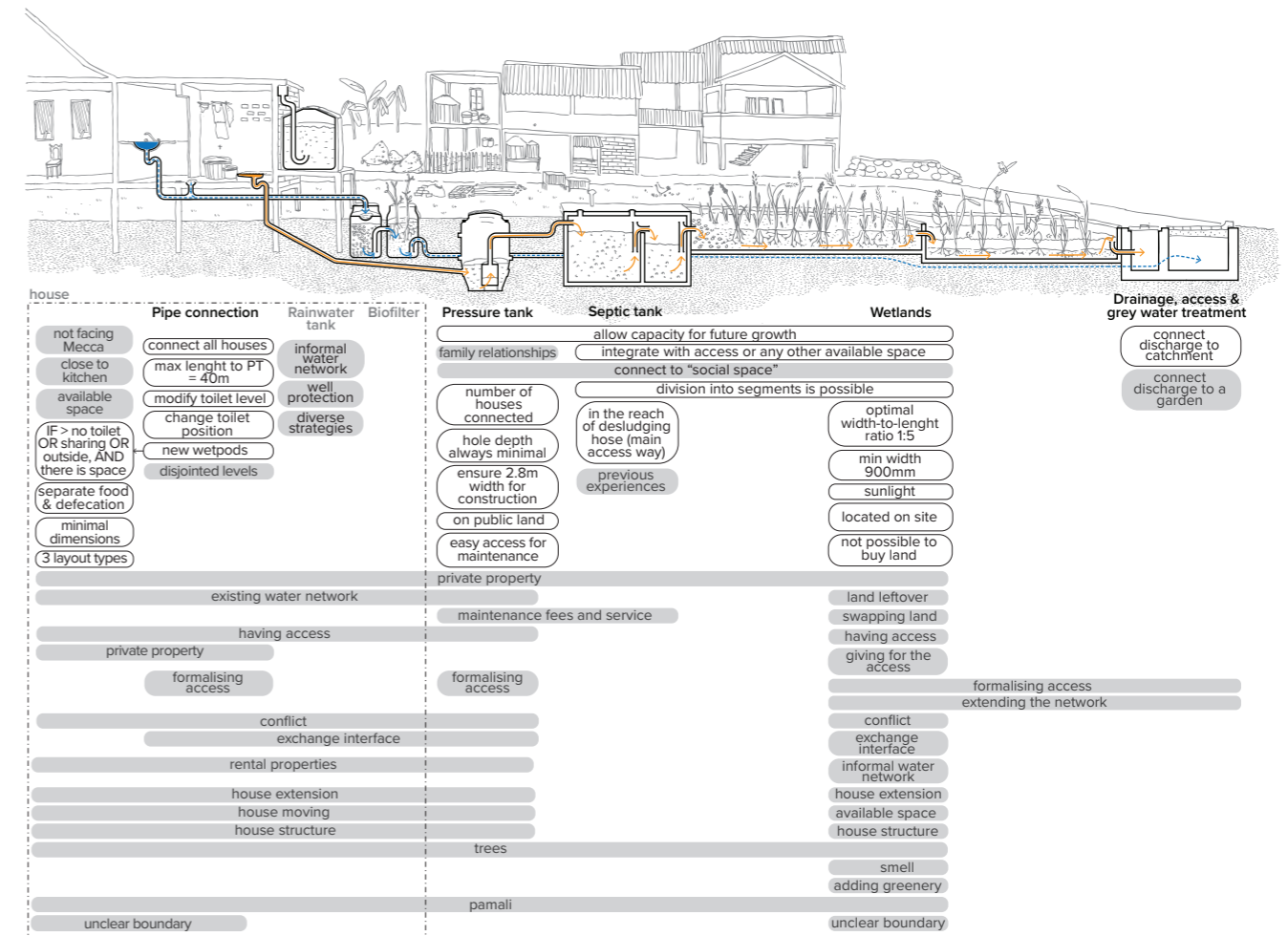
The case study research used ethnographic and design research methods to empirically document and analyse how decentralised water and sanitation infrastructure has been designed in six informal settlements in Makassar, Indonesia.

The research findings reveal a set of practical opportunities and barriers for integrating water-sensitive urban design in Indonesian informal settlements. For example, a wetland that can solve *pamali* – a spatial feature that brings misfortune and misery, such as a street that ends because of a house wall – is eagerly wanted by residents.

The findings also highlight the potential for architects and designers to address systemic sustainability challenges, as their skills have the potential to comprehend the multiple relations of infrastructure. Finally, my research contributes to the socio-technical understanding of water infrastructure and methods for designing that take into account the *pluriverse* in which it is embedded.

It was fascinating to discover and experiment with far-reaching imagination and creativity that gets unleashed when designing infrastructure in a collaborative way! ■

[See the public exhibition.](#)



The technical (white boxes) and social (grey boxes) parameters that influence the design of RISE plans in six intervention settlements in Makassar are listed under each component of the treatment train.

Meaningful participation was not only triggered through 'architectural tools' such as 3D models, but through the right approach that people could relate to: the interplay of residents sitting on the floor around and inside the 3D model, with their names already embedded in it, with theatre performance making pumps and wetlands 'alive' before they could be discussed in this model-space, and later in the real space of the neighbourhood.



Doctorate research



Lamiya Bata, Faculty of Engineering

My PhD is testing and validating alternative methods to sampling novel and composite soil and surfaces, to better understand the risk of diarrhoeal pathogen transmission through these pathways. My research aims to capture pathogen data from contexts like high-touch indoor and outdoor surfaces frequently accessed by young children, providing insights on their exposure risks. This will be followed by the opportunity to develop mitigation strategies that work to reduce the burden of disease in vulnerable populations.

This process of testing and validation, known as optimisation, has been slow and arduous. One unforeseen task involved trialling a modified version of a water quality standard to measure solid contaminants. So, this year, I couldn't be more proud or excited to have identified and implemented an optimised protocol for our Fiji and Indonesia laboratory technicians to use – with another protocol to improve genomic analysis currently under construction!



Michelle Escobar Carius, Faculty of Business and Economics

I am a third-year PhD candidate at Monash University's Centre for Health Economics, and my thesis focuses on the effects of environmental shocks on the health and economic preferences of adults and children in developing countries. The first paper of my thesis studies the effects of floods on morbidities, adult depression and child emotional functioning. It has been submitted to a top economic journal and is currently under review. My second paper looks at how temperature influences preferences towards time and risk of Indonesian adults is currently being prepared for journal submission. My third paper on heat stress and human health in informal settlements is currently in progress.

My findings have been presented at 14 international conferences in the areas of development, health and environmental economics. I hope that someday this research will inform health and development policies in response to climate change.



Brendan Josey, Faculty of Art, Design & Architecture

My PhD documents the evolution of form within the built environment in informal settlements participating in RISE in Makassar, Indonesia. I am exploring household-led construction practices, and the ways in which they interact with RISE's implementation of water and sanitation infrastructure. In particular, 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 book chapter [\(Temporary\) Appropriation \(of Space\), Makassar, and Urban Kampung](#) explores how, the ways in which people temporarily claim space may inform the design and implementation of in-situ informal settlement upgrading projects, by giving a greater contextual understanding of existing urban dynamics, and spatial use patterns. With my final milestone complete, I am just about to successfully complete my doctorate.



Robyn Mansfield, Monash Sustainable Development Institute

The purpose of my PhD is to understand the barriers and enablers to mainstreaming children's participation in urban planning processes for vulnerable settings. The RISE program in Fiji is one of a series of case studies I am analysing to explore opportunities for embedding children's participation in similar projects. I am in the final stages of my research. I have shared my findings at global conferences, and have received exciting feedback, including from Save the Children, who are keen to operationalise my findings. Ultimately, I aim to use the results of my research to drive achievement of Sustainable Development Goal target 11.3: 'By 2030, enhance inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning and management in all countries,' with a specific focus on children's participation.



Mahsa Mesgar, Faculty of Art, Design & Architecture

My PhD focuses on informal land rights and land tenure uncertainties in infrastructure retrofit practices. Using RISE as a case study, I am exploring how driving forces – like space, tenure and land use – interact when acquiring units of land for infrastructure. My research contributes to debates on fit-for-purpose land procurement strategies for community-scale upgrading initiatives. It uses spatial thinking to explore social and legal concerns in land procurement initiatives and land negotiation processes. Some of my findings are published in the journal *Land*. I was also honoured to receive Monash University's Postgraduate Publication Award to write four journal articles based on my research findings by the end of 2021. The findings in these papers provide new avenues to explore complex urban environments, and can be used for further research on RISE and future research in other contexts.



Emma Ramsay, Faculty of Science

I am a PhD Researcher working with RISE's environmental research team. My research focuses on the impacts of local and global climate warming for people living in informal settlements throughout the tropics. I am interested in both the direct impacts of heat stress on people's health and wellbeing, as well as the indirect impacts of altered patterns of mosquito disease vectors.

I am proud to have the [first paper published from my PhD](#) this year, in collaboration with colleagues across the RISE consortium. We found that informal settlement residents in Makassar, Indonesia, are exposed to chronic heat stress, which could impact their health and capacity to work. My research highlights the importance of integrating heat mitigation through green and blue infrastructure in programs such as RISE.

Doctorate research



Hannah Turner, Monash Sustainable Development Institute

My PhD explores the behaviours and practices that residents in informal urban settlements adopt to protect themselves from flood impacts in Suva, Fiji. I have worked closely with the RISE Fiji team, training them in my research framework, and collaborating to pilot, and then roll out my data collection methodology across communities participating in RISE. I am now in the process of data analysis, having collected interviews and photovoice data (photographs) from 42 households at risk of flooding across 10 RISE settlements. I anticipate the empirical data will reveal new understandings of the key factors that influence the ways in which informal settlement residents protect themselves, their families and their communities from flood impacts.



Jane Wardani, Monash Sustainable Development Institute

My PhD aims to deepen understanding of the process of collaboration in transdisciplinary research for planetary health, with RISE as a unique case study. I am currently in the data analysis stage of the research. My first academic paper is a literature review of lessons learned from transdisciplinary research practices at the environment-health-development nexus, which has been accepted for publication in *Sustainable Development*. With this deepened theoretical and empirical understanding, I hope to develop a practice framework for transdisciplinary collaboration that can help optimise process design and outcomes.



Erich Wolff, Faculty of Art, Design & Architecture

My PhD investigates flooding in Indonesia and Fiji, and explores citizen science as a way to work in partnership with the communities participating in RISE. In collaboration with RISE colleagues from both countries, I led a flood monitoring citizen science project that collected more than 5,000 photos of floods sent by community members between 2018 and 2020. This project informed the design of RISE's infrastructure, and revealed important lessons on how scientists and communities can better collaborate to produce key information needed for researching and designing nature-based systems. These lessons show that direct community participation in monitoring activities can not only facilitate data collection, but also provide rich context and nuance to support the management of floods. This work contributes to important debates on how communities can be empowered to become central stakeholders in the realm of resilience and adaptation to the effects of climate change.







Together, we can transform human and environmental health.

Thank you to the individuals and organisations who are supporting our ambitious program in a COVID-19 world. As a global community, we can be part of ground-breaking research to transform human and environmental health in informal settlements across the world.

rise-program.org/get-involved

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REVITALISING INFORMAL
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THEIR ENVIRONMENTS