

REVITALISING A RIVER, REVITALISING COMMUNITIES

CHANGING LIVES THROUGH
THE CITARUM LIVING LAB



CHANGE IT.
FOR GOOD.



THE CHALLENGE: COMMUNITIES IN CRISIS

More than 25 million people rely on the Citarum River in West Java, Indonesia. This river not only provides water and energy to its surrounding communities, but also sustains livelihoods through agriculture, animal husbandry, fishing, and ecotourism.

Yet, it's also one of the most polluted rivers on the planet. Each day, 20,000 tons of solid waste and 340,000 tons of wastewater from villages and local industries are disposed of directly into the waterway.

The cause?

Only 30% of those living in the Citarum River catchment have access to centralised municipal water and waste networks. In the upper Citarum catchment, this drops to only 5%. Without the option of proper waste and sanitation services, littering and open defecation is common. Lack of sanitation services in villages contributes to 60% of the pollution in the Citarum River.

While some industries do have wastewater treatment, the performance of large factories in treating wastewater is disappointingly low among the 2000 textile factories in Bandung (the capital of West Java). And for smaller industries, it's even worse. Wastewater from industry and agriculture contributes to 34% of the river pollution.

This pollution brings water-borne disease (gastrointestinal, skin, and respiratory infections), degrades biodiversity, chokes waterways, and causes flooding. Beyond the devastating health and environmental impacts, the river's pollution also affects the region's economy: polluted water lowers the yield and the quality of food grown in the area, and poor health from water-borne illnesses hinders education and employment. Globally, heavily polluted rivers reduce GDP growth of downstream regions by one third, compared with average country GDP growth. And these health and economic impacts are felt the most by vulnerable community members – especially women, children, and elderly, who are most in contact with the polluted environment in their day-to-day lives.

This is both a humanitarian and an environmental crisis that needs to be addressed urgently. But how?

Traditionally, solutions have often been created and applied in silos. Evidence shows that separately implementing infrastructural, social, behavioural, and economic solutions hasn't been enough to sustainably improve rivers and their communities in crisis.

To change the story for those who live and work by the Citarum River – and change it for good – we need experts to bring all of these elements together and integrate them into a holistic, community-led transformative solution.

OUR VISION: THE CITARUM RIVER TRANSFORMATION PROJECT

As Australia's largest and most international university, with a presence on five continents, Monash University is committed to improving and saving lives across our global communities through innovative and collaborative solutions. We have long and deep collaborative agreements with institutions in Indonesia, cemented most recently with our new campus in southwest Jakarta.

Building on Monash's deep expertise and capabilities in water sensitive solutions, we have an ambitious vision to change lives through the **Citarum River Transformation Project**.

This collaborative project brings our Monash expertise together with Universitas Indonesia, the Indonesian Government, local communities, local NGOs, and the global research community.

Our mission? To transform the Citarum River into a clean, healthy, and productive place that nurtures the communities relying on the river for their survival. This is a shared vision that has recently been endorsed by the West Java Government through a partnership agreement with Monash.

OUR UNIQUE, HOLISTIC APPROACH

We believe that innovation requires more than technology. It requires solutions that are sensitive to local landscapes, ecologies, cultures, wisdom, economy, behaviours, governance, and capacities. That's why we take a holistic approach that brings technological and social innovation together to create real, long-term change.

Our approach is grounded in two important principles. The principle of planetary health recognises that human health and the health of our planet are inextricably linked. The principle of circular economies is about no longer viewing waste as something to discard, but as a valuable resource for communities to reuse.

By fostering cross-disciplinary collaboration, learning, and innovation, we will explore the feasibility of practical solutions through a demonstration project. This 'living lab' aims to deepen knowledge and evidence for river transformation, by connecting an international consortium of partners to work together on shaping integrative social and technological innovation for waste. By building local capacity and empowering our in-country partners to upscale, the living lab will aim to generate positive and transformative impact within and beyond the communities involved.

We plan to partner with selected villages along one of the channels feeding into the Citarum River to demonstrate how our community-led, technically rigorous approach addresses pollution, biodiversity loss, community health, and poverty in the river corridor.

Through participatory, community-led processes we'll integrate local knowledge, perspectives, and wisdom with cross-disciplinary expertise to:

- create a unifying vision of a clean, healthy, and productive future where waste is valued
- empower local stakeholders with tools, knowledge, data, and capacity to evaluate their local contexts and inform co-designed solutions
- co-design and build new infrastructure to recover, treat, use, or repurpose wastewater and solid waste
- collect rigorous scientific evidence by conducting small-scale trials to test social, behavioural, economic, and technology solutions, and by measuring the impact on river pollution
- imagine and trial sustainable business models for local circular economies that transform waste into new products, services, and livelihoods.

What makes our integrated model for waterway, sanitation and solid waste solutions unique? Unlike conventional models where water and waste management systems are centralised, our model will include systems that are:

Nature-based: Our solutions are inspired and supported by nature. They use, or mimic, natural processes to improve water management. And they can involve conserving or rehabilitating natural ecosystems, as well as enhancing or creating natural processes in modified or artificial ecosystems.

Multifunctional: Working with nature allows us to create multipurpose infrastructure. For example, we might design water and waste infrastructure within open green and blue spaces for recreation and cultural activities.

Off-grid: Building large-scale, centralised pit-pipe-pump-based systems like we have in developed countries is a slow and expensive process, and may never reach poorer communities. However, our approach quickly 'leapfrogs' over conventional approaches by working with local communities in co-designing and implementing decentralised, or 'off-grid', water and sanitation.

Customised to context: Our infrastructure and social solutions are decentralised and community-driven, enabling us to customise solutions to the local context and needs of the community.

Affordable: Our model includes water and waste solutions that are affordable to both build and maintain.

OUR ULTIMATE GOAL

Through our unique approach, what do we ultimately hope to achieve?

First, we want to make a difference for the selected villages we'll be working with. Working together as partners, we will support communities to move towards improved circular solutions that recycle, remanufacture, and reuse waste in an economically sustainable way. In turn, this would help to stop contaminants from being discharged into the river, restore natural river and riverine habitats, and revitalise the community, environment, and economy.

Second, we want to build capacity for scaling our approach to transform the Citarum River.

By participating in place-based trials, the local community, industry, government, and international research community will co-create new knowledge, skills and governance processes that can be applied to other village contexts and government programs.

By measuring the impact of the place-based trials on the river ecosystem, community wellbeing, and the local economy, we will generate compelling evidence of the benefit of our integrated urban model.

We plan to **collect rigorous scientific evidence** that localised technology and social innovations can deliver sustainable improvements and growth for rivers and their communities. In this way, our project has the power to validate an evidence-based urban model that could be scaled to sustainably revitalise the entire Citarum River and all its communities – and even be used to transform other rivers across the Southeast Asia region.



IMPACT: IMAGINE THIS FUTURE



RESTORED WATERWAYS

- The ecological health of waterways and their surrounding environment is restored.
- A healthy, vibrant environment enhances the wellbeing and resilience of people living near and connected with the river. Improved health leads to children staying in school, and people being productive and self-supporting.
- Clean river water is used for irrigating rice paddies and feeding livestock – producing more locally grown and nutritious food.



WASTE REUSE

- Solid waste is being recovered at the source and in waterways, and transformed into new products, services, and off-grid energy.
- The burden on local landfills is reduced.
- The transition to a well-organised, safe, and locally run waste sector benefits the health and economic wellbeing of women, who are traditionally involved in informal waste systems, and who could be disadvantaged by a centralised, traditional system of waste management.



IMPROVED SANITATION SERVICES

- Wastewater from households and local industry is treated by nature-based green infrastructure and recycled for household or micro-horticultural enterprises, or returned to the river.
- People no longer need to practise open defecation in the river, and more people have clean water for washing their hands – reducing the incidence of illness from contact with the river water (e.g. gastrointestinal, skin, and respiratory infections).
- Vulnerable members of the community – such as women, children, and the elderly – are able to visit the toilet privately and safely.



CLIMATE CHANGE ADAPTATION

- With diversified water sources and new practices, the region is more resilient to floods, drought, and heat – leading to fewer deaths, injuries, and illnesses from these climate impacts.
- The community enjoys a more secure water and food supply now and into the future.



STRENGTHENED LOCAL ECONOMY

- A local circular economy has been created, which means the community now reuses and creates value from waste. New jobs and businesses have been created by linking waste-derived products and services with local agriculture, horticulture, and aquaculture industries (e.g. feed for livestock, organic composts, waste to energy services, and wastewater to water supply services).
- An alternative water supply now exists for domestic, agricultural, and small industries, leading to cost savings.
- The restored river attracts visitors for recreation, with locals benefiting from increased income from tourism.



ENHANCED RIVER GOVERNANCE

- Evidence-informed policy now guides effective river management and decision making.
- Community and institutional governance processes for river protection and circular economy transitions have been strengthened.
- Stakeholders understand their role in protecting and managing the river as a natural asset that delivers essential ecosystem services.

MAKING IT POSSIBLE: THE POWER OF PHILANTHROPY

Previous piecemeal solutions have proven insufficient to sustainably improve rivers in crisis. We know that taking a holistic approach is the only way to create meaningful, lasting change. This means we need to bring together and integrate the efforts of technology experts, social innovators, local communities, industry, government, and many other collaborators.

Monash has already invested seed funding to develop such an approach, and conducted cross-disciplinary research to confirm the approach's validity.

In 2022, supported by a one-year grant from the Victorian Government, Monash is collaborating with research institutes, governments, communities, and local leaders to understand the feasibility of a range of waste and wastewater solutions, and co-create a river transformation framework to guide pilot-scale experiments.

Supported by the Veski Study Melbourne Research Partnerships program, we are working together with our foundation partners CSIRO, the Swiss Federal Institute of Aquatic Science (Eawag), Universitas Indonesia, Universitas Padjadjaran, and the West Java Government, to establish the living lab in the Citarum basin. Our partners bring substantial community engagement and impact research experience through CSIRO's Australian-Indonesian Plastics Innovation Hub, Eawag's FORWARD and SIBRE programs, Universitas Indonesia's water and waste research, and Universitas Padjadjaran's water system modelling.

This is a first step towards our collective vision for a clean river and generation of a new local circular economy.

Now, we need the support of passionate philanthropists to take our work beyond feasibility studies to the next level.

The next step is to turn a 2.5km corridor along part of the Citarum River into a 'living lab': a demonstration project where our holistic solutions can be tested and refined in the real world. This proof-of-concept and the critical lessons generated will serve as the foundations for impact-driven scale-up across the river catchment, in partnership with the Indonesian Government. These innovative solutions have the vast potential to improve the lives of millions of people living in more than 50 river catchments across Indonesia.

Governments need to see a proven, real-world model before committing the funding, institutional collaboration, and policy reform required to achieve our ambitious, long-term goals. That's why philanthropy is so important, as it will provide the initial injection of funds needed to unlock future transformational impact on a much larger scale.

Philanthropic support would enable the following crucial elements for the living lab:

- **Essential Infrastructure:** building the 2.5km corridor of infrastructure (nature-based systems, etc.)
- **Research:** engaging world-class researchers to conduct the lab's social and environmental studies, which will provide the evidence-base to attract further support for upscaling
- **Capacity building:** empowering West Java communities and government to work with and make the most of the solutions we're implementing.

As a philanthropic partner, your support will help to deliver the demonstration project, opening the door for us to scale solutions to transform river catchments and revitalise communities across Indonesia. Once we have a validated model, it can be replicated to help communities thrive across the globe.

It all starts with you. We welcome the opportunity to discuss the possibilities of contributing to this exciting project.

Together, we can **Change It. For Good.**



WHY MONASH?

OUR MISSION-LED APPROACH

At Monash, we go beyond research. We pioneer and translate solutions to the most pressing threats facing humanity and the planet. Our recently announced strategic plan – Impact 2030 – singles out three major challenges of the age, which will take centre stage in our strategy and focus over the next decade. Two of these core challenges – Climate Change and Thriving Communities – are inextricably linked to the goals of the Citarum River Transformation Project.

Monash is deeply committed to creating a more globally sustainable future in response to climate change, and transforming rivers in crisis is part of that aim. Our mission to create thriving communities is focused on building transformative responses not for but with communities locally, nationally, and internationally.

OUR UNIQUE CAPABILITIES

- **Deep expertise & transdisciplinary approach:** We have a unique capability in mobilising and creating collaborative platforms for deep expertise and transdisciplinary approaches to solve community problems. The collaboration platforms we create ensure that industry expertise and experience complement our own expertise, and that community knowledge is included, and embedded, in the solutions developed. Monash is Australia's largest university and houses a critical mass of experts in water and sanitation, human health, and environmental restoration. This expertise has already been brought together for RISE (Revitalising Informal Settlements and their Environments), a flagship program trialling a new approach to water and sanitation management in 24 informal settlements across Indonesia and Fiji. The Citarum River Transformation Project will draw on the world-class researchers and methodology from this existing platform.



- **Cross-sectoral partnerships for greater impact:** We know that our expertise can only bring about the change we seek by partnering with others. We have a history of successfully partnering with government, industry, philanthropy, other research organisations, and on-the-ground communities to tackle difficult problems and deliver real-world impact.
- **Scaling solutions across geographies:** As Australia's most international university with a substantial footprint across five continents, we have a proven track record of taking local solutions and creating scaling pathways through our institutional relationships and unique international networks for national and global impact.

OUR TRACK RECORD OF COMMUNITY-LED INNOVATION

We've worked hand-in-hand with vulnerable populations in more than 14 countries across several continents to empower them through co-created and community-led programs. We know how to build local teams and capacity, recruit and train local experts and non-experts, and communicate between local communities and institutional partners. Success stories include:

- **Revitalising Informal Settlements and their Environments (RISE):** This flagship project for the Wellcome Trust's 'Our Planet, Our Health' initiative is working with communities, governments, local leaders, and partner institutions to co-design local solutions to water and sanitation challenges for communities living in urban slums in Indonesia and the Pacific.
 - **Cooperative Research Centre for Water Sensitive Cities (CRCWSC):** The CRCWSC (2014–2021) was an Australian Government \$120M initiative established to develop a cross-disciplinary approach to urban water management to revolutionise the way we design, build, and manage our cities and towns.
- By applying water sensitive urban design approaches, the CRCWSC has created important insights and proof-of-concepts in social-technical innovations in helping global cities transition to more sustainable, resilient, liveable, and productive places. These have been adapted into policies and methods for co-designing physical infrastructure with communities, transforming cities of the developed and developing world into green and blue precincts, advancing their resilience to climate change, and promoting healthy lives and livelihoods.
- **World Mosquito Program (WMP):** The WMP is working with communities, local health authorities, and non-government organisations in project sites in 12 countries across Latin America, Asia, and Oceania to prevent the transmission of mosquito-borne diseases. It was piloted in far north QLD and has been taken worldwide.
 - **Bushfire Resilience Program:** Launched in response to the Australian Black Summer fires, this partnership program with the Paul Ramsay Foundation is working with four Australian communities whose existing experience of disadvantage was further compounded by the fires. We're empowering them to rebuild stronger than before, and we will share our model through a national learning network to break cycles of disadvantage Australia-wide.
 - **Monash Net Zero Precinct Program:** This Australian Research Council (ARC) and industry supported action-research program won the United Nations Momentum for Change Award in 2018. Using our campuses as a living laboratory, this initiative works to develop, test, and integrate innovative precinct-scale energy technologies, ultimately achieving an emission-free Monash Technology Precinct. By transferring lessons learned to decarbonise precincts elsewhere, this program aims to inform energy transitions in other communities – leading the way to global energy sustainability.

FURTHER INFORMATION

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Funding partners



Research partners



Government partners



The Provincial Government of West Java

