



2014 – 2018



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Message from The Australia-Indonesia Centre



HAROLD MITCHELL AC
CHAIR

The Australia-Indonesia Centre was established in 2014 with a three-fold mandate. Its core objectives were to foster research collaboration, strengthen relationships across government, business and academia, and promote understanding between the nations: Australians' of Indonesia, Indonesians' of Australia. Over the ensuing years, it has fulfilled that mandate.

The Centre is a consortium of 11 leading universities – four Australian and seven Indonesian. Some of its achievements are easy to measure. It has overseen over 80 projects in five key areas, undertaken by 428 researchers from Australia and Indonesia. Its leaders program has 162 alumni, and it has formed numerous partnerships with other organisations.

Other successes are harder to quantify, but no less valuable for that. The people-to-people links built over the past four years are the very heart of the Centre's mission. They have allowed exchanges of knowledge, built goodwill and mutual understanding, and created pathways for the shared advancement that will help secure both countries' future.

Much has been made about the differences between Australia and Indonesia. In some ways, they are significant; although the nations are united by geography and many common interests, they are divided by culture and history. But the research of the Centre has shown that a majority of both Australians and Indonesians want the countries to work more closely together. There is a shared understanding that our prosperity is linked.

Both nations stand to gain tremendously from closer ties. Forging those ties has been fundamental to the mission of the Centre. We came into being with a mandate to provide a platform for Australians and Indonesians to make a positive contribution to each other's lives. That is what we have done, and what we look forward to continuing to do.



DR EUGENE SEBASTIAN
DIRECTOR AND CEO

Four years ago, the Australia-Indonesia Centre set out with the lofty aim of bringing the two nations closer together through an unprecedented program of structured and collaborative research. As we reflect on those years, we can say with confidence that we reached our goal.

The journey so far has been one of discovery: new ideas, new relationships, new ways of working. The Centre has provided a platform for Indonesians and Australians to work side-by-side on an array of key challenges. Our researchers examined innovative ways of providing reliable, affordable energy to remote communities in both countries. They explored strategies for tackling the rise of non-communicable diseases, the number one killer of both Australians and Indonesians. They plotted ways to leapfrog towards water sensitive cities.

Through building that platform, we not only fostered first-class interdisciplinary research, we gained invaluable insights into working together across borders and cultures. We forged powerful networks in academia, government and business, as well as bringing future leaders of each nation together to form new understandings and partnerships. We are pleased that key partners have recognised the importance of building bilateral networks; the Victorian Government, for example, made the Centre a finalist for Excellence in Innovation and Partnership and International Engagement at the Victoria International Education Awards 2018.

Now that we have reached the point of turning research into results, the relationships we have built in the past will underpin many of the efforts of our future. Over the coming four years, we will look to deliver tangible, positive impacts; we will provide the evidence base to influence change, and strengthen the leadership networks that will amplify that change.

As the Australia-Indonesia Centre completes the first, discovery phase of its operations, it is time to turn to consolidation and impact. At this critical moment in our journey, we are both proud of what we have achieved so far, and excited by what is still to come.

"At the heart of all our actions has been a vision to bring Australia and Indonesia closer together – to advance the mindset that working together is much better than working separately."

HAROLD MITCHELL AC, CHAIR

The Australia-Indonesia Centre Board

HAROLD MITCHELL AC
Chair

GARY QUINLAN AO
Australian Ambassador to Indonesia

PROFESSOR DR AINUN NA'IM
Secretary General
Ministry of Research, Technology, and Higher Education of Indonesia

PROFESSOR MARGARET GARDNER AO
President and Vice-Chancellor
Monash University

PROFESSOR MARK CONSIDINE
Provost
The University of Melbourne

PROFESSOR MICHAEL CARDEW-HALL
Pro Vice-Chancellor (Innovation)
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PROFESSOR DR DWIA PULUBUHU
Rector
Universitas Hasanuddin

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Ministry of Foreign Affairs of Indonesia

DR MARI PANGESTU
Former Minister of Trade of Indonesia

JAMES CASTLE
Founder and General Manager
CastleAsia

ROSS FITZGERALD
Director
Pratt Industries

VISHNU SHAHANEY
CEO
ANZ Indonesia

About The Australia-Indonesia Centre

The Australia-Indonesia Centre is supported through federal funding from Australia's Department of Education and Training and Department of Foreign Affairs and Trade. Support also comes from Indonesia's Department for Research, Technology and Higher Education.

The Centre, hosted by Monash University, is a collaboration between Monash University, the Australian National University, The University of Melbourne and The University of Sydney, working with seven leading Indonesian universities.

The Indonesian academic institutions are Universitas Indonesia, Universitas Gadjah Mada, Universitas Hasanuddin, Universitas Airlangga, Institut Teknologi Bandung, Institut Teknologi Sepuluh Nopember and Institut Pertanian Bogor.

Valued corporate partners include the Pratt Foundation, ANZ and PwC.

The Australia-Indonesia Centre has three Core Objectives set in consultation with the Australian Government.

RESEARCH

Pursuing solutions to shared national challenges in areas such as Energy, Infrastructure, Health, Urban Water, and Food & Agriculture via highly collaborative research.

LEADERSHIP

Strengthening and deepening Australia-Indonesia networks, developing leadership skills and fostering the exchange of knowledge.

INSIGHT

Promoting greater understanding and cultural awareness – Australians of Indonesia, and Indonesians of Australia.

Introduction

It is hard to overstate the challenges that the Australia-Indonesia Centre faced when it opened in 2014. As a project in long-term, structured international collaboration, it was unprecedented. Not only did it have to bridge a cultural and linguistic divide to deliver important research and forge lasting, high-level partnerships between profoundly disparate nations, it had to do so without a road map. Five years later, it would be an understatement to say that the Centre has succeeded.

The agreement to create the Australia-Indonesia Centre was signed by the leaders of the two nations in late 2013. With a \$15 million joint contribution from Australia's Department of Foreign Affairs and Trade and Department of Education, it commenced operations five months later. Within its broader mission to deepen and strengthen the relationship between the countries, it had three core objectives: research, leadership and insight. Specifically, it had to find innovative solutions to shared national problems, build networks between future leaders and foster the exchange of knowledge, and promote greater awareness and understanding – Australians' of Indonesia, and Indonesians' of Australia.

Hosted by Monash University, the Centre is a consortium of 11 leading universities – four Australian and seven Indonesian. It has enjoyed strong bilateral support at all levels, signing agreements and securing close to \$9.5 million in cash contributions and further in-kind support from corporate and philanthropic sources, partner universities and Indonesian ministries. There are great expectations from our partners in Indonesia that its pioneering approach will continue to bear fruit.

What has made the Centre unique is that it is much more than just another mechanism for distributing grants. It is an exercise in directed research into solutions to pressing local problems, and an investment in conscious relationship building. It has contributed important technical work, but also studied the sociological impacts of that work. It has delved into cultural diplomacy through a short film festival and brought together future leaders for programs and workshops. Crucially, it has learned along the way, identifying the barriers to successful international collaboration and finding ways to break them down.

This report represents a major moment in the Centre's existence, and a milestone in Australia-Indonesian relations. It closes the chapter on phase one of our work, and details the ways in which we have met and exceeded objectives. But it is also the launchpad for the next phase, where we will use the lessons we have learnt and the networks we have built to deliver powerful practical outcomes to materially benefit both nations.

The success of the Australia-Indonesia Centre can be measured in many ways. Some of its achievements are easily quantifiable. There have been the 84 projects in the key areas of energy, health, urban water, infrastructure and food, agriculture and attitudes and perceptions. There are the corresponding technical developments, media reports and academic journal publications, and the rich new data sets that have both laid the foundation for further research and provided policy-makers with the tools to make better decisions about energy, health, water management and more (the Centre's work, for instance, was cited in the development of the long-awaited Australia-Indonesia free trade agreement).

There are the 428 Australian and Indonesian researchers who collaborated on those projects, the new partnerships formed and the further grants leveraged from organisations such as APEC and the European Climate Foundation. Our leaders program boasts 162 alumni.

Harder to measure, but equally valuable, were the lessons learnt along the way. No organisation had previously attempted such a sustained and structured research collaboration between the nations. The Centre learned, sometimes by trial and error, what worked and what didn't. It discovered the many ways researchers can work together, and the incentives and disincentives to them doing so. It learned about the importance of culture, given that more than 60 per cent of the researchers had never worked in the other country, and the importance of engaging government and industry early in the process. These lessons have put the Centre in a uniquely strong position for the next phase of operations, and make it a model for other similar projects.

Most difficult of all to quantify, but perhaps most essential in contributing to our past, present and future success, is the power of the connections built over the past five years. In its public diplomacy strategy, the Department of Foreign Affairs and Trade places enormous emphasis on the importance of people-to-people relationships in building Australia's influence and profile in the region and around the world. These are networks that surpass and enhance official channels, that create opportunities for enterprise and cooperation, and build the sort of enduring rapport that can ride out the occasional inevitable turbulence between governments.

The people-to-people relationships created by the Australia-Indonesia Centre include those that were consciously nurtured in our leaders program, which brought together future leaders from both countries for a series of workshops, courses and masterclasses. One alumni of this program is now in an influential role on a body advising the Indonesian President. Another is the key advisor to the Governor of West Java, a rising star of Indonesian politics. These are affiliations and points of influence that wouldn't have existed otherwise, and promise to bring benefits for years to come.

But they also include the connections that have developed organically between officials, board members, academics, teachers and students. (It's worth noting, in this context, the significant role that alumni of Indonesian universities, and indeed Indonesian alumni of Australian universities, play in the civil administration of their country.) One of the distinctive hallmarks of the Centre's work is that it hasn't been about Australians studying Indonesia, or vice versa. Its intention has always been to create a level playing field where Australian and Indonesian academics could work side by side on shared problems.

For the past five years, the Centre has been in its discovery phase. It has funded and supported the work of academics from 11 collaborating institutions: Monash University, the

Australian National University, the University of Melbourne, the University of Sydney, Universitas Indonesia, Universitas Gadjah Mada, Universitas Hasanuddin, Universitas Airlangga, Institut Teknologi Bandung, Institut Teknologi Sepuluh Nopember and Institut Pertanian Bogor. It has also attracted generous support from our corporate partners The Pratt Foundation, ANZ and PwC.

Each of its areas of inquiry have generated groundbreaking and useful research on some of the most pressing issues facing each country, from energy security and climate risks, to the cost of infrastructure, the increasing burden of noncommunicable disease and containing the spread of religious extremism throughout the region.

Just a small sample of its work includes:

- The Succeeding Together report, which identifies a \$3 trillion economic opportunity for Australia and Indonesia to work together to secure parts of global supply chains. The report helped inform the Indonesia-Australia-Comprehensive Agreement.
- Modelling new ways of using renewable energy and storage to provide reliable electricity to the 67 million Indonesians without access to the grid. This project also promises significant benefits for the many remote Australian communities that rely on expensive non-renewable sources such as diesel for their power.
- Creating a dataset of shipping container logistics in Indonesia, and container logistics simulation software – critically important data in a nation of many islands that is both reliant on shipping and beset with maritime infrastructure and efficiency issues. The research was presented to considerable acclaim to port authorities from both nations.
- Developing a better and cheaper way to monitor the condition of railway tracks and work out when maintenance is needed, potentially improving both safety and efficiency.
- Tackling the shockingly high incidence of youth smoking in Indonesia, and developing an Indonesian-language tool to assess depression and anxiety in adolescents.
- Establishing an Indonesian version of the acclaimed Health Transform Leaders program, a multi-sector approach to combating noncommunicable diseases – the number one killer of both Australians and Indonesians.
- Detailed research and benchmarking for moving to a Water Sensitive Cities model in Indonesia, allowing it to 'leapfrog' into a sustainable future by avoiding infrastructure mistakes made in developed countries.
- Building, for the first time, a tool to model the future cost of power from 14 different technologies under Indonesian conditions – crucial data for a country wrestling with the dilemma of massively increasing its power generation capacity at the same time as managing climate risks.

The Centre's accomplishments to date are impressive examples of creative solutions to particular problems. But what will inform its future success is the realisation that problems do not exist in isolation, but are often, in fact, closely interlinked. Consider the example of cocoa.

Indonesia is the world's third largest producer of cocoa. It is the main source of income for 400,000 farming families. But for some years cocoa yields have been in steep decline, becoming a major source of concern to the national government. The AIC ran a project focusing on improving yields through a standard lens of farming practices and crop genetics.

That project's breakthrough moment, however, was not in revolutionising crop rotation or designing a better bean. It was in a conversation with a farmer resting under a tree, who revealed that he had serious health issues that often stopped him working in the fields. That inspired researchers to turn the problem on its head, and they discovered that poor productivity could be linked to farmers' poor health and advancing age, and the fact that their children are moving to the cities.

It was a realisation that made us see how many of our projects could be connected. For example, could our work on microgrids be applied to the challenges of commodity production? Could our research on logistics and supply chains help improve the movement of goods from farms to ports? Or could work in the design, packaging and marketing of food help bring young people back to the land?

This is the holistic approach the Centre will adopt in its next phase. Research will be integrated, place-based and demand-driven. Fueled by the expertise of the best universities in two countries, we plan to identify and address local problems with interdisciplinary teams. Projects will be driven by demand and solutions worked through to implementation. Key to this will be deep and early stakeholder engagement, from village to national level.

Already under way is the Partnership for Australia-Indonesia Research (PAIR). Instead of being divided into five clusters, PAIR researchers will focus on the island of South Sulawesi under the theme of Connectivity, People and Place. Connectivity encompasses energy, digital and physical links. People will focus particularly on the health, education and economic empowerment of the booming youth population – more than half of all Indonesians are aged under 30. Place examines the nexus of infrastructure, energy and water in an environmental context. By 2022, PAIR aims to deliver two outcomes: evidence-based research addressing key policy challenges in South Sulawesi, and a network of researchers competent in conducting demand-driven and interdisciplinary team-based research.

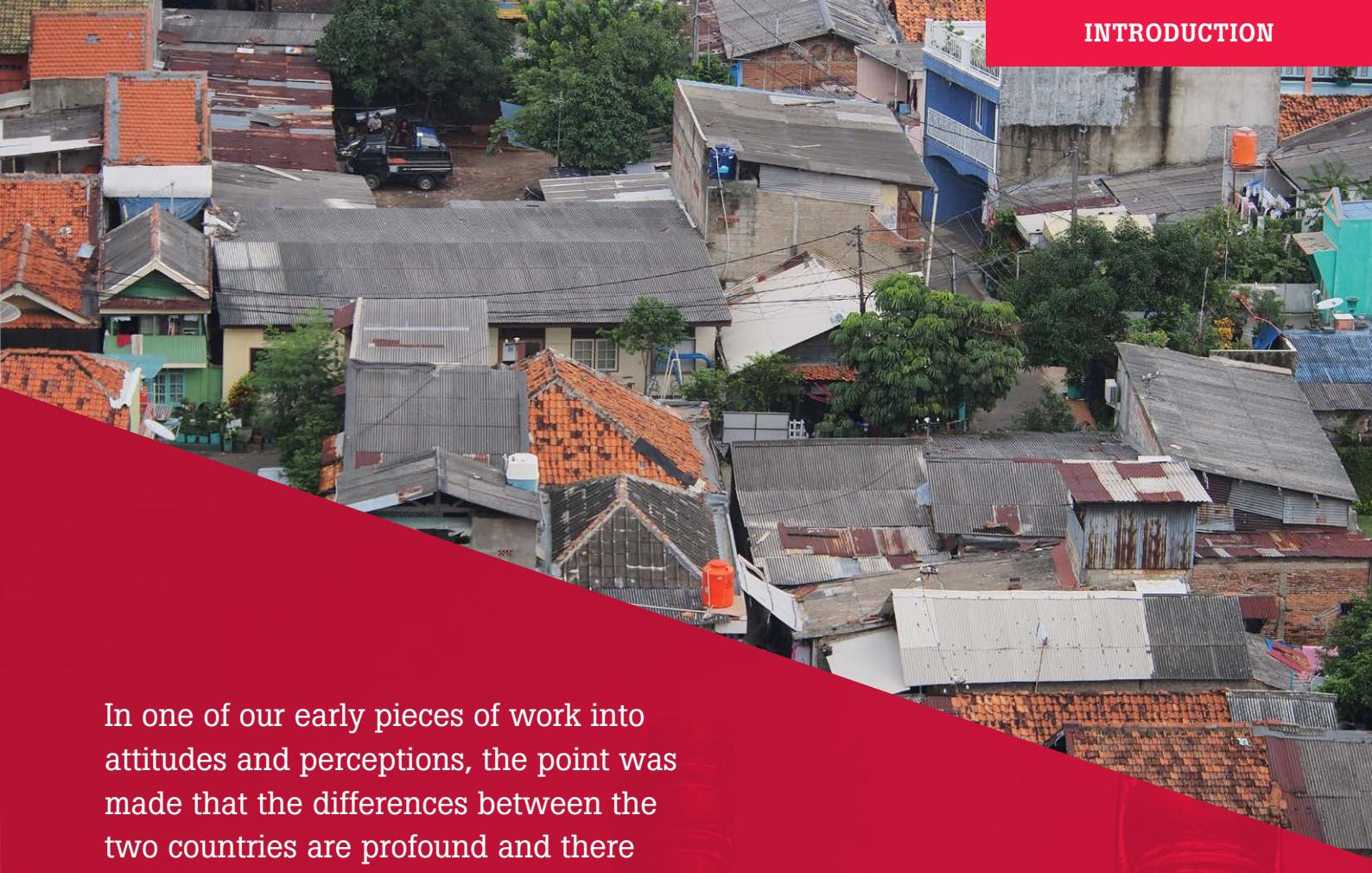
Programs like PAIR will set the stage for phase three, where we will take the solutions and approaches we have developed, and scale and apply them to problems in any location..

It is hard to overstate the potential of the Australia-Indonesia relationship. United by geography but divided by history and culture, both nations stand to make tremendous gains from closer ties and better understanding. That doesn't mean the process will be easy.

In one of our early pieces of work into attitudes and perceptions, the point was made that the differences between the two countries are profound and there are significant domestic complexities. "However," the report went on, "when you sit down and listen to people talk about their lives, their aspirations and 'what's important', many similarities emerge. It underlines that building greater connection and trust will only occur by demystifying and building the levels of understanding. There can only be rapport if there is respect and an appreciation of shared values."

The Australia-Indonesia Centre has been nothing if not a place where that understanding can grow and flourish.

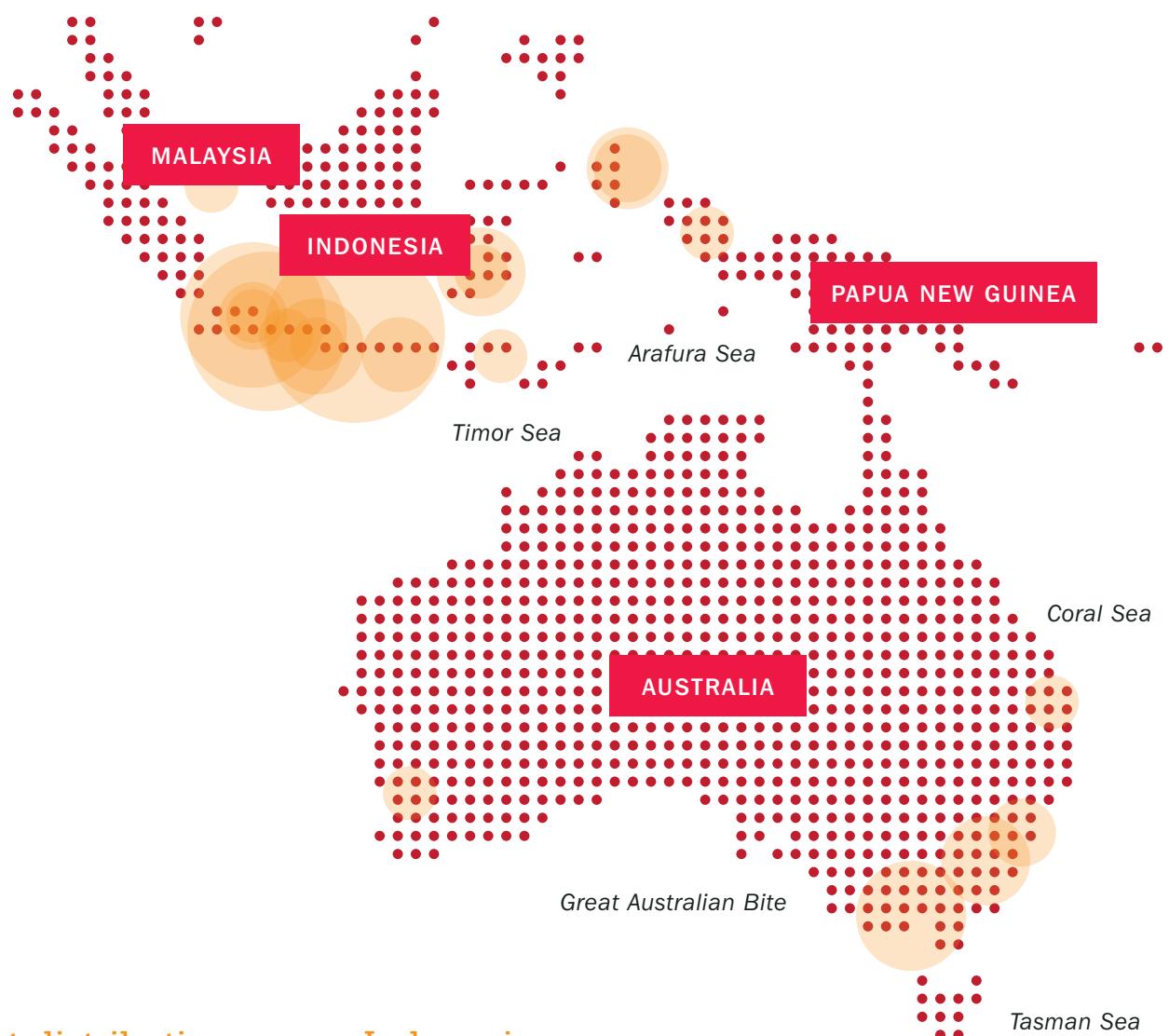
Five years ago it took a step into the unknown, bearing an ambitious agenda to produce research, insight and leadership. It is with great pleasure that we can say that it has delivered on all fronts.



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Project distribution map – Indonesia & Australia



Project distribution map – Indonesia



Completed Projects

	STRATEGIC RESEARCH PROJECTS	30
	TACTICAL RESEARCH PROJECTS	19
	SMALL PROJECTS	23
	RAPID START	3
	CAPACITY PROGRAM	2
	CLUSTER PLANNING	5

Research projects



Strategic Research Projects

Large-scale projects, generally interdisciplinary, that make a substantial contribution to the achievement of the cluster goal.



Tactical Research Projects

Small- to medium-scale projects that complement Strategic Research Projects by filling specific gaps in knowledge.



Small Projects

Small-scale pioneering projects aimed at testing ideas to be pursued in the cluster.



Rapid Start

Medium-sized projects designed to accelerate the implementation of cluster research activities.



Capacity Program

Intensive programs designed to further develop research and collaboration capacity for undergraduate and graduate students within the Centre's networks

The Australia-Indonesia Centre (AIC) Funding 2015 – 2018

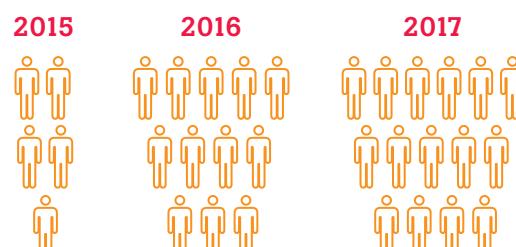
FUNDING AND PARTNER CONTRIBUTIONS

Australian Government (DET & DFAT)	\$15M
Australian University Partner Contributions	\$8M
Corporate, Government and other Partner Contributions	\$1.4M

DISTRIBUTION OF GOVERNMENT FUNDS

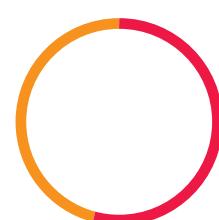
Research	\$13.4M
Network Building, Stakeholder Engagement and Communications	\$1.6M
Total	\$15M

Australia-Indonesia researchers 2015-2018



115 231 381 428

RESEARCHERS BY COUNTRY



	52%
	INDONESIA-BASED
	48%
	AUSTRALIA-BASED



Energy

Affordable, sustainable energy for all –
transforming electricity supply in Australia and Indonesia.





The Energy Cluster asked the question, **'What is the best way to transition from fossil fuels to the energy sources of the future?'** Its particular focus was remote and rural Indonesia, where about 67 million people are living off the grid, either using expensive, non-renewable power such as diesel or going without altogether. Australia, too, has many remote Indigenous, mining and small-island communities.

Energy projects explored small-scale solutions involving microgrids. Researchers looked at how to make these options sustainable for remote communities, and found it was important to meet community aspirations, provide training for ongoing management of the microgrid and to take into account long-term costs when arranging financing.

The Cluster also investigated national-scale strategy development. Aspects of this work included:

- Modelling the installation of microgrids, looking at optimal technologies, timing, financing and management arrangements, and legal requirements. The Cluster ran a seminar in Sulawesi about how best to approach renewables in the region, with researchers, business and government representatives providing advice and insights.
- Assessing the viability of larger renewable power grids in remote locations, linked using high-voltage DC cables and stabilised with pumped hydro energy storage. Researchers found that solar energy and pumped hydro sites were abundant in both Australia and Indonesia.

— The Indonesian Energy Technology Assessment. This projected the potential cost of generating power using each of 14 different technologies between now and 2050, modelling for Indonesian conditions. This study will assist energy planning in Indonesia and bring the Australian and Indonesian energy markets closer together, as a similar assessment has been run in Australia.

Cluster researchers from the Australian National University, Monash University, the University of Melbourne, Institut Teknologi Bandung, Universitas Hasanuddin, the University of Sydney and the University of NSW shared their findings with government and industry stakeholders at workshops in Canberra and Melbourne in July 2018, and to Indonesia's National Energy Council, government and industry representatives in Jakarta in October 2018.





PEOPLE

Energy Cluster Leads



Prof Kenneth Baldwin
Australian National University



Dr Ariel Liebman
Monash University



Dr Ulfah Juniarti Siregar
Institut Pertanian Bogor



Dr Retno Gumilang Dewi
Institut Teknologi Bandung

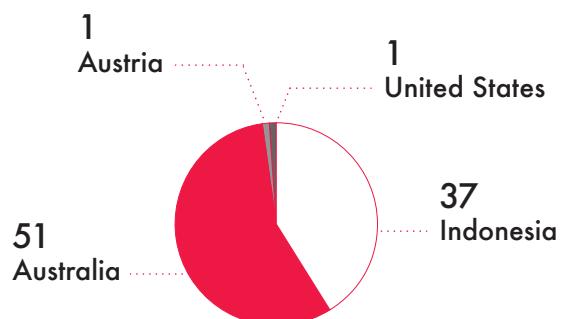
Co-ordinator



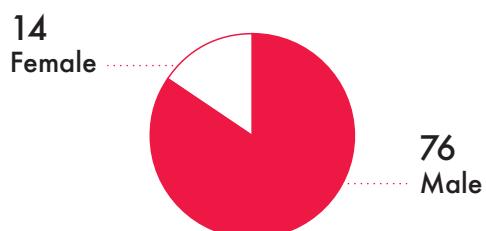
Dr Igor Skryabin
Australian National University

KEY STATISTICS

90
Total researchers



\$2M
Total investment



KEY ACHIEVEMENTS

- Creating a detailed Indonesian energy technology assessment (IETA) projecting the future cost of generating power via different technologies. The report will help planners and policymakers make informed decisions about the future of Indonesia's energy network. It was presented at a forum at the Australian Embassy Jakarta in 2018.
- Securing APEC funding for the project titled “Integrated energy system planning for equitable access to sustainable energy for remote communities in the APEC regions using North Sulawesi as a pilot project/testbed.” Researchers from Monash, Institut Teknologi Bandung and Institut Pertanian Bogor are engaging with communities in North Sulawesi, City of Bitung and Universitas Sam Ratulangi to model a Low Carbon Model Town initiative.
- Attracting a \$100,000 commitment from CWP Renewables, a global company with business activities in both Australia and Indonesia.
- Working with the European Climate Foundation fund to develop a state-of-the art analysis of the renewable transformation potential for the Java-Bali power system.
- Building deep and lasting research networks between Australian and Indonesian academics and institutions.
- Evaluating the potential for biofuel use and production in Indonesia's future energy mix.
- Developing models for the design and installation of microgrids in remote communities, taking into account specific economic, social and cultural factors and examining the impacts of electrification.
- Creating robust models for the integration of clean-energy microgrids into large-scale transmission systems.
- Developing a novel method of measuring fouling on a ship's hull, a technology with the potential to deliver significant widespread economic and environmental benefits to the global transport industry.
- Evaluating options for large-scale generation and storage of renewable energy, including identification of potential pumped hydro energy storage sites and enumerating the benefits of deep decarbonisation of the Indonesian economy.
- Presentations to government and industry aim to shape policies and advance technologies to help reach Indonesia's renewable energy targets set by President Joko Widodo's government.



Affordable, sustainable energy for all – transforming electricity supply in Australia and Indonesia

RESEARCH TEAM

PROF KENNETH BALDWIN
Director, Energy Change Institute
Australian National University

DR ARIEL LIEBMAN
Deputy Director
Monash University

DR ULFAH JUNIARTI SIREGAR
Associate Professor
Institut Pertanian Bogor

DR RETNO GUMILANG DEWI
Assistant Professor
Institut Teknologi Bandung

DR IGOR SKRYABIN
Business Development Manager
Australian National University

PROJECT SUMMARY

The Energy Cluster set out to explore ways to improve access to affordable, reliable energy that transforms communities. For most Australians and Indonesians, that energy still comes from national grids. But about 67 million Indonesians – almost a third of the country's population – are not on the grid. They either rely on expensive, non-renewable sources of power – often diesel – or they have no access to power at all.

That poses a critical challenge for sustainable development in Indonesia. To meet the Indonesian government's goal of 90 per cent electricity coverage by 2020, generation must grow by nine per cent a year.

Australia also has many remote Indigenous, island and mining communities that rely predominantly on electricity generated from expensive and polluting diesel. On top of that, the concept of the energy grid is changing. For example, some new Australian suburbs may be going 'off the grid'. Such suburbs could use renewables such as solar and wind, supported by battery storage and gas, to create microgrids that essentially run independently of the national electricity grid.

The best ways to transform energy supply in the two countries may not be simple. In communities not yet reliably connected to the grid, there is now the opportunity to leapfrog into the 'future grid' by tailoring development to suit local requirements. Both countries also have large reserves of coal, natural gas and other fossil fuels but have committed to 'decarbonising' the energy system.

The aim of this cluster was to develop local solutions by assessing, modelling and trialling microgrids, and explore national scale strategy by modelling the deployment of microgrids, assessing future technology options, and identifying the policy and regulatory frameworks needed.

Specific themes were:

Microgrids and remote area networks. This focused on technical and economic assessment of decentralised electricity provision options, configured as microgrids with substantial levels of renewable sources and energy storage. Covering both off-grid and grid-connected microgrids, this work is important to both Australia and Indonesia. In Indonesia, microgrids are being considered as a key solution for remote area and island electrification, while in Australia microgrids are being considered for development both within cities, as a cost mitigation mechanism, and in remote communities to provide an affordable alternative to diesel generation. The theme focused on better ways of designing microgrids to integrate new technologies, such as solar PV, batteries, and smart grids, with existing small-scale technologies such as biomass and micro-hydro.

Energy system transformation pathways. This investigated the development of centralised electricity provision, including the trade-offs with microgrids. The aim was to create a model that can map out the energy future at a system level, informing decisions by investors, policymakers and the community on the best strategies for achieving an economically optimal mix of technologies.

Technology assessment. The decisions, models and designs developed in the first two themes are critically dependent on the characteristics of new technologies. Particularly important variables include cost, ease of integration and deployment times. Additionally, energy feedstocks or energy resource availabilities are often geographically diverse, and capital costs will decline significantly over time for newer technologies. Understanding and modelling how the characteristics of new technologies may change is a relatively new field of study, as is the use of models for making investment decisions. A rigorous treatment and enhancement of these methods is fundamental to developing confidence in investment models.



Optimal microgrid design and operations

RESEARCH TEAM

DR HASSAN HIJAZI

Senior Lecturer
Australian National University

DR TRI DESMANA RACHMILDHA

Assistant Professor
Institut Teknologi Bandung

PROJECT SUMMARY

This project aimed to address critical issues relating to developing and deploying microgrids in Indonesia and Australia. It sought to address the technical and legal frameworks necessary to deploy microgrids, both for rural electrification and for cost-effective emissions abatement in areas where grid power is available.

This project had three main parts:

- Part one, on microgrid design and mathematical optimisation, focused on developing techniques to solve various technical issues. A range of fundamental mathematical problems resolved in this project were critical for the development of an optimal microgrid design and operations tool.
- Part two aimed to provide a database of battery storage devices suitable for incorporation into the tool. This part of the project focused on evaluating the optimal location/distribution of battery systems and their optimal scheduling, based on various load and generation profiles. This was supplemented by developing scalable optimisation algorithms related to storage components and their implementation.
- Part three examined legal and economic barriers and drivers affecting the microgrid and distributed energy sectors in Indonesia. Specifically, it explored the legal and policy frameworks applicable to mini-grids and microgrids. It included a substantial amount of research on barriers to utility-scale solar PV development in Indonesia. This part of the project documented issues with the implementation of Indonesian electricity law, notably the adaptation of feed-in tariffs to microgrids and problems with the connection of small-scale generation capacity to storage systems and microgrids. A subsidiary goal was building the knowledge base amongst Indonesian and Australian academics of electricity and renewable energy law in the context of climate change.

An associated aim was developing sustainable and formalised networks of research collaboration between Indonesia and Australia in the fields of energy, climate and environmental law, through seminars, workshops and co-publications, facilitated through membership of the IUCN Academy of Environmental Law.

Key achievements of this project include:

- Developing an evidence-based decision-support tool for the optimal design and operation of microgrids, providing an investment evaluation tool that offers technical feasibility guarantees.
- Using the decision-support tool to inform investment strategies in Indonesian and Australian microgrid deployment projects.
- Consolidating and expanding the knowledge base amongst Indonesian and Australian energy and environmental law and policy academics of the specific topics of electricity law and renewable energy law in the context of addressing climate change, by disseminating research results more widely.
- Disseminating knowledge from the research project to influence policy debates in both countries and ensure corporate and government decision-makers are aware of innovative clean energy technologies.

OUTCOMES

Articles

Wang, G., & Hijazi, H. (2018). Mathematical programming methods for microgrid design and operations: a survey on deterministic and stochastic approaches. *Computational Optimization and Applications*, 71(2), 553-608
<http://doi.org/10.1007/s10589-018-0015-1>

Presentations

- Regulatory and policy transformation for microgrid enablement. Meningkatkan hukum, regulasi dan kebijakan untuk mengaktifkan dan memfasilitasi microgrids energi terbarukan. Australia-Indonesia Centre Energy Cluster Workshop, Australia Indonesia Centre Summit, Presentation at Universitas Airlangga, Surabaya, 24 August 2016.
- (2016) “What’s Blocking Solar PV in Indonesia? Will the new FIT law work?” Australian Photovoltaic Institute 2016 Asia-Pacific Solar Research Conference, ANU 30 November 2016.
- Critical analysis of current regulatory frameworks to encourage investment in solar PV in Indonesia. Innovations Seminar Series, School of Regulation and Global Governance (Regnet), ANU, 11 April 2017.
- Law and policy to encourage renewable energy microgrids in Indonesia. International Tropical Renewable Energy Conference, University of Indonesia, 23 November 2017.
- Observations on the Recent Policy and Regulatory Framework for Microgrids and Distributed Energy in Indonesia. Energy Cluster Workshop, Canberra, 2018.
- Meningkatkan hukum, regulasi dan kebijakan untuk mengaktifkan dan memfasilitasi microgrids energi terbarukan. Australia Indonesia Centre, Energy Cluster Workshop, Presentation at ANU, Canberra, 19 July 2018.



Indonesian energy technology and resource assessments

RESEARCH TEAM

PROF KENNETH BALDWIN
Director, Energy Change Institute
Australian National University

DR RETNO GUMILANG DEWI
Assistant Professor
Institut Teknologi Bandung

PROJECT SUMMARY

This project aimed to develop a means for Indonesian energy planners to understand the relative costs of electricity generation of 14 technologies in Indonesian conditions. Using best practice from the development of similar programs in Australia, it aimed to provide the foundation for an Indonesian energy technology assessment (IETA).

Electricity generation costs are changing rapidly, bringing serious repercussions for national energy policies. For a nation to develop efficient and effective energy policies, it must understand the specific factors affecting it. Generation costs will vary depending on a country's labour market, technical, geographical and climatic conditions, along with its domestic policy imperatives. Energy policies in one country cannot be developed based on the generation cost assumptions of other countries.

Over coming decades, the Indonesian electricity sector will need to adjust to unprecedented changes in the relative cost of generation technologies, arising from innovation, movements in fuel prices and adoption of climate change policies. This project equips policymakers, investors, researchers and developers with the information necessary to decide on the optimum mix of technologies for providing sustainable, reliable and affordable electricity to millions of Indonesian customers.

The project focused on the application of the Australia energy technology assessment (AETA) methodology in Indonesia, using Indonesian specific costs and conditions. The objective was to develop an IETA and apply it to a range of technologies agreed with the Indonesian Ministry of Energy and Mineral Resources. The further, interrelated objective of the project was to review existing technology assessment methodology, develop enhanced approaches and trial them in application to the Indonesian electricity market.

The IETA provides the best available and most up-to-date cost estimates for 14 electricity generation technologies under Indonesian, specifically Jakarta regional, conditions. It allows for cross-technology and over-time comparisons. The cost estimates for each of the 14 selected technologies were generated on a 'bottom up' approach that accounted for the component costs, which determine the overall long-run marginal cost of electricity generation. The methods used to build up the cost estimates were applied consistently across all technologies and all key assumptions fully detailed.

IETA parameters and costs will be invaluable to energy companies, regulators and operators who need detailed cost comparisons across energy technologies for planning purposes.

Following the Australian model, IETA has been developed in consultation with Indonesian experts and using Indonesian technology input cost studies, especially for the selected values of fuel prices, performance parameters and interest rates. IETA also gained valuable input from the Indonesian Ministry of Energy and Mineral Resources.

The IETA 2017 provides many important insights, including the finding that Indonesia's electricity generation mix in 2050 is likely to be very different to its current state. The key finding is that the costs of renewable technologies will drop rapidly as a result of a rapid increase in global production and technical developments. If planners and investors in the electricity sector are to effectively manage and adapt to this energy transformation, up-to-date and rigorous estimates of the cost of various electricity generation technologies will be required.

OUTCOMES

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“Regulatory and policy context for decentralised electrification and microgrid development in Indonesia” (Prest ANU, Wibisana UI, Widnyana ANU, Susanto), Asia Pacific Journal of Environmental Law, forthcoming.

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Conference presentations

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“Critical analysis of current regulatory frameworks to encourage investment in solar PV in Indonesia”, Innovations Seminar Series, School of Regulation and Global Governance (Regnet), ANU, 11 April 2017.

“Law and Policy to Encourage Renewable Energy Microgrids in Indonesia”, International Tropical Renewable Energy Conference, University of Indonesia, 23 November 2017.

Energy Technology Assessment to enable uptake of renewables, I. Skryabin presentation at the Asia Clean Energy Forum, ADB, The Philippines, Manila, 2017.



Microgrids as enablers of sustainable power system investment and decarbonisation pathways

RESEARCH TEAM

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PROJECT SUMMARY

This project sought to apply a systems-thinking-based approach to sustainable investment in the Australian and Indonesian power systems, with microgrids as an enabler. It aimed to integrate techno-economic modelling with social and institutional analyses to identify the best strategies for investing in renewable energy.

The project's objectives were:

- To develop a computer-modelling decision-support platform and a set of reusable models to identify the best microgrid deployment strategies.
- To engage end-users such as energy companies and community organisations by integrating their input into the project research and resulting analyses.
- To integrate social and institutional factors into decarbonisation strategies to enable rapid rollout of microgrid technologies.
- To produce national level strategic plans for the decarbonisation of the electricity system, with microgrids and energy storage as primary enablers.
- To develop comparative case-study methodology for analysis of socio-cultural enablers and barriers to microgrids.
- To design and test concepts for a remote and rural communities socio-technical awareness-raising program on microgrid development, incorporating input from stakeholders including communities, scientists and government and business leaders in both Indonesia and Australia.
- To explore the potential of pumped hydro energy storage (PHES) to support large-scale deployment of solar and wind generation to reduce peak power deficits and transmission/distribution losses.

The project employed interdisciplinary methods, including projecting future electricity demand and developing a methodology for modelling demand against current Indonesian and Australian power systems. A range of tools was used or developed for this project. The Plexos Energy Modelling Suite from Energy Exemplar, for instance, was used to build a whole-of-system model for Indonesia. Further tools were developed when off-the-shelf products could not perform certain tasks. These included tools to model individual household demand based on activity and demographic models, and tools for co-optimised investment in generation, transmission and storage.

Another central platform of the project was the application and comparative analysis of four forms of action research. It investigated challenges and developed insights for deepening and broadening stakeholders' appreciation of the need for systematic attention to social conditions and considerations.

The project also developed methods of locating pumped-hydro sites in this framework and in a related project funded by the Australian Renewable Energy Agency. A search for upper reservoir sites in Bali identified 2.3 TWh of potential storage capacity, more than enough to support 100 per cent renewable electricity for the whole of Indonesia.

This project significantly advanced the Energy Cluster's capacity to model the deployment of new electricity infrastructure in both grid-connected and off-grid areas in Indonesia. The socioeconomic element included establishing an integrated set of empirically grounded social research methods to help ensure successful community renewable energy provision, through marrying attention to local conditions with practical concerns around logistics and scalability.

The modelling included a focus on renewable energy and microgrids as enablers of system decarbonisation. This included consideration of novel technology such as residential batteries and off-river pumped hydro energy storage. Policy and regulatory settings and trends were taken into account, including the national energy plan and the national electricity utility's annual 10-year investment plan, known as the RUPTL. Results include electricity demand projections, cost-of-generation projections, and renewable energy investment projections that support national decarbonisation targets. This was produced for both a national level and for an example region of North Sulawesi.

Local and international partners included the Indonesian Institute of Essential Services Reforms, the European Climate Foundation, German energy think tank Agora Energiewende, and a range of government agencies and NGOs. The North Sulawesi study was funded by APEC and performed jointly with Indonesian energy specialist firm CastleRock, in collaboration with the government of North Sulawesi, the City of Bitung, the University of Sam Ratulangi (Manado) and the University of Hasanuddin (Makassar).

The modelling showed that the path to renewable energy is possible and affordable. We used input data from other AIC Energy Cluster work, namely the Indonesian energy technology cost assessment, to reach this conclusion. To complement this work we have identified an almost unlimited number of potential sites for pumped hydro around Indonesia, with a publicly available detail dataset for Bali demonstrating what can be done with further analysis. We developed modelling to identify the optimal cost of solar plus residential battery storage for households of a given size and income, which could be applied across any remote and unelectrified village in Indonesia.

Research projects completed were:

Anthropology-led electrification research in West Kalimantan & Maluku (2015-2018)

INGO-led electrification research through Landscape-Lifescapes Analysis in Sumba (2016)

Sustainability Science-led electrification research in West Java & North Maluku (2017)

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Additional information is at: <http://re100.eng.anu.edu.au/>



Near off-grid solutions using renewable energy technologies and demand side prediction

RESEARCH TEAM

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PROJECT SUMMARY

The rapid growth of electricity demand, coupled with insufficient supply due to geographical constraints, has limited energy access for remote communities in countries such as Indonesia. However, recent advances in renewable energy and storage technologies provide promising means to supply power to communities under near off-grid conditions. Energy management solutions that effectively combine storage systems with multiple renewable energy sources, such as solar and geothermal, can increase the reliability of energy supply for remote communities.

This project aimed to study the optimisation of such systems. Along with conducting significant research into theoretical and numerical analyses related to controlling renewable energy integrated storage systems, the project undertook hardware experimentation.

The main experimental focus was to test how the operation of a solar PV-integrated battery system impacts its lifetime. We developed a prototype to test the battery lifetime value with three different strategies: simple set-point control, optimised operation disregarding battery degradation, and optimised operation considering degradation. The prototype was tested indoors, and six units were to be installed around The University of Melbourne for further assessment. Due to the problems of procuring locations at the university, however, testing was delayed.

OUTCOMES

Articles

Abdulla, K., De Hoog, J., Steer, K., Wirth, A., & Halgamuge S. (2017). Multi-resolution dynamic programming for the receding horizon control of energy storage. *IEEE Transactions on Sustainable Energy*, 10(1), 333-343. <http://doi.org/10.1109/TSTE.2017.2754505>

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Baseline survey of energy needs, consumption and production sources on Bintan Island

RESEARCH TEAM

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PROJECT SUMMARY

Adequate, reliable and sustainable power crucial for the economic and social development of Indonesia's islands. Currently, many island power systems rely on expensive, polluting and unsustainable diesel generation. The planning and development of alternative systems is greatly hampered by a lack of data on the needs and resources of specific communities. This project aimed to document existing sources of power and provide baseline data on consumer behaviour on Bintan in the province of Kepulauan Riau.

Researchers surveyed the household energy needs of 360 individuals on Bintan. The results were statistically analysed, as well as being used to model the value of distributed generation and storage in providing increased reliability and lower greenhouse gas emissions.

The survey was conducted face-to-face by trained volunteers in three districts. After collecting basic demographic information, questions in the energy section consisted of two parts. Part one tried to profile households energy consumption and expenditure. The interviewer also performed a high-level audit on the household electrical appliances, emphasising heavy power users such as air-conditioning systems, computers and microwave ovens, which could be included in the analysis to estimate the energy consumption profile of each dwelling.

Part two focused on electricity outages, with questions on the average frequency and duration of blackouts, methods of back-up power and the interviewees' opinions on the inconvenience the frequent outages raise.

Finally, interviewees were asked for their ideas on improving the situation, as well as a set of questions exploring the extent of behavioral and economic sacrifices they would make to have an uninterrupted, reliable electricity supply.

It was evident that monthly electricity consumption has significant positive correlation with all variables. This is easily understood, as variables reflected dwelling size, appliance ownership and financial status, so an increase in any one can be easily associated with an increase in electricity consumption. Among all variables, electricity use correlated most strongly with connected wattage, household income, the number of televisions and the number of air-conditioners. The variables representing the size of dwelling (number of bedrooms and occupancy) had a weaker correlation to electricity consumption.



Building coalitions to support community empowerment through renewable energy and livelihood solutions

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PROJECT SUMMARY

This project explored the development of community-scale renewable energy initiatives in remote and regional areas to support local needs and aspirations with appropriate technologies and complementary sustainable livelihoods. Through collaboration with multiple stakeholders, the project established a template for bringing community organisations together with industry, government, and research institutions to identify and implement local solutions.

From an initial case study in Indonesia, the project will connect with comparable Australian initiatives to build a bilateral coalition of community-oriented, research-driven solutions to contemporary challenges in energy and sustainable development.

This project's objectives were:

- To establish a coalition of Indonesian and Australian organisations to develop community centred renewable energy and livelihood solutions in a remote Indonesian community.
- To develop a template for identifying community needs, aspirations, and opportunities relating to renewable energy provision and novel livelihood opportunities in remote and regional contexts.
- To produce high-impact outputs including peer-reviewed journal articles, media content and engaged partnerships for further funding and development initiatives.

This project investigated community scale renewable energy electrification initiatives in Indonesia. Three phases of field work were conducted to collect data. The first activities were undertaken in November 2016 to establish relationships with participating communities in West Java, and to collect data on local livelihood needs and aspirations. A second round of field work in February 2017 involved evaluating community scale renewable energy options in two case study sites from the first field work – Cinta Mekar and Ponggang. The results of this second research trip were modelled using HOMER software. A final round of field work was conducted in Morotai in North Maluku in June 2017. This area was chosen for its contrasting geographical and demographic features relative to West Java. Morotai also rose above other potential sites with similar features due to its importance in wider AIC and Indonesian government planning. Interviews were conducted with community members in Cinta Mekar and Ponggang, and biophysical data collected to inform the HOMER modelling of hybrid renewable energy options for both case study sites.

Overall, this project produced several outcomes.

These include:

- A bilateral, multi-institutional, interdisciplinary research team that collaborated productively to engage diverse stakeholders from industry, government, civil society, and community sectors.
- An evidence-based understanding of community needs and aspirations relevant to energy in representative rural and remote areas of Indonesia.
- An evidence-based understanding of policy, regulatory, economic, and cultural constraints and enablers of community renewable energy in Indonesia.
- An empirically derived template process to collaboratively develop and implement renewable energy in remote communities, which is more likely to achieve long-term sustainability outcomes than current practices.
- Generating networks and relationships to support future research and development activities that will build on the knowledge gained through this project.

The research team has formed strong interpersonal links and developed new levels of cultural and academic understanding. The team are producing high-impact publications based on the research, and actively exploring opportunities for next steps and further collaboration. The applied, transdisciplinary nature of the project has resulted in the formation of important and valuable relationships and networks, and the team are working to maintain and extend these into the future.

OUTCOMES

Articles

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Operational security support for power and energy systems: networked microgrids as the solution

RESEARCH TEAM

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PROJECT SUMMARY

This project aimed to develop an innovative method of operating networked microgrids to achieve optimal economic benefits, high operating robustness and efficient security support for power systems.

With large-scale installation of distributed generation, energy networks are evolving from conventional passive systems to active decentralised systems such as microgrids. To reduce greenhouse gas emissions and alleviate dependence on fossil fuels, renewable energy sources such as wind and solar dominate today's microgrids. Unlike conventional fossil-fuel generators, however, wind turbines and solar photovoltaics only generate intermittent, volatile and non-dispatchable power. The uncertainties and intermittency can significantly impair microgrid operation, in terms of reducing economic benefits and triggering operating constraint violations. Thus, it is sensible to develop a robust co-ordinated operation approach for microgrids to account for uncertainties.

On the other hand, power systems must stay within security and economic constraints. Security constrained optimal power flow (SCOPF) is a powerful tool to balance conflicts between security and economic requirements. As microgrids proliferate, they provide an opportunity to support post-contingency control by managing multiple networked microgrids simultaneously. Therefore, a novel robust SCOPF that accounts for the development of networked microgrids is necessary for future power system security.

This project aimed to develop a robust framework for microgrids to co-ordinate various distributed energy resources, including distributed generation, energy storage and demand response, as well as a robust SCOPF method using networked microgrids to implement post-contingency control.

This project proposed two microgrid co-ordination methods aimed at maximising profits for the microgrid operator while satisfying operating constraints. One method focused on energy storage and direct load control, the other on day-ahead price-based response and regular adjustment of distributed generation units. Simulation results indicated high robustness and efficiency. It is concluded that both proposed methods can provide significant economic and technical benefits.

The project also proposed a new SCOPF tool that is able to maintain security in an uncertain operating environment. Multiple microgrids are co-ordinated to support post-contingency control, i.e. corrective control actions. Rigorous modelling that quantifies the cost for control actions and accounts for uncertainties and contingency cases means robust and secure performance of the SCOPF using multiple microgrids can be achieved. Numerical simulations demonstrate the high effectiveness of the robust SCOPF method. For industrial applications, it can help the system operator enhance system security while optimising economic performance under large-scale intermittent renewable power integration and microgrid deployments.

In future works, the proposed robust co-ordinated operation framework is expected to be applied in practical microgrid operation problems such as voltage/VAR control, demand-side management and multi-energy (power, thermal and gas) dispatch. The proposed robust SCOPF method is expected to be extended considering frequency and voltage stability and resilient operation under disasters.

OUTCOMES

Articles

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Indonesia-Australia renewable energy super grid

RESEARCH TEAM

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PROJECT SUMMARY

Indonesia's electricity network does not currently meet the needs of its population. The national electrification rate is around 84 per cent, and in some regions it is as low as 30 per cent. The network needs to grow massively to accommodate rising living standards, rising population and the connection of those not yet on the grid.

Most power in Indonesia is generated from fossil fuels, with a mix of coal, oil and gas; geothermal and hydroelectric power make up a little more than 10 per cent of the mix. Worldwide, solar photovoltaic and wind technology is being deployed on a large scale (more than 100 gigawatts of new capacity per year combined), and are likely to grow into enormous industries over the next decade. This growth is being driven by extraordinarily rapid price reductions over the past five years and ever-increasing concern about greenhouse gas emissions.

This project aimed to explore the potential for renewable energy, principally solar PV, to supply most of Indonesia's and Australia's needs by 2050, through the development of large-scale, interconnected generation, storage and transmission systems. The primary storage technology chosen was pumped hydro energy storage, which constitutes about 99 per cent of all energy storage due to its low cost relative to alternatives such as batteries. The two nations are expected to be connected by a high-voltage direct current (HVDC) transmission line. This technology is being explored by the main electric utility in Indonesia, and there are three HVDC installations in Australia as well as many others around the world.

As a first step, the project investigated the possibility of supplying 50 per cent of Australian and Indonesian electricity needs from solar PV and wind by 2035. To reach their conclusions, researchers gathered information on the electricity use of a sample of typical Indonesian islands and reviewed recent literature for HVDC technology.

In 2014, renewable energy (primarily hydro, wind and solar) provided 59 per cent of net new electricity generation capacity worldwide, with fossil fuel (primarily gas and coal) power stations providing most of the balance. PV and wind presently constitute nearly all of the new generation capacity in Australia and several other countries. Within a few years, wind and solar are likely to pass hydro, gas and coal combined. About 0.1 per cent of Indonesia's land surface would be required to meet all electricity requirements from PV and wind. However, wind and solar have low deployment rates in Indonesia despite excellent solar resources.

Indonesia is grappling with the triple problem of energy poverty, poor energy security and, to a lesser extent, high emissions intensity. Huge increases in electricity production and transmission are needed in the coming decades. Current power sources are fossil fuel intensive. Changes to this system of thought have been emerging, as Indonesia plans to provide new and renewable electricity penetration levels of 25 per cent by 2025, and to have achieved 10 per cent energy efficiency savings by 2019. Indonesia also faces the task of increasing electrification rates, a task that is more difficult than in other countries because the population is spread across numerous islands.

Dramatic falls in the price of solar PV mean that this mature technology has become affordable in many parts of the world. Indonesia is located in the tropics and has high levels of solar insolation. Importantly, Indonesian insolation and energy demand have low seasonality; unlike countries at higher latitudes, the temperature and solar availability varies little from season to season, which means expensive seasonal storage is not needed. There is no demand for energy intensive space heating, and low demand for energy intensive domestic water heating. Demand for air-conditioning is usually well matched to solar availability. Energy demands for lighting and refrigeration vary little from month to month.

Australia has some of the best solar resources in the world, but much of this falls upon unpopulated and unconnected desert. This resource could, however, be harnessed and transported to Indonesia through HVDC transmission. Connecting Australian deserts to Indonesia via HVDC would result in a broad and diversified electricity market.

CONCLUSIONS

Reductions in the cost of solar PV and wind, coupled with developments in transmission and storage, allow PV and wind to strongly compete with all fossil, nuclear and renewable alternatives. Indeed, PV and wind are probably the cheapest options for new large-scale generation capacity in both Australia and Indonesia.

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Articles

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Remote area electrification in Indonesia

RESEARCH TEAM

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PROJECT SUMMARY

Rapid, widespread technological change has myriad complex impacts, with remote area electrification being a critical case in point. Electrification boosts local business, industry and education opportunities and enhances global connectedness.

Less often considered are the social fractures and even conflicts that can occur, along with the social structures and cultural values that are altered over time. It is vital to the long-term success of electrification projects that communities and social scientists are closely involved throughout the planning, implementation and follow-up phases. This is particularly the case for major electrification rollouts.

This project performed groundwork for deep and far-reaching research into social impacts and enablers associated with electrification and related energy initiatives in remote parts of Indonesia and, in the longer term, Australia. The project's main contribution to remote-area electrification planning is arguably its articulation of the need for, and initial steps undertaken towards, bridging macro-level energy resource and technology cost data gathering with local-level ethnographic field studies.

The team gathered and began analysis of data on archipelago-wide energy resource availabilities, potentials and related technology cost factors. Field studies focused on a landlocked area in West Kalimantan and a remote island chain in Maluku, producing both individual case studies and scope for generic comparison of variables across the sites. The combination of macro-level data collection, high-level network participation, seminar presentations, ethnographic studies and field visits generated valuable insight into the under-researched area of remote electrification. This is of benefit to industry stakeholders, government representatives, academics and communities alike.

The project took place against a background of Indonesian leaders attempting to balance the nation's rapidly growing economy and infrastructure against the need to maintain its cultural integrity and rich biodiversity. Renewable energies are becoming more accessible and technologies simpler, more efficient and more affordable, but coal and other old-guard energy interests remain strong. As evidenced in many countries, well-intentioned renewable energy programs in remote areas can produce enormous benefits, but can also create new social problems and often have limited long-term success.

With major electrification initiatives under way – such as Program Indonesia Terang – the team was involved in broad resource and economic data gathering, as well as leading granular village-level studies. The primary purpose was to build bilateral, interdisciplinary teams, and create solid policy-relevant data through co-learning with village and district level leaders.

The project provided benefits to both Indonesia and Australia through the bilateral nature of the research. Of broader significance, it called attention to contrasting and parallel factors and challenges with renewables-driven remote-electrification aspirations in both countries. While population sizes and per capita GDP differ significantly between Indonesia and Australia, both nations have large areas with sparse populations (desert and ocean respectively) and share a need for innovative energy provision solutions, with microgrids a particularly strong case in point.

The aim of this project was to ‘identify appropriate touch points for policy enablers to assist with uptake of renewable technologies for remote-area electrification in Indonesia’. Objectives included mapping electrification types and levels in Indonesia, understanding local-level stakeholder renewable energy knowledge and aspirations, and exploring social impact and acceptance factors around electrification.

Team leaders visited villages to discuss issues and aspirations and engage in common activities, and two Master’s students spent more than three months in their respective village areas. Team members engaged with researchers from leading universities in the provinces in which case study villages were located – Tanjungpura University (Pontianak, West Kalimantan) and Pattimura University (Amboin, Maluku) – most of whom are connected

to local communities, although rarely to those under this particular study. There were meetings throughout the process, and two seminars at Tanjungpura University in West Kalimantan, which brought together university and NGO stakeholders.

This project contributed substantively to the collaborative building up of macro-level data on energy resources and related economic considerations in Indonesia. The main small project activities were directed to ‘ground up’ ethnographic studies. The local-level studies highlighted insights around socioeconomic and cultural issues that can only be developed through deep study into single village cases. Further to this, the ongoing attempts to bridge the macro/quantitative and micro/qualitative approaches form a component of major rollout preparations under way.

The unique and progressive nature of the ethnographic dimensions of the project was praised at the international anthropology symposium at the University of Indonesia in 2016.

OUTCOMES

Presentations

Presentation on barriers and policy enablers for uptake of renewable electrification technologies at macro and micro levels. Presented at the Energy Cluster component of the AIC Research Summit in Surabaya.

Dr Richter delivered a presentation at the AIC-Energy forum in Canberra.



Energy sustainability in naval and aerospace systems through improved turbulence management

RESEARCH TEAM

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PROF KETUT ARIA PRIA UTAMA
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PROJECT SUMMARY

The global shipping industry has an enormous environmental and economic footprint. There are estimated to be over 90,000 ships operating worldwide, together consuming between five million and seven million barrels of oil a day (up to eight per cent of the world's production).

The oil that these ships burn is mostly of a low grade, with a sulphur content that can be thousands of times higher than is permitted in diesel fuel. The health impact of shipping pollution is difficult to quantify, but recent studies indicate there may be up to 60,000 deaths a year related to shipping emissions, with health bills running into the billion dollars.

Hull roughness and fouling is a major but unmeasured contributor to the energy expenditure of the world's shipping fleet. This project aimed to improve the efficiency of ship operations by providing a means to quantify the penalty in emissions, financial cost and fuel use of hull fouling on an in-service vessel. This in turn would permit the maritime industry to make more informed decisions in terms of operations, either at a regulatory or operational level.

Both Australia and Indonesia are uniquely reliant on long-haul shipping. Australia is a large continent, with diverse population centres, that is geographically isolated from major trading partners. A strong resource sector puts major demands on export bulk shipping. Indonesia is an archipelago of 17,000 islands, with a large population reliant on shipping for transport links. The President of the Republic of Indonesia, Joko Widodo, has pledged to start a Sea Highway project involving new ports and consistently high numbers of large transport ships between five of Indonesia's main islands. Currently, it is more expensive to deliver goods from Jakarta to West Papua than to London due to lack of transport infrastructure.

Hull roughness is an important but largely unquantifiable contributor to shipping's energy expenditure. For any vehicle moving through a fluid, the optimal surface for minimising drag will almost always be a smooth finish. The degree of smoothness required to meet this optimum is determined by operating conditions. For a ship moving at 15 knots, this creates a target of approximately 20 microns (less than the diameter of a human hair) for the maximum permissible roughness height, beyond which performance will start to degrade. With the exception of racing yachts, ships rarely meet this optimum condition.

Hulls have underlying roughness due to manufacturing imperfections, coatings, and, most importantly, biofouling – the settlement of marine organisms on to a ship's hull. An earlier study used laboratory data to estimate that heavy fouling in a naval frigate could result in powering penalties of 86 per cent at cruising speed. In subsequent work, the economic impact of moderate hull fouling to the US fleet of FFG-7 frigates was calculated at US\$1 billion over 15 years. When one considers that this calculation is for just 56 ships out of the 90,000 estimated to be operating, the magnitude of the economic and environmental impact of biofouling becomes clear.

Despite the severity of the problem and the knowledge that rough surfaces are undesirable (hence the expenditure on anti-fouling technology), there is no reliable way for ship operators to quantify drag due to hull roughness for an in-service vessel. Almost all reliable estimates on hull roughness penalties have resulted from laborious laboratory experiments on replicated surfaces, precluding widespread regular monitoring. As a consequence, the scheduling of cleaning and recoating remains suboptimal.

Through underwater scanning techniques coupled with laser measurement of water flow over the hull, this project aimed to provide data on the increase in drag experienced by a ship under different fouling conditions. An Indonesian inter-island ferry was fitted with sensors, with detailed laboratory experiments used to validate the approach.

The goal is to create a real-time monitoring methodology suited to widespread application. This is of particular importance to an industry under increasing pressure to mitigate emissions. Ultimately it is hoped that this project will lead to more informed decisions around hull-cleaning, regulatory guidelines and application of coatings.

The collaboration between Indonesia and Australia has been cemented and will be ongoing, with the interchange of staff between universities strengthened by the arrival of the first Institut Teknologi Bandung PhD student into the University of Melbourne fluids research group in 2016. The project

attracted further support from Europe (the University of Southampton and the Danish marine coatings manufacturer Hempel A/S), and from Indonesia (the government shipping registry, Biro Klasifikasi Indonesia, and ship operator PT Dharma Lautan Utama).

Besides the obvious advantages of improved collaboration between Australian and Indonesian researchers, we firmly believe that the eventual outputs from this project will improve the overall efficiency of shipping. The economic and environmental penalty due to biofouling has, up to this point, been difficult to accurately quantify. By putting an accurate figure on this we believe that appropriate regulatory pressure can be brought to bear that will improve the overall efficiency of the world's fleet. For an industry that burns such a large proportion of the world's oil supply, the economic advantages of such an outcome would be far-reaching.

OUTCOMES

Assoc Professor Hutchins was invited to departmental seminar at the University of Southampton, 2015.

Assoc Professor Jason Monty presented to the second ANZPAC Workshop on Biofouling Management for Sustainable Shipping, 2015.

Professor Ketut presented to RINA Conference in Surabaya, 2015.

Media

Putting a window and lasers in a ship's hull
<https://phys.org/news/2016-01-window-lasers-ship-hull.html>



Case study on decarbonising the Indonesian electricity sector

RESEARCH TEAM

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PROJECT SUMMARY

Indonesia faces enormous challenges in achieving decarbonisation. In an environment of rapid economic expansion, population growth and soaring demand for energy, it must find ways to embrace clean power sources, boost energy efficiency and encourage electricity use.

To do this, it must internalise climate change into the national agenda, attract finance for significant infrastructure and technology investment, facilitate technology transfer, and adopt the right energy pricing policy for renewable sources.

This study envisages that despite these challenges, decarbonisation holds economic opportunities for Indonesia, and therefore goes hand-in-hand with the country's development objectives. Developing renewable energy sources and low-emissions technologies could stimulate economic development and create jobs. Energy-efficiency measures could improve productivity. A deep decarbonisation scenario also assumes a shift towards a more service-oriented economy that is less dependent on unstable revenues from fossil fuel exports. Deep decarbonisation holds two additional benefits. The first is reduced pollution from transport, industry, power plants, and residential energy; the second is improved energy security from developing domestic renewables.

In 2009, the Indonesian government made a non-binding commitment to reduce 26 per cent of CO₂ emissions by 2020, compared to a business-as-usual (BAU) path. In 2016, it committed to an emissions reduction of 29 per cent below BAU in 2030. However, climate concern has not been fully internalised into the Indonesian development agenda. To embrace deep decarbonisation, the government has to make climate change integral to that agenda.

As a developing country, Indonesia's economy and population are expected to grow. By 2050, energy demand under a decarbonisation scenario is estimated to be 300 per cent higher than in 2010. This would be an average annual growth rate of 2.8 per cent, much lower than economic growth, which is in the range of 5.4–5.8 per cent. The difference is attributed to energy efficiency measures. Important changes expected by 2050 include a significant increase in industry's share of energy consumption (from 49 per cent to 74 per cent) and a significant increase in electricity, gas and biofuels, and decrease of oil fuels. The decarbonisation scenario has 20 per cent lower energy demand in 2050, compared to BAU.

Under decarbonisation strategies, Indonesia's CO₂ emissions will at first increase due to economic development before declining as a result of decarbonisation measures. A decarbonisation scenario results in much lower emission intensity in 2050 – around 50 per cent of BAU. Emissions from the industrial sector will increase from 152 megatonnes in 2010 to 241 megatonnes in 2050. Emissions from electricity generation will also increase to 184 megatonnes in 2050. Decarbonisation will occur in the transportation sector, from 111 megatonnes in 2010 to 88 megatonnes in 2050, due to a shift to public transport, electrification of transport and fuel substitution.

Indonesian decarbonisation has three pillars: energy efficiency, electrification of end-use and decarbonisation of the power sector.

Efficiency improvements will come from building design, better appliances and lifestyle changes. Efficient transportation is expected to be achieved through transport-energy-conscious urban design and development of mass transport systems. The electricity generation system will become more efficient through better power plants and improved electricity transmission and distribution systems. Efficient industrial equipment and development of less energy intensive industry will combine with structural changes in the country's economy (i.e. decreased role of industry through service sector substitution) to significantly decrease overall energy input per dollar of GDP.

Decarbonisation of the power sector will come from deployment of renewables (geothermal, hydropower, biomass and solar), natural gas and, possibly, nuclear power. Decarbonisation is projected to cut emissions intensity of power generation from 871 gCO₂/kWh to 133 gCO₂/kWh.

Replacing combustion energy systems with electrically operated devices (end-use electrification) will increase the share of electricity in energy demand and, combined with a decarbonised generation system, result in an overall decarbonised energy system. End-use electrification is projected in all sectors: fossil-fuelled heating systems (stoves/heaters/boilers) will be replaced by electric, and

electric vehicles will replace internal combustion engines. The share of electricity in final energy demand is expected to triple, from 12 per cent in 2010 to 35 per cent in 2050.

New technologies are key to this process. Some of these are still in the demonstration phase, or require important progress if their cost is to decline. There are also some proven technologies, such as solar, biofuel, and geothermal, that are currently more expensive than competitors such as diesel and coal-fired generation. Deployment of renewables requires technical development to reduce costs, combined with the right energy pricing policy.

Deep decarbonisation also requires massive infrastructure development: in public transport, gas transmission, and subsea electrical transmission. One of the main challenges is financing that infrastructure, and, most notably, redirecting investment towards low-carbon options. Given its fast growth and size, Indonesia's economy is expected to be able to absorb the investment needs of decarbonisation. The main challenge lies in the country's capacity to reorient investment decisions towards low-carbon solutions, a drastic change from past and current decisions that largely target fossil energies. Deployment of nuclear power could play a role, but faces special challenges.

Indonesia's decarbonisation scenarios are built on assumptions that the country maintains steady economic growth, provides electricity to almost all households, and reduces poverty. Decarbonisation is therefore compatible with the country's socioeconomic development objectives. The scenario used in this study will also see Indonesia significantly contribute to global efforts to prevent 2°C temperature increases in 2050.

OUTCOMES

Baldwin, K., & Dewi, R. G. Case study on decarbonising the Indonesian electricity sector in Low Carbon, Resilient and Prosperous Economies (Cambridge University Press, forthcoming).



Priorities and pathways to implementation for energy and urban sustainable development goals for Indonesia

RESEARCH TEAM

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PROJECT SUMMARY

This project aimed to bring together leaders and experts from academia, government, business and civil society to discuss Indonesia's future energy needs, identify how they can be met in line with decarbonisation and sustainability goals, and to develop plans for collaborative solutions.

The project's major activity was a two-day workshop on Priorities and Pathways for Sustainable Energy and Deep Decarbonisation in Indonesia. The workshop took place in November 2014 in Jakarta and was attended by more than 100 participants.

The workshop was jointly hosted by the Research Center for Climate Change (RCCC) at Universitas Indonesia, Monash University and the United in Diversity Forum under the auspices of the Sustainable Development Solutions Network (SDSN). It was held in partnership with the Indonesian Minister for Environment and Forestry, Siti Nurbaya. Presenters included the Indonesian Minister of Finance, the Governor of Jakarta, and many other prominent leaders from Indonesia, South-East Asia and Australia. Energy experts from Monash University, the Australian National University, the University of Melbourne, University of NSW, and the University of Technology Sydney participated in the workshop.

Participants discussed how Indonesia's rapidly growing energy needs can be met while also addressing the objectives of the UN's Sustainable Development Goals and the need to reduce global carbon emissions. Working in breakout groups on key areas for energy in Indonesia – deep decarbonisation, renewables, urban and island sustainability, transport, and energy for sustainable tourism – participants considered what a sustainable energy future for Indonesia looks like, identified major opportunities for realising it, and put forward concrete project ideas.

The priorities identified included incentives for renewables, integrated transport planning, biofuels, transport electrification in cities, energy efficient building codes, remote island electrification and renewables, and capacity building for policymakers and the public on sustainable energy. The summaries of the breakout group outcomes have been collated, and a follow-up event to discuss them was hosted by US Ambassador to Indonesia Robert Blake in February 2015. As a result of the workshop several ongoing collaborative activities have been initiated between Indonesian and Australian participants.

ClimateWorks Australia, in partnership with the UN Sustainable Development Solutions Network, the Institute of Technology Bandung, the Green Building Council of Indonesia and the Jakarta Property Institute, undertook a collaborative project to improve energy efficiency in commercial buildings across Australia and Indonesia. The project was funded by the Australian Department of Foreign Affairs and Trade. It involved a full-day workshop in Jakarta in October 2015 with Australian and Indonesian experts from government, the property sector, the energy and energy efficiency services sector and from universities. Participants discussed building codes and standards; information and incentives; skills, products and services; and finance, and worked collaboratively to identify, prioritise and start planning six tangible program ideas that can deliver real improvements in the energy performance of buildings in Indonesia. For each project, individuals self-nominated as co-ordinators, and ClimateWorks committed to supporting these co-ordinators develop project ideas and source funding. This project also involved an exchange trip for two Indonesian stakeholders from the Green Building Council of Indonesia and the Jakarta Property Institute to come to Australia and meet a broader range of stakeholders. This trip took place in November 2015.

The workshop also helped develop relationships on deep decarbonisation pathways and expand networks in the area of remote area electrification, which were subsequently taken forward by the Energy Cluster. This project brought together key stakeholders and experts to explore the implications for Indonesia of UN proposals for sustainable development goals in the key areas of energy/deep decarbonisation and sustainable cities, and to start developing plans and partnerships for how Indonesia can implement these goals.

OUTCOMES

Media

[Galang Solusi Energi Berkelanjutan dan Dekarbonisasi](#)

[Menkeu Bambang Paparkan Energi Alternatif untuk Listrik, Mulai Geothermal Sampai Air](#)

[SDSN Indonesia Upayakan Solusi Energi Berkelanjutan](#)

[Regional SDSN Summit 2014 Digelar di Indonesia](#)

[SDSN: pemerintah perlu dorong efisiensi penggunaan energi](#)

[Ini usulan penurunan emisi karbon di Indonesia](#)

[Pemerintah Mulai Fokus Pengembangan Energi Alternatif](#)

[Pemerintah Diminta Inventarisasi Lahan Sumber Energi Terbarukan](#)

[Perlu Dorong Energi Terbarukan Berkelanjutan](#)

[Skotlandia Siap Bantu Kembangkan Energi Terbarukan di RI](#)

[Kementerian LHK dan Jaringan Berkelanjutan PBB Jalin Komitmen Dekarbonisasi](#)

[SDSN Southeast Asia and SDSN – Indonesia: Event Highlight](#)

[Panas Bumi Jadi ‘Senjata’ RI Kurangi Tingkat Karbon](#)

[Usulan Penurunan Emisi Karbon Di Indonesia](#)



Overcoming legal and governance barriers to clean energy in Indonesia and Australia

RESEARCH TEAM

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PROJECT SUMMARY

This project aimed to assist policymakers and legislators by identifying, investigating and elaborating upon barriers and blockages to investment in cleaner energy in Indonesia.

Indonesia is one of the largest energy users and greenhouse gas emitters in South-East Asia. A rapid acceleration of investment in renewable electricity generation is urgently required to avoid lock-in to a carbon intensive path of development. Through comparative research, the project aimed to identify barriers to clean energy investment in Indonesia and Australia. The ultimate objective was to help policymakers and legislators incentivise clean energy in both nations.

The pace of investment in renewable electricity in Indonesia has been relatively slow compared to other Asian nations. Researchers examined laws and policies affecting renewable energy investment in Indonesia, particularly the 2017 feed-in tariff law, with a focus on utility scale projects. A case study of one of the most *prima facie* promising sectors for renewable energy in Indonesia – geothermal energy – was selected. The project aimed to document, via a mixture of desktop and field interview research, the barriers and drivers of geothermal development in Indonesia, with a specific focus on issues of law reform, institutions and improved implementation of environmental laws.

Geothermal was chosen because although Indonesia has one of the world's best geothermal energy resources, and international leaders have stressed the importance of developing the sector, progress in commissioning geothermal generation has been slow. The principal benefit of geothermal energy relative to other low-emissions sources is its ability to meet base-load demand, due to its capacity to produce electricity regardless of weather conditions.

- Despite this, Indonesia utilises less than five per cent of its estimated geothermal potential. There are various challenges to developing geothermal projects in Indonesia that reflect both the unique nature of geothermal investment and Indonesian energy law and policy. Primary obstacles include:
- A lack of available and reliable data on geothermal resources.
- An electricity tariff that is not proportionate to the risk and high costs associated with geothermal exploration and exploitation.

- Long lead times and the commitment of developers who win tenders to carry out development within the specified time period.
- The need for stable, predictable and supportive law and policy frameworks, and certainty in licensing and land-acquisition processes.

Although feed-in tariffs with defined geothermal pricing have been very successful in attracting commercial investment in some European countries, a key challenge in Indonesia has been the excessively low geothermal tariff offered by the state electricity network, PLN. The geothermal feed-in tariff is calculated as the avoided costs to PLN of power generation by default sources, mostly coal. However, the avoided cost of coal electricity generation – calculated as the financial investment required to build a coal plant – is generally insufficient to cover the costs of geothermal generation. Proving that geothermal energy is economically competitive with coal in Indonesia is difficult because many externalities associated with coal power generation are not considered in economic analyses.

This project examined the role of law and governance in achieving a rapid transition to a clean energy future in Asia within the context of two urgent challenges – first, preventing dangerous climate change by reducing emissions and second, the need to address limited, insecure and unequal access to energy in the region.

Some have described an energy ‘trilemma’ in Indonesia, with three problematic aspects: energy security, climate change mitigation and energy poverty reduction. In Indonesia, there is a pressing need to address two particular issues: limited and unequal access to energy, with more than 60 million people without a grid connection, and the distorting effects of multitrillion rupiah transport fuel and electricity subsidies. The governance aspects of these problems are crucial. The International Energy Agency’s 2008 mission identified improved governance as vital to driving renewable energy investment. This research is intended to fill a critical gap in the legal literature, with a comparative review of lessons for the making and reform of energy legislation and policy in Indonesia and Australia.

In 2015, President Joko Widodo announced an ambitious plan for new power generation, with plans for 35,000 megawatts of new capacity. If this is exclusively in fossil fuel generation, Indonesia will lock in substantial carbon emissions for the next 40 years. Geothermal energy provides potential baseload generation capacity, but the challenges of developing it include carbon and nuclear lock-in amongst existing political and organisational decision makers. An additional challenge is the very low price for clean development mechanism units, which renders them ineffective as a project incentive.

Substantial reform of the legal framework for geothermal energy occurred in 2014, and this seems to have restored some momentum to the sector, with 67MW of geothermal

developments coming online in 2014. However, feed-in tariff laws have failed to follow overseas models. In particular, there is a lack of clarity about the obligation of distribution and transmission providers to purchase geothermal electricity. PLN has shown a reluctance to sign power-purchase agreements for some renewable sectors, despite tariff laws, and this uncertainty has raised the risk profile for foreign investment.

The research enabled Australian energy researchers to form a deeper understanding of international energy dilemmas, as well as facilitating participation in the broader interdisciplinary network of researchers within the Energy Cluster of the Australia-Indonesia Centre. This project also laid the groundwork for a second extended research project on the PV sector.

OUTCOMES

Draft articles

Prest, J.; Syarif, L., Widanaya, J. Overcoming legal and governance barriers to geothermal energy law in Indonesia. Target journal Asia Pacific Journal of Environmental Law.

Renewable energy in Indonesia: A review of law and policy: context and challenges. Target journal Journal of World Energy Law and Business.

Conference presentations

(November, 2014). Comparative approach to legal and governance barriers to clean energy in Indonesia and Australia. Presentation, Institut Teknologi Bandung.

(September, 2015). Geothermal energy law in Indonesia/Hukum energi panas bumi di Indonesia. Australia-Indonesia Centre workshop, University House, ANU.

(November, 2015). Energy transformation barriers : Factors common to Indonesia & Australia. Australia-Indonesia Centre Small Grant Workshop, Presentation at Kemitraan, Jakarta.

(August, 2016). Regulatory and policy transformation for microgrid enablement, Meningkatkan hukum, regulasi dan kebijakan untuk mengaktifkan dan memfasilitasi microgrids energi terbarukan. Australia-Indonesia Centre Energy Cluster Workshop, Universitas Airlangga, Surabaya.

(November, 2016). What's blocking solar PV in Indonesia? Will the new FIT law work? Australian Photovoltaic Institute 2016 Asia-Pacific Solar Research Conference, ANU.

(April, 2017). Critical analysis of current regulatory frameworks to encourage investment in solar PV in Indonesia. Innovations Seminar Series, School of Regulation and Global Governance (Regnet), ANU.

(November, 2017) Law and policy to encourage renewable energy microgrids in Indonesia. International Tropical Renewable Energy Conference, University of Indonesia.



Evaluation of technologies for energy from biomass and waste

RESEARCH TEAM

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The University of Melbourne

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Professor

Institut Pertanian Bogor

PROJECT SUMMARY

This project aimed to assess various technologies for generating energy from biomass and waste in Indonesia.

The objectives of this project included:

- To identify the types and quantity of fossil fuels that can be substituted by biofuels.
- To characterise the available biomass and waste.
- To identify the suitable technologies.
- To identify future research avenues.

The project combined literature review, data collected from secondary sources (national and regional level institutions in Indonesia), and some primary data collection from limited survey. The long-range energy alternatives planning (LEAP) system was employed to model the Indonesian energy mix and forecast energy demand up to 2025.

The technological assessment of biomass for energy was extended to economic valuation of the resource itself. This economic valuation was considered necessary since technological assessment is tightly linked to economic value. The data was grouped into three regions, namely JAMALI (including Java, Madura, Bali), Western Region (including Sumatra, and Kalimantan), Eastern Region (including Sulawesi, Maluku, Papua). Studying the distribution and type of biomass and waste in those regions helped identify potential technologies to be applied. For instance, oil palm, its processing wastes and forest residue are the potential bioenergy feedstocks. These are more available in the Western Region, while agricultural waste and manure are more available in JAMALI. The conversion technology in those regions will also be different. Recommended technologies were listed, and outcomes were communicated in the form of two papers.

Researchers investigated the biomass and waste available, as well as social, financial and environmental considerations. This project is relevant as Indonesia is currently a net fossil fuel importer, but possesses abundant biomass and waste that could be exploited for power generation. Moreover, Australia has homegrown technologies, expertise and best practices in utilising biomass and waste as energy sources. Combining the lessons learned in Australia with Indonesian expertise, the project provided potentially valuable information to Indonesian energy policy makers, as well as refining the applicability of Australian technologies in the developing countries.

Estimates of total potential forest biomass resource as feedstocks for bioenergy in 2013 ranged from 104 to 177 petajoules, with an average of 132 petajoules. About 50.4 per cent was from harvesting residues and the remainder from wood processing residues. Riau province has the largest potential bioenergy, followed by Central Kalimantan, East Kalimantan, East Java, South Sumatra, Central Java, and Jambi, which together accounted for 87 per cent of potential bioenergy. Moreover, three major islands accounted for 95 per cent of total potential bioenergy. They are Sumatra, Kalimantan, and Java (in decreasing order). The economic value of pelletised forest biomass was estimated to be about US\$5.60 per tonne of wood residues. The economic value of forest biomass is more sensitive to changes in the price of wood pellet than to changes in the collection and hauling cost of wood residues.

The results suggest that substituting liquid biofuels for fossil fuels in various applications, including electricity generation, could contribute up to 23 per cent of liquid fuel consumption by 2025. The use of solid biofuels and waste in electricity generation could provide up to 1091 of the 6190 petajoules required to produce electricity. This is a saving of approximately 7.2 per cent in solid fossil fuels. Liquid and solid biofuels combined could contribute up to 24 per cent of the national primary energy mix.

Detrimental environmental impact could potentially occur, however, as biomass plantations would require a significant amount of land, about 22 million hectares. On the other hand, this could offer employment opportunities to about 14 million people, both in utilising waste and retrofitting current fossil fuel power plants, mechanical and chemical process machinery.

As the majority of power plants are located in the JAMALI region, while liquid and solid biofuel resources are in the Western and Eastern regions, further analysis would be required if the scenario were to be implemented. Moreover, not all areas of Indonesia are suited to growing oil palm, and population is not distributed evenly. Future work with the Indonesian LEAP model to detail locations for plantations and distributed power plants, as well as identifying regions' energy demands, should provide more precise estimates.

OUTCOMES

Articles

Simangunsong, B.C.H., Sitanggang, V.J., Manurung, E.G.T., Rahmadi, A. , Moore, G.A., Aye, L., & Tambunan, A.H. (2017). Potential forest biomass resource as feedstock for bioenergy and its economic value in Indonesia. *Forest Policy and Economics*, 81, 10-17.
<https://doi.org/10.1016/j.forpol.2017.03.022>

Rahmadi, A., Aye, L., & Moore, G. (2013). The feasibility and implications for conventional liquid fossil fuel of the Indonesian biofuel target in 2025. *Energy Policy*, 61, 12-21.
<http://doi.org/10.1016/j.enpol.2013.06.103>



Mapping the energy resources and infrastructure of Indonesia for efficient and equitable system growth, and electrification of remote/island populations

RESEARCH TEAM

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PROJECT SUMMARY

This project aimed to form a comprehensive and comparative understanding of the electricity systems in Indonesia and Australia. This understanding was intended to be a cornerstone of the Energy Cluster's work.

This project explored opportunities for and barriers to the growth and transformation of energy systems in both countries. In particular, it focused on the supply of power to remote and island populations that do not yet have access to electricity.

The project canvassed existing work on assessing energy resources and the costs of new energy generation technologies, as well as the structure and planning processes for investing in sustainable energy. This included a high-level literature review, as well as interviews with Indonesia's Ministry of Energy and Mineral Resources and other stakeholders. Researchers consulted further energy experts in Indonesia to confirm the understanding gleaned from the literature and interviews.

The conclusions of this led to the thematic focus of the Energy Cluster investment plan and the following concrete outcomes:

- A memorandum of understanding with Indonesia's energy ministry under then-Energy Minister Pak Sudirman Said and the Bali Clean Energy Centre.
- Committing resources to developing a methodology for replicating Australian work in energy resource assessment and energy technology cost assessment.
- Publication of the Indonesian Energy Technology Assessment in 2018.
- Microgrids a key part of Indonesia Terang plan (Brighten Indonesia under the Bali Clean Energy Centre). Lapsed with appointment of new energy minister in 2017.
- An Institute of Essential Services Reform (IESR), Agora Energiewende and European Climate Foundation study to determine ability of Java-Bali-Sumatra grids to integrate large amounts of renewables from 2018 to 2027.
- An APEC study on the provision of sustainable energy solutions to the Bitung Special Economic Zone and Low Carbon Model Town (LCMT) and north Sulawesi.

CONCLUSIONS

- There is limited data available for analysis of energy resources and energy technology costs in Indonesia.
- There are limited data and models available for energy system planning and decision-making for electrification of remote communities in Indonesia as well as for a sustainable expansion of the electricity grid in Indonesia.
- Working with the Indonesian government is possible, and there are promising opportunities for deep partnerships with NGOs. Funding is available from international sources, for example the successful raising of funds from APEC for the North Sulawesi Bitung low carbon model town project, and the European Climate Fund and Agora Energiewende project for modelling integration of renewables.



Infrastructure

Supporting sustainable, resilient ports and cities.





The Australia-Indonesia Centre Infrastructure Cluster investigated the **built, political, social and natural environments of Indonesia's ports and transport networks**. Its research will help ensure that the many large-scale maritime and land transport infrastructure projects in the pipeline will be resilient, efficient, and able to support the massive economic growth Indonesia is experiencing.

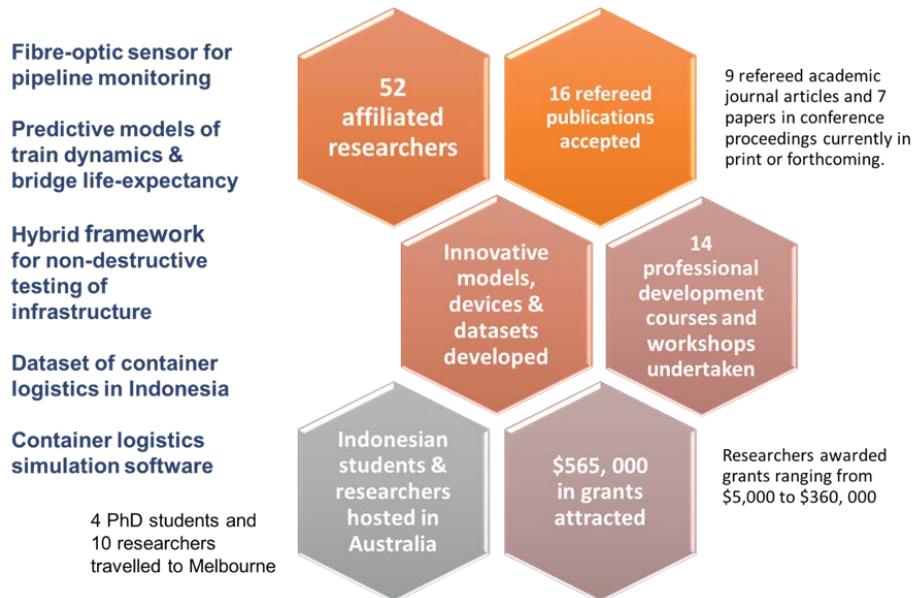
Led by a team of experts from Institut Teknologi Sepuluh Nopember, Institut Teknologi Bandung, Universitas Gadjah Mada, Monash University and the University of Melbourne, the Cluster worked with stakeholders including port and railway authorities in Australia and Indonesia, engineers, policy makers, and experts in private industry.

The Cluster's central theme was 'building sustainable and resilient port cities'. It produced research that can assist in the integrated development of port cities, in establishing resilient and efficient intermodal transport to and from ports, and in addressing social and environmental demands in areas of rapid development. It also contributed to an evidence base enabling effective infrastructure governance and policy, and generated fundamental questions for the next phase of research.

Within the central objective, the Infrastructure Cluster focused on three themes:

- 'There and back again: improving transport and connectivity' – One project saw the development of software that tracks the flow of goods around Indonesia to identify inefficiencies and suggest better routes. Another developed a model for predicting how different train carriages will respond to different track conditions, and when maintenance is necessary.
- 'Infrastructure policy and processes' – This included a comparative study of financing decisions and barriers to investment in port infrastructure projects in Australia and Indonesia. The Port competitiveness and financing workshop in Melbourne in April 2018 allowed researchers to discuss their work with the CEOs of Australia and Indonesia's largest ports, as well as government, engineers and other consultants
- 'Technological advancement to asset management' – Researchers developed, among other tools, a non-destructive testing method for evaluating degradation in concrete structures. To more easily monitor large and long structures, the Cluster also developed optic fibre sensing that reads the stresses in concrete across hundreds of kilometres in real time.

Figure 1 Infrastructure Cluster Key Achievements



PEOPLE

Infrastructure Cluster Leads



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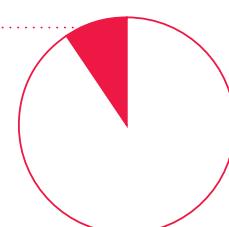
KEY STATISTICS

53

Total researchers

5
Female

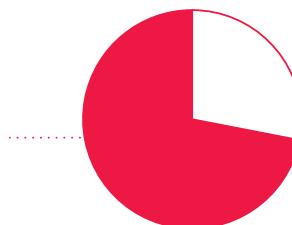
48
Male



\$2M
Total investment

38
Australia

15
Indonesia





KEY ACHIEVEMENTS

- Developing a fibre-optic sensor for pipeline monitoring, predictive models of train dynamics and bridge life expectancy, a hybrid framework for the non-destructive testing of infrastructure, a dataset of container logistics in Indonesia, and container logistics simulation software.
- Producing 16 refereed publications, with many more in the pipeline.
- Hosting a special session on infrastructure modelling at the 6th Asia Pacific Workshop on Structural Health Monitoring in Hobart, Tasmania, 7-9 December 2016.
- Delivering an end-of-research workshop in Surabaya to showcase outcomes from the research program in May 2018. This workshop was attended by representatives of the Indonesian Government, The Indonesian Railway Company, Regional Water Company, Indonesian Transport Offices from both national and regional level, Port Authorities from East Javanese ports of Teluk Lamong and Surabaya, as well as road transport and railway industry representatives.
- Supporting exchange visits of Indonesian students to Melbourne and Australian students to Indonesia, as well as providing many professional development opportunities for researchers.
- Fostering research relationships that will extend beyond the life of the AIC Infrastructure Cluster. Notable connections include the good working relationship between the Institute of Rail Technology at Monash University and the Jakarta MRT, and the collaborative research work on fibre optics between Monash University and the Institut Teknologi Sepuluh Nopember (ITS) Surabaya.
- Emphasising the central role of stakeholders and end-users. Stakeholders outside the university sector included port and railway authorities in Australia and Indonesia, engineers, policy makers, and experts in private industry. Key stakeholders were engaged throughout to facilitate and develop relationships around data sharing. Notable relationships were established with PT Teluk Lamong, PT Jasamarga Surabaya Mojokerto, Pelindo III and Jakarta MRT.



Changing the landscape of rail through advanced asset health monitoring systems – A novel method to increase the resilience of track infrastructure

RESEARCH TEAM

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PROJECT SUMMARY

Adequate maintenance of railway track infrastructure is vital to its efficient, reliable and safe operation. Fundamental to maintenance is the ability to assess the condition of infrastructure.

Difficulties in doing this are compounded by the length and accessibility of the track, especially in remote regions or busy metro environments. The dynamic response of rolling stock on any given section of track is an indication of the track's condition and the characteristics of the rolling stock. By measuring and analysing this dynamic response it is possible to extract meaningful information about track infrastructure.

METHOD

This project aimed to deliver a tool for advanced asset health monitoring of rail track infrastructure. The tool developed predicts the motion of the rolling stock during operation, with track geometry measurements and the speed of the rolling stock as inputs. These inputs are measured using instrumented revenue vehicles (IRVs) developed by the Institute of Railway Technology at Monash University. Predictive models were developed for three classes of wagons – a passenger wagon in Indonesia, a freight wagon in Australia and a faster regional passenger wagon in Australia.

The project addressed challenges arising from a lack of consensus amongst operators on the standards to be used. As an example, chord length of various track geometry measurements varies to suit the rolling stock in use. These disagreements require track geometries to be measured multiple times under various configurations, especially when a variety of rolling stock classes operate on it. This is time-consuming and impacts operational efficiency and maintenance cost. First principle mathematical models were developed to convert track geometry measurements from one chord length to another. The accuracy and reliability of the mathematical models was investigated to understand the limitation of the method.

The main focus of the project was developing a vehicle dynamics predictive model. The in-service wagon identified for modelling was instrumented in the initial stage. Track geometry parameters and operational speed were measured using the IRV, and the data analysed and processed to develop predictive models. Two distinct types of models were developed: a first principle mathematical model and a data-driven model from a self-learning algorithm (machine learning).

Some assumptions and approximations were made in developing a first principles mathematical model. These assumptions are valid for the passenger wagon, but the predictive performance of these models decreases for complex rolling stock systems, i.e. freight wagons. For more complex systems, machine learning was used to determine the relationship between the inputs and the dynamic response of the wagon, from which the predictive models were developed. Researchers used machine learning to develop two types of predictive models for assessing track health and operational risk, based on the dynamic behaviour of the wagon:

- A model that classifies every 50-metre section of track between class one and four, with class one denoting a section where measured response is highest, and class four denoting the lowest.
- A regression model that predicts the time series dynamic response of the wagon.

FINDINGS

Both models were extremely useful in quantifying operational risks from track condition. Innovative sampling strategies were used to develop a reliable predictive model from datasets without the desired level of distribution. Optimisation schemes were employed in determining the structure of the machine learning predictive tool. In addition to developing predictive models capable of evaluating dynamic performance, the tool was used to assess the risk to passengers. The predictive tool was trained to predict jerk, which is a measure of the shock sensed by passengers in various orientations. Large jerk events can lead to passengers toppling. The ability to preempt jerk allows operators to adjust operational parameters to minimise the risk of injury.

The outcomes demonstrated that measured data from IRVs can be used to derive business value and quantitatively evaluate performance and risk. Predictive modelling also facilitates migration from corrective maintenance to predictive maintenance. Project outcomes will not just improve the safety and comfort of passengers, but also promote effective maintenance.

CONCLUSION

With developed tools, maintenance strategies can be shifted from conditional to predictive. This shift could potentially maximise asset life and minimise maintenance cost, and allow for optimised operations and more informed operational decisions. The tool can also be used to evaluate the effectiveness of speed restriction to improve operational safety. Further refinement in the model from permanently instrumented revenue vehicles will improve the predictive capability of the model.

OUTCOMES

Journal articles

Nadarajah, N., Shamdani, A., Hardie, G., Chiu, W. K. & Widystuti, H. (forthcoming). Data driven predictive algorithm for railway vehicles. *Electronic Journal of Structural Engineering*.

Lingamanaik, S. N., Thompson C., Nadarajah N., Ravitharan R., Widystuti H., Chiu W. K. (2017). Using instrumented revenue vehicles to inspect track integrity and rolling stock performance in a passenger network during peak times. *Procedia Engineering*, 188, 424-431.

<https://doi.org/10.1016/j.proeng.2017.04.504>

Chong, T. L., Awad, M. N., Nadarajah, N., Chiu, W. K., Lingamanaik, S. N., Hardie, G., Ravitharan, R., Widystuti, H. (2017). Defining Rail Track Input Conditions Using an Instrumented Revenue Vehicle. *Procedia Engineering*, 188, 479-485. <https://doi.org/10.1016/j.proeng.2017.04.511>



Seismic performance of critical infrastructures in port development

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PROJECT SUMMARY

Seaports are vital to local and international transport networks and play a key role in a nation's economic activity. In most countries, sea is the most common mode of international trade. In Indonesia, about 90 per cent of internationally traded goods are distributed by sea. Infrastructure damage to seaports can cause significant economic loss.

This project aimed to assess the response of critical port structures to earthquake forces. It focused on bridges connecting berths to the mainland. Issues associated with port development, including deep soil sediments and effects of natural environment on the structural conditions were addressed. Field measurements using non-destructive testing equipment were proposed to determine the existing condition of structures. The method was used to assess two bridges in two ports (Terminal Peti Kemas and Pelabuhan Teluk Lamong) in Surabaya. The results were used as inputs to assess structural performance in an earthquake. The assessment showed that both structures were in good condition and existing maintenance and mitigation measures were effective.

The research has the potential to contribute to developing design guidelines and maintenance and mitigation strategies for ports in the region.

Poor foundation and backfill soil, common to waterfront environments, and liquefaction phenomena in loose saturated sand beneath port structures have been reported as common reasons for poor seismic performance in ports. Poor foundation soil was found to have caused damage to piles supporting the wharf structures in the Kobe earthquake and Haiti earthquake. Beside poor soil conditions, damage to port structures due to inadequate design and poor

maintenance are equally common. When subjected to earthquakes, these structures can be more at risk of collapse. Inadequate shear reinforcement, improper detailing and corrosion of transverse ties contributed to the damage of piles supporting the port structures in Andaman Islands during the 2004 Sumatra earthquake.

Indonesia is one of the world's most seismically active regions, with a tectonic boundary stretching from Sumatra to West Papua. Within the past decade, close to 20 earthquakes above magnitude 7 have occurred in the country, resulting in the seismic hazard map of Indonesia being updated to reflect an increase in seismic hazard values. However, there are currently no guidelines for seismic design of port structures in Indonesia.

In view of Indonesia's high seismic activity and the importance of seaports, there is a clear need to assess the seismic performance of port structures. This project was able to predict seismic demands based on the seismic hazard and local site conditions, assessing the structural health of port structures using non-destructive techniques and conducting seismic vulnerability assessments based on structural health. Two ports in Surabaya, Indonesia, Terminal Peti Kemas and Pelabuhan Teluk Lamong, were used as case studies. Researchers assessed bridges connecting berths with the mainland.

The results of the assessment were used as inputs for seismic assessment of the structures. Probabilistic seismic hazard assessments have been conducted to establish seismic hazard values for regions in Indonesia. The assessment found an increase in seismic hazard for Surabaya and an increase in the uniform hazard spectra. The results indicate that structures could be subjected to much higher seismic forces than they were designed for.

A database of ground motions was developed based on established seismic hazard values, consisting of a combination of recorded and generated ground motion accelerograms. The ground motions were generated taking into account the effects of soil layers. Seismic vulnerability assessments were conducted based on non-linear time history analyses using the ground motion inputs. Fragility curves were constructed for different levels of structural degradation due to corrosion. It was found that taller piles are more vulnerable than shorter piles. It was also shown that corrosion can significantly increase structures' vulnerability in an earthquake. The fragility curves indicate that the damage limit set for the bridges can be exceeded by 2500-year return period events for the most onerous case.

This research is potentially valuable in developing an innovative design guideline that will enhance the resilience of seaports to seismic hazards, as well as contributing to the development of innovative retrofitting and strengthening strategies for port structures.

OUTCOMES

Articles

Sofi, M., Lumantarna, E., Mendis, P. A., Duffield, C. & Rajabifard, A. (2017). Assessment of a pedestrian bridge dynamics using interferometric radar system IBIS-FS.

Procedia Engineering, 188, 33-40.

doi.org/10.1016/j.proeng.2017.04.454

Maizuar, M., Sofi, M., Lumantarna, E., Oktavianus, Y., Zhang, L., Duffield, C., Mendis, P., & Widayastuti, H. (2018). Dynamic behavior of indonesian bridges using interferometric radar technology, structural health assessment using non-destructive methods: Case studies of marine port and bridges in Surabaya. Special Issue: Structural Performance Assessment of Civil Infrastructure, Electronic Journal of Structural Engineering, 18(1), 23-29. <http://www.ejse.org/Archives/Fulltext/2018-1%20Sp/2018-1-3.pdf>

Oktavianus, Y., Sofi, M., Lumantarna, E., Maizuar, M., Mendis, P. A., Duffield, C., & Widayastuti, H. (2018). Structural health assessment using non-destructive methods: Case studies of marine port and bridges in surabaya, Special Issue: Structural Performance Assessment of Civil Infrastructure, Electronic Journal of Structural Engineering, 18(1), 13-22.

Sofi, M., Lumantarna, E., Mendis, P., Duffield, C., Rajabifard, A. Assessment of a pedestrian bridge dynamics using interferometric radar system IBIS-FS. 6th Asia-Pacific Workshop on Structural Health Monitoring (APWSHM). Elsevier BV. 2017, 188. Editors: Chiu W.K., Galea S., Mita A., Takeda, N. DOI: 10.1016/j.proeng.2017.04.454

Hui, F. K. P., Duffield, C., Wilson, S. (2018). Proceedings of the Port Competitiveness and Financing Research Workshop, Proceedings of the Port Competitiveness and Financing Research Workshop, 164 <http://hdl.handle.net/11343/210542>

Presentations

6th Asia-Pacific Workshop on Structural Health Monitoring, 7-9 December 2016

Competitiveness and Financing Research Workshop 4-6 April 2018

AIC Infrastructure Cluster Conference 8-9 May 2018



Efficient facilitation of major infrastructure projects

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PROJECT SUMMARY

Indonesia is the largest of the ASEAN economies, with an impressive political and economic track record over the past 10 years. The country is on target to meet the goals detailed in the Indonesian Economic Development Plan 2011–2025, and its complementary document, the Master Plan for the Acceleration and Expansion of Indonesian Economic Development (MP3EI), which sets a goal of Indonesia having a GDP of more than US\$4 trillion by 2025.

The delivery of essential and innovative economic infrastructure to achieve these aspirations is reliant on significant private sector funding. However, there is already an estimated \$41.2 billion backlog of infrastructure projects delaying growth. Available mechanisms to apply new land laws and processes to gain approval for funding and financing of projects are significantly delaying implementation.

This project sought to reduce the bottleneck in initiating infrastructure projects. It did so by examining the processes for initiating large infrastructure projects in Indonesia and comparing these with the processes followed in Australia. The project considered results from online surveys, focus group discussions and interviews conducted with key senior port, industry and government personnel related to port planning and development. This research aimed to improve infrastructure project initiation by informing policies and stakeholders about growth potential. The focus of this project was port/city interfaces in Indonesia and Australia. Ports are important gateways to trade and serve as commercial hubs for urban cities. The research team investigated ports in Surabaya, Jakarta, Palu and Melbourne and established a number of key differences, synergies and opportunities between the ports.

Infrastructure projects are usually nationally significant investments that provide much-needed social and economic benefits. Decision makers are often faced with a challenging task to prioritise and allocate scarce financial resources. In the case of investments such as port projects, specific guidance on critical issues will help with decision making to ensure that value is delivered.

METHOD

In this project, the team conducted both qualitative and quantitative research on surveys, focus group discussions and in-depth interviews to identify projects and initiatives critical to the competitiveness and survival of international ports in Australia and Indonesia. The project investigated investment decisions, port/city performance both in Indonesia and Australia, barriers to investment decisions in both countries, funding and financing decisions related to port infrastructure development, sustainability, the procurement process, and capacity building.

In this project, the team found that, apart from financing mechanisms, it is also important to prioritise projects and initiatives that are critical to the competitiveness and survival of international ports in Australia and Indonesia.

FINDINGS

There are various findings in the research. Firstly, there are never sufficient funds to meet the expectations associated with infrastructure development. Developed countries like Australia can readily raise the finance for such investments, provided the investment is underwritten by an AAA credit rated government, but balancing the level of debt with the ongoing cost of finance remains a challenge. Emerging nations such as Indonesia face additional challenges in raising finance due to sovereign risk, perceptions of governance and the depth of their in-country financial market. The options available to decision makers are important. Literature review and reflections from experts reveal that viable options for Australia and Indonesia include government-led investments, intercountry loans, public-private partnerships, integrated industrial estates (or co-located industry port-zones), special tax zones and asset recycling. These options have been adopted with some degree of success in both countries.

The project observed that the asset sale model is an effective financing mechanism for port infrastructure development in Australia, with the asset lease being the most agreeable among other asset sale options. Some initial critical factors were found and these will be of use to Indonesia. The critical issues related to Australian port infrastructure decisions were enabling and directing investments towards land side and hinterland connectivity.

The research in Australia found that the enabling effects of directing investment to land-side transport as a means of improving port operations is crucial. Transportation is a priority area where investment funds should be directed. Reduction of traffic bottlenecks in road and rail infrastructure near the ports also needs to be addressed. The importance of investment in rail and road connectivity as a way to improve port operations was identified. However, it is recognised that it is a challenge to use rail as the main mode of freight transportation to and from ports. Rail networks currently prioritise passenger trains over freight, which may lead to increased dwell times and increased costs due to the resulting disruption to the supply chain. A possible solution is the development of inland hubs co-located with industrial and warehouse areas.

Financing options available for infrastructure projects in Indonesia differ from those in Australia. The study gained insights from Indonesian seaport stakeholders on the issues, barriers, and improvement of port infrastructure financing and the most effective financing vehicle for port infrastructure projects. It found that among the various financing options, Indonesian domestic banks syndication and public-private partnership (PPP) schemes with government support are the two most awaited financing vehicles. In reality, however, our research showed that domestic banks have limited capacity and PPP schemes are still ineffective.

The Indonesian side of the study indicated that government policies for investment facilitation are supported, that document standardisation has been the most useful initiative of the government's reform package to reduce high logistics and freight costs, and that corruption, bureaucracy, and policy instability are the most prominent government support problems. Port competitiveness is also an important factor for decision makers in Indonesia, as most container traffic is going to regional hubs such as Singapore. A model of Indonesian port competitiveness has been developed. It is revealed that productivity and speed of service are perceived as port and terminal competitive strengths, while perceived weaknesses included transport, road connectivity, management efficiency, customs clearance, energy infrastructure and operational improvements.

OUTCOMES

Hui, F., Duffield, C., Wilson, S. (2018). Port Competitiveness and Financing Research Workshop Proceedings of the Port Competitiveness and Financing Workshop. Report number 180404, ISBN No 978 0 7340 54319.



Connectivity – from sea to rail, sea to road, road to rail

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PROJECT SUMMARY

For a nation of 17,000 islands, ports are essential to the delivery of goods to more than 260 million people in Indonesia. Understanding the port-road-rail interface is central for port authorities in Indonesia, Australia and worldwide. This project aimed to predict the capacity of this infrastructure under different configurations to facilitate the development of a tool that can be used by infrastructure planners.

This project set out to create a better understanding of container logistics infrastructure requirements in Indonesia, particularly the port-rail interface. It was determined early in the research project that land-side transport was the bottleneck and needed far more attention than the details of the logistics inside the port.

Port-road-rail connectivity is crucial for logistics efficiency. Traffic congestion, especially in port access, is one of the main bottlenecks in container distribution in Indonesia. The lack of rail connectivity and low usage of rail transportation is one potential factor that could be improved to address these problems.

METHOD

The study employed multi-level planning approaches to consider connectivity issues. The planning level models can be categorised into strategic planning and tactical planning. Strategic planning considers factors such as the location of terminals, additional connectivity requirements, and long-term infrastructure planning. In the tactical model, high-level congestion modelling is considered. The model takes into account the mode split availability, flow, capacities, and infrastructure utilisation for given transportation networks.

The study created and published a significant dataset to allow more comprehensive studies of bottlenecks and congestion of container movement. Several new mathematical models were developed to optimise the configuration of the network and determine optimal container flows for a given network design. The final output from the project includes software to allow Indonesian partners to investigate alternative scenarios using one of the optimisation models.

The project employed a novel method, developing mathematical optimisation models that take into account current conditions and future development plans for port-road-rail interface in Indonesia. Optimisation models were produced using commercial optimisation solvers. Heuristic approximation approaches were developed to give a feasible solution in a reasonable computing time. Additionally, numerical simulation was utilised to include uncertainty factors that are difficult to address in the static model.

FINDINGS

The research shows that by investing in the establishment of inland container hubs, the total congestion cost and fixed cost is reduced. Introduction of discounted pricing on rail transport was shown to influence network flow and throughput, and can lead to congestion reduction on roads around seaports. Through these capital investment instruments, more containers are transferred to seaports via rail. This causes shorter queues at ports for ships and better utilisation of port facilities.

However, not all seaports automatically see reduced congestion due to increased rail facilities, as rail stations can attract additional truck traffic to transfer containers to rail. A better pricing policy results in more efficient usage of port facilities, as well as reduced road congestion. The tactical model, which uses a given optimised network from the strategic model, supports the finding that multimodal connectivity can help to reduce road load and system costs.

The study found that it is important to consider factors such as location of container terminals, rail and road infrastructure, and future demand. The application can be used by infrastructure planners at various stages of planning and developing transportation networks in Indonesia. The model and solution provide the ability to experiment and find an optimal configuration for container distribution planning.

Several new mathematical models were developed to optimise network configuration and determine optimal container flows for a given network design. The first was the strategic model, a form of optimisation model

to address the question of where container hubs should be located to take full advantage of intermodal container transportation. This model was applied to the existing rail/road transportation network in Indonesia to consider several potential intermodal terminals. The second model was the tactical model. This is an optimisation model for route selection to alleviate congestion around container terminals. This model investigated alternative scenarios of infrastructure development.

In addition to developing the models above, the study has created and published a significant dataset representing the Indonesian container distribution network, allowing the study of bottlenecks and congestion in container movements. Indonesia has unique geographical conditions, covering a total area of 1,913,579 square kilometres and consisting of approximately 17,500 islands in 34 provinces. Hence, the Indonesian container distribution network is connected through a sparse network of road, rail and sea links. Existing datasets do not take into account the sparse network and conditions of intermodal requirements in Indonesia. The Indonesia Container Dataset (ICD) contains an origin-destination flow demand matrix, operational and fixed costs, a set of potential hub locations, and sets of links with three transfer modes in the network. The ICD enables researchers and practitioners to experiment with different network and demand configurations.

OUTCOMES

Articles

Mokhtar H., Perwira Redi A.A.N., Krishnamoorthy M., & Ernst A. T. (2018). An intermodal hub location problem for container distribution in Indonesia, *Computers and Operations Research*, 104, 415-432.

<https://doi.org/10.1016/j.cor.2018.08.012>

Perwira Redi A.A.N., Krishnamoorthy M., & Ernst A.T. Lagrangian Particle Swarm Optimisation for the Concave-Cost Network Flow Problem

Tools

Public Indonesian Logistics Data: Assembled from publicly available information on container logistics, the dataset includes infrastructure, cost information, travel times and estimated demand. Researchers and policy analysts can use this data to compare logistics and port access options, and develop new modelling. <https://orlib.uqcloud.net/>

Optimisation-based Logistics Simulation Software: Allows sophisticated simulation of container logistics infrastructure use, subject to intelligent (optimised) allocation of freight demand and non-linear costs.



Development of fibre-optic-based sensors for critical road, railway, port and bridge infrastructure

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PROJECT SUMMARY

Roads, ports, bridges and pipelines are critical infrastructure that underpin the economies of Australia and Indonesia. Ageing and degradation can affect the integrity and performance of infrastructure, as can increased use and climate change.

Threats to infrastructure include frequent and more intense floods, increased heavy road traffic, ground liquefaction during earthquakes, increased corrosion due to moisture fluctuation and water pressure surges in pipelines. Failure of these assets can lead to lost revenue due to downtime and, in some cases, greater financial loss for repair and remediation.

Both practical experience and literature indicate that integrated structural health monitoring can significantly improve asset management and safety. Such monitoring often requires considerable planning, especially in deploying sensors, setting up alarm systems, post-processing of signals and data, and cost-efficient analysis. There are many structural health monitoring techniques available commercially, but there is no perfect solution for monitoring large and long civil structures. This is because most sensors are best suited to localised monitoring, where the weak point or monitoring region is known. With infrastructure like pipes, railways and bridges, identifying weak points is a challenge. There is therefore a need to develop advanced sensing technology to perform real-time, continuous, distributed and permanent integrity monitoring for ageing infrastructure.

Over the years, distributed fibre-optic sensors have gained attention. Their potential to be used in structural health monitoring has been successfully demonstrated, especially in structures such as rail tracks, pavements, tunnels, harbours, slopes, bridges and pipelines. The biggest advantage of distributed sensing over conventional sensing is the ability to monitor thousands of points over a single fibre spanning kilometres. Building on existing strengths, this project focused on developing novel fibre-optic sensors for application in monitoring critical infrastructure, and on studying the practicality of these applications.

This project was broken up into three major tasks:

- The development of a sensor to measure water pressure in changing conditions.
- The development of sensors to be used under roads.
- A review of the use of these fibre-optic sensors in monitoring a range of infrastructure types.

From existing literature, almost all fibre-optic sensor deployment methods have required the fibre to be attached to or embedded in the structure. This restricts the application of fibre-optic sensors to new and smart pipelines. A challenge remains for the use of fibre sensors for the assessment of existing, buried and old pipelines. In the first task, an optical fibre sensor package was designed with the intention of providing ‘contactless’ deployment to continuously monitor water pressure and detect leaks via anomalous vibration. A prototype package with multiple optical fibre sensors was constructed at Monash University and tested in the civil engineering laboratory. In this study, the quantification of leak size with both detection methods deployed in the optical fibre sensors package was possible. The test also showed possibility of correlating the acquired information to minimise a false positive alarm.

The sensor package was also successfully duplicated and arranged in series, forming a quasi-distributed sensor. The results showed that the proposed sensor deployment method significantly improved the sensitivity and spatial resolution of the monitoring to detect even small anomalies. Development of the quasi-distributed optical fibre-based pressure sensors and signal processing is ongoing, with the aim of improving accuracy and sensitivity.

A review was conducted on the use of optical fibre sensors to monitor pavements. Pavements are fundamental transport infrastructure that sustain vehicular and human traffic. The review found that to place fibre sensors under roads, regardless of the monitoring technique, a number of factors must be considered in the planning stage. These include fibre protection, location of the fibre, orientation of and quantity of the fibre, deployment method, and operating conditions. The ability of optical fibre sensors to detect and pinpoint the location of cracks in pavement has been successfully demonstrated. A novel application of fibre-optic sensors to the evaluation of the flexural behaviour of pavement material was developed.

FINDINGS

This project has developed a novel application of fibre-optic sensors with the potential to be practical for monitoring leaky, buried pipelines. The results obtained from the prototype constructed at Monash University show the capacity of the sensors to detect leaks and assess the condition of the pipeline.

Nevertheless, the prototype will need to be fine-tuned. Once signal processing of the data is developed, it could assist asset managers to better manage buried pipelines, and even help predict the remaining lifespan of the pipe.

This project found an innovative application of fibre-optic sensors for designing pavement. It showed that the sensors are capable of measuring the flexural properties (initially difficult to obtain) of pavement material. Knowing the flexural properties of the pavement material may lead to a paradigm shift in design. The results have been presented to pavement utilities in Australia, and some are willing to be involved in developing this concept.

OUTCOMES

Articles

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Life-cycle structural performance assessment framework for concrete bridges

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PROJECT SUMMARY

The aim of the project was to develop a framework for assessing the structural performance life-cycle of concrete bridges, based on environmental and loading conditions.

Bridges have a vital financial, environmental and social role. The service life of bridges depends on various factors, including concrete mix design, quality control during construction, and environmental and loading conditions. In extreme conditions, bridges may deteriorate more rapidly. This could lead to serious consequences, including for freight distribution that depends on ground transport. This project aimed to fill the information gap on the effects of traffic load on progressive deterioration of concrete bridges, and to develop innovative bridge inspection techniques for the detection of structural degradation. The findings of this study are targeted to ensure the longevity and safety of bridges and assist in the optimisation of their management.

Assessing the condition of a bridge involves continuously monitoring changes to material properties, support conditions and system connectivity. It is known that the structural integrity of bridges can be monitored by measuring their vibration responses. However, the relationship between frequency changes and structural damage is still not fully understood. This study presents a bridge condition assessment framework that integrates computational modelling and noncontact radar sensor techniques (IBIS-S) to predict changes in the natural frequencies of a bridge girder as a result of a range of parameters that govern its structural performance.

FINDINGS

The research found several key factors affected the natural frequencies of a girder. In addition, an integrated bridge health monitoring framework was developed using advanced modelling in conjunction with weight-in-motion technology and interferometric radar sensors.

This project led to the development of a fully integrated reliability model in conjunction with advanced non-destructive testing (NDT) techniques for ageing bridges that require significant maintenance and rehabilitation. The outcomes from this project will provide significant benefits to both the economy and society by ensuring the longevity and safety of ageing bridges.

This project aimed to develop a validated life-cycle performance model for bridges consisting of a traffic load prediction model, a damage prediction model and a reliability-based assessment model. First, information on the parameters governing current bridge structural conditions (e.g. crack width) was obtained by on-site inspection using advanced NDT techniques developed in this project, while the loading on the bridge was characterised by traffic load prediction model in conjunction with IBIS-S and WIM data analysis.

Using the information on bridge characteristics and traffic loading obtained in step one as input data, we quantified damage accumulation in bridge structures through a damage prediction model. This was calibrated and validated using field test data. The changed structural capacity of the bridge over time was predicted using the damage prediction model, and this was also validated by the field test results over the three years of the project. Finally, the probability of structural failure at a given time was estimated using the reliability-based assessment models.

CONCLUSIONS

Currently, road authorities face numerous challenges in maintaining bridges. These include the inability to predict the effect of increased heavy truck loads on damage accumulation in bridge components (e.g. creep, cracking and corrosion), and the difficulty of knowing when to intervene. In practice, decisions about bridge structures are based on uncertain and incomplete information. Uncertainties arise due to the variability in environmental factors, methods of inspection and data collection, lifetime traffic load prediction and so on.

For these reasons, the improving accuracy of deterministic models and computational tools does not solve the problem of identifying the uncertainties of the model parameters. In this project, a theoretical model has been developed to predict the residual service life of bridges, with consideration of progressive deterioration resulting from daily traffic loading and extreme events such as earthquakes and truck impacts.

OUTCOMES

Articles

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Asset life improvement of rail infrastructure

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PROJECT SUMMARY

This project aimed to conduct preliminary activities identifying critical issues in Indonesia's rail infrastructure, in preparation for a larger project addressing the asset life extension, safety and efficiency of rail transport in Indonesia.

The project had several objectives:

- Identifying critical infrastructure issues that must be addressed to operate rolling stock safely and efficiently.
- Outlining and prioritising research projects to address identified issues.
- Driving collaboration between Indonesian and Australian partners to jointly develop research addressing common critical issues in the passenger rail network.
- Formulating a framework for AIC Infrastructure Cluster activity within rail transportation.

The project team from the Institute of Railway Technology held discussions with researchers from the Institut Teknologi Sepuluh Nopember Surabaya and representatives of the East Java Province Department of Transportation, the Indonesian rail operator Kereta Api and the planning and development team at the recently commissioned port, Teluk Lamong. The discussions allowed an overview of infrastructure plans in Surabaya and the challenges faced.

The project outlined the state of the Indonesian economy, and the role of East Java Province within it. Researchers highlighted the flow-on economic effects of transport efficiency. As Surabaya is the economic centre of the East Java Province, the effectiveness of its transport infrastructure is crucial to economic growth. Central to this discussion was the new port at Teluk Lamong.

The issue

The city of Surabaya is serviced by a number of ports, the largest and most congested of which is Tanjung Perak. This port is operating far above its designed capacity, as is the infrastructure linking it to the road and rail network of East Java. The result is that getting freight through this port is a slow and expensive exercise. This bottleneck is having a significant negative impact on economic growth.

To relieve this situation, a large new container port is being constructed at Teluk Lamong. This port is being built in five phases over 15 years. Phase one has been completed, allowing it to handle a small volume of domestic and international freight. Future development will see the port grow in capacity and be connected by dedicated road, rail and monorail links. The main rail link to the port will be via the currently inactive Indro Line.

Presently the only method for moving freight on the land side is via a congested, undivided road that passes through heavily populated areas. This road presents a significant obstacle to the port operating at maximum efficiency. The project outlined strategies for better connecting Teluk Lamong.

The options

The first strategy proposed is a combination of road, rail and dedicated monorail. This approach has several advantages, namely decentralising the distribution of freight, and avoiding the high cost of purchasing or reclaiming land close to the port. When the system reaches maturity it is expected to be faster and cheaper than road transport direct from the port.

The next phase of port development includes building an elevated roadway connecting the port directly to an existing tollway to the west. This project faces several challenges, mainly related to cost and land acquisition, and the existing tollway is already near full capacity. It is expected that congestion will mean this method is not viable as the main method of connection in the long term. The road would be tolled in such a way as to promote the use of rail over road transport. The design of the roadway is dependent on the capacity of the rail infrastructure, as the tonnage that cannot go by rail must go by road. Therefore, the capacity of the rail infrastructure must be determined before finalising the design of the roadway.

The second strategy is to consider an Automated Container Transport (ACT) system based on a passenger monorail, with cars redesigned to accommodate shipping containers. The monorail would run along the coast to existing freight depots near Tanjung Perak. Five stations along the route would allow containers to be transferred to road. This is an attractive option due to the relatively low cost, smaller land footprint and reduced land acquisition. However, the system would be limited, as monorails are not suited to bulk freight transport. It would also feed freight into already congested and over-capacity depots.

The inactive Indro line is planned to be the primary rail connection to the port. Two options for this are being considered. The first would be a direct link from the port to the Indro line. This is the most expensive option, as it would require building a bridge and reclaiming land. The second option includes building a dedicated roadway to an inland 'dry port' close to Teluk Lamong. Trucks would move containers from the terminal to the dry port, where they would be processed and delivered by rail to satellite distribution centres. This shows promise as it reduces the cost to the customer with only a moderate increase in waiting time. However, it would involve double-handling containers.

CONCLUSIONS

Passenger and freight railway services are becoming major transportation modes to overcome road congestion in Indonesia. Implementing state-of-the-art practices in rail planning, design and maintenance will be vital. The port at Teluk Lamong is central to the economic growth of the region, but connections to the port are yet to be established. The capacity of rail infrastructure will be key, but a brief inspection of wheel and rail profiles has revealed potential issues with maintenance, as well as mixed rail grades across the network. This will have an impact on overall network capacity.

Central to all strategies is establishing the maximum allowable tonnage on the rail network. This is dependent on rail infrastructure, rolling stock, and maintenance and monitoring regimens. The network's capacity is central to the design of both road and monorail systems and critical to Teluk Lamong's ability to reduce the import-export bottleneck in Surabaya.



Australia-Indonesia joint workshop on smart cities

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PROJECT SUMMARY

This workshop brought experts from Australia and Indonesia together in the research areas of the Internet of Things, Big Data analytics and smart cities.

The goal was to establish a smart cities research network addressing the challenges of rapid urbanisation. The workshop facilitated initiatives addressing smart city problems to develop intelligent, economically viable solutions of value to the environment, homeland security, infrastructure and health sciences. The workshop enabled researchers to identify common themes and opportunities for collaboration. The workshop was conducted in February 2015 in Bandung, Indonesia.

By 2050, 70 per cent of the world's population – more than 6 billion people – is expected to live in cities and surrounding regions. Cities will need to be smart, if only to survive as places that enable economic, social, and environmental wellbeing. Australia is highly urbanised, with more than 89 per cent of people living in urban centres. Four of the world's top 10 cities are in Australia and Melbourne has been consistently rated as the most liveable in the world. In line with global trends, Indonesia is facing a very high rate of urbanisation. Its cities are growing by more than 4 per cent each year. To deal with this unprecedented scenario, cities need to be smart. The smartness of a city is technologically enabled by the emerging Internet of Things, which can be seamlessly integrated into urban infrastructure (transport, health, environment, etc.) and form a digital skin over the city.

The aim of the workshop was to foster research in this niche area at the crossroads of sensors (Internet of Things), communication (high-speed broadband), and interpretation (big-data analytics). Connecting sensing and actuating devices in the Internet of Things (IoT) allows the sharing of information across platforms through a unified framework, developing a common operating picture for city management. The interpretation of events and visualisation of information will ensure sustainability and higher quality of life in the urban environment. It will enable researchers in similar areas to work more cohesively to establish a long-term collaborative mechanism. It will lead to exciting projects that will deliver new knowledge in scalable network data handling. It will strategically position Australian and Indonesian researchers at the forefront of the international drive towards smart cities, and consolidate their preeminence in innovative research.

The core goal was to establish an Australia-Indonesia Research Network on Smart Cities. Building on the experience of the Australian Research Council's successful Research Network on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP, with more than 200 researchers worldwide), the proposed network seeks to create collaboration between the two countries. Specifically, this network will develop projects providing new solutions for monitoring, analysis and interpretation of smart city data. In doing so, the network will form the base for collaboration between The University of Melbourne and its partners.

The program addressed technological integration by building new paradigms of the data-information-knowledge-action axis, dictated by efficient transformation of collected data to information and knowledge via novel sensing technologies and interpretation abilities.

The workshop identified major issues in cities in Indonesia, including transport, healthcare and governance. Transport is one of the major problems facing the people of Indonesia. Narrow roads and increased traffic are bringing transport

to a near halt. An associated problem is frequent natural disasters thwarting both transport development and economic growth. Healthcare is another issue that needs attention. This encompasses the need for health and hygiene education to address the skills and knowledge divide among city populations. Governance is a third important factor, covering the inability of government budgets to fund the necessary research and development projects. Similar issues were also apparent in Australian cities, including public transport, the increasing cost of energy, and issues of integrating frameworks to ensure sustainability, liveability and productivity.

Smart cities have been pitched as a means of tackling urban issues in developing and developed countries. Four key challenges were identified in building smart cities:

- Insufficient data due to improper planning or system failure.
- Sparse data due to problems with the system, sensors, or communication
- Erroneous data due to systemic error or problems with sensors
- Lack of computational power.

Providing real-time analytics is a big challenge. Smart cities bring several complicated systems together, requiring analytics algorithms to be highly intelligent and adaptive to unknown and large amounts of data.

The workshop successfully facilitated discussions between experts from Indonesia and Australia. Common research themes and interests were identified, and common problems and possible solutions were discussed. Interactions among city councils from both nations were also identified as a critical step. There has been ongoing discussion among researchers from the University of Melbourne and the Institut Teknologi Bandung.



Improving rail infrastructure – rail transportation (interfacing to a port intermodal terminal)

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PROJECT SUMMARY

This project aimed to improve the safety and efficiency of rail infrastructure in both Australia and Indonesia. Computer models to predict how railcars would respond to different track conditions were developed, allowing quicker identification of problems and improved maintenance schedules.

The project was conducted with the support of the Government of East Java, the Institute of Railway Technology at Monash University, PT Kereta Api Indonesia (the national rail company), Java Integrated Industrial and Port Estate, the Lamong Bay Terminal container port, the Australian Rail Track Corporation, Public Transport Victoria and Monash University.

Railway networks offer significant advantages for transporting both passengers and freight as they occupy two to three times less land per passenger than other modes of road transport. Determining the structural health of track and rail vehicles is crucial to support this growth and ensure the safe and reliable operation of railways. Detrimental track conditions include heavy wear, corrugation, defective welds, formation failures and mud holes.

For railway operators, it is standard practice to periodically measure track conditions. However, the influence of track conditions on a vehicle isn't fully understood, meaning thresholds for maintenance are neither comprehensive nor optimised. When different types of vehicles use the tracks, for example passenger and freight wagons, the risks associated with passive threshold-based maintenance increase. The increased demand on railways, particularly in a growing country like Indonesia, has exposed the crippling limitations of existing assessment methods, and a number of derailments have resulted from a combination of detrimental track features.

The project discussed the use of instrumented revenue vehicles (IRV) to evaluate track conditions and assess the performance of rolling stock during peak operating hours in an Indonesian passenger network between Lamongan and Surabaya. Assessment of track condition and vehicle response is crucial in setting safe operating speeds, developing economical, proactive maintenance plans and maximising throughput.

Track conditions and vehicle responses were measured over multiple journeys using various sensors strategically mounted on the in-service vehicle. The data were analysed and used to develop visual hotspot maps of the track to determine regions of high dynamic response. A web-based reporting system was used to provide plots and figures to communicate the results. Results presented demonstrate the ability of the IRV system to assess the health of track, identify regions of degradation and quantify the severity of the dynamic response. The project created a successful model for passenger carriages, validated against the performance of trains in Indonesia. The project also worked on models for freight trains.

It is important to acknowledge the challenges in determining track degradation due to the complex nature of dynamic loading and variations in network utilisation. The traditional solution in the industry has been to use dedicated Track Geometry Cars (TGC). These dedicated monitoring vehicles are equipped with laser measurement systems, accelerometers, gyroscopes and other sophisticated sensors that allow them to identify and quantify a range of track issues such as alignment, curvature, rail profiles and twist. However, a key drawback in a dedicated TGC is that they are often very expensive, and they provide no direct indication of the dynamic behavior of the typical revenue vehicles. An alternative to the dedicated cars is the use of wayside monitoring devices. However, these devices only evaluate the integrity of the rolling stock performance and track quality over a localised region of a track, making them an unfavourable choice to monitor significant sections of a network.

An alternative is the use of IRVs. This technology has helped substantially reduce operational costs and increase network safety. IRVs are a fully automated measurement platform that can be embedded on any standard in-service vehicle. They reduce the need for track down time and have the key advantage of allowing the response of in-service rolling stock to be measured under typical operational loads, thus providing information about track condition. It has been recognised that a vehicle's response to a given track feature is often dependent on the dynamic characteristics of the individual wagon; armed with this information, plans can then be devised using the deterioration rates inferred from the dynamic rolling stock responses.

The project highlighted the capability of retrofitted vehicles to automatically monitor the track condition and vehicle responses without impacting on network operations. Mathematical modelling reinforced the capability of the IRV system to both measure and predict track deterioration rates. The use of data visualisation tools such as heat maps to summarise the condition of the entire track can help maintenance planners and railway operators better prioritise scheduled track maintenance.

OUTCOMES

Article

Lingamanaik, S. N., Thompson C., Nadarajah N., Ravitharan R., Widayastuti H., & Chiu W. K. (2017). Using instrumented revenue vehicles to inspect track integrity and rolling stock performance in a passenger network during peak times. Procedia Engineering, 188, 424-431.
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Chong, T. L., Awad, M., Nadarajah N., Chiu W. K., Lingamanaik, S. N., Hardie, G., Ravitharan, R., & Widayastuti, H. (2017). Defining rail track input conditions using an instrumented revenue vehicle. Procedia Engineering, 188, 479-485. <https://doi.org/10.1016/j.proeng.2017.04.511>

OTHER OUTCOMES

Videos

[How Can We More Efficiently Connect Ports, Rail and Roads?](#)

[What Is the Best Way to Monitor and Assess Ports and Bridges?](#)

[How Can Fibre Optic Sensors Provide Monitoring of Crucial Infrastructure?](#)

Articles

Al Dagħlas, H., Hui, F. K. P., Duffield C. (Forthcoming). The importance of environmental sustainability to obtain finance for port developments in Australia and Indonesia. Australasian Universities Building Education Association (AUBEA) conference proceedings, Singapore, 2018.

Hui, F. K. P., Duffield, C., Wahyuni, S., Parikesit, D., Wilson, S. (Forthcoming). Collaborative international industry-university research training in infrastructure projects: an Australian-Indonesian case study. Australasian Universities Building Education Association (AUBEA) conference proceedings, Singapore, 2018.



Effective structuring and packaging of funding and financing arrangements for the delivery of infrastructure

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PROJECT SUMMARY

The project aimed to identify, diagnose and prioritise future research required to overcome the gaps in current policies, legislation, procedures and processes used for infrastructure delivery in the newly declared special economic zone (SEZ) in the City of Palu, Central Sulawesi, when using public private partnership (PPP) models.

Specifically, the efficient structuring and packaging of infrastructure projects necessary to support the outcomes desired for the SEZ is to be evaluated. Foreshadowed infrastructure includes: a water system; a deep harbour port; transport; power generation; improved telecommunications; industrial hubs; and societal facilities including hospitals, schools and social urban infrastructure.

A mixed methodology was adopted to combine theory building through the use of action research on real-time procurement of a pilot water-supply project in Palu. A synthesis of the existing rich literature held by the chief investigators in economic development/SEZ theory and the use of PPP methods is to be undertaken. This is followed by key stakeholder interviews, the conduct of focus groups to synthesise and develop theory and the process for the application of PPPs in Indonesian SEZs. Through the use of a Delphi-style appraisal, using a panel of international experts, the developed theory is tested and refined prior to identifying weakness and opportunities for further enhancement prior to being recommended for adoption.

The research team was unable to pursue the research further to produce outputs or committed outcomes.

OTHER OUTPUTS

Cluster Videos

[How Can We More Efficiently Connect Ports, Rail and Roads?](#)

[What Is the Best Way to Monitor and Assess Ports and Bridges?](#)

[How Can Fibre Optic Sensors Provide Monitoring of Crucial Infrastructure?](#)

Cluster Publications

Al Daghlas, H.; Hui, F. K. P.; Duffield C. (forthcoming)

The importance of environmental sustainability to obtain finance for port developments in Australia and Indonesia. Australasian Universities Building Education Association (AUBEA) conference proceedings, Singapore, September 26-28, 2018.

Hui, F. K. P.; Duffield, C. F.; Wahyuni, S.; Parikesit, D.; Wilson, S. (forthcoming) Collaborative international industry-university research training in infrastructure projects: an Australian-Indonesian case study. Australasian Universities Building Education Association (AUBEA) conference proceedings, Singapore, September 26-28, 2018.

Hui, F. K. P.; Yokota, A.; Aye, L. (forthcoming) Education and Training for Zero Energy and Lean manufacturing & Construction of Housing in Australia. Australasian Universities Building Education Association (AUBEA) conference proceedings, Singapore, September 26-28, 2018.

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Sounthararajah, A.; Wong, L.; Nguyen, N.; Bui, H. H.; Kodikara, J. (2017). Evaluation of flexural behaviour of cemented pavement material beams using distributed fibre optic sensors. *Construction and Building Materials* 156: 965-975.

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<https://doi.org/10.1016/j.proeng.2017.04.504>



Urban water

Developing advanced pathways towards water-sensitive cities.





Water management is one of the great challenges of the future. Providing secure supplies to highly concentrated urban populations, managing pollution and wastewater and controlling floods in a changing climate will test planners and policymakers around the world.

Developing nations face even greater obstacles, but also have unique opportunities.

In particular, countries such as Indonesia have the chance to learn from the mistakes of the cities of the developed world and 'leapfrog' past them into environmentally and socially sustainable systems.

The Urban Water Cluster research program aimed to achieve a detailed understanding of the water systems of Bogor City and Bogor Regency, and to explore their potential to leapfrog to a water-sensitive future through socio-political and biophysical pathways. It did this through a process of benchmarking and diagnosing the water challenges and opportunities of Greater Bogor against other developed cities.

At the neighbourhood level, the research program looked at four sites in Greater Bogor – Pulo Geulis, Griya Katulampa, Cibinong Situ Front City and Sentul City. These sites reflected a range of spatial, social and economic conditions within the broader city and provided a comprehensive assessment of the different ways in which a city can develop and transform over time.

It is hoped that the insights gained and partnerships built will make a lasting difference, and help Indonesia make the leap to a water-sensitive future.

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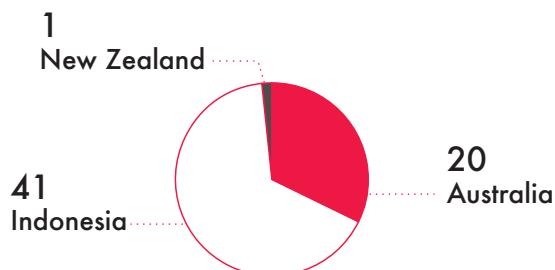
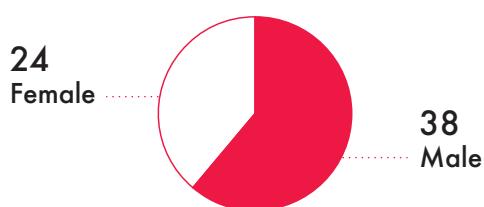
KEY STATISTICS

62

Total researchers

\$2M

Total investment





KEY ACHIEVEMENTS

- Through three co-design workshops in Melbourne and three in Bogor, the cluster research partnership between Monash, Universitas Indonesia and Institut Pertanian Bogor evolved and strengthened over the two-year research program.
- Over 30 higher degree students across Institut Pertanian Bogor and Universitas Indonesia conducted research related to the Urban Water Cluster, under the supervision of cluster academics, and some of these students have also supported cluster data collection and translation activities.
- The Urban Water Cluster launched the Learning Alliance in November 2017 with the signing of the declaration of water-sensitive cities by the Mayor of Bogor, Head of Bappeda, cluster leaders and 82 ‘water champions’. The Learning Alliance was established early on in the research program, to connect thought leaders, decision-makers, designers, planners, academics and residents.
- The cluster designed and conducted four ‘community visioning’ workshops with the residents of Pulo Geulis and Griya Katulampa. These workshops explored the aspirations of the residents for their communities and how water could play a role in achieving this vision. For Pulo Geulis, the cluster developed this vision into a number of water-sensitive urban design plans, incorporating nature-based infrastructure and roadmaps for implementation.
- The cluster worked closely with government agencies in Greater Bogor to understand the barriers and enablers to transitioning to a water-sensitive future through water governance, water policy and regulations, urban planning and water-resource management practices.
- Kabupaten Bogor government delegates and water resources management authorities from Bogor Regency (Indonesia) visited Monash University to attend a two-day Governance & Strategy Workshop series with the Urban Water Cluster research team.
- The UWC was invited to a sharing session with PDAM Bogor Regency and its customers. This included a visit to Ciburial Spring Installation Plant and co-presentation of key insights by cluster leaders. The delegation explored the scale and methodology of the research, insights for diversifying water resources, and how the Water Sensitive City (WSC) concept fitted into the SDG framework.
- The Masters in Sustainability Industry project provided students the opportunity to work with an award-winning social enterprise in Indonesia, Ecofunology, to design a new educational game aimed at players building their knowledge on the future scenarios of climate change, urbanisation and society change, and how choices around water can impact the liveability and resilience of their cities and communities.
- Dr Dwinanti R Marthanty, the Urban Water Cluster Leader at Universitas Indonesia, was awarded the prestigious APEC Women in Research Fellowship in July 2018.
- The final Urban Water research report was launched on 4 December at the Urban Water Showcase and Exhibition at IPB International Convention Centre, attended by 120 stakeholders across government, industry, media and community.
- The Governor of West Java expressed a strong desire to include advice from the cluster into the new urban design guidelines being developed.



Water-sensitive city transition strategy for Bogor Raya

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PROJECT SUMMARY

Greater Bogor, like most other Indonesian cities, is experiencing rapid growth accompanied by pressure on essential services.

In recent years, Bogor has demonstrated environmental commitment by pursuing green agendas, and now has embraced a vision of a transition towards holistic and sustainable approaches to urban water management.

The research project applied a Water Sensitive City (WSC) framework to Bogor to substantiate and facilitate its sustainable water aspirations. The WSC approach embraces cross-cutting and holistic solutions that deliver multiple benefits. This is expected to provide a strong foundation for tackling the multidimensional challenges required of Indonesia's commitment to the Sustainable Development Goals (SDGs).

A WSC approach is defined by enabling change in key spheres of operation, such as system design and planning, professional practice and technological solutions, and community behaviour. Transformation requires a combination of technical innovation and social and institutional restructuring to overcome entrenched unsustainability. Indonesia's transition to a water sensitive city may need to make greater advances in productivity, resilience and liveability than industrialised economies, but it may also have the opportunity to leapfrog some unsustainable patterns of production associated with economies that industrialised earlier.

Leapfrogging is a phenomenon in which developing countries – whose technological systems are not yet as fully established as developed economies – can adopt advanced technological systems to address current environmental issues. This report assessed Bogor's capacity for a WSC transition and recommended enabling strategies using the lens of leapfrogging. By doing so, it was hoped that Bogor and other Indonesian cities may avoid features of water-servicing models seen in developed economies that represent unsustainable 'dead ends' and adopt more holistic and sustainable water technologies and management approaches that are based on WSC principles.

METHOD

This research took advantage of new socio-technical tools and methods to assess Indonesian WSC leapfrogging potential through in-depth case study research in Bogor, developed insights and practical recommendations for Bogor's leapfrogging journey, and derived general insights and recommendations for WSC leapfrogging in other Indonesian cities.

Specific objectives of the research included:

- Applying a benchmarking framework for assessing the water sensitivity (in particular the liveability, sustainability and resilience) of Bogor and identifying management actions that take advantage of leapfrogging opportunities.
- Identifying social and institutional structures and processes that create enabling conditions for Bogor to advance its water-sensitive transition.
- Developing broad adaptation pathways to ensure the provision of equitable, affordable and safe urban water services over the long-term against different climatic, urbanisation and societal challenges.
- Evaluating the general suitability of available low-energy and low-cost stormwater harvesting and water treatment systems for Bogor.

- Guiding water-sensitive urban design through a range of design and demonstration activities in case study locations that represent different development typologies.
- Developing active WSC learning alliances with stakeholders from universities, government, industry, business and community.

RESULTS AND ACHIEVEMENTS

The strategies identified to expedite Greater Bogor's WSC transition through leapfrogging are broad in scope and designed to address key water issues identified through the research and enable change towards water-sensitive outcomes over the short and long term.

The recommended strategies to achieve a water-sensitive Bogor by 2045 are organised into six leapfrogging pathways:

- Commit to greater Bogor's water-sensitive future.
- Improve regulatory performance for water sensitive outcomes.
- Support integration and co-ordination across water and urban stakeholders.
- Empower communities to become water sensitive.
- Develop local evidence and experience from water-sensitive approaches.
- Build professional capacity for water-sensitive practices.

The pathways are intended to be considered for investment as a whole, as the underlying strategies are often interrelated and mutually reinforce achievement of Greater Bogor's water-sensitive aspirations.

The recommended short-term (0-3 years) strategies provide guidance on priority initiatives for rapidly advancing Greater Bogor's water-sensitive city leapfrogging journey. It is recommended that the momentum of this Urban Water Cluster research be built upon to immediately establish a governance framework for implementing this WSC leapfrogging strategy.

This framework would become a key driver of collaboration within and across organisations, underpinned by a strategic water-sensitive city vision for Greater Bogor collectively developed by diverse government, industry, community and research stakeholders. The framework would also support the WSC Learning Alliance established as part of this research to build capacity to adopt water sensitive practices amongst Bogor's water and urban professionals.



Benchmarking Greater Bogor using the Water Sensitive Cities Index

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PROJECT SUMMARY

As cities seek to adopt a water-sensitive approach, they often need a better understanding of their current system and how it compares with best practice. The Greater Bogor region of Indonesia has been benchmarked and profiled as part of the Australia-Indonesia Centre's Urban Water Cluster using a new tool developed for this purpose – the Water Sensitive Cities (WSC) Index.

The WSC framework recognises that the management of water systems has untapped potential to benefit a city's liveability, sustainability, productivity and resilience. Water-sensitive cities strive to enhance biodiversity, encourage connected communities and foster cultural significance. They also protect the health of waterways, reduce flood risk and create multi-functional public green spaces. Ultimately, a water-sensitive city recognises how water can both meet the basic needs of society and contribute to the creation of connected, vibrant and liveable communities.

METHOD

The WSC Index was developed by the Australian Government's Cooperative Research Centre for Water Sensitive Cities. It takes a holistic and integrated approach to water system benchmarking, measuring performance against 34 indicators reflecting WSC attributes. These indicators are organised under seven thematic goals to help compartmentalise the scoring process. Scoring involves engagement with key sectoral stakeholders, expert judgement and evaluation of evidence to determine a score out of five for each indicator.

The research is founded on the concept that a city moves through a range of water systems in its journey towards a WSC, and that it is possible to 'leapfrog' from early stages of urban water development to a WSC.

As cities seek to adopt the WSC approach, they need to understand both its present status with regard to urban water management and define their short and long term sustainability goals. An analytical tool has been developed specifically for this purpose: the urban water transitions framework. The framework identifies six distinct developmental states that cities may move through on their path towards increased water sensitivity. The transition journey is not necessarily linear, as a city may show indicators of later developmental states while not fully satisfying earlier states; this is particularly evident when flooding remains a hazard to a city's liveability although other attributes of waterway health and aesthetics are maintained.

While a city's local WSC vision may not emphasise all indicators of the WSC Index to the same degree, the tool enables diagnosis of key areas of strength and weakness. This insight can then inform the prioritisation of actions and provide a framework for ongoing monitoring and evaluation of a city's water-sensitive performance.

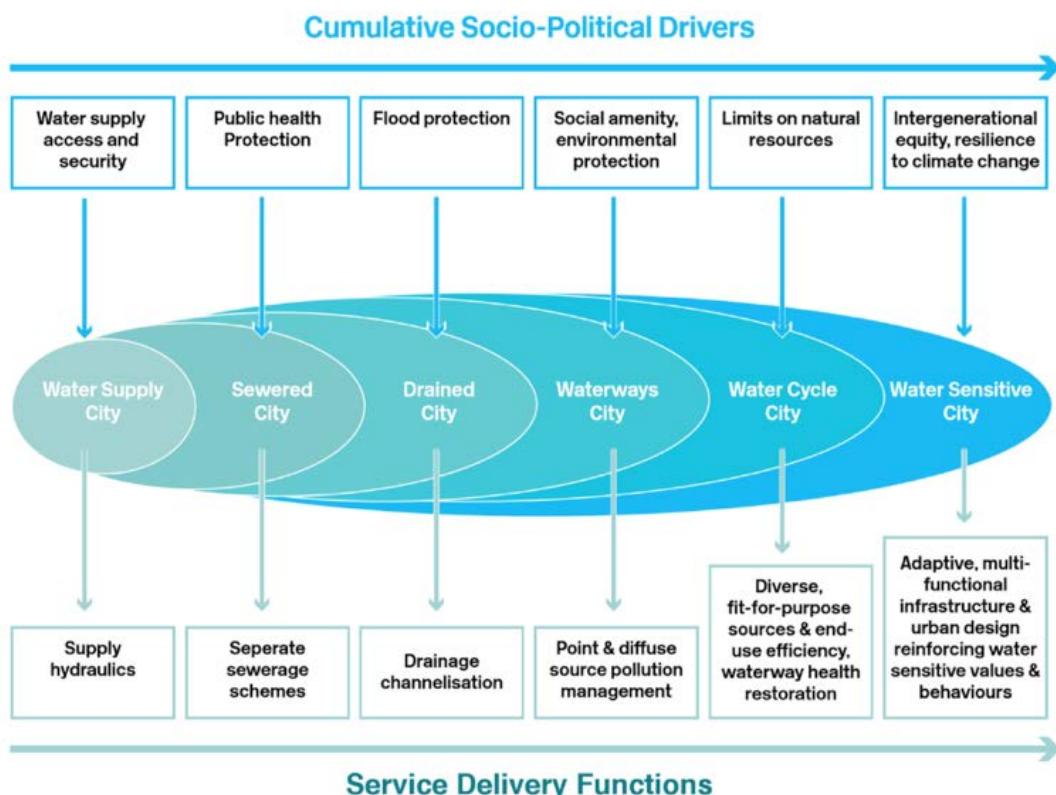
A Water Sensitive City index assessment creates an opportunity to reflect on the strengths and weaknesses of the city's water system, to identify opportunities for improvement and areas of common concern with other cities. The results of the assessment indicate that except for 'Quality open space' (which scored two out of a possible five) the averaged performance of goals is relatively even.

The average scores of the six other goals were in the range of 2.4-2.8. This suggests that 'Quality open space' is a clear area of concern. However, consistently low open space scores from the benchmarking of a number of Australian cities of varying sizes and geographies speaks to the difficulty of achieving scores closer to three than two in the goal's indicators.

Index indicator scores in themselves do not necessarily correlate with areas for priority attention. This is largely because of the degree of integration of Index goals and indicators. For instance, the 'Good water sensitive governance goal', though it may have moderate scores, should still warrant attention to achieve flow-on benefits in other indicators. Generally, the index is most effective as a tool for planning and measuring progress. As the first attempt to apply the WSC Index to an Indonesian city, there are lessons that can be gleaned for similar cities as well as for the index itself.

RESULTS AND ACHIEVEMENTS

For stakeholders in Bogor, the WSC index has been beneficial in applying a system-oriented lens to water management. In a planning environment that has typically emphasised technical approaches, the balanced approach to social and ecological systems has opened up new possibilities for transformation. These are explored in richer detail in other outputs of this research program. In terms of performance benchmarking, it is recommended that this work form the basis for shaping an ongoing approach to system evaluation.





Governance for a water-friendly transition in Greater Bogor

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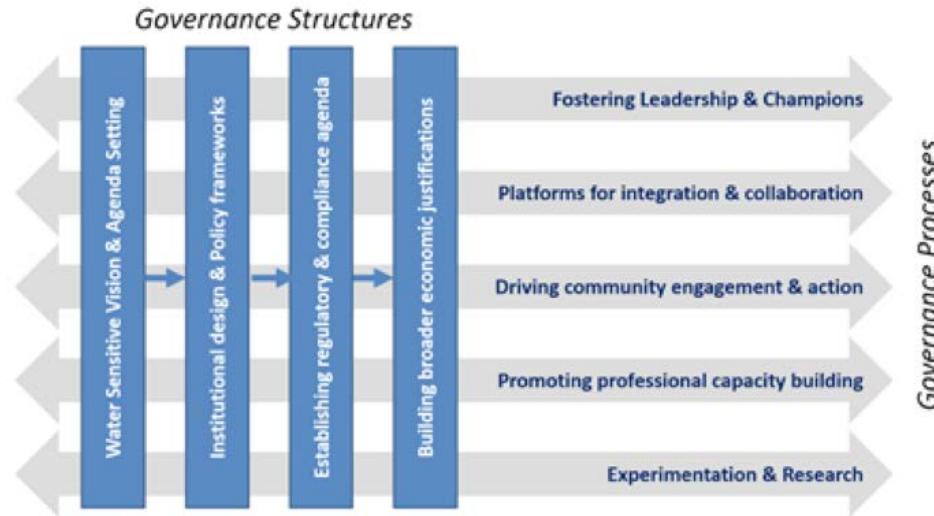
PROJECT SUMMARY

Making urban water practices more sustainable is widely regarded as a water-governance challenge, which involves working within and across the different social, political and economic frameworks where urban water management takes place. Achieving Water Sensitive City status requires rethinking the way urban water governance is conceived of and delivered – moving beyond traditional single-service delivery models, to incorporate more flexible, integrated and complex institutional designs to respond to and accommodate multi-functional and adaptive infrastructures.

As a result, broad urban water governance transitions involve conceptualising change as a co-ordinated, multi-staged set of processes. To work towards a common vision (in this case, a water-sensitive Bogor in 2045) these processes must engage with multiple actors, across multiple scales (such as local and catchment), and across multiple sectors (such as planning, environment, health, agricultural and urban design). Governance for a water-sensitive city would involve establishing core structures (such as regulatory and policy frameworks) and processes (such as leadership and facilitated platforms for interaction) to guide and steer the formal and informal engagement and co-operation of all relevant actors.

METHOD

To generate guidance for future water governance reforms the research team examined the historical and contemporary governance structures and processes of urban water systems in Greater Bogor. This involved a series of focus-group discussions and research interviews with key decision-makers to gain insight into the current water system's structure and workings, and to identify opportunities to improve current interventions. The group discussions and interviews were conducted using the transition dynamics framework to unpack key structures and processes at play. This framework proved to be a useful approach to identify structural, agency and learning opportunities for future governance interventions.



Adapted from: Farrelly, M.A., Brown, R.R. and Rijke, J. (2012) Exploring operational attributes of governance for change. Proceedings of the 7th International Water Sensitive Urban Design Conference, February 21-23 2012 Melbourne, Australia

Modified from Brown, R., Farrelly, M.A. and Loorbach, D. (2013) Actors working the institutions in Sustainability Transitions: The Case of Melbourne's Stormwater Management, Global Environmental Change 23(4), pp. 701-718; Brown, R., Rogers, B.C., and Werbeloff, L. (2016) Moving toward Water Sensitive Cities: A guidance manual for strategists and policy makers. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Urban water governance in Indonesia is complex and traditionally fragmented on a number of levels: bureaucratically, socially, politically and spatially. This poses significant challenges to key institutional structures and dynamics. Furthermore, it is important to recognise that there is no one-size-fits-all approach to governance or institutional design; rather these need to relate to the relevant social, environmental and developmental contexts. The research used tools (see Figure on next page) to ensure the adaptation and implementation of a water-sensitive vision by government actors in Indonesia.

RESULTS AND ACHIEVEMENTS

Based on this framework, the research arrived at several recommendations:

- Water sensitive vision and agenda setting: This significant first step in achieving water-sensitive governance involves generating a collective vision across all actors and multiple scales, regarding what is possible/desired for Greater Bogor and also in Bogor Regency and Bogor City individually. Efforts in this space are underway but require alignment.
- Institutional design and policy frameworks: It is recommended that the roles and responsibilities among the multitude of organisations (including the provincial government) that play a part in the functioning of Greater Bogor's urban water systems be further clarified. In addition, further studies need to be done on the formal and informal organisational routines and practices used to shape current and emerging water initiatives, as well as formal or informal engagement and co-operation of mutual interest across relevant organisations.
- Establishing regulatory and compliance agendas: National leadership for advancing sustainable urban water servicing is an important element in generating more formalised authority for decentralised decision-makers. Aspirational targets are useful, but must be realistic and relevant to local conditions.
- Building broader awareness of the multiple benefits of green infrastructure: Decision makers need to be aware of, and understand the financial value of, the many social and environmental functions and services provided by multifunctional green infrastructure such as rainwater tanks and rain gardens.
- Fostering leadership and 'water champions': Fostering distributed leadership (shared, collective and extended leadership practice) is important for building capacity for change and needs to be reinforced and aligned towards a common agenda.
- Platforms for administrative integration and collaboration: Co-ordinated, facilitated, formal and informal processes are required whereby actors from different organisations can come together to shape innovative and alternative water practices.
- Capacity building: Having multiple actors (individuals and organisations) involved in delivering a water-sensitive vision for Greater Bogor will require a dedicated and tailored capacity building program. This will require building on existing opportunities and developing new knowledge-sharing programs.
- Driving community engagement and action: Careful attention is required to ensure there is broad community participation, not just community elites. The Pulo Geulis community co-design process developed by UWC researchers is a key example of fostering and building community capacity.
- Experimentation and research: Co-designing a joint industry, community and academic research agenda that is policy relevant is a key step to developing and testing new innovative, place-based approaches and technologies.



Infrastructure adaptation scenarios: technical report

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PROJECT SUMMARY

Developing infrastructure adaptation scenarios are essential for cities wishing to leapfrog to a WSC. This research drew on the WSC index baseline assessment for Bogor, described challenges and proposed opportunities for infrastructure adaptation scenarios.

Many of these challenges and opportunities are common throughout Indonesia and may provide a frame of reference for future case studies. This particular research on infrastructure adaptation scenarios aims to aid in providing high-level recommendations for a leapfrogging strategy.

The research highlighted that the primary challenge Bogor must overcome to leapfrog to a WSC is managing water with the ‘business as usual’ mindset. The compounding effects of population growth and climate change place increasing stresses on current practices and highlight the need for new solutions. By using innovative, cost-effective and robust solutions, it is possible to turn many of the challenges identified into opportunities.

Used effectively, modelling approaches can drive a deeper understanding of the connection between the water system, land use, urban design and technology, especially when founded in quality data and modelling. Furthermore, our research found that involving stakeholders early in the modelling process can improve the quality of options developed, increase water literacy, and significantly influence the success of water resource management projects.

IDENTIFIED OPPORTUNITIES

Through workshops and studies in Bogor, the research identified that the Bogor community presented the biggest opportunity and challenge in implementing leapfrogging strategy from an infrastructure adaptation perspective. Challenges and opportunities include: ensuring good water-sensitive governance; increasing community capital; achieving equity of essential services; improving productivity and resource efficiency; improving ecological health; ensuring quality urban space; promoting adaptive infrastructure; and turning challenges into opportunities.

Establishing robust data platforms

Throughout Indonesia, the Meteorology, Climatology and Geophysical Agency (BMKG) is responsible for the collection, quality control and storage of meteorological and climatological data. Local government agencies and research bodies also collect and hold localised data sets. For Greater Bogor, a co-ordinated approach to data collection, quality control, interpretation, storage and dissemination will better inform water policy, city development and infrastructure design, and is critical for Bogor's transition to a WSC.

Data-driven improvements in water literacy and community capital.

Water literacy is the measure by which the community, water professionals and government stakeholders understand the connections between water, climate change, population growth and other water-related issues. Access to relevant data helps stakeholders make informed decisions on a variety of issues, from preparedness for severe weather conditions to sanitation issues.

Modelling performance of green infrastructure interventions.

To design infrastructure options that are resilient under various climate change and urbanisation scenarios, opportunities exist for Bogor to promote adaptive water-sensitive infrastructure by modelling numerous uncertain scenarios and testing possible adaptation pathways where integrated multipurpose infrastructure elements are installed.

To develop urban designs and recommendations for the selected case study sites, our researchers applied a water balance model to evaluate the water cycle at each site and quantify the current demand for drinking water and sanitation, incorporating population growth and rain tank interventions.

For example, assuming an increase in rainfall of 25 per cent and city population more than doubling from 12,258 in 2018 to 26,631 in 2045, water-balance modelling of Cibinong Situ Front City found that retrofitting each residential building with small 400-litre rainwater tanks (which would collect enough rainwater for flushing toilets for 75 per cent of the year) could reduce household imported water demands by 35 per cent.

Green infrastructure interventions such as rain tanks, wetlands and retention ponds can also be used to offset the increase in impervious surfaces and adapt to changing runoff regimes. Our modelling research demonstrated that flood waters could be mitigated through the implementation of green infrastructure technologies and proper catchment management strategies.

The research team also developed a tool called 'Green Infrastructure Tool Based on Location Analysis', which analyses several variables to determine the suitable placement of green infrastructure within a catchment.

Scenario modelling to inform city development, planning and design.

Modelling numerous adaptation pathways under a variety of climate change, population growth and urbanisation scenarios allows urban planners to develop contingency plans for an uncertain future and advise policymakers on how to regulate new development to ensure a water sensitive approach is applied. Modelling can also be used to assess the security of safe water supplies given a variety of supply and demand scenarios. Including stakeholder input in planning, modelling and design processes increases water literacy and the community's all-important connection with water.

To assess and understand the impact of land use on the water system, our research tailored the DAnCE4Water model to the context of Bogor. Based on open data and various tools, DAnCE4Water enables stakeholders to assess the impact of a range of urban planning decisions on the urban water system and identifies potential adaptation options.



A guidance manual for green infrastructure application

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PROJECT SUMMARY

Bogor's reputation as the 'city of rain' and 'city in the garden' suggests it is ideal for transformation to a Water Sensitive City.

With its natural greenery, amenity and botanic gardens drawing people to the city, the importance of ornamental greenery is clear throughout the city. The government seeks to build upon this foundation to become a green city of the future. Positioned upstream of Jakarta on the banks of the Ciliwung and Cisadane rivers, and alongside hundreds of natural lakes, water is also a key feature of Bogor and commonly believed to bring good fortune.

This upstream position means Bogor's water management is of high significance to Jakarta, with a local saying that if it is raining in Bogor it is flooding in Jakarta. This natural, social and political capital is a solid foundation for the application of green water treatment technologies or green infrastructure, which utilise natural filtration processes.

Certain green-blue infrastructure or green technologies, referred to as green infrastructure (GI), have different functions in terms of providing essential water services such as water treatment, flow attenuation, storage for reuse, and secondary benefits such as landscape value and urban cooling. They can be applied at a range of scales and used for a range of applications (notably urban farming, food production, and so on). Almost all green infrastructure requires the presence of vegetation and soil of adequate volume, nutrient content and drainage characteristics. Porous pavements and rainwater tanks are exceptions to this. They are considered water-sensitive technologies and have relatively low environmental impact; they are similar low-cost and low-energy systems and are thus regarded as part of the same group.

Selecting which GI systems to use in urban designs is essential to delivering a range of water-management outcomes. In a water-sensitive city model, green infrastructure is used for stormwater treatment, flow attenuation/control and storage for reuse. GI can also provide secondary benefits such as improving the look and value of the landscape, urban cooling and flood mitigation. Most green technologies are multi-functional, and can be applied at a range of scales and used for a range of applications. With these benefits, GI can help strengthen Bogor's economy and improve the health and quality of life of its residents.

Green infrastructure measures to treat, control or store water should be selected based upon the individual site characteristics, urban planning objectives and the benefits the community or city wish to achieve. GI provides environmental, socio-cultural and economic benefits to a community. The environmental benefits include:

- Water-quality treatment (through pollutant removal).
- Flood mitigation (by reducing flow).
- Protecting human and ecological health.
- Providing a source of water for reuse (through stormwater harvesting or greywater treatment and re-use).
- Enhancing water security and resilience and reducing demand on other water sources.
- Urban greenery, biodiversity and amenity.
- Groundwater recharge through infiltration.

The socio-cultural benefits of GI include:

- Enhancing human wellbeing and health
- Cooling the city's microclimate and buildings
- Providing habitat for flora and fauna
- The economic benefits of GI are:
 - Increased property values and avoiding future costs for remediation and grey infrastructure.
 - Possible economic benefit from harvested plants for products or food.

Bogor is ideal for transformation to a Water Sensitive City through the integration of GI into development plans for tackling challenges such as dry season water shortages, flooding and water management.

RESULTS AND ACHIEVEMENTS

The research revealed several key findings. Green infrastructure, such as bioretention systems, constructed treatment wetlands, green roofs and others, has been demonstrated to have multiple benefits in tropical climates. There are solid foundations for the adoption of GI in Bogor, with many examples to build upon and existing local skills and resources.

Case studies highlight how multiple issues at a site can be mitigated by green infrastructure due to its multi-functional nature. The most appropriate technologies will differ between sites and should be selected to suit the site and available resources for construction and maintenance. In order to have a more sustainable and resilient water supply, diversification of water sources offers potential.

Given Bogor's high rainfall, rainwater harvesting offers significant potential to supplement existing sources of water. Treated greywater through GI systems could also provide an alternative water source for less personal end-use applications and help reduce wastewater discharge.

In designing GI in Bogor, system sizing is critical to ensure sufficient treatment capacity and protect the system from high flows. Protecting systems from sediment and gross solids is vital for long-term functioning, hence investing resources in solid waste management campaigns will help GI performance. There are multiple widely cultivated local plant species that offer potential for use in green infrastructure, with many plants also associated with potential economic uses.

The research recommended that a standardised document be developed to facilitate implementation and design of GI in Bogor. This document would ideally include target design objectives for stormwater and wastewater management (that is, the key pollutants and their reduction limits as well as flow reduction targets). Testing of GI systems under local conditions would also help refine design.



Case study: Pulo Geulis' transition roadmap to WSC

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PROJECT SUMMARY

The island of Pulo Geulis is an informal settlement in the middle of the Ciliwung River's catchment area, with major environmental issues related to water management and sanitation. However, Pulo Geulis also has great potential to become more water sensitive by adopting appropriate urban concepts.

The cluster research aimed to provide the necessary infrastructure to improve Pulo Geulis' community health and environmental performance, and the residents' liveability with new multifunctional public space. In the case study, the research team created a roadmap for the revitalisation of Pulo Geulis based on active participation of community, academic and governmental stakeholders to provide a clear strategy for leapfrogging to a more water-sensitive community.

The island of Pulo Geulis is just over 3.58 hectares and houses approximately 2600 inhabitants in around 560 dwellings, yielding a population density of 700 people per hectare. The research team identified several main issues facing the community, some of which relate to river pollution and insufficient water management systems.

Sanitation on the island is poor, with houses on the perimeter discharging untreated blackwater and other domestic wastewater directly to the river via small pipes, despite this practice being restricted by law. The island's small, densely packed houses often lack space for an individual septic tank. The rest of the island is serviced by septic tanks, but proper maintenance is hindered by the lack of vehicular access.

The water from the Ciliwung river is used by some members of the community for bathing, washing, fish production in cages, and as a public gathering place. The water looks clean, but laboratory tests show that it is polluted by bacteria and chemical waste.

Another issue facing the island is limited open and green spaces. The islanders have a strong community organisation and pride in their cultural roots and have been promoting its culture and arts through the Kampong Murals beautification project. However, there is virtually no public open space, aside from narrow walkways. Children's playgrounds are non-existent, and most children's recreational activities take place in the alleys or the polluted Ciliwung River, exposing them to health risks. There is no car access to the island, and while river flooding is reportedly rare, internal flooding occurs during heavy rain.

There is no groundwater access within Pulo Geulis and the majority of households use water that is pumped to the island. No alternative water sources such as rainwater harvesting are currently used. Householders generally boil tap water before ingestion, but the community nonetheless sometimes suffers from water-borne diseases. Solid waste management is also a significant problem with some garbage discarded directly into the river; however, there are some initiatives for wastewater collection by the youth groups of the island.

Border land erosion is also a major issue on the island. Many buildings cantilever beyond the island perimeter, creating a risk of collapse, especially during the rainy season. In addition to the health risk from polluted water, flash floods occur regularly, meaning that activities at the water's edge are very dangerous.

The community aspires for Pulo Geulis to become a better place to live, be more healthy and productive, and increase its potential as a tourist destination. In recent years, the number of visitors to the island has increased, particularly to visit the small traditional Javanese food stalls. The community wishes to build upon this and become a culinary destination. This provides a good foundation for further development of urban agricultural systems, supported by green technologies such as rainwater harvesting, water treatment with constructed wetlands, and biofiltration.

METHOD

The research combined intensive community engagement with focus group discussions and drone mapping to deliver different scenarios to improve conditions. The discussions and follow-up workshops revealed the community's commitment to improving their environment. The discussions also generated options for the creation of new public spaces and the implementation of green technology. These options created several scenarios that will serve as a useful recommendation to the regional government.

The methodology used in this case study seeks to empower the community by involving them in upgrading their town, from the initial design stages through to consultation, construction and maintenance. The history of similar programs in developing countries shows that this approach offers a better chance of success than top-down planning interventions from the city administration that do not consider the community in the transformation process.

RESULTS AND ACHIEVEMENTS

The main findings of this case study research are:

- Communities in informal settlements have the potential to be the main agents of the positive transformation of their environments if provided with the tools to manage the transition towards a more resilient community.
- The adoption of green technologies in informal settlements could help reduce their environmental impact, taking into consideration the local culture and knowledge in the implementation and management of these systems.
- Multi-functional public space can be one of the main drivers of community wellbeing, providing not only amenities, but also opportunities for productive green technology, such as vertical urban farming and fish ponds, that can provide food security and economic uplift.
- This revitalisation can serve as a good reference for the wider adoption of water-sensitive design principles in similar informal settlements, giving the community tools to leverage against common land-clearing and top-down slum upgrading strategies.



Case study: Situ Front City's transition strategy to WSC

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PROJECT SUMMARY

The city of Cibinong is the capital of the kecamatan of Cibinong and Bogor Regency, covering an area of 57 hectares.

The district incorporates a number of large lakes (situs) and a population of 357,000 people. Within Cibinong, there is a large development planned along the lakefront of the situ Cikaret and Bentenan by the Bogor Regency Planning Department called the Situ Front City (SFC). This project is one of the main urban development areas in Bogor Regency.

The master-plan is based on the winning design from a competition, and construction is due to commence in 2020. The SFC master plan included basic water-sensitive urban design principles in the landscape and public space design using green technology tools to deliver a better environmental performance of the urban development. However, the master plan did not base its recommendations on hydrological and hydraulic modelling, which are essential to provide a more refined implementation of green Infrastructure and to understand the water systems of the area. The Urban Water Cluster provided a set of recommendations to make the SFC master plan more water sensitive and support the transition of Cibinong to a Water Sensitive City.

The research team identified several problems faced by the development. The first issue is that of pollution, where some dwellings are discharging wastewater directly into lakes. The second issue is the disconnection between lakes' waterfronts and the surrounding area, where waterfronts are not being actively used by the locals. The third issue surrounds the lack of hydrological modelling in the master-planning process. As major changes to the water bodies are proposed, a thorough hydrological analysis of the area is essential. The fourth issue in the development is lack of water discharge capacity studies. For the degree of change the development proposes, the study of sufficient water capacity is lacking.

METHOD

The research team utilised spatial and social analysis tools to offer recommendations for the creation of a water-sensitive city. Starting with a visioning focus group discussion, community mapping was developed along with Water Sensitive City Index and SWOT Analysis. Land-use mapping was conducted to give an overview of possible green technology and green infrastructure implementation. Hydrology modelling, including water balance models and the use of a tool for green infrastructure allocation, was performed and scenarios developed. Feedback on scenarios for public space allocation and uses was delivered in a forum including community members. Interviews were conducted to collect information on government processes for water management.

RESULTS AND ACHIEVEMENTS

Urban planning

Cities can provide many opportunities for community and economic development. Since the decentralisation of governance and the partial devolution of regulatory authority, cities have gained the power to considerably influence the business environment and improve the regulatory environment. With effectively planned infrastructure, policies and enforcement, urbanisation can lead to increased efficiency, opportunity, access to services, and good quality of life for the masses.

Urban design

- Researchers made a number of recommendations for a better design of public spaces for the SFC master plan, and similar urban developments. These were:
- Include green technology based on hydrology and water balance models.
- Provide alternative plans to cope with challenges related to change in climate patterns.
- Explore the potential of alternative sources of water (mainly rainwater harvesting) in the urban design to provide more diverse and adaptable public spaces and reduce the need of mains water for non-drinking purposes.
- Include the approach for WSUD proposed in the SFC master plan in planning regulations, so it can be applied widely in other similar projects and provide guidelines for the utilisation of green technology.
- Monitor the performance of the green technology implemented in the new urban developments.

Built environment

The government can include the assessment from the Green Building Council Indonesia, which was founded in 2009 by professionals in the building design and construction sector who are concerned with the application of the green building concept. The GBC Indonesia rates buildings and neighbourhoods on the following six indicators: appropriate site development; energy efficiency and conservation; water conservation; material resources and cycle; indoor air health and comfort; building and environment management.

Community empowerment

Some recommendations for a more successful community participation strategy for the SFC master plan and other similar urban developments are: include the community more actively in the planning process from early stages; stimulate the local economy by incorporating existing trades into the commercial areas of the master plan; and retain the existing productive areas in the area, mainly the rice paddy fields located in the area between the Situ Cikaret and the Situ Bantenan.



Case study: Sentul City

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PROJECT SUMMARY

Sentul City is a high-end estate developed by a private company. Located in a mountainside region, close to Mount Salak and Mount Mas, it is conveniently close to the toll road and is home to 8000 permanent residents who live and work in Jakarta or Bogor.

It also functions as a resort, with approximately 1000 residents living in Jakarta during the week and using Sentul City as a weekend retreat. Nine villages are also located within the Sentul City area, and many local villagers are employed to farm the land banks. The city is projected to grow five-fold from its current area of 3020 hectares to cover an area of 15,000 hectares.

High-quality, sustainable and green living is an integral part of Sentul City's development plan. The overall aspiration is to become a pioneering Global Green City embodying water-sensitive urban design (WSUD). Set in a hillside location, the development is surrounded by greenery from forests to agricultural land. The land banks for future development are currently farmed and house local villages. Despite the plans for high growth and expansion, Sentul City management aims to maintain green open space at 60 per cent, including blue open space.

The vision is for the city to be green, eco-friendly and sustainable. More specifically, the sustainable city will focus upon three aspects; Agropolitan, Technopolis, and Aquapolitan. The key issues that Sentul City is now facing to become a more water-sensitive estate are: unstable soils and landslides; high stormwater run-off; limited water supply; and management of future growth.

Sentul City already incorporates a number of green or environmentally sustainable systems. Some have been implemented for reasons such as aesthetics but have the potential to be adapted to provide water treatment and retention functions. The initiatives include green roof and green wall implementation, green technology usage, V-drains, vegetated drains and artificial creeks, urban farming, retention lakes (*situ*) and development of water for recreation purposes.

As the community is considered as an important factor in becoming a Water Sensitive City (WSC), the community of Sentul City should also be empowered to support the leapfrogging of Sentul City and Greater Bogor towards WSC through training, simulation and socialisation. In addition, the community should be involved in the drafting of regulations for Sentul City so that it gains a sense of belonging and a willingness to obey the regulations.

Water supply is a critical issue. Currently, Sentul City is dependent on water resources supplied by the central water utility, PDAM. The supply is not sufficient to meet demand, especially in the dry season, so around 8000 permanent residents living in Sentul are facing water shortages. With this in mind, the development of a diversity of water supply options is urgently required.

Private companies are also involved in water supply as the PDAM service does not provide coverage to the entire community. In particular, industry and hotels tend to use companies to supply them with water from deep wells. Although ground water is accessible in the area, in Sentul City households are prohibited from digging wells.

Stormwater is drained from the city via a network of channels, largely open rectangular concrete drains of various sizes. These were originally constructed as an irrigation distribution network in the colonial times. Thus, they were not constructed for the purpose of drainage, leading to issues with a lack of connectivity within the network, inefficiency and a non-ideal drainage configuration. At small scales, people often construct their own drainage infrastructure and manage it themselves.

The drainage network also suffers from a high sediment and litter load. It carries untreated urban stormwater run-off and household greywater discharges. In terms of wastewater management, a treatment plant was constructed by Sentul City's private management to service the community. However, the relatively small facility is currently not functioning. It is utilised for emergencies only and is only capable of treating a small proportion of wastewater (about 10 per cent). Instead, new houses have individual septic tanks and commercial buildings are required to construct their own wastewater treatment plants. For solid waste, roughly seven tonnes per day are currently generated.

The research team utilised several analysis tools, including community or stakeholder and site analysis tools, green technology solutions and water-balance models.

RESULTS AND ACHIEVEMENTS

- Commercial opportunities have been realised through the innovative approach to water management within Sentul City. Water serves as a key feature of the Ah Poong Floating Market, while green walls provide notable aesthetic features at the Aston Hotel and Savana Hotel.
- The upmarket private development provides opportunities for individual households to shoulder the cost of system construction and maintenance.
- Green water treatment technologies can be a motivation for buyers, both private and commercial.
- Many of the existing systems provide scope for modification to provide water treatment and retention benefits. For example, the conversion of V-drains into swales and bioretention systems.
- The existing open space and greenery will facilitate future technology adoption. Unlike many parts of Bogor, land availability for systems is not a critical limitation.
- There is high potential for widespread technology adoption as part of the large future growth in Sentul City. If system design is incorporated into projects from the outset, it also greatly reduces costs relative to retrofit situations.
- Traditional preference and reliance on certain water sources (such as the PDAM supply, or also groundwater in other parts of Bogor) should not provide a barrier to the adoption of alternative water supplies (such as rainwater harvesting schemes) which will diversify supply and enhance resilience against future changes in supply. Community education, supporting research (such as demonstrating the water quality of roof run-off) and demonstration projects will help to promote the adoption of new water supply options.



Case study: Griya Katulampa

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PROJECT SUMMARY

Griya Katulampa is a settlement located in Katulampa Village in East Bogor District, Bogor City.

Built in 1992, it houses 2257 people in 460 dwellings. Its water is provided by PDAM. Griya Katulampa is a community with great potential in relation to water, given its privileged position between the Kali Baru River and the Ciliwung River. The local community has shown strong mutual co-operation in protecting the environment and initiative in taking care of the environment, especially in the case of water resources, such as using alternative water sources from existing springs and building a distribution system.

With its potential, Griya Katulampa can offer some valuable lessons in water-resource management to become a Water Sensitive City. There is an opportunity to provide advice for better waste management in Griya Katulampa, using green infrastructure such as constructed wetlands, biofilters and bioswales to reduce water pollution to the river and stormwater runoff.

Currently, Griya Katulampa has implemented pilot projects for bioretention at communal and household scale. These pilot projects have been successful in reducing the stormwater run-off in the area. The Urban Water Cluster also explored the capability of rainwater harvesting at the communal and household levels and found that it had great potential for decreasing the reliance on city water for non-drinking purposes, such as irrigation, toilet flushing and fish ponds.

The concept of leapfrogging is an exciting alternative route with particular relevance for cities with poorly developed water management systems. By leapfrogging, a city can skip over the traditional transition pathway of major, centralised infrastructure design and management, and proceed directly to more sustainable infrastructure that is decentralised and customised for local contexts, avoiding the social and environmental consequences that came with these pathways.

Leapfrogging is “a situation in which a newly industrialised country learns from the mistakes of developed countries and directly implements more sustainable systems of production and consumption, based on innovative and ecologically more efficient technology”. Leapfrogging as a transition strategy has the potential to advance to a stage that is characterised by greater productivity, resilience, sustainability and liveability.

The difficulty in becoming a Water Sensitive City in developed countries is that technological and institutional path dependencies lead to changes being incremental, often resulting in mere optimisations of unsustainable practices with limited potential for systemic change. Sunk costs and vested interests are very high through decades of investment that have aligned organisations, legislations and infrastructure with a particular set of practices and ‘locking in’ the status quo. The opportunity to leapfrog in developing countries comes from their relatively low levels of investment in traditional infrastructure and institutions, which makes existing practices less entrenched and more receptive to adopting water-sensitive practices.

RESULTS AND ACHIEVEMENTS

Several steps are recommended to be adopted for the effective leapfrogging of Griya Katulampa towards becoming a water sensitive city:

- Demonstration of community organisation, engagement, initiative, self-management and self-sufficiency.
This allows initiatives to move forwards without waiting for government support.
- Further knowledge transfer to communities of water management and related skills by developing and operating the system themselves. Observations reported by the community on spring water quality demonstrate this local knowledge.
- Further, instilling the importance of water to the community ensures it has a tangible interest in maintaining the quantity and quality of water resources. This interest promotes ongoing maintenance of the system, and each household participates in maintenance.
- Demonstration of the multiple benefits provided by passive and natural water supply and treatment systems. The system in Griya Katulampa is considered an added value to living in the area and is expected to add to property values.
- The passive gravity fed system avoids potentially expensive operating costs
- Cultivating fish in ponds to help prevent growth of mosquito habitats by eating mosquito larvae.
- Further understanding of the key drivers of community self-motivation will be valuable to promote this in other communities.



Developing a new regulatory approach to ensuring potable water quality and pollution control in East Java

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PROJECT SUMMARY

The project looked to establish, in conjunction with Dinas Lingkungan Hidup Jatim (DLH Jatim) – the Environmental Management Agency of East Java – a new bio-assay method for first-pass evaluation of the chemical toxicity of water.

Three cases studies were considered:

- Changes in water toxicity as a result of human-centric discharges to the Brantas River in East Java.
- The quality of reticulated water in the City of Surabaya.
- The quality of a range of bottled water products.

The results were compared to water supply, wetland, wastewater discharge and reticulated water samples in Melbourne, Australia. This was the first time an alternative to chemical analytical approaches had been utilised in Indonesia for the evaluation of water quality in terms of the presence of chemicals that may lead to acute or chronic toxicity to humans and the environment. Rivers and the associated environs in East Java are highly polluted as a result of inadequate wastewater treatment management.

DLH Jatim is cost and capability constrained in terms of chemical analytics. The chemical as distinct from pathogenic safety of reticulated water is also unclear. The methodology that was established provides a cheap and relatively low-tech first-pass or hurdle assessment of the potential for acute or chronic chemical toxicity of discharges to the environment and of water for human consumption (both cooking and drinking). Previous studies have shown that there is a direct correlation between the chemical toxicity of more than 3000 chemical compounds and the bioluminescence response of a simple marine photobacterium (*Vibrio fisheri*). The adapted methods allowed a higher-order regulatory framework to be established for discharges and provided feedback as to the adequacy of current water treatment approaches for reticulated water supply, with the use of expensive chemical analytics being an important but second-order consideration.

The project aimed to:

- Establish a laboratory for the screening of water samples from a range of sources, including waste water, industrial discharge, rivers and water allocated for potable use.
- Develop a field program of screening of river health that is consistent with EPA guidelines in the US and Australia but without the need for in-depth analysis that looks to identify the actual toxins being discharged.
- Train personnel from ITS in more detailed bio-assay and eco-toxicological methods.
- Move to a philosophy where bio-assay rather than chemical analytics is used for secondary source identification rather than routine chemical water analysis.
- Use the information from routine assays of river and potable water to inform a new regulatory environment and to inform choices of infrastructure for water and wastewater treatment.

METHOD

The methodology established through previous work and further elaborated in this work showed that for a water sample to be considered chemically non-toxic for drinking purposes, a concentration point of >400 is required whereby a reduction in photobacterium response of <50 per cent (LC50) is observed. A previous study demonstrated that, for water samples meeting the Australian drinking water standard in terms of chemical analysis across 1200 chemicals and showing no response to receptor specific bioassay, a LC50 of more than 400 was always observed. A qualitative overview of the results of the testing showed:

- Longitudinal sampling of the Brantas River for over 200 kilometres showed that, even in the upper reaches of the river, the LC50 of all water samples was <10 or at least 20 times more toxic than is deemed highly suitable for drinking water purposes. Some samples were so nutrient rich as to cause an increase in photobacterium response at short time scales (five minutes). They were observed to be acutely toxic at longer time scales (ten minutes).

- Sampling and analysis of water samples from the Surabaya reticulated water system in one district, from close to the water treatment plant and then at various points in the system, showed highly variable results, including values of LC50 from <20 and up to 150. None of the samples, by this analysis, would be considered safe for human consumption, even after boiling. The data suggests a highly porous distribution network.
- Analysis of a range of bottled water samples showed a LC50 of >100 in all cases whereby there was no response at this concentration ratio, indicating that they were most likely safe to drink.

RESULTS AND ACHIEVEMENTS

Simple toxicity testing using bioassay was able to demonstrate a longitudinal increase in chemical toxicity down the Brantas River using a low-cost methodology. The data was consistent with and correlated with COD measurements. The water in the lower reaches of the river was observed to be acutely toxic. This provides the basis for the assessment of discharges into the river without the use or need for expensive laboratory methods (as a first-pass hurdle assessment). In addition, the inadequacy of the treatment process for water from the Brantas River that is then distributed into the water reticulation system of Surabaya was clearly demonstrated. Many samples in the distribution system were observed to be chronically chemically toxic. This is a major indicator for planning of future treatment infrastructure and is contrary to current beliefs as to the safety of the water in the reticulation system and the adequacy of the treatment process. This is a typical misconception that deems water to be safe if it can be shown to be free of pathogens. The water in the reticulation system was shown in some locations to be more chemically toxic than secondary treated effluent from a wastewater treatment plant in Melbourne, Australia. This is disturbing but perhaps not surprising given that the feed to the treatment process is in the lower reaches of the river and almost 20 million people inhabit the basin, with limited waste water treatment. The use of standard treatment processes for the production of water for human consumption from a highly contaminated feed source was shown to be highly inadequate.



The socio-economic impacts of floods on Jakarta

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PROJECT SUMMARY

As a city located in a low-lying area, with about a seven-metre elevation and with 13 rivers crossing it, Jakarta is incredibly susceptible to flooding.

The incidents occur annually, affecting a significant number of its residents. The National Development Planning Agency reported that the flood of 2007 submerged about 70 per cent of the city and no fewer than 140,000 houses. It is estimated that the loss occurring from flooding in 2007 reached Rp5.16 trillion.

The Jakarta government has implemented a number of initiatives to mitigate flood disaster risks. Despite these, flooding remains an issue for the city. This is mostly due to the persistent problems of inadequate infrastructure and unabated growth in the capital of one of Asia's fastest-growing economies. Additionally, the cost of the projects required to mitigate floods in Jakarta is not trivial. Thus, reducing flood risks in Jakarta remains a challenge to be tackled by the Indonesian government as a key priority within disaster management. Civil society and the private sector also need to contribute in reducing the impact of flood risks in Jakarta. To encourage them to participate, and enable them to effectively contribute, information on the socio-economic impacts of flooding on households needs to be available to them.

This project aimed to provide a comprehensive understanding of the profound economic and social impacts of floods on individuals and communities. Thus, this study contributed to a body of knowledge that informs development policy, potentially leading to more effective use of foreign aid funds and to promote a more prosperous, safer region.

The project conducted a household survey to collect data on the socio-economic impact of flooding in Jakarta. The questionnaire was developed corresponding to the results from in-depth interviews and literature reviews that were performed at the beginning of the study. Computer-assisted personal interviews developed by the World Bank's Survey Solution were used, instead of a conventional paper-based survey.

To ensure the quality and validity of the data, this survey employed random sampling methods. Flooding map data from the National Board for Disaster Management was also used to obtain information on regions that flooded every year, sometime flooded and never flooded in Jakarta. In total, 1119 household surveys in Jakarta were received. Further visits were conducted to these households to get information on the socioeconomic impact of floods.

The research found some indication that households with higher income/expenditure are less likely to experience flooding. The lowest flooding frequency occurred to those who owned their own homes. A diminishing pattern of flooding frequency also appear on the indicator of electricity power. The better the power supply installed in the house, the less likely the household is to experience a flooding incident. Households with their own sanitary facilities experience fewer floodings than households without.

Given that less wealthy households tend to experience flooding incidence is worrying, as households with no sanitary facilities are vulnerable to illness caused by flooding. The same pattern is also seen with regard to food security issues. Although the survey only captured a limited number of households with food-security problems, most of them were also facing flooding problems, resulting in their condition being even more worrying.

The impact of flooding can take various forms, such as asset damage, activities and livelihood disturbance, and health problems. Results showed that two-thirds of residents have suffered power blackouts and disruption to daily activities, such as working, schooling and in-house activities, during flooding. Half of them have also experienced water supply problems; only about 20 per cent of them have suffered disease or have been evacuated. We found that 15 per cent of households perceive that they are not disturbed during flooding.

Flooding also caused households to spend more. About 60 per cent of the victims stated that they had to spend more on food and beverages, sanitary supplies and equipment to clean out flooding debris, such as mud and garbage.

In terms of damage to buildings, around half of the victims pointed out that the flooding causes damage to the walls, making them damp and mouldy. In the long run, this could lead to various health problems. A quarter of them stated that the flooding did not cause any damage to the building.

Interestingly, three-fifths of flood victims said that they do not have any specific plan to reduce the risk of flooding; in other words, in the future, these households would do nothing about facing the flooding.

RESULTS AND ACHIEVEMENTS

Respondents were asked whether they would be willing to participate in the flooding index insurance scheme and an anti-flooding program. The former is insurance providing an amount of money if the flooding level exceeds a particular standard at the river dam. The latter is a government program that guarantees that no flooding will occur in the future.

Most people are willing to take out insurance if the starting price is Rp10,000 per month. The majority of the respondents are still willing to pay for it even at double that price. The pattern is almost the same for the anti-flooding program. Most people are willing to pay the premium if the price is set at between Rp20,000 to Rp100,000 per month. While households are at risk of flooding, it seems that they tend to do nothing and accept it as a common event. Educational programs on flood mitigation and adaptation are needed to help them to cope with flooding.



A socio-technical investigation of Jakarta's opportunity for leapfrogging towards sustainable water management

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PROJECT SUMMARY

As Indonesian and Australian cities look to transition towards water sensitivity, there are significant lessons to be learned and shared, creating partnerships that support leapfrogging towards sustainable urban water management.

The aim of this project was therefore to develop a socio-technical understanding of drivers, barriers and opportunities for water sensitivity in Jakarta to inform an agenda for collaborative interdisciplinary research to transform water management in Indonesia and Australia.

The project worked with three key main objectives:

- Analyse the current socio-technical water management practices in Greater Jakarta to identify the current state of Jakarta's water-management practice in relation to changing societal expectations around water supply, public health, flood protection, watershed management, environmental health, climate resilience and the upstream-downstream relationships of waterways.
- Investigate the potential for water-sensitive city principles to be applied in Jakarta in consideration of its local context. Understanding the local context and the characteristics of Jakarta's water system in relation to the water-sensitive city principles is critical to identify the desired processes and pathways for leapfrogging.
- Scope the agenda for a collaborative interdisciplinary research program for advancing water-sensitive management practices in Indonesian and Australian cities. Supporting Australia's and Indonesia's transition towards water-sensitive cities will require significant knowledge gaps across each of these areas to be addressed through interdisciplinary research that is scoped with reference to empirical evidence from both countries.

- The project was conducted in two phases. The first involved a scoping study carried out by Monash and IPB researchers. Data was collected through literature review, desktop analysis, site visits and interviews with local stakeholders. These were analysed to develop a background report that informs the second phase of the project, which involves the second phase of the project, which was a two-day stakeholder workshop, co-hosted by the AIC, Monash University, IPB, the Indonesian Academy of Sciences (AIP), and the Academy of Technological Sciences and Engineering (ATSE) in Jakarta, Indonesia. A broad group of approximately 60 academic, government, industry and civil society participants attended the workshop.

The activities undertaken in this project have established strong partnerships among the participating research institutes and stakeholder organisations for undertaking further collaborative research towards the water-sensitive cities agenda.

Managing water infrastructure to ensure adequate supply and sanitation services, minimise flooding and support healthy environments is challenging, especially with increasing urbanisation and climate change impacts. The concept of ‘water-sensitive cities’ is emerging in response, offering water management principles for enhancing urban liveability, sustainability and resilience. As Indonesian and Australian cities look to transition towards water sensitivity, there are significant lessons to be learned and shared. This project developed a socio-technical understanding of drivers, barriers and opportunities for water sensitivity in Jakarta to inform an important first step in developing an agenda for interdisciplinary research.

A range of technical, social and institutional challenges are currently perceived to inhibit Jabodetabek’s advancement towards more water-sensitive practices. Prior to the commencement of the workshop, the socio-technical analysis provided a context and explanation of some of the urban water challenges faced in Jabodetabek.

The factor most widely regarded as limiting advancement towards a more sustainable urban water management is limited co-ordination and integration in policy and governance arrangements. An example of this is the lack of regulation in land use change, despite the lack of coherence between the national masterplan and the local Jabodetabek masterplan, as well as the lack of synergy with local developer objectives.

The workshop also identified that the drivers for change are not evident to the community, thus, there is a lack of water literacy and participation in the community. The low community involvement is perceived to be a significant challenge in creating the momentum to move towards water sensitivity. Another challenge identified in the workshop is the lack of access to clean water and sanitation. According to the scoping study, an off-site sewerage system only covers around three per cent of the area in Jakarta. Poor wastewater and solid waste management leads to two major challenges: poor public health and inequality.

RESULTS AND ACHIEVEMENTS

For the people of Jabodetabek, a major challenge the government needs to tackle is degraded infrastructure, inadequate maintenance regimes and climatic pressures. The water-sensitive city can be described by three pillars of practice (Wong and Brown, 2009), which collectively enhance urban liveability, sustainability and resilience:

- Cities as water supply catchments, in which all the available water resources within an urban footprint are considered valuable supply sources and infrastructure systems integrate both centralised and decentralised technologies to utilise these resources at different scales.
- Cities providing ecosystem services, in which water infrastructure and the urban landscape are designed both functionally and aesthetically.
- Cities with water-conscious citizens and communities, in which people appreciate the many values of water, feel connected to their local water environments and engage in water-conscious behaviour.

For Jabodetabek to leapfrog towards being a water-sensitive city requires the general principles to be translated to have specific meaning and relevance for its unique ecological, geographical, cultural and institutional context. When considered against the three pillars of a water-sensitive city, the workshop participants identified the following practices and visions required to achieve this:

- While technological solutions are needed, most of the underpinning factors are largely focused around new methods of water governance that involve capacity building, equitable decision-making processes and increased collaboration among water managers and users.
- Less-industrialised countries such as Indonesia provide more flexibility towards a solution as their infrastructure and institutions are not as established. This is why cities in industrialised countries are more well-placed to leapfrog directly to a sustainable urban water system.
- The project identified key dimensions that will be important in developing further collaborative Australia-Indonesia programs for following these pathways to advance water-sensitive technologies and practices.



Health

Innovative approaches to address primary prevention of Non-Communicable Diseases.



Maintaining the health and wellbeing of young people is of paramount importance to a society's sustainable growth and advancement. **Investing in human capital should always go hand-in-hand with the building of infrastructure and markets, and will be the key to Indonesia's success in this century;** it will be just as vital for Australia's continued growth.

The great challenge facing both countries will be preventing illness, disability and premature death from non-communicable diseases (NCDs). The World Health Organisation estimates such diseases are responsible for 71 per cent of worldwide deaths each year, and has declared them the second greatest threat to global health, behind only pollution and climate change.

The focus on NCDs has traditionally been the burden of heart disease, diabetes, chronic lung disease, cancer and obesity. Mental health conditions, however, are increasingly understood to be highly significant diseases that have historically received less research and policy attention, especially in low- and middle-income countries.

Non-communicable diseases, including mental health conditions, are the leading cause of illness and premature death in Indonesia, Australia and around the world. They also come at a significant economic cost, with estimates that US\$7 trillion will be lost in low and middle-income countries alone between 2011 and 2025. In Indonesia, the majority of the public health insurance scheme is spent on NCDs. Compounding these costs are the prolonged social impacts of preventable early deaths, disability and illness.

To combat the rising epidemic of NCDs, the Health Cluster has concentrated on research into innovative approaches to frontline primary prevention in children and adolescents. The focus of projects over the past two years includes:

- Primary prevention: Prevention is better than cure – and far more cost effective than the screening, diagnosis, or management of NCDs.
- Improving risk factors: Eliminating one risky behaviour can reduce the rates of multiple conditions – for example, smoking is linked to heart disease, chronic lung disease and cancer. Risk factors such as smoking, poor nutrition choices, harmful use of alcohol and physical inactivity are also largely preventable.
- Early intervention: The most cost-effective investment is in early-life health. Interventions in childhood and adolescence can improve nutrition, increase physical activity, and help people avoid harmful substances in later life. Quality education is critical to future health and wellbeing, as are safe and engaging physical and social environments.
- Compounding benefits: We have helped build understanding that the benefits of early intervention extend beyond the current generation, with payoffs in adulthood and in ensuring that the next generation gets the healthiest start to life.
- Improving the quality of research and training: We have used new research methods, brought together new interdisciplinary teams, focused on knowledge transfer and helped build research management capabilities.
- Empowering young people: We have worked hard to engage young people as active participants in the research process, and to elevate their voices in research translation activities.
- Boosting capacity: We have worked across disciplines and sectors to maximise policy opportunities for effective actions on NCDs where children and young people live and learn.



PEOPLE

Health Cluster Leads



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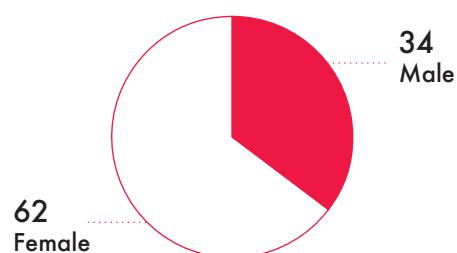
Co-ordinator



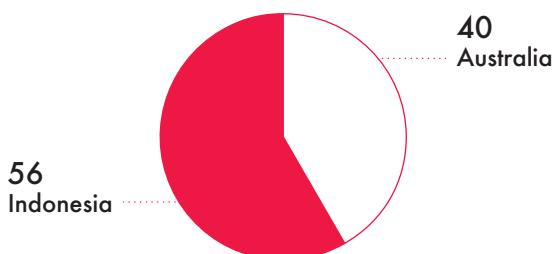
Christianne O'Donnell
The University of Melbourne

KEY STATISTICS

96
Total researchers



\$2M
Total investment





KEY ACHIEVEMENTS

- Creating a detailed Indonesian energy technology assessment (IETA) projecting the future cost of generating power via different technologies. The report will help planners and policymakers make informed decisions about the future of Indonesia's energy network. It was presented at a forum at the Australian Embassy Jakarta in 2018.
- Securing APEC funding for the project titled "Integrated energy system planning for equitable access to sustainable energy for remote communities in the APEC regions using North Sulawesi as a pilot project/testbed." Researchers from Monash, Institut Teknologi Bandung and Institut Pertanian Bogor are engaging with communities in North Sulawesi, City of Bitung and Universitas Sam Ratulangi to model a Low Carbon Model Town initiative.
- Attracting a \$100,000 commitment from CWP Renewables, a global company with business activities in both Australia and Indonesia.
- Working with the European Climate Foundation fund to develop a state-of-the art analysis of the renewable transformation potential for the Java-Bali power system.
- Building deep and lasting research networks between Australian and Indonesian academics and institutions.
- Evaluating the potential for biofuel use and production in Indonesia's future energy mix.
- Developing models for the design and installation of microgrids in remote communities, taking into account specific economic, social and cultural factors and examining the impacts of electrification.
- Creating robust models for the integration of clean-energy microgrids into large-scale transmission systems.
- Developing a novel method of measuring fouling on a ship's hull, a technology with the potential to deliver significant widespread economic and environmental benefits to the global transport industry.
- Evaluating options for large-scale generation and storage of renewable energy, including identification of potential pumped hydro energy storage sites and enumerating the benefits of deep decarbonisation of the Indonesian economy.
- Presentations to government and industry aim to shape policies and advance technologies to help reach Indonesia's renewable energy targets set by President Joko Widodo's government.



Evaluation of NCD risks, NCDs and NCD monitoring frameworks in Australia and Indonesia

RESEARCH TEAM

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Burnet Institute

A/PROF ANSARIADI

Head of Department of Epidemiology
Universitas Hasanuddin

PROJECT SUMMARY

Non-communicable diseases (NCDs) are now the leading cause of death and disability in Australia and Indonesia. Globally, up to 60-70 per cent of deaths are caused by largely preventable diseases.

NCDs represent a complex group of conditions that share the characteristics of chronicity and non-transmissibility; many are associated with significant stigma and are determined, to varying degrees, by living conditions and behaviours. Many NCDs are preventable through modification of risks and exposures in early life – for example, poor diet and tobacco smoking – and early detection and treatment of health risks such as hypertension, overweight and obesity.

Health policy in both Australia and Indonesia has included a focus on NCD (to varying degrees), however this has been predominantly focused on conditions arising during adulthood; we increasingly understand that NCDs impact across the whole life-course. NCDs that emerge in childhood and adolescence provide a particularly important target for intervention, as this can improve the health of young people now, their health as adults, and the health of the next generation. Strategies to reduce NCDs have been hampered by an inadequate definition of NCD. We now understand that NCDs extend beyond cardiovascular disease, stroke, diabetes and cancer (the typical focus of policy) to include other important conditions such as mental disorders.

The quality and availability of national health data on NCDs varies in both Australia and Indonesia. There are a range of agencies with valuable data collections, such as the Ministry of Health's RISKESDAS in Indonesia and National Health Survey from the Australian Bureau of Statistics. However, significant gaps exist in the frequency of data collection, the methodology employed, and the outcomes, risks, and determinants which are reported on. A reporting framework is generally defined as a group of indicators brought together to describe the status of a given population. A strong reporting framework accompanied by well-defined indicators provides the basis of accountability for NCDs in Australia and Indonesia.

The overarching aim of this project is to define a comprehensive reporting framework for NCDs in Australia that builds on those currently in use.

The specific objectives are to:

- Define a reporting framework for NCD outcomes, risks and determinants that is of specific public health and policy relevance to Australia and Indonesia, separately;
- Map data, assess the quality of currently collected data, and define clear indicators to apply to the reporting framework;
- Analyse the available data to describe a profile of NCD and its risks for Australia and Indonesia;
- In Australia: Consider what a NCD reporting framework for Aboriginal and Torres Strait Islander Australians might include; and
- In Indonesia: Consider sub-national variation in key NCDs.

The research developed a reporting framework for NCD outcomes, risks and determinants. The reporting framework was defined using a modified priority setting approach. For key age-groups across the life, the team defined the key NCD outcomes and risks by considering public health relevance and policy relevance. For NCD determinants we used the Commission on Social Determinants of Health (Closing the Gap in a Generation) to consider key determinants, and additionally consulted a broad range of stakeholders and reviewed current data collection systems. By exploring how the NCD framework could be populated by sound, nationally representative, data the research was able to come to the findings that;

NCDs extend beyond cardiovascular disease, diabetes, cancer and chronic respiratory disease (the traditional focus of policy). Reporting of NCDs in both Australia and Indonesia should include a focus on musculoskeletal disorders, poor mental health, neurological disease (including dementia), chronic skin conditions, vision and hearing defects, endocrine disorders and gynaecological conditions, given these all contribute to the burden of disease in both countries and are all to some degree preventable. Key to prevention in both countries is a measure of risk factors and determinants.

- NCDs occur across the life-course and not just in adulthood. NCDs that emerge in childhood and adolescence provide a particularly important target for intervention as this can improve the health of young people now, their health as adults, and the health of the next generation.
- Current data systems in Australia and Indonesia measure some, but not all, relevant NCDs, and do so across differing age groups. There is a need to continue to invest in objective measures, and extend this across the life-course in both countries. One area of strength in Australia, its cancer registry, could be an area of improvement for Indonesia. Inter-country collaboration to improve data collection methods for cancer in Indonesia could be an opportunity to extend data collection on key NCDs.

Indigenous Australians have a distinct profile of NCD – in general, NCDs occur earlier in the life-course and to a greater severity. There is a distinct policy context, and unique opportunities for response. As such, a distinct NCD reporting framework is required.

NCDs vary sub-nationally in Indonesia. Geographic health inequity across the archipelago requires regular monitoring in order to take advantage of unique opportunities to elicit change.

OUTCOMES

Conference presentations

[Presentation at Australian Association for Adolescent Health Conference 2018](#)

Policy briefs

[Measuring What Matters – Australia](#)

[Measuring What Matters – Indonesia](#)

Reports

[Towards a Comprehensive NCD Reporting Framework for Australia](#)

[Towards a Comprehensive NCD Reporting Framework for Indonesia](#)



Assessment of NCD risk factors in Indonesian adolescents

RESEARCH TEAM

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Burnet Institute

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Universitas Indonesia

PROJECT SUMMARY

There has been a significant global shift in the pattern of disease, with non-communicable diseases (NCDs) such as diabetes, cardiovascular disease and mental disorder now the prevailing cause of death and disability in most countries, including Indonesia.

Adolescents represent an important population group in terms of responding to NCDs for two reasons. Firstly, many of the risk factors for adult NCDs (such as tobacco use, physical inactivity and poor diet) arise and are potentially modifiable during adolescence. Secondly, adolescents experience a significant burden of preventable NCD, including mental disorder, asthma and chronic pain. As such, NCDs have implications for the health and wellbeing of adolescents, their longer-term health, and the health of the next generation. However, current global data collection systems (such as DHS and MICS) primarily focus on sexual and reproductive health risks and outcomes, without measuring the range of NCD risk factors and outcomes in adolescents. Where NCD data are collected (for example, the RISKESDAS survey in Indonesia), measures are often not specific to adolescent risk behaviour or outcome. A further challenge is that data for adolescents are typically collected from schools or home-based samples, and may therefore exclude young people who are at greatest risk of NCD – those who are disconnected from home or school. In many countries, such as Indonesia, the absence of these data contribute to a policy and practice gap.

This study aimed to fill key data gaps by measuring the prevalence of key NCD risk factors and outcomes among both school- and community-based adolescents in Indonesia. Additionally, it aimed to document the determinants that underpin NCD risks and outcomes, and explore how young people themselves perceive NCDs. To date, these have both been poorly explored, yet are critical to informing effective preventive and treatment interventions. Additionally, the study aimed to assess the prevalence of poor mental health (a key NCD outcome) and high body mass index (a key metabolic risk).

The study employed a sequential mixed-methods design. It included a formative qualitative phase comprising 16 focus group discussions (FGDs), followed by a quantitative component that included a cross-sectional survey, anthropometric measurements (height and weight) and biomarker assessment (including venous blood sampling to measure lipids, anaemia and blood pressure measurements).

We also validated the assessment of mental health using survey scales by including a psychiatric interview for a sub-sample in Jakarta.

The study was carried out in two purposively selected provinces in Indonesia. Jakarta was selected as it represents the most developed and populous province in Indonesia, while South Sulawesi (in the mountainous region on the western southern peninsula of Sulawesi island) was selected in order to sample adolescents living in more peri-urban and remote parts of Indonesia.

FINDINGS AND RECOMMENDATIONS

This is a large and complex study, but one that will serve as a rich platform to further advance our understanding of NCDs among adolescents in Indonesia. To date we have finalised all data collection, completed analysis of the qualitative data and commenced quantitative data analysis. We have focused our immediate efforts on the qualitative data analysis and interpretation, given this is critical to contextualising the quantitative analysis. The findings of this analysis also privilege the voice of young people (often not heard), and stand to make an important contribution to policy and practice in their own right. From these analyses, the research was able to arrive at the following recommendations:

- Given the burden and perceived severity of poor mental health and overweight/obesity among young people, there is a critical need to address these issues within Indonesia.

- Young people have a sophisticated understanding of the risk and protective factors associated with both mental health and high BMI, and should, therefore, be part of the solution.
- Given the substantial stigma associated with mental health and what appears to be low levels of mental health literacy, a multi-sectoral approach that includes the educational, health and community sectors is recommended.
- Mental health specialists need to work with religious leaders and communities to develop initiatives that reduce the stigma and discrimination associated with mental illness and mental health help-seeking.
- Initiatives aiming to reduce the risk of high BMI among Indonesian adolescents need to focus on addressing access to fresh food for young people, creating safe and accessible spaces for physical activity within urban settings, and making use of existing spaces within rural settings by implementing community-based physical activity programs.

OUTCOMES

Presentations

Presentation at the Indonesian Medical Education and Research Institute International Conference and Exhibition December 2017



Regional Initiatives: Building health and wellbeing in the first 1000 days

RESEARCH TEAM

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The University of Melbourne

DR INDAH WIDYAHENING
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Universitas Indonesia

PROJECT SUMMARY

Indigenous infants in Australia and Indonesia can benefit from early life health and wellbeing strategies that are culturally protective, place-based and community driven.

Approaches that start from the parents' adolescence and that support and build the roles of both male and female carers, especially in terms of mothers' mental health, will strengthen foundations for Indigenous children so that they are able to grow and thrive.

This project examined the holistic prevention of non-communicable diseases (NCDs). It focused particularly on a child's first 1000 days of life – from conception to age two – and on families in the Indigenous communities of Australia and Indonesia.

The University of Melbourne, First 1000 Days Australia, Universitas Indonesia and Universitas Pertanian Bogor were key partners in the study, which brought together 50 health workers, policy makers and government and NGO representatives for two roundtables – one in Indonesia, one in Australia.

Both Indonesia and Australia are home to many different Indigenous groups, speaking hundreds of languages and each valuing their diversity of culture and history. In Indonesia, unlike in Australia, the definition of 'Indigenous' is still contested; it remains difficult to define 'Indigenous' and simultaneously accept the ethnic and cultural diversity within the different groups and cultures.

Of primary importance within Indigenous communities in both countries are the strengths of community and family. If community and family are valued, strengthened and economically empowered, families will have what they need to bring up strong healthy children.

RECOMMENDATIONS

Participants concluded that the most important factors in a child's health and wellbeing are their parents having a strong foundation in health and family planning, quality learning opportunities, and empowered families and communities. The project's recommendations reinforce the need to take different cultural,

linguistic, and socioeconomic contexts into account when making decisions on policy, training and service provision for Indigenous infant health.

Greater understanding of communal living scenarios is needed. A broad, non-biological definition of family is crucial, inclusive of any and all immediate carers of a child. Families also need to be economically strengthened so they are able to enact their own agency.

More focus is called for on the mental health conditions faced by mothers before, during and after pregnancy. Also predominantly affecting women, and pregnant women even more so, is domestic violence. These two factors have a substantial influence during and after pregnancy, and need to be considered in any approach to combating NCDs. However, the First 1000 Days model should emphasise the positive impacts that valuing men as fathers, caregivers and role models has on the health and wellbeing of the child. KASIH, a program for supporting soon-to-be fathers in Jakarta, is already showing signs of popularity and success.

Programs for children prior to school and kindergarten have been shown to have immeasurable benefits, and there should be universal access to appropriate early learning resources. One recommendation is for the

development of culturally relevant assessment tools to ensure that developmental delays and other conditions are being noticed and responded to.

Increased adolescent education on the requirements for a healthy pregnancy, infancy and childhood, alongside skills, leadership and capacity building, will result in healthier parents and healthier children. There should also be further exploration of the various reasons (cultural, social and economic) for early marriage and sexual debut.

Solutions must be place-based and should strengthen the community through their process. This is, in part, to combat the separation from culture and identity caused by ongoing colonisation and dispossession of Indigenous communities. This includes exploring traditional practices that could help promote healthy practices and prevent NCDs, and employing innovative communication methods for reaching families who struggle with literacy or who live in remote areas.

OUTCOMES

Report

Regional Initiatives: Building Health and Wellbeing in the First 1000 Days



Improving nutritional outcomes in infants

RESEARCH TEAM

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The University of Sydney

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Universitas Airlangga

PROJECT SUMMARY

Feeding babies exclusively on breast milk until at least six months of age, and then continuing breastfeeding as other foods are introduced, is known to be the best possible nutritional start to life.

This pattern also reduces the chances of the child becoming obese, and lowers their risk of developing heart disease and diabetes later in life. Currently, however, formula milk is big business, and the product is aggressively marketed worldwide. This is in spite of efforts to restrict advertising under the World Health Organisation's International Code of Marketing of Breast-milk Substitutes, adopted in 1981. The issue is particularly challenging in low- and middle-income countries, where paying for a product rather than using a free natural alternative may be perceived positively by an aspirational population.

This project aimed to ascertain the extent of existing literature in both countries; to examine a snapshot of current advertising for formula milk; and to explore the impact of formula advertising on parents' and health professionals' attitudes and practices around infant feeding.

METHODS

The same study protocol was used in two sites (one urban and one rural) in Australia and four (two urban and two rural) in Indonesia. There were three phases to the study:

A literature review of Australian and Indonesian databases, looking for studies on the influence of formula advertising. This served as the literature review for the main study and was useful in identifying gaps in information available on, for example, exclusive breastfeeding rates in both countries.

A snapshot of formula advertising and availability in each study location. Surveillance in supermarkets and other locations recorded health and nutrition claims on packaging, price promotions and incentives for packaged infant foods, the display of infant foods and point-of-sale promotions, and co-located and co-branded formula milks for pregnant or nursing mothers or growing-up milks (those identified as for 12 months of age or more).

In-depth interviews with health professionals, mothers and community members in the chosen sites.

FINDINGS

Literature on the impact of advertising and marketing on infant feeding is generally of low quality in both Indonesia and Australia. There is evidence that formula milk companies incentivise staff in Indonesia through providing free samples, training sessions and the like. Providing information for staff also occurs in Australia, where there is work showing that women perceive any formula advertising (e.g. for follow-on milks) as advertisements for baby formula. There is great need for more sophisticated and high-quality studies to assess the impact of formula advertising.

In both Australia and Indonesia, formula milk is very easy to find. There is a wide range of products other than newborn infant milk – e.g. follow-on milks for toddlers, formula for pregnant and lactating mothers, and formula for the elderly. This may serve to normalise the product in the minds of the public.

Co-branding is very common, with newborn formula often packaged in exactly the same way as formula for older children. Code-compliant advertising for toddler milks can easily be interpreted as promoting newborn formula.

In Australia, the snapshot identified point-of-sale promotion, cross promotion, health claims, a telephone advice service provided by a manufacturer, and relationship marketing. In Indonesia, the snapshot identified point-of-sale promotions, gifts with purchase, volume sales incentives, cross promotion, health and nutrition claims, and aspirational presentation.

The main findings from health professional interviews were similar in both countries. They include:

- That health workers have limited access to independent information and education about formula milk.
- That in the absence of information, many health workers turn to advertising.
- That in Indonesia, some health workers promote or supply formula milk products personally (in their private practice).
- That in Australia, some health workers abandon parents to advertising messages.
- That when health workers have limited capacity to assess and rectify breastfeeding problems, formula milk offers a ‘low cost’ solution.

Interviews with mothers showed that:

- They need more support in breastfeeding, especially at the start.
- A lack of independent information about formula is a challenge.
- An evangelistic approach to breastfeeding (especially in Australia) may compromise the relationship between mothers and their health care workers.
- Mothers tended to ‘medicalise’ normal newborn issues – e.g. regarding posseting as reflux – suggesting that they are vulnerable to formula milk advertising that offers solutions.

OUTCOMES

Presentations

Presentation of results at 2nd Surabaya Breastfeeding Symposium November 2018



Parent support initiative needs assessment on early NCD prevention in adolescents

RESEARCH TEAM

A/PROF LENA SANCI
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DR BERNIE MEDISE
Paediatrician
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PROJECT SUMMARY

Indonesia is experiencing rapid change in the pattern of disease in the population as a result of the increasing rate of non-communicable diseases (NCDs). Adolescence is a critical period for encouraging the adoption of healthy lifestyle behaviours that will optimise prevention of NCDs across the life course. The quality of parenting is known to have a significant impact on developing healthy lifestyles.

However, there's a significant lack of support for parents of adolescents generally, let alone for parents of those with chronic illnesses or special needs. Despite having a large population of adolescents whose future health is at risk from factors such as smoking, poor diet, poor exercise habits, and an ignorance of mental health, there haven't been specific supportive parenting materials from the Indonesian Ministry of Health, which instead focuses on newborns and under-fives. There is also little information or discussion by Indonesian parents of what skills they feel they need, and how they might be interested in accessing parenting information.

This study is an important first effort to address this gap in parenting education and to move towards better understanding the role that parents might play around NCD prevention in adolescents. Our study focused on identifying the support needed to improve the skills of both parents of adolescents in general, and the parents of adolescents with chronic illnesses or special needs. We addressed four key aims through qualitative methods with two groups of parents (of adolescents in general, and parents of adolescents with chronic illness or special needs). This study aims to identify the knowledge and skills needed, potential barriers, and the best method of delivery of educational support for parents.

METHODS

The research conducted focus group discussions (FGDs) using a semi-structured interview with six groups of parents: four groups of parents with different demographic backgrounds; one group of parents of adolescents with chronic illnesses (e.g. thalassemia, cancer, diabetes mellitus type I); and one group of parents of adolescents with special needs (e.g. intellectual disability). For each group, a trained moderator conducted the discussion, assisted by a member of the research team to take notes and ensure that all points were covered. An anonymous questionnaire was completed by each parent at the time of the

discussion to access personal and parenting-style data. We undertook discussions with parents from both rural and urban settings. The rural setting had two groups: one on Java island (Serang, Banten Province); and one outside of Java (Padang, West Sumatra). The urban setting, Jakarta, also had two groups: from lower and higher socioeconomic backgrounds. Groups of parents of adolescents with chronic illnesses and special needs were gathered from Cipto Mangunkusumo Hospital, Jakarta. Each group consisted of five to 10 parents, and each spouse was counted as individual representation to gain more individual insight around the issues.

The discussions covered a range of topics: parenting issues in general; changes and challenges of parenting in the transition from childhood to adolescence; knowledge of NCDs and preventions; difficulties parenting adolescent children in general; strategies on developing healthy behavior and incorporating healthy lifestyle in daily living; obtaining parenting support from families, communities or professionals; the knowledge and skills needed to help adolescents adopt healthy behaviours needed for NCD prevention; and, whether they were interested in more information about parenting, and their preferred format to access that information (e.g. parenting group, app, website, etc). All discussions were audio-recorded and transcribed for content and thematic analysis. Themes were compared across the four demographic areas to determine any similarities or differences in needs.

FINDINGS

The parents from lower socioeconomic backgrounds were found to have challenges in communicating with their adolescents and a lack of knowledge of NCD prevention and healthy behavior (most fathers were smokers). Most had no boundaries for gadget use, encouraged underage (unlicensed) motorbike riding and had less priority for healthy food. “I need support to know how to deal with adolescents; I need the knowledge about adolescence and health,” one parent said.

Meanwhile, parents from higher socioeconomic backgrounds had more challenges in controlling the use of technology, although they had set limits on gadget use. “I still need support for parenting to teen, especially how to equip them to resist bad influence and how to develop good communication habit,” one said.

Those whose children had chronic illnesses said, “It is easier to implement healthy lifestyle after my child was diagnosed to have chronic disease. Our family is also more inclined to commit a healthier lifestyle.”

The parents of adolescents with special needs had more problems dealing with puberty and more concern about their adolescent’s independence and the impact of stigma on adolescent wellbeing.

Parenting support programs that provide basic knowledge and skills on parenting adolescents are needed. There were two methods mentioned by parents: interactive and practical mobile applications, and offline support programs through existing community-based activity. There was more support for online programs.

CONCLUSION

Parents most needed basic information about understanding adolescence, communication skills and puberty. Although knowledge, attitude and practice around NCD prevention were not good enough, NCD has not become a priority issue in parenting adolescents in general. Support programs are needed by all kinds of parents, especially those from lower socioeconomic backgrounds and parents of children with special needs. An online support program was preferable across all socioeconomic backgrounds.

OUTCOMES

Paper presentation in Annual Scientific Meeting of Indonesian Pediatric Society in 2019



Needs assessment of health professionals and medical students in communicating with adolescents about prevention of NCDs

RESEARCH TEAM

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PROJECT SUMMARY

Given the increasing burden of non-communicable diseases (NCDs) in Indonesia, early interventions such as enabling adolescents to develop healthy lifestyles are very important.

The role of primary healthcare is crucial in these interventions. Hence, students of medical and other health professions need skills in exploring the challenges faced by adolescents and in encouraging healthy lifestyles. The current curriculum of Indonesian medical and other health professional education has not emphasised adolescent health, especially in regard to NCD prevention. This project developed an instructional design for an elective adolescent health module for undergraduate medical students.

The greatest burden of disease for adolescents is psychosocial in nature. The antecedent lifestyle behaviours for adult NCDs most commonly begin during adolescence, and also some mental health issues. It follows that a focus on understanding adolescent health and development is required, with much benefit to be gained by appreciating the role and value of a team-based approach. The awareness that one professional, however skilled, cannot solve some health problems alone should be coupled with the skills to work in an interdisciplinary team. This requirement underlies the need to provide interprofessional education for every health professional student. Interprofessional education allows, in this case, medical students to understand and exercise healthcare team dynamics and management to deliver the best and safest integrated patient care.

METHOD

This project used qualitative and quantitative approaches. It began with needs analysis through a detailed review of the literature and currently available modules, interviewed related stakeholders, and held focus group discussions (FGDs) with relevant pioneers who have been working with adolescents around NCDs. It also used a questionnaire that evaluated students' insights into an elective adolescent health module.

FINDINGS

Based on the needs assessment, the adolescent health module is considered an important additional clinical module, especially regarding communication skills and motivational interviews. Students could benefit from motivational interview lessons, role-play, and actual interviews with adolescents. FGD and interview findings comprise several themes, such as the causes of adolescent health problems, measures taken and challenges faced in managing those problems, and standards of competence needed by healthcare practitioners. Educators are aware of the importance of teaching adolescent health to medical and health professional students. A thematic analysis subtheme was the importance of government regulation on adolescent health, and cross-sector collaboration involving educators in managing adolescent health problems. Good communication skills with teens and parents is a competency needed by doctors and other health practitioners that may lead to early detection, treatment and prevention of disease, and the promotion of good health. The questionnaire found most students considered adolescent health important and wanted to explore it further in clinical setting. Students prefer adolescent health being delivered through field activity (e.g. at school or primary health care), problem-based learning, and bedside teaching. Students' interest in adolescent health was found to be focused on promotive and preventive education. Key findings from the comprehensive needs analysis of the study were well triangulated and synthesized in the instructional design of an adolescent health elective module; hence, we believe that the module is evidence-based and well constructed. The module design seeks to guide medical faculty graduates and other health faculties' standards of competence in managing adolescent health problems.

Several aspects need to be considered in adolescent patients, including their physical and emotional condition, the phase of puberty, socioeconomic factors and support from family and surroundings. General practitioners and other health professionals need to explore more about adolescent health and adolescence itself.

This study developed an instructional design for an elective module on adolescent health for undergraduate medical education, which could be a pilot module for other universities. The module is designed to deliver specific communications skills and familiarity with adolescent health issues. It has an interprofessional education and practice component that is very enriching and may strengthen the positive attitude of undergraduate medical students towards interprofessional collaborative care, especially in regard to adolescent health. In the future, a multicentre implementation of this module could be conducted through a blended learning model involving face-to-face interaction and hands-on/practice-based activities in the clinical and community settings, as well as e-learning platform. The module highlights comprehensive and systematic needs analysis; hence, attempts for evidence-based module development are completed. Such practice may be disseminated as a scholarly result of the study and can be adopted by other universities attempting to implement evidence-based medical and health education.

OUTCOMES

Module

Instructional design draft for elective adolescent health clinical module

Fully refereed conference proceedings

Jamarin, V. (2019) Short communications: Development of adolescent health module in undergraduate medical education curriculum: exploration of stakeholders' views. in Asia Pacific Medical Education Conference, Singapore January 2019



Engaging primary care physicians in approaching adolescents for early prevention of NCDs

RESEARCH TEAM

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The University of Melbourne

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Associate Professor
Universitas Gadjah Mada

PROJECT SUMMARY

Adolescence is a period of life when the adoption of healthy or unhealthy habits will significantly contribute to health in adulthood.
Adolescents have greater autonomy and responsibility for physical activity and eating habits than younger children, but do not automatically develop the skills and behaviours that support healthy choices.

Primary care physicians (PCPs) play a major role in tackling adolescent health, as they are the health care providers that adolescents are most likely to visit. However, adolescent visit rates in Indonesia are still low and very few programs are available to support PCP involvement in adolescent health.

This project aimed to develop an acceptable and feasible educational initiative program for early prevention of non-communicable disease (NCDs) in adolescents. PCPs and related stakeholders in primary care were involved. This program was also embedded into the existing and well-known community and school working groups on adolescent health called 'Dokter Kecil' and 'Pos Bindu'. It is expected that the program could, in time, become sustainable because these two initiatives are fully supported by the Indonesian Department of Health and the Department of Education.

The objectives of this project were:

- To undertake a needs analysis of GPs and medical students about their self-perceived knowledge and skill gaps with adolescents, and to train them in undertaking a dietary and needs assessment, building relationships, communicating sensitively and dealing with adolescents from early adolescence (elementary-school children) to high school.
- To create, together with GPs and medical students, an educational initiatives program consisting of three educational initiative modules for early prevention of NCDs in adolescence.
- To pilot and evaluate the educational initiatives program with fifth-grade students via a 'Dokter Kecil' program, and with 11th-grade students via a 'Pos Bindu' program, in one elementary school and one high school in South Yogyakarta remote regency.

This project implemented action research principles in which key stakeholders (i.e. end users consisting of GPs, medical students, and adolescents) were involved in the development of the educational initiative program. This strategy is anticipated to enhance acceptability and applicability of the program. Furthermore, the educational programs were embedded into existing and well-known community and school working groups ‘Dokter Kecil’ and ‘Pos Bindu’.

Kolb’s experiential learning style theory was applied in the development of the educational modules. The theory is typically represented by a four-stage learning cycle: concrete experience; reflective observation of the new experience; abstract conceptualisation; and active experimentation. At the concrete experience, the key stakeholders (GPs, medical students, and SD/ SMK health cadres) are expected to have insight before developing the educational modules in preventing NCDs.

FINDINGS

Two modules on NCD prevention for both elementary and high school students were developed, consisting of the healthy lifestyle and smoking cessation modules. These modules were accepted by GPs and the local health department. Some suggestions have been made for follow-up developments, such as combining the activities under both the health and education departments, and involving cadres in primary care settings.

RECOMMENDATION

A scaling-up study is needed to appropriately implement the modules in schools. The involvement of health cadres is desirable to provide more comprehensive implementation in the community. The future development of modules should also cover the topics of mental health, injury and prevention of infectious diseases.

OUTCOMES

Claramita, M., Sanci, L., Syah, Nur Afrainin; Hilman, Oryzati; Ekawati, Fitriana Murriya (2018): Remaja Hebat Peduli Sehat Bersama Posbindu.

<https://doi.org/10.26180/5b610e6fcb9cb>

Manuals

[Aku Generasi Sehat: Pesan dari Doktor Kecil](#)

[Remaja Sehat Peduli Sehat Bersama Posbindu](#)

Videos

[NCD Prevention](#)

[Healthy Achievers Without Smoking](#)

[Increasing vegetable intake](#)

[Memberdayakan Remaja dan Dokter Untuk #BeatNCDs / Empowering GPs and students to #BeatNCDs \[IN + EN\]](#)



Breaking the chain of tobacco smoking by Generation Z by changing the perspective of school students

RESEARCH TEAM

HASNA PRADITYAS

Program Director
Smoke-Free Agents

PROJECT SUMMARY

Tobacco is a leading cause of non-communicable disease (NCD) in Indonesia. Every year, according to the Tobacco Atlas, more than 220,000 people die from smoking-related diseases in Indonesia.

There are an estimated two million youth smokers in Indonesia – around one in five students. The lack of early education on the harms of tobacco is a problem. Students smoke because of peer pressure and tobacco advertising, which is still not banned in Indonesia. Children can be exposed to tobacco advertising both offline and online. Law enforcement is still weak, with many violations of tobacco-free rules in public areas or even inside schools. The majority of students are exposed to smoking in their homes and public places.

Smoke-Free Agents educates Generation Z students (those born from 1998 to 2010) about the importance of making healthy choices from a young age and living tobacco-free. Generation Z is a target of the tobacco industry's marketing, and students need to be aware. In an era of easy internet access, students do not always know which information is right or wrong. The GEN-Z PINTAR (Indonesian Tobacco-Free Students) program helps students to make better choices, including about what they will consume. Young people are encouraged to use their creativity and influence to end tobacco use by being peer educators and smoke-free advocates. GEN-Z PINTAR encourages them to be a part of the tobacco-free generation and not become 'replacement smokers'. GEN-Z PINTAR builds students' character to be the generation that dares to speak up and make a change.

Tobacco advertising is one of the factors that convinces children to smoke. Research shows that exposure to tobacco advertising and promotion from a young age will increase the positive perception of tobacco or smoking, and encourage young people to continue smoking or relapse after initially attempting to quit.

This research presented the results of a survey of students from three selected schools in Jakarta, completed from May 2018. It surveyed 83 students aged 13 to 17 from one middle public school, one vocational school, and one middle private school. The surveys were done before and after students joined the GEN-Z PINTAR program for three hours in class.

By law, schools are supposed to be free of smoking, cigarette sales and advertising or promotion. This report shows that students at the schools surveyed were still exposed to tobacco advertising and their knowledge of tobacco is doubtful, especially of tobacco advertising and industry tactics to lure new customers.

The PINTAR intervention in the schools includes defining students' motivation and goals, explaining tobacco advertising and how Generation Z is targeted as new consumers, the psychological effect of advertising, knowing the truth about cigarettes, and debunking the myth of tobacco's contribution to national economy and social welfare.

This project found that 100 per cent of students understood the harms of smoking and it that it becomes a long-term addiction. But many students did not know the harms of tobacco advertising. They also still believed that the tobacco industry was a benefit to the country, with 78 per cent saying they did not know that the loss to the economy caused by smoking was higher than the income from the tobacco industry. Meanwhile, 22 per cent of students also thought that tobacco was a part of Indonesian culture. Moreover, 54 per cent of students did not notice forms of tobacco promotion including music, scholarship and sport sponsorship. Students also acknowledged that they were exposed to tobacco advertising when surfing the internet.

After the GEN Z PINTAR presentation, their disagreement with tobacco marketing increased. They disagreed that tobacco should be advertised on television (93 per cent), outdoors (95 per cent), in music and sport (88 per cent),

and education and scholarship (90 per cent). The method of discrediting tobacco was successful, with 95 per cent of students saying that smoking is uncool. Despite the messages of the tobacco advertising and promotion they were exposed to, 96 per cent of students agreed that the tobacco industry did not care about people's health and life. The GEN Z PINTAR program applied an interactive education method that focused on shaping students' perception of coolness, tobacco industry strategies, the impact of tobacco consumption and the economic burden in Indonesia.

This report shows that even though students got much of their information from the internet or other resources, tobacco advertising could not be avoided. Their acceptance of the normality of tobacco products and advertising was still high, but intervention and education helped change attitudes to tobacco.

OUTCOMES

2 Modules of GEN-Z PINTAR (Pelajar Indonesia Tanpa Rokok/ Indonesian Tobacco-Free Students)

Souvenirs for schools and students (tumbler, block note, stickers, certificates)

Video and photos recap of school

Declaration posters of the signatures of students and school teachers

One-page report of the GEN-Z PINTAR result



De-normalising smoking among youths: a school-based smoking prevention program

RESEARCH TEAM

ANINDITA SITEPU

Program Director
Center for Indonesia's Strategic Development Initiatives

PROJECT SUMMARY

The high rate of adolescent smoking has become one of the major concerns for tobacco control in Indonesia. The Global Youth Tobacco Survey (GYTS) indicated that Indonesia has one of the highest numbers of adolescent smokers in the world.

Students' exposure to smoking activity is very high, either in the home or in the school environment. Three out of five children aged 13 to 15 are exposed to cigarettes at home, with seven out of 10 children seeing smoking activity in their school environment. GYTS data also showed that three out of five children aged 13-15 years in Indonesia have seen cigarette advertisements in cigarette selling counters, and have been exposed to smoking activity at home or in public areas. The availability of tobacco products is also high in Indonesia, with three out of five children able to buy cigarettes in grocery stores and kiosks without being restricted. With such a high exposure and the ease of accessibility, it is no wonder that approximately 20 per cent of junior-high school teenagers, or one in five children aged 13-15 years in Indonesia, have ever smoked.

Due to the early age of tobacco uptake, youth is a critical period for targeting smoking prevention measures and beginning to decrease the high prevalence of tobacco use in Indonesia. In order to prevent youth tobacco use, a comprehensive tobacco control program requires a combination of educational, clinical, regulatory, economic and social strategies. School-based smoking prevention programs are considered to be among the most effective strategies for reducing initiation of adolescent smoking. Teachers have been shown to be a significant vanguard population for tobacco control; they are an epitome of community norms and can be instrumental in school-based tobacco control programs.

The Center for Indonesia's Strategic Development Initiatives have a strong focus on health and youth-related issues. Considering the problems of youth smokers can affect healthy populations, CISDI developed a program that aimed to integrate a tobacco-smoking-harms education module into the current grade-seven curriculum at two targeted schools in Jakarta. CISDI aimed to improve the knowledge of junior high school students about the adverse effects of smoking and to provide them with several soft skills to influence attitudes, which may help to decrease their desire and intention to smoke.

This project consisted of a classroom management strategy, which provides an enhanced academic curriculum designed to improve knowledge about the health risks of smoking, as well as a youth-led workshop designed to build and improve soft skills among students in order to decrease early initiation smoking. The study found most students (78.4 per cent) started smoking when they were younger than 12 years old. The prevalence of self-reported tobacco or e-cigarette users in the current academic year was 26.05 per cent, with 8.45 per cent current smokers. Of past users, 12 per cent have tried an electronic cigarette (e-cigarette).

CISDI, in collaboration with volunteers and education consultants, conducted a literature review on the existing Junior high school education syllabus to formulate an integrative module. We analysed smoke-free issues that would best fit with the syllabus and, based on this analysis, came up with five units of study and three smoke-free issues. The issues deemed relevant were smoke-free areas, the dangerous impact of tobacco, and tobacco advertisements. These issues were integrated into social studies, science, maths, language and civil education.

The module was implemented for five weeks at SMP 97 and SMP 7 in Central Jakarta. Nine teachers delivered smoke-free education through five units of study to 142 students in the seventh grade to build stronger knowledge and attitudes towards smoke-free behavior.

- This project integrated the negative effects of smoking into the curriculum of junior high school students in grade seven. This content was integrated into five subjects.
- The first stage was volunteer capacity building to assist the process of module preparation and implementation.
- The second phase integrated the modules that had been prepared based on the topic of the subject. Modules were implemented by teachers who have been given previous training.
- Third stage was soft skill training to improve student attitudes toward smoking behavior.

Cigarette consumption in Indonesia has reached an epidemic level that threatens its population, particularly its younger generation. High exposure to cigarette advertisements and smoking from an early age plays a significant role in creating positive perceptions of smoking activity. While nearly 70 per cent of students are informed about the dangers of smoking in schools, there are a limited number of formal smoking prevention programs implemented within schools in Indonesia.

The broader impact of this project is the experience of integrating cigarette education information within the school curriculum in Jakarta. Previous approaches have only integrated the information into science subjects, whereas this project expanded the number of subjects embedding the tobacco information. The practice has brought new experiences and knowledge in tobacco control in Indonesia, both in methods and content. In May, the results of this project were presented at the Indonesian Conference on Tobacco Control or Health in Surabaya, where many delegates appreciated it and proposed collaborations for module development and subsequent implementation.

OUTCOMES

Module

'Progresif' Module : Integration of a tobacco-smoking-harms education module into Junior high school (SMP) curriculum; 2018; CISDI: Jakarta

Presentations

Abstract entitled 'PROGRESIF: An innovative approach on school-based tobacco control intervention through integrated module' was presented to the 5th Indonesia conference on Tobacco or Health (ICTOH), May 2018, Surabaya, Indonesia

'Increasing student's knowledge and attitude on smoking hazard through PROGRESIF' presented to the 5th Indonesia conference on Tobacco or Health (ICTOH), May 2018, Surabaya, Indonesia, and Asia Pacific Conference on Tobacco or Health (APACT) 12, Bali, September 2018



Collecting minimally sufficient data on child and adolescent mental health disorders in Indonesia

RESEARCH TEAM

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PROJECT SUMMARY

Adolescence is the usual time of onset of most major mental disorders. Despite this, there is insufficient information on the subject to allow policy-makers in many low and middle income countries to effectively set priorities and guide investments.

This project aimed to evaluate the availability of minimally sufficient data on major mental and behavioural problems in Indonesia and other countries in the Southeast Asia region. It also examined the range of existing studies that could inform preventive action, in order to determine which risk factors should be prioritised in data collection and mental health policies in Indonesia.

Further objectives were to establish contacts with leading experts on adolescent mental health globally, engage with both academic and civil society partners in Indonesia and develop a proposal for collecting minimally sufficient data on mental disorders in Indonesia.

The work was split into two smaller projects. The first analysed the available prevalence data for child and adolescent mental disorders. The data were sourced from systematic reviews conducted for the Global Burden of Disease Study 2017. Coverage was calculated for each study and country, and the region.

It was found that the coverage of prevalence data for mental disorders in children and adolescents was 4.9 per cent for Southeast Asia. Depression had the highest coverage (3.1 per cent) while eating disorders had no available prevalence data. Of the 13 countries in Southeast Asia, only eight had any prevalence data for mental disorders in children and adolescents and only three had data for more than one disorder. Malaysia had the greatest coverage (9 per cent) while Sri Lanka (less than 0.01 per cent) had the lowest coverage of countries with available data. Coverage has increased since similar analyses were conducted on data available from GBD 2013 (0.3 per cent). However, coverage remains low compared to other nearby countries such as Australia, which had an average coverage of 69.1 per cent.

Indonesia has effectively no data coverage for child and adolescent mental disorders. This carries a number of implications:

- Difficulty in planning service and efficiently allocating resources for child and adolescent mental health policy and programming.
- Difficulty highlighting mental health as an area for investment by the Indonesian government or other stakeholders.
- Inability to determine whether existing programs or policies may have been effective in reducing the burden of mental disorders.

Work is currently underway to address these gaps through upcoming National Adolescent Mental Health Surveys in Indonesia and Vietnam.

The second part of the project mapped evidence gaps in the study of risk factors for depression and anxiety disorders in low and middle income countries, particularly those relevant to Indonesia. We used a review of reviews methodology to identify primary studies, and analysed every available study on risk factors for those aged 5 to 24 years for all country income groupings. We classified studies by design, place, age group, diagnosis and risk factors assessed.

Notable findings included:

- From the 289 studies of risk factors for major mental disorders in children and adolescents, the overwhelming majority (70 per cent) have been in high-income countries. There have been only 22 studies (8 per cent) in low and lower middle income countries

- The most commonly studied problems have been conduct disorder in younger children, followed by anxiety and depression
- Family risk factors, including a family history of mental disorder, have been the most studied group of risk factors. Again, the great majority of relevant studies have been in high income settings.
- Other risk factors with multiple studies include educational attainment and exposure to natural disasters. Surprisingly, these studies have all taken place in high and upper middle income countries.

We concluded that there is a rationale for undertaking a full-scale gap map of risk factors for some mental disorders, and that there is a strong case for examining existing cohort studies in low income countries to explore the availability of risk factors and relevant mental health outcomes.

We also concluded that new studies should be extending the range of risk factors examined in their work, and that there is a need for population-based surveys and cohort studies in Indonesia to examine not just the prevalence of common mental disorders, but also risk factors that are relevant for that setting.

OUTCOMES

Articles

[Roundtable feeds building momentum for better mental health and wellbeing in Indonesia](#)



Translation, cultural verification and formal validation of the Centre for Epidemiologic Studies Depression Scale – Revised (CESD-R) for young people in Indonesia

RESEARCH TEAM

PROF JANE FISHER

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DR FRANSISKA KALIGIS

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PROJECT SUMMARY

Mental health problems among young people are a major public health concern in every country. Worldwide, it is estimated that about one in five adolescents experience a mental health problem annually, but rates are higher in low- and middle-income than in high-income countries.

Modelled estimates available from the Global Burden of Disease 2015 study show that mental disorder peaks during adolescence in Indonesia, with these disorders contributing 15 per cent of the total disease burden experienced by this age group.

Reliable and valid psychometric instruments for early detection and to establish population burden and distribution within communities are crucial for effective clinical and public health responses. Most instruments to detect symptoms of mental disorders have been developed and their psychometric properties established in high-income, English-speaking countries. When applied in low- and middle-income countries to groups who speak languages other than English, have a diversity in emotional lexicons or differing familiarity with test-taking, these instruments cannot be assumed to have the same cut-off points to detect clinically significant symptoms or other psychometric properties as among those in the original populations. It is therefore essential to establish the reliability and validity of any psychometric instrument before its use in a new setting. To date, there is no locally validated instrument for screening for common mental disorders among young people in Indonesia. This project aimed to provide a reliable and valid instrument for screening for common mental disorders among young people in Indonesia.

METHOD

This nested sub-study had two inter-linked components. Component one was the translation, cultural verification and pilot-testing of the Centre for Epidemiologic Studies Depression Scale Revised (CESD-R) and the Kessler Psychological Distress Scale – 10 items (K10). We used a formal, documented, multi-stage method to translate and culturally verify the CESD-R and K10 for Indonesia.

Component two was a formal validation study to establish the local psychometric properties of these two scales among young people in Indonesia. The formal validation study was integrated into Project 4 data collection in the Jakarta schools. About 720 young people in Jakarta contributed data to Project 4 by completing a detailed self-report questionnaire that included the CESD-R and K10 Indonesian versions. We randomly selected a sub-sample of 196 students from those who had completed the questionnaires and invited them to complete brief individual diagnostic psychiatric interviews. The diagnostic MINI International Neuropsychiatric Interview for Children and Adolescents modules for major depressive episode, dysthymia, panic disorder, separation anxiety disorder and generalised anxiety disorder were administered by supervised Universitas Indonesia trainees in child and adolescent psychiatry or clinical psychology.

FINDINGS

The translated and culturally verified scales were found to be comprehensible, and meaningful to young people in Jakarta. The data revealed that the Indonesian versions of the CESD-R, K10, and the K6 (a subset of 6 items of K10) have good internal consistency. The CESD-R and the K10/K6 demonstrated good discriminant capacity to detect depression or any depressive or anxiety disorder among 16-18 year old Indonesian adolescents.

This study indicates that the CESD-R is a useful tool for screening for depression and both the K10 and K6 are useful for screening for any depressive or anxiety disorder among Indonesian adolescents. Depression and anxiety disorders commonly co-occur. These mental health problems share most risk factors. They should be addressed simultaneously, especially in primary health care. The K10 and K6 were designed to detect psychological distress as an indicator of either or both depression and anxiety. The results of this study suggest that both the K10 and K6 can be used to screen for any depressive or anxiety disorders, each with high sensitivity and specificity. The K6 is preferable for use in primary health care because it is shorter and has similar

good psychometric properties. The CESD-R was constructed to screen for depression only. It is longer than the K10/K6. We would not suggest CESD-R for use in primary health care but for programs or epidemiological studies that focus on depression among Indonesian adolescents.

The research has translated and culturally verified the CESD-R and the K10 and formally validated these tools against the Mini International Neuropsychiatric Interview for Children and Adolescents, a gold-standard structured diagnostic interview, among 196 young people in Jakarta. This is the first study to describe the performance and identify the optimal cut-off points of the CESD-R, K10 and K6 to detect depressive and anxiety disorders among adolescents in Indonesia. The data revealed that these scales have good internal consistency and discriminant ability to detect depression or any depression or anxiety disorders among 16- to 18-year-old Indonesian adolescents. This indicates that the CESD-R Indonesian version is a comprehensible and sensitive tool for screening for depression, and both the K10 and K6 Indonesian versions are comprehensible and sensitive tools for screening for any depression or anxiety disorder among young people in Indonesia.

OUTCOMES

Journal articles

Tran, T. D., Kaligis, F., Wiguna, T., Willenberg, L., Nguyen, H. T. M., Le, M., Luchters, S., Azzopardi, P., Fisher, J. (2019). Screening for depressive and anxiety disorders among adolescents in Indonesia: Formal validation of the centre for epidemiologic studies depression scale – revised and the Kessler psychological distress scale. *Journal of Affective Studies*, 246, 189-184. <https://doi.org/10.1016/j.jad.2018.12.042>

Article

[The Conversation: How we can help detect depression in our teens](#)



Cigarettes in small hands: Mapping cigarette retailers around children and adolescents in Denpasar, Indonesia

RESEARCH TEAM

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PROJECT SUMMARY

Tobacco consumption in Indonesia is among the highest in the world, with a staggering 61.4 million adult smokers.

Worryingly, the smoking population is not limited to adults; while two-thirds of Indonesia's adult male population smoke, one-third of boys aged 13-15 years are also smokers. The prevalence of smoking among those aged 10-14 years increased from 9 per cent in 1995 to 17.4 per cent in 2010. The growing number of young people smoking will have an impact on the future social and economic burden of chronic disease.

In December 2012, the Indonesian government issued a national regulation for tobacco control (regulation PP 109/2012). Most of the tobacco control measures it contained focus on addressing the demand side of tobacco control, with no apparent attempt, beyond prohibiting sales to minors, to address supply side issues. Indonesia is home to around 3,800 cigarette manufacturers, with overall retail volume as high as 238.9 million cigarettes a year in 2014. The ubiquitous presence of cigarette retailers, coupled with cheap cigarettes and the ability to purchase single stick cigarettes, renders young people vulnerable to tobacco industry targets.

This is the first study to provide visual mapping of cigarette retailer distribution in Indonesia. The study highlighted the high availability and accessibility of cigarettes by young people in Denpasar. The prevalence of cigarette retailers who also display extensive cigarette promotional materials and cigarette products exposes young people to tobacco brand imagery and the product itself. Moreover, the practice of selling cigarettes, including single sticks, to young people is common.

Smoking uptake among young people is partly attributed to tobacco promotions and cigarette retailer outlet density and proximity to schools and homes. Cigarette retailers present an effective promotional opportunity, right at the crucial time of purchase. In-store marketing increases the likelihood of smoking initiation among young people and hampers quitting attempts for existing smokers. Bans on point-of-sale promotions, including the display of tobacco products, has proven to be an effective measure to reduce smoking, especially among young people. Therefore,

to complement current tobacco control measures, efforts to address supply side issues by acknowledging the role of cigarette retailing in uptake and continued smoking need to be seriously considered by the government. The research team aimed to assess cigarette retailer distribution and retail tobacco promotion intensity in Denpasar, a provincial capital city in Indonesia. By doing this, the study aimed to map the existing distribution of cigarette retailers in Denpasar and cigarette advertisements and promotions at the tobacco retailer level, with particular attention to areas with a high concentration of children and adolescents. The study took place between October 2017 and March 2018.

METHOD

The project was conducted in two stages:

- Documenting and mapping cigarette retailers and schools in the City of Denpasar. The data collection was conducted with electronic checklist using open data kit (ODK).
- Auditing tobacco advertisements and promotion at 1,000 selected retailers. After randomly selecting 1,000 retailers from the list mapped in stage one, the team conducted an audit survey to document advertisements, promotions, prices and retailing behaviours. The audit comprised of observation accompanied by digital photo taking and structured interviews with a questionnaire.

FINDINGS

The research team mapped a total of 4114 cigarette retailers (excluding restaurants and hotels), finding a high cigarette retailer density of 32.2 outlets per square kilometre. The density was greater in more populated areas. There were about five tobacco retailers for every thousand people in Denpasar.

The majority of schools in Denpasar (367 out of 379) have at least one cigarette retailer within 250 metres, with two-thirds of schools having a retailer within 100 metres. On average, there were 10 cigarette retailers within 250 metres of each school, with one school having 44 retailers within the 250-metre radius.

The study documented a high intensity of cigarette advertisements, both in outside and inside retailers. Out of the 1,000 retailers audited, 674 displayed outdoor cigarette advertisements, and almost all retailers, 989 out of 1,000, displayed indoor ads, including cigarette displays at the point of sale. The most common form of outdoor advertisements were banners, with most of the retailers displaying cigarettes. More than half of the retailers at both kiosks and mini markets admitted selling cigarettes to young people, with retailers admitting to receiving incentives from the tobacco companies for cigarette sales and for displaying advertisements.

CONCLUSION

The omnipresence of cigarette retailers signifies that cigarettes are easily accessible and socially acceptable. A key success factor in tobacco control is changing social norms around cigarette use to ensure that smoking is viewed as unacceptable behavior, especially among young people. Many countries have adopted a total ban on tobacco advertisements, including those at the point of sale. An example of this is Australia, where cigarette advertisement is not allowed and cigarettes cannot be displayed at point of sale. These efforts have contributed to the steep decline in youth smoking in Australia.

The research team recommends that the Indonesian government urgently adopt a comprehensive tobacco advertising and promotions ban, including at the point of sale. Additionally, governments should prioritise the enforcement of the ban on cigarette sales to young people and the development of a legislative framework to reduce cigarette retailer density.

OUTCOMES

Report

'Cigarettes in Small Hands' The Australia-Indonesia Centre (2018) <https://doi.org/10.4225/03/5b160ad26c1a2>

Video

[Keeping Cigarettes out of Small Hands / Menjauhkan Rokok dari Tangan-Tangan Kecil \[IN + EN\]](#)



Understanding immune response to tuberculosis infection to help design new vaccines

RESEARCH TEAM

PROF WARWICK BRITTON
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A/PROF NING RINTISWATI
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PROJECT SUMMARY

This project sought to determine if the protein antigens in two candidate tuberculosis (TB) vaccines that are protective against experimental TB infection are recognised by the T cell immune responses in Indonesian TB patients.

This is an essential step in the selection of these vaccines for development as new TB vaccines. This was a collaboration between medical researchers at the University of Sydney and Universitas Gadjah Mada (UGM) to facilitate the transfer of immunological assays from Sydney to UGM.

Project objectives were:

- To establish immunological assay for the T cell recognition of *M. tuberculosis* protein antigens by TB patients in the TB laboratory at the Faculty of Medicine, UGM.
- To hold a workshop on tuberculosis research at UGM, focusing on the immune response to *M. tuberculosis* and development of new TB vaccines.
- To test the immune responses to *M. tuberculosis* protein antigens in TB patients and healthy endemic controls from the Provincial Lung Clinic.
- To determine if HIV co-infection in tuberculosis patients reduces the cell response to the *M. tuberculosis* protein antigens.

The aim of the study was to understand the human immune response to TB vaccine antigen candidates in the setting of a high TB burden country. This project successfully initiated a collaboration on TB research between the Sydney Medical School at the University of Sydney and the Center for Tropical Medicine, Faculty of Medicine, UGM. The transfer of two immunology assays, ELISA and ELISpot, was conducted by sending an Indonesian PhD student from the University of Sydney, Heni Muflihah, to establish the assays and train Indonesian scientists in UGM, Yogyakarta.

A study to understand the human immune response to TB and TB vaccine antigens was conducted in Yogyakarta. Two protein antigens, CysD and MPT83, were developed in The University of Sydney. Studies by Professor Britton and Triccas have demonstrated that TB vaccines based on these protein antigens induce partial protective immunity against *M. tuberculosis* infection in aerosol model of TB infection in mice. This study was to test the human responses to these proteins, including three additional *M. tuberculosis* recombinant protein antigens. The protocol ethics for this study were approved by the University of Sydney Human Ethics Committee (Project No.2015/346), and by the Medical and Health Research Ethics Committee, Faculty of Medicine UGM. The application for protocol ethics was prolonged, contributing to delayed initiation of the study.

The study started in October 2015 and was finished by August 2016. Of 76 recruited participants, 33 subjects were active TB patients, and 43 subjects were healthy controls. Venous blood was collected and peripheral blood mononuclear cells were isolated for testing response to TB vaccine antigen candidates by the two immunology assays, ELISA and ELISpot. The *M. tuberculosis* recombinant protein antigens tested in this study were CysD, MPT83, Ag85B, ESAT-6, and CFP-10.

FINDINGS

Generally, this study was able to measure the human immune response to TB vaccine candidates by ELISA. The responses to the antigens in active TB patients were similar to the response from healthy controls. Overall responses in the ELISpot assay were variable because reading the ELISpot plates by microscope in the field setting proved unreliable. The ELISpot technique requires an automated plate reader for accurate results.

Nevertheless, all five proteins tested were recognised by T cells from 40-50 per cent of active TB patients, including the two vaccine antigens, CysD and MPT83, developed at The University of Sydney. Future TB vaccines should use a combination of these antigens.

OUTCOMES

Workshop on tuberculosis research at Universitas Gadjah Mada in April 2015



Uncovering information on nutrition for school age children in Indonesia's linguistic landscape

RESEARCH TEAM

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The University of Sydney

DR SISILIA HALIMI
Manager for Cooperation, Ventures and
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PROJECT SUMMARY

Indonesia's landscapes are linguistically rich and frequently filled with visual signs and texts.

These include posters, charts, signs, billboards, road and safety signs, shop signs, graffiti and many other inscriptions in public spaces that convey messages to those who read them.

The purpose of this project was to digitally gather and analyse food/nutrition signs/texts in the 'linguistic landscapes' around two Indonesian school communities (inside and immediately outside the school perimeters). This was done to judge the nature of the linguistic landscape that has a likely potential impact on school-age children – children who need to learn about good food and nutrition for a long, healthy life.

The research was qualitative in design, and was undertaken in two stages. The first involved text capturing, text analysis and focus group interviews. Stage two was text/document analysis plus content analysis.

FINDINGS

Results showed that the linguistic landscape regarding food and nutrition inside school grounds was replete with texts and images from 'top-down' sources (policy, government communications, sponsors, food companies, curriculum materials, etc.) outlining a solid, informative, endorsed set of information about healthy food and nutrition. However, there was also photographic evidence of texts and images about 'not-so-healthy' food both inside and outside the school grounds, with no evidence of nutrition information. This may present a contradiction for the students. Gathered alongside the food and nutrition texts were unrelated images ranging from advertisements for local businesses to labels and, concerningly, cigarette advertising on local food stalls.

Grade-five students participated in small focus groups to provide reactions to the food and nutrition images shown to them by the research assistants in their school's linguistic landscape. Interestingly, the students volunteered parroted information about good and nutritious food that they have learned in class or at home, and were adamant in responding that they did not eat the candy readily available in the school's canteen or in food stalls outside the school grounds. Photographic evidence exists to the contrary, indicating that school canteens and local stalls were well patronised.

This research was a project of perceived value for education authorities in these two school districts, and is intended for upscaling to a project with a broader scope in the future.

CONCLUSION

This project produced informative data on linguistic landscapes in two of Indonesia's schooling communities, and the school children's awareness of the food and nutrition texts/messages directed at them as community participants and, in the case of advertising, consumers. Findings may be of interest to researchers from the food, agriculture, health or medicine sectors. Health or medical researchers in Indonesia will be able to compare their own findings with findings from this project, to gain greater insight into the impact of poor nutrition on school performance.



Household nutritional intake and trade reform in Indonesia

RESEARCH TEAM

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Universitas Indonesia

PROJECT SUMMARY

The debate on trade policy (in particular, trade liberalisation) has so far been limited to welfare measures in terms of contribution to economic growth, impacts on productivity, and wage skill premium, as well as to the distributional consequences of such policy in terms of who wins and who gains from it.

This project aimed to further this debate to the area of health. In particular, it explored how trade reform can affect household nutritional intake. In doing so, we studied the causality from trade exposure to attitude towards nutritional consumption, controlling for idiosyncratic factors in household as well as in regional levels.

The research aimed to investigate the extent to which trade reform (e.g. reduction in tariffs) has an impact on household health quality, as proxied by nutritional consumption. The project also explored the heterogeneity in district levels on household responses to central government policy.

The research took datasets from the Indonesian Socio-economic survey (SUSENAS) in 1999, 2005 and 2011 and analysed detailed household consumption patterns. The main method employed was the pseudo-panel approach to examine variations between and within different data periods and regional groupings (district level).

In particular, the research explored how different tariff regimes correlated with household nutritional intakes, or probabilities of a household being undernourished. The study then sought the extent to which causalities might exist. The working hypothesis of the research was that household exposure to trade (i.e. living in an environment where daily consumption is affected by prices in other countries) can influence how the members of a household behave in their consumption. This includes nutrition, hence affecting the state of health in the household.

We found an indication of negative correlation between tariffs in output markets and nutritional intake, but positive association between input tariffs and nutritional intake. The net effect will depend on the actual tariff imposed in either or both markets.





Universal Health Coverage for the informal sector

RESEARCH TEAM

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PROJECT SUMMARY

Indonesia introduced its National Social Health Insurance in January 2014, as a final phase in the transition to universal health coverage. The scheme relies on mandatory contributions for formal sector workers and subsidised premiums targeted to the poor.

However, about 60 percent of Indonesian households earn an income in the informal sector, of which roughly half will not be eligible for the subsidies and are expected to self-enrol.

To date, this program design has been ineffective in reaching the informal sector and achieving universal coverage. After one year, almost half the population had not enrolled. This is in line with international experiences, which find that it is extremely difficult to convince informal sector households to enrol voluntarily into health insurance without providing strong incentives. Yet, rigorous empirical evidence on the barriers to insurance uptake is scarce.

This study had four key objectives:

- Assess National Social Health Insurance enrolment among the many informal sector households that are not eligible for subsidised fees and that cannot be enrolled through formal sector payroll contributions.
- Identify barriers to self-enrolment for these informal sector households.
- Assess how quality and availability of health care supply affects insurance uptake.
- Provide policy recommendations for mandating the informal sector to participate in the National Social Health Insurance.

In this study we assessed the determinants of insurance uptake among informal sector households. Using nationally representative household survey data, we related enrolment into the National Social Health Insurance with local health care supply, household characteristics and sector of employment.

Analysis was done on the national socio-economic household survey (Susenas) data 2014. This data includes information on insurance uptake as well as a variety of socioeconomic characteristics. This data was merged to the village census (Podes), which includes information on local health care supply.

To identify barriers to insurance uptake, the research applied a multivariate regression approach.

FINDINGS

The study confirmed that the practice of voluntary enrolment for the informal sector is not sufficient to achieve universal coverage. In particular, statistical analysis found three specific barriers to insurance uptake:

- Insurance literacy: insurance uptake is strongly associated with proxy variables for insurance and financial literacy, and level of education.
- Adverse selection: insurance uptake is strongly associated with health status.
- Public health care supply: insurance uptake is strongly associated with proxy variables for quality and supply of health care.

These results are robust with regard to controlling for other household, village and regional characteristics, variations in the statistical model and choice of (sub-)sample.

The results suggest that distance to health care facilities and lacking insurance literacy are key barriers to insurance enrolment. We also found clear evidence of adverse selection, in that enrolment is concentrated among households that have an immediate need for health care. Such adverse selection undermines risk sharing, which is crucial for the viability and sustainability of the insurance scheme.

CONCLUSIONS

We drew three main policy conclusions from these findings. First, the insurance program needs to address critical design flaws to reduce adverse selection, by introducing longer waiting periods for enrolling. Second, additional incentives to enrol need to be introduced if universal coverage is to be achieved. These can take the form of premium subsidies and campaigns to improve financial literacy.

Alternatively, linkages to other social protection programs or innovative mechanisms to enforce informal sector enrolment can be explored. Finally, national and local governments need to increase investment in health care quality and supply, as these are crucial to the success of a national health insurance scheme.

OUTCOMES

Journal Publication

Agustina, Rina., Dartanto, Teguh., Sitompul, Ratna., et al. ‘Universal health coverage in Indonesia: concept, progress and challenges’ in *The Lancet Review*, Vol. 393, Issue 10166 (5 January 2019), pp. 75-102.

[https://doi.org/10.1016/S0140-6736\(18\)31647-7](https://doi.org/10.1016/S0140-6736(18)31647-7)



A study of pneumonia in hospitalised Indonesian children and its association with vitamin D deficiency

RESEARCH TEAM

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PROJECT SUMMARY

The burden of acute respiratory illness (ARI), including pneumonia, is not well described in infants and young children in Indonesia. There is suggestive evidence that vitamin D deficiency is a potential risk factor for ARI, including pneumonia.

However, this has not been studied. This research project aimed to describe the prevalence of vitamin D deficiency in children hospitalised with severe respiratory infections in Yogyakarta, and to determine if vitamin D deficiency is associated with severity of ARI.

From 18 February 2016 to 18 July 2017, 154 children with 163 admissions of ARI were successfully recruited in the study. One third of these admitted children had severe pneumonia. Blood samples for Vitamin D levels in these children were analysed.

Acute respiratory illness (ARI), predominantly pneumonia, is recognised as a major cause of under-five-year-old child morbidity and mortality globally, with infants and young children (less than two years of age) experiencing the highest mortality rates and the majority of pneumonia-related deaths. However, there is very little data from Indonesia on the burden of pneumonia in infants and young children. The identification of children who have the greatest risk for severe pneumonia and pneumonia-related mortality is required to inform the potential impact of preventive and management intervention strategies to reduce the burden of disease.

This study provided original baseline data on the prevalence of vitamin D deficiency in children under five years of age hospitalised with ARI, including pneumonia. This study is the first study to evaluate the association between vitamin D deficiency and the severity of ARI in Southeast Asia, a region where ARI and pneumonia is prevalent and vitamin D deficiency has been recognised as common. If an association between vitamin D deficiency and the severity of ARI in Indonesian infants and children is found, this may justify a future vitamin D-supplementation clinical trial for the prevention of ARI in Indonesian and perhaps other Southeast Asian children who share similar features and risk factors. By evaluating the possible risk factors for vitamin D deficiency and ARI this study may be able to help inform mitigation of these risks and prevent diseases.

Nutritional deficiencies, including protein-energy malnutrition and micronutrient deficiencies, are recognised to be among the most important risk factors for pneumonia globally, although the relationship between nutritional deficiencies and pneumonia has not been well studied in Indonesia. Of micronutrient deficiencies, the strongest evidence is for vitamin A deficiency and measles-related pneumonia and there is variable evidence for zinc deficiency, depending on the setting.

There is, however, increasing evidence that vitamin D deficiency also increases susceptibility to pneumonia in children, a deficiency that is common in many countries in Southeast Asia, despite proximity to the equator. Vitamin D is an additional micronutrient that may be important in protecting against respiratory infections, but for which there is currently insufficient clinical evidence. Vitamin D is produced predominantly by solar conversion through the skin, with a small amount being absorbed from food such as oily fish, fish liver oil, eggs, and fortified dairy products. Vitamin D appears to play a role as an immune modulator, including in the immune system of the respiratory tract.

While there is considerable evidence to support the biological plausibility that vitamin D deficiency may increase susceptibility to respiratory tract infection, the evidence is largely from *in vitro* studies, and its application to clinical practice needs further investigation. Additionally, there are cultural practices in Indonesia that might increase the prevalence of vitamin D deficiency in the community compared with other settings at the same latitude, such as maternal covering clothing, a more indoor lifestyle and high breastfeeding rates. Importantly, there are no published data from Indonesia on the association between vitamin D deficiency and the incidence of child pneumonia.

Inadequate levels of vitamin D have been recognised as common in children living in communities close to the equator in Southeast Asia. The main causes of deficiency are due to lifestyle changes and cultural practices that limit exposure to ultraviolet radiation. It is possible that Indonesian infants are particularly at risk. The avoidance of direct sunlight and wearing of headscarves by many Indonesian women may mean that maternal vitamin D deficiency is common, and therefore their babies are at risk of vitamin D deficiency at birth.

FINDINGS

A hospital-based study was conducted to determine the prevalence of vitamin D deficiency in children under five years of age hospitalised with ARI, including pneumonia, and to evaluate an association of vitamin D deficiency with severity of pneumonia. The study was conducted in two hospitals in Yogyakarta province.

This study was conducted over a 15-month recruitment period (from February 2016 to July 2017) to include all seasons in Indonesia. After informed consent was obtained, a sample of 2.5ml of blood was collected. Risk factors for pneumonia and for vitamin D deficiency were explored. The data showed that a good percentage of children with pneumonia had vitamin D deficiency. Infants of between two and six months old and children with congenital heart disease were more likely to have a lower vitamin D level. This data is valuable in informing the potential for a future vitamin D supplementation clinical trial for the prevention of pneumonia in Indonesian children. The study provides important background data should such a trial be justified.

This study additionally allowed for transfer of knowledge, skills and mentoring between institutions and countries. Dr Vicka Oktaria is a UGM staff member pursuing a PhD at the Department of Paediatrics at the University of Melbourne. Her project was conducted under joint supervision between UoM and MCRI (Professor Steve Graham, Dr Margie Danchin, Professor Julie Bines) and UGM (Dr Rina Triasih and Professor Yati Soenarto). The study helped to address a major health problem in Indonesian children, i.e. pneumonia, led by Professor Graham, an international expert in childhood lung disease.

OUTCOMES

Reports

Royal Children's Hospital Melbourne, 'Global Health Report: leading global approaches to caring for sick children' Annual Global Report 2015

https://www.rch.org.au/uploadedFiles/Main/Content/global/140773%20RCH%20Global%20Report%20A4L_LR.pdf

The Australia-Indonesia Centre 'Can sunshine help prevent pneumonia?' Media releases from <http://www.scienceinpublic.com.au/media-releases/pneumonia-background>

Presentations

Oktaria, Vicka. 'Vitamin D Status in Young Children Hospitalised With Pneumonia In A District Hospital In Yogyakarta, Indonesia'. International conference, 2017 (International Congress of Tropical Paediatrics)

Oktaria, Vicka., 'Determinants of Prolonged Hospitalisation In Young Children With Pneumonia In A Rural Hospital In Yogyakarta, Indonesia'. International conference, ICTP 2017 (International Congress of Tropical Paediatrics)



Transform: Investing in leadership and building educational and translational capacity for early prevention of NCDs

RESEARCH TEAM

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PROJECT SUMMARY

Over past decades, the predominant burden of adult disease in Indonesia has shifted from communicable diseases to non-communicable diseases (NCDs) such as mental health, obesity, heart disease and cancer.

This same period has witnessed a rapid change in Indonesia's population profile, with a large increase in the number and proportion of adolescents, as improvements in the health of children have increased survival rates. An obvious strategy to address the future burden of NCDs is to cultivate healthy preventive behaviours in adolescence, including healthy eating, regular exercise, and not smoking. Greatly concerning is that unhealthy behaviours in Indonesian adolescents are at high rates and rising.

The primary goal of the Transform program was to develop the capacity of a select group of current and future leaders from a range of sectors in Indonesia in prevention strategies for NCDs, with a focus on adolescence. Specifically, it aimed:

- To increase knowledge of adolescence and the evidence base for effective strategies for the prevention of NCDs at individual and population levels;
- To develop some of the core skills for leadership (effective communication, negotiation, and facilitation), with a focus on working collectively in cross-sectoral contexts;
- To build skills around consulting and engaging with young people, and facilitating their participation in the conception, development and implementation of NCD prevention strategies;
- To develop skills in using social media to support the advancement of prevention strategies for NCDs.

The program was designed to be an intensive, small-group, residential training program bringing together a range of professionals representing different disciplines and sectors. The model was based on a well-established and highly successful Australian program that brought eight rural youth workers together in Melbourne for a residential program run through the Centre for Adolescent Health. Nine delegates, from professions including pediatrics, research, policy, program

development and education, spent 10 days hosted by the Department of Pediatrics at the University of Melbourne. They participated in intensive training with experts in adolescence, epidemiology of NCDs, NCD prevention, health promotion, program implementation, youth participation, advocacy and leadership, and social media.

On their return to Indonesia, the delegates developed and delivered a two-day workshop, ‘Indonesian Approach to Transform Adolescent Health in NCDs Prevention’. This largely replicated select sessions of the Transform program for 20 competitively selected colleagues at the Indonesian Academy of Sciences in Jakarta on 14 and 15 April 2018. This is evidence that the delegates saw value in the Transform program, and had the confidence in their own skills and knowledge to deliver it, recognising its potential to transform others too.

OUTCOMES

Establishment of Indonesia Transform Health Leadership Program

OTHER OUTCOMES

Hosted articles on Australia Indonesia Centre website:

The first 1000 days: Building the best possible start for Indigenous children

Membantu remaja melawan PTM / Helping students combat NCDs

Tobacco company in Indonesia skirts regulation, uses music concerts and social media for marketing

Keeping an eye on the impact of baby formula promotions in Australia and Indonesia

Excited Indonesian GPs rise to the challenge of engaging with Indonesia's booming youth generation

Memberdayakan Remaja dan Dokter Untuk #BeatNCDs / Empowering GPs and students to #BeatNCDs [IN + EN]

Embracing compassion and spreading awareness to prevent suicide in Indonesia

Keeping Cigarettes out of Small Hands / Menjauhkan Rokok dari Tangan-Tangan Kecil [IN + EN]

Mental health matters for Indonesia's farmers: education must complement laws and brochures

Building human capital of the Golden Generation: Health forum consolidates cross-sector innovation towards critical investment in health and education

Roundtable feeds building momentum for better mental health and wellbeing in Indonesia

“Little did I know initiating the bill was only 5% of the process”: Waiting in vain for follow-up on Indonesia’s Mental Health Law

Losing a loved one from heart attack – how early life prevention can save lives



Food & Agriculture

Improving productivity of farmers.





The Food and Agriculture Cluster's work was highlighted by the groundbreaking project '**Sustainability and profitability of cocoa-based farming in Sulawesi**'. Researchers from Universitas Hasanuddin, the University of Sydney and Institut Pertanian Bogor took interdisciplinary research to a new level, ultimately providing many lessons in research practice on top of their core findings.

Declining cocoa productivity is of major concern in Indonesia, and this project set out to identify some of the causes of that decline. It concluded that the health and financial literacy of farmers were key factors in increasing sustainability and profitability. Researchers promoted the benefits of becoming certified producers to farmers and local advocacy groups, and ran a tasting session that showcased and explained the different flavours of chocolate produced by cocoa from around the world. They also

made a series of recommendations aimed at reversing declining production and improving farmers' livelihoods.

Other projects undertaken by the cluster explored the risks and opportunities for Indonesia's increasingly important food-processing industry, looked at innovative ways to combine soil data and socioeconomic information to improve land-use decisions, and examined the numerous challenges facing fishing communities on some of Indonesia's small islands.

PEOPLE

Sustainability and profitability of cocoa-based farming systems in Indonesia



PROF DAVID GUEST
The University of Sydney



DR NUNUNG NURYARTONO
Institut Pertanian Bogor



THOMAS SOEM
The University of Sydney

Soil information to support sustainable agriculture and food security in Indonesia



PROF BUDIMAN MINASNY
The University of Sydney



DR BABA BARUS
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Assessing food security and resilience of small island communities to socio-environmental changes: the case of the Kei Islands in Southeast Maluku



PROF BUDY RESOSUDARMO
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DR MUHAMMAD TAJIBU
Universitas Hasanuddin

Food processing and value chain development in Indonesia



PROF BILL PRITCHARD
The University of Sydney

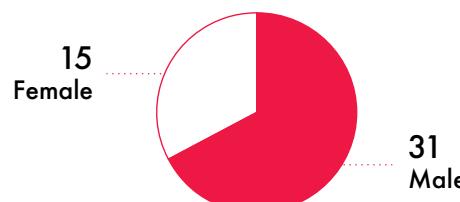
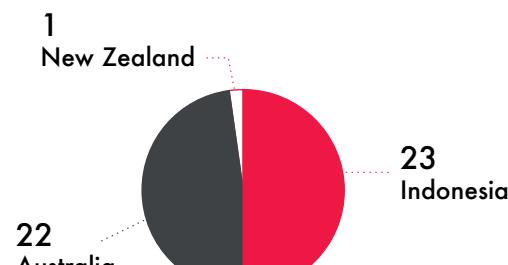


PROF ISKANDAR SIREGAR
Institut Pertanian Bogor

KEY STATISTICS

46
 Total researchers

\$800K
 Total investment





KEY ACHIEVEMENTS

- Three stakeholder workshops were held in Sulawesi, and all received positive feedback on the use of integrated, multidisciplinary approaches to finding solutions. Stakeholders from the district government's health and agricultural sectors, the cocoa industry, farmer organisations, senior vets and university academics attended the workshops. A new, integrated approach to address farmers' livelihood concerns was developed.
- AIC project members presented in the general assembly meetings of the Cocoa Sustainability Partnership (CSP), the foremost forum for the cocoa industry in Indonesia, which raised further CSP interest in the project.
- Swiss Contact have expressed interest in using AIC project results to inform their program development. UTZ Certified have also instigated a study on gender roles, and the consultant has requested information produced on gender in the AIC project. Data from the project accessible through the CSP contributed to developing programs concerned with community livelihood.
- Discussion of the project's research findings has raised awareness within the Directorate General of Plantations at the Indonesian Ministry of Agriculture. Strategies to raise cocoa productivity have become a major topic for discussion within this Ministry.
- David Guest, through his participation on the Mars Chocolate Research Advisory Board, has briefed the industry on constraints and options for cocoa production in Indonesia. As a result, a Mars Chocolate delegation visited the Australian Centre for International Agricultural Research in June 2018 to discuss co-funding research in Indonesia.
- Mapping soil and socioeconomic data to drive better decisions on land-use and improve food security across Indonesia.
- In-depth research on the challenges facing Indonesia's small-island fishing communities, which are dealing with the impacts of falling fish stocks, along with numerous environmental, social and economic changes.
- Recommendations on strengthening and expanding the Indonesian food-processing industry, a significant and growing contributor to the Indonesian economy.



Sustainability and profitability of cocoa-based farming systems in Indonesia

RESEARCH TEAM

PROF DAVID GUEST

Professor

The University of Sydney

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PROJECT SUMMARY

Cocoa is the third most lucrative export commodity in Indonesia after palm oil and rubber. Despite Indonesian government investments under the GERNAS program designed to stimulate farm productivity, cocoa production declined from 550,000 tonnes in 2007 to under 300,000 tonnes in 2018 as a result of agronomic and socioeconomic factors.

This production shortfall resulted in a decline in cocoa bean exports and an increase in bean imports, and led to the suspension of grinding operations in nine of 20 plants. While yields of more than one tonne per hectare were common in the past, over 85 per cent of cocoa farmers in Sulawesi now produce less than 500 kilograms of wet beans annually, worth around Rp10 million. Lower incomes have forced cocoa farmers to seek off-farm employment or replace their cocoa trees with other crops.

This project aims to identify new opportunities to raise cocoa productivity and profitability, improve cocoa-based farmer livelihoods and revive the Indonesian cocoa industry. The project took an interdisciplinary, holistic approach that examined rural livelihoods, intensification of cocoa production, diversification into mixed farming, supplementary crops or small businesses connected to the cocoa supply chain, access to finance and community healthcare.

METHOD

The project adopted an integrated approach examining relations between cocoa productivity on the farm, smallholder livelihoods, and policies further downstream in the value chain. Constraints to cocoa productivity and profitability were identified through focal studies on producer practices, health and livelihood, analyses of price transmission and the impact of the cocoa export tax.

A study on the cocoa value chain was conducted for the research component of a Masters course at the Institut Pertanian Bogor (IPB). Market data on raw bean sales between 2015 and 2017 were collected from public resources including the Indonesian Farmer Association and the New York Board of Trade. Analysis using the Vector Error Correction Model, monthly price means and standard deviations was used to establish correlations and the coefficient of variation, as well as the impact of export tax on local prices.

To support further studies, baseline data on livelihood, health and household economics were collected from a typical cocoa-based community in Polewali-Mandar District, West Sulawesi. Four villages in two sub-districts, Anreapi and Mapilli, were selected by purposive sampling. Households were selected using a randomisation method, providing a total sample of 130 households distributed between the four villages. The first survey gathered demographic data and information on access to water, sanitation practices and farm practices, as well as health-related information on men (older than 15 years) and, including anthropometric data, women (15-49 years) and children (under 5 years). The second survey focused on income from cocoa and other crops, household consumption, expenditure on farm inputs and availability of finance.

In addition, the project surveyed consumer perceptions of niche chocolates in Australia. Key informant interviews were conducted. These interviews and data from the village surveys were used to develop a livelihood curriculum framework, as well as general recommendations.

RESULTS AND ACHIEVEMENTS

Price volatility was cited as a major deterrent to farmer investments in agricultural inputs and management practices. Analysis of the relation of international and domestic prices showed that fluctuations in international prices were transmitted directly to domestic prices, affecting farmers.

The project identified the extent to which youth are not attracted to cocoa farming. Access to formal finance is a key constraint. The study demonstrated access to finance is improved by financial literacy.

Household income was higher on farms that had diversified into other crops. Evaluation of a mixed farm (cocoa/goat) model demonstrated efficient use of resources and favourable cost/benefit ratios.

Health constraints to productivity were demonstrated in Polewali-Mandar, supporting World Health Organisation estimates of substantial losses in labour productivity due to poor health and nutrition. Key health issues detected were

high blood pressure (34 per cent of a subsample of adult males and 30 per cent reported by the District Health office for pregnant mothers, higher than the national average), undernutrition (26 per cent) and malnutrition (23 per cent) in young children, high rates of adult overweight/obesity (31 per cent in females and 24 per cent in males) and reported joint pain (28 per cent in females and 33 per cent in males). Few resources are available for mental health patients. Gender roles are separated on cocoa farms, however interviews indicated women benefit from vegetable growing programs to improve nutrition as well as supplementing income.

The study concluded that smallholder-based cocoa farming as currently practised in Sulawesi is unsustainable. Without the benefit of 'forest rent', yields are too low to be profitable on small farms because of price volatility, labour shortages and poor community health.

We recommend that strategies should focus on promoting medium-scale, diversified cocoa production on 5-10 hectare farms. Our study showed the potential of medium-scale cocoa-agroforestry to increase yield and carbon stocks. Financial and health services to cocoa-farming villages need to be improved, following consultation with communities to identify their needs and priorities, to improve the productivity of labour.

In parallel, we recommend the development of large-scale, high-productivity cocoa production. This will require incentives to promote significant agro-investment to establish high-productivity farms using fertigation, selected genotypes and intensive management. Such enterprises are necessary to satisfy the currently idle processing capacity in Indonesia.

OUTCOMES

Journal article

Nisurahmah, A., Nuryartono, N., & Novianti, T. (2017). Relation Analysis of International Cocoa Prices and Indonesian Cocoa Farmers' Price after Export Tax Policy on Cocoa Beans. International Journal of Developing and Emerging Economies, 5(4), 1-13.



Assessing food security and resilience of small island communities to socio-environmental changes: the case of the Kei islands in Southeast Maluku

RESEARCH TEAM

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Australian National University

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Lecturer

Universitas Hasanuddin

PROJECT SUMMARY

The livelihoods and food security of small island communities in Indonesia are highly sensitive to social, economic and environmental changes. However, knowledge of the ways in which members of small island communities cope with socio-environmental change is limited.

In collaboration with Pattimura University and Tual Fishery Polytechnic, the team surveyed 534 households in fishing communities in the Kei Islands, Southeast Maluku, in February 2016. The main goal of the project was to assess the food security and resilience of Indonesia's small island fishing communities to socio-environmental change, in particular to the declining stock of fish due to an increasing number of fishermen in the area.

The Kei islands in southern Maluku, consisting of Kei Kecil, Kei Besar, Kur, Dullah and around 130 smaller islands, have approximately 160,000 inhabitants.

They were chosen for the study as being representative of living conditions in Eastern Indonesia's small islands, which are prone to food insecurity. Small island communities are highly dependent on natural resources for food, income, and employment. Marine resources in particular underpin the primary livelihood, food security, and opportunities for an increased standard of living. Improving the food security and resilience of these communities requires a deep understanding of, firstly, current and potential social, economic and environmental threats; secondly, of the sensitivity of community members to the threats; and, thirdly, of their capacity to mitigate and adapt to the threats. The information collected by this project contributed in these areas.

The project documented the communities' level of awareness of the socio-environmental changes to their livelihood, in particular their level of knowledge regarding declining fish stocks and the reasons for this phenomenon, and their understanding of small-island ecology. The project also identified whether socio-environmental changes affect the food security of fishing communities on small islands, and examined their coping strategies, such as fortifying the coastline, diversifying their sources of livelihood – for example from fishing to planting crops – and relocating to higher ground. Additionally, the project documented long-term investment strategies, particularly with regard to children's education, and explored the role of women in fostering community resilience strategies.

METHOD

The project undertook a field survey in coastal villages in the Kei islands, Southeast Maluku in 2016 and collected information about livelihood, socioeconomic characteristics, governance and institutional arrangements for resource management. A follow-up survey in the same villages and households collected similar data, as well as indicators measuring food security and resilience strategies. A face-to-face interview was carried out and data integrated to create a longitudinal household data set. The project conducted a panel data analysis to understand the impact of socio-environmental changes on community food security and the ability of communities to cope with these changes.

RESULTS AND ACHIEVEMENTS

Using an experimental game of receiving an additional income from an alternate livelihood, this project found that, on average, a 10 per cent increase in income would reduce the probability of adults in a household experiencing food insecurity by 24 per cent, and reduce the probability of children in a household experiencing food insecurity by 34 per cent. These results show that the required additional income to increase food security in a household in a fishing community is relatively small.

OUTCOMES

Journal articles

Yamazaki, S., B.P. Resosudarmo, W. Girsang & E. Hoshino. (2018). Intra-village and Inter-village Resource Use Conflict in Indonesia: The Case of the Kei Islands. *Ocean and Coastal Management*, 155, 50-59. <https://doi.org/10.1016/j.ocecoaman.2018.01.022>

Yamazaki, S., B.P. Resosudarmo, W. Girsang & E. Hoshino. (2018). Productivity, Social Capital and Perceived Environmental Threats in Small-Island Fisheries: Insights from Indonesia. *Ecological Economics*, 152 62–75. <https://doi.org/10.1016/j.ecolecon.2018.05.020>

Hoshino, E., E.I. van Putten, W. Girsang, B.P. Resosudarmo, & S. Yamazaki. (2017). Fishers' Perceived Objectives of Community-based Coastal Resource Management in the Kei Islands, Indonesia. *Frontiers in Marine Science*, 4(141). <https://doi.org/10.3389/fmars.2017.00141>

Paper under review

Nasrudin, R., Resosudarmo, B., P., Yamazaki, S., & Girsang, W. Alternative livelihoods for household food security: Evidence from a small-island fishing community in Indonesia.

Paper in progress

Moorena, L., Resosudarmo, B., P., Nasrudin, R., Girsang, W., Yamazaki, S., Hoshino, E., & Tajibu, M., J. Collective action on food security in a small island setting: A case study of fishery communities in the Kei islands, Indonesia.

Article

Fishing for food security



Food processing and value chain development in Indonesia

RESEARCH TEAM

PROF BILL PRITCHARD

Professor

The University of Sydney

PROF ISKANDAR SIREGAR

Director, Research and Innovation

Institut Pertanian Bogor

PROJECT SUMMARY

Indonesia's economy is the largest in Southeast Asia. Transformations in the Indonesian food processing sector are driven by this growing economy, along with changing food consumption patterns.

The manufacturing sector (excluding oil and gas) contributes around 20 per cent of Indonesia's total GDP through the domestic market, valued at around \$200 billion. Food, beverage and tobacco processing represents 37 per cent of total manufacturing, and the industry is expanding rapidly, at an average annual rate of 10 per cent over the last decade.

Food processing is also a major source of employment within Indonesia, increasing from 2.93 million in 2010 to 4.26 million people in 2013, at a remarkable rate of 15 per cent annually. Significantly, much of this growth in employment has come from micro enterprises (employing less than five people) and small enterprises (employing less than 20), which together make up more than 76 per cent of employment in food processing. Medium and large enterprises, however, are responsible for an estimated 83 per cent of the total output value in the sector. The food processing sector has also experienced strong growth in investment.

Despite these positive indicators, Indonesia's participation in the global food industry remains marginal, where it contributes around 1 per cent of total global exports. Indonesia faces difficult political choices in regards to a coherent policy framework around food production and food processing, but enhanced integration with regional and global production networks is likely to provide important growth opportunities for the food processing sector in the future.

Leading Indonesian-based food-processing firms such as Indofood, Garudafood, CP Prima and Delfi have emerged as market leaders in their respective categories with sophisticated managerial and technical capacities, and have successfully penetrated export markets. 'National' ownership, however, is complicated, as ownership structures are frequently embedded within the broader Southeast Asian cultural diaspora, with strong links to holding companies in Singapore and Hong Kong. This is, perhaps, less important, as the Indonesian food processing sector has remained relatively open to foreign investment, and global food companies such as Nestle, Danone, Coca-Cola, Mondelez and Unilever all maintain a manufacturing presence in the country, and have been responsible for capacity building and technology transfers.

The project found that by regional standards, Indonesia still has an undeveloped distribution and retail infrastructure, with modern retailing having a relatively limited reach beyond the major towns and cities. This has provided something of a brake on upstream sectoral development. Modernisation of retail and distribution would also likely lead to greater competition between local and imported products. The project reveals that the complexity of Indonesia's distribution network and inadequate infrastructure is often particularly problematic. Leading firms, such as Indofood and Delfi, have responded with downstream vertical integration of their own networks. Long term, retail distribution channels are expected to become more efficient, as centralised warehousing and distribution centres expand around the country.

The project identified the effect of protective trade and industry policy on Indonesia's marginal role in the regional and global value chains. This is consistent with a relatively high degree of self-sufficiency and insulation from global market perturbations, but it also means that Indonesia is missing out on growth opportunities that accompany the expansion of global value chains. Indonesia-based food processors are often forced to pay more for basic ingredients than their regional competitors, often as a result of policies that are ostensibly designed to protect farmers and ensure food security.

Despite these limitations, Indonesia has developed export competitiveness in processed product sectors that utilise basic ingredients produced in Indonesia. This includes the production of intermediate cocoa ingredients from raw cocoa beans and the processing of seafood items such as tuna, shrimp and crab. It is noteworthy that export competitiveness appears to decline when processed products include tightly regulated ingredients, such as rice, sugar and dairy. In contrast, instant noodle manufacturing appears to have developed competitiveness by combining locally produced palm oil with imported wheat products, but where the latter is relatively free from regulation as it does not compete with domestic production.

The project found that foreign investment and joint ventures have been important in developing export competitiveness in the cocoa ingredients and seafood processing sectors, but have been far less important in instant noodle manufacturing. Due to significant bottlenecks and inefficiencies in both agricultural supply chains and distribution networks, Indonesia-based food processors are often required to be more vertically integrated than in other countries, and local firms are far better positioned to make the necessary investments that foreign firms may find too risky.

RESULTS AND FINDINGS

The food processing sector is one of Indonesia's largest and fastest growing sectors and is the largest sub-sector of manufacturing, serving a domestic market of 255 million with a rapidly expanding middle class. Increasing demand for value-added processed foods that meet the need for convenience, nutrition and evolving taste preferences is creating exciting new opportunities for the sector. With these increased opportunities, it is in the strategic interest of Indonesia to enmesh itself within globally competitive food value chains. This requires increased sensitivity to how food is produced, innovative methods of food production, and awareness of nutrition, content and labelling practices.

In summary, tariffs may have gone down but protectionism has proliferated in recent years, mostly in the form of non-tariff barriers. While this is evident in almost all sectors, the food products sector remains one of the most protected. This increasing protectionism has proved counterproductive, as it tends to inhibit the involvement of Indonesian firms in more dynamic regional production networks, affecting competitiveness and stymieing access to new technologies and ideas. Attempts to protect domestic producers have come at the expense of the competitiveness of food processors, who are forced to pay high prices for key inputs such as sugar, salt, milk and grains. Food processors overwhelmingly rely on the relatively protected domestic market as a result. Many of the recent regulations have hindered rather than supported development in the food sector.

OUTCOMES

Report

Neilson, J., Morrison, M., Dwiartama, A., Utami, R., Patunru, A., & Pritchard, B. (2017). Food processing and value chain development in Indonesia.

https://figshare.com/articles/ASYDPrilPB_-_Food_Processing_and_Value_Chain_in_Indonesia/5673577

Journal article

Neilson, J., Pritchard, B., Fold, N. & Dwiartama, A. (2018). Lead firms in the cocoa-chocolate global production network: An assessment of the deductive capabilities of GPN 2.0. *Economic Geography*, 94(4), 400-424.

<https://doi.org/10.1080/00130095.2018.1426989>



Soil information to support sustainable agriculture and food security in Indonesia

RESEARCH TEAM

PROF BUDIMAN MINASNY
ARC Future Fellow
The University of Sydney

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Head of Soil Science Department
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PROJECT SUMMARY

The goal of this project was to investigate how a soil information system can be linked to socioeconomic data and used to support sustainable expansion of agriculture and its management in Indonesia.

Digital technologies have revolutionised the way soil data is being produced, but challenges remain in integrating this data with socioeconomic data to support future agricultural strategies. Opening up new areas of land is required to maintain food security and find ways to adapt to the impacts of climate change. This project explored the state of soil mapping and relevant socioeconomic data in order to understand food security issues in Indonesia.

Soil information is essential to supporting sustainable agricultural development. Soil has many important functions, including biomass production, regulating water, serving as a cultural environment and biodiversity pool, providing a source of raw materials and nutrient supply, and archiving cultural heritage.

There is an urgent need for proper soil data in order to protect Indonesia's prime agricultural land and increase production via improved land management. There is also a pressing need for soil data to help solve Indonesian environmental problems such as peat management, water management, greenhouse gas emission and land fires. Soil data in its current resolution is of too low quality to enable effective regional planning. New digital technologies are therefore needed to facilitate faster data provision and soil mapping at better scales.

The project revealed that Indonesian agriculture contributes around 10.3 per cent of the country's total GDP. With an annual growth rate of 4 per cent, it is dominated by plantation or estate crops. About 60 per cent of major food crops (rice, maize, and soybeans) are produced in Java, while plantation crops such as palm oil are produced on other islands (primarily Sumatra and Kalimantan). The importance of agriculture and food production is clearly established in the Minister of Agriculture's goals for the years 2015 to 2019. These goals include increasing food availability and diversity to achieve food sovereignty; increasing the competitiveness of Indonesian food and agricultural products; increasing the

production of bioenergy; and raising income levels to improve the prosperity of farmers. The project showed how a large part of the achievement of this goal relies on soil as a natural resource.

To improve food production in Indonesia, relevant stakeholders must be able to benefit from the latest agricultural research, and have access to improved technology and soil information. The primary assets for smallholder farmers are land, labour and seeds. The intrinsic productivity of soil is a key determinant of food security of subsistence producers. Thus, soil is the primary asset that needs to be efficiently managed and utilised. Farmers, agriculture extension agents and policy makers must have comprehensive information on soil conditions to determine the best practices to be employed. This project was not just about generating soil maps; it developed an initial framework for the use of biophysical and socioeconomic data in assessing soil functions for crop production. In addition, the project linked soil functions with socioeconomic factors that can affect decisions about land use. All of these components combine to create a valuable tool for policy guidance. Australian digital soil mapping techniques in particular have been used in the project as a reference to support soil mapping to improve food production in Indonesia.

OUTCOMES

Neilson, J. Wright, J. (2017). The state and food security discourses of Indonesia: feeding the bangsa: Food security Indonesia. Available at https://www.researchgate.net/publication/314249690_The_state_and_food_security_discourses_of_Indonesia_feeding_the_bangsa_Food_security_Indonesia

Minansy, B. (2016). Indonesia offers a cool million to whoever can help take the heat off its peatlands. Available at: <https://theconversation.com/indonesia-offers-a-cool-million-to-whoever-can-help-take-the-heat-off-its-peatlands-56294>



Attitudes

Promoting Contemporary understanding of Indonesia and Australia.



When the Australia-Indonesia Centre (AIC) was established in late 2013 by the leaders of the two nations, it was agreed that **one of the new centre's core objectives would be to improve Australians' understanding and appreciation of contemporary Indonesia** and, likewise, Indonesians' understanding and appreciation of contemporary Australia.

The AIC has addressed this challenge in a variety of ways. These include research and non-research based projects, as well as engagement initiatives. Working with key advisers from government, industry, academia and communities, the Centre started by acknowledging that there is an opportunity to reshape how Australians view Indonesia, noting misconceptions driven in part by major incidents that have played out in the media in recent years.

The Australia-Indonesia Centre, in conjunction with its partners, has commissioned significant research into the relationship between the two nations. Projects included longitudinal studies of Australians' attitudes to Indonesia, and vice versa, as well as an in-depth investigation of international trade and collaborative business opportunities. The results have provided deep insights into the strengths and weaknesses of the Australia-Indonesia relationship, as well as delivering key recommendations that have the potential to lead to a better future and stronger partnership for both nations.

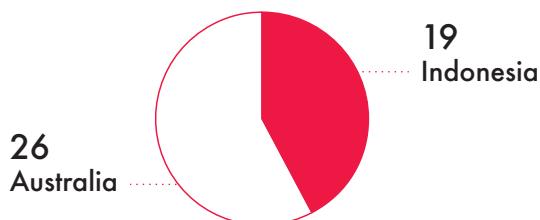
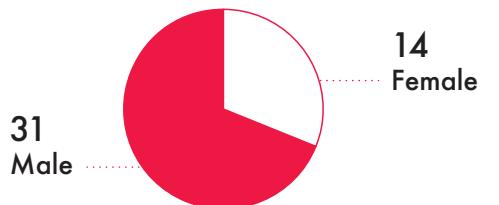
KEY STATISTICS

45

Total researchers

\$700K

Total investment



KEY ACHIEVEMENTS

- ReelOzInd! Short Film Festival and Competition reached 3,900 people through 68 screenings held across both countries and over 14,000 online audience over the past 3 years.
- Innovative analysis that benchmarks and offers insights for future improvements and development of deeper linkages between Australians and Indonesians – both government-to-government and people-to-people
- Dissemination of research findings to key agencies in Indonesian and Australian governments
- 8 publications in refereed journals and presentation of research findings to seminars and conferences in Indonesia and Australia, with more in the pipeline
- Workshops and presentation of findings in partner institutions in Indonesia
- Widespread media coverage of research activities in Indonesia and Australia
- Forging dynamic partnerships between Indonesian and Australian educational institutions and other industry groups, involving significant capacity building and collaboration
- Development of an Indonesian language version of an existing psychological text analysis software tool



ReelOzInd! Australia Indonesia short film competition & festival



Established in 2016, ReelOzInd! is a pioneering short film competition and festival, bringing Australians and Indonesians together through shared stories. Open to young and old alike, and judged by an impressive array of figures from the film industry and academia, the competition helps tell the stories of close neighbours, in an effort to build understanding.

The ReelOzInd! Short Film Competition and Festival seeks to raise awareness and improve understanding between the peoples of both countries. It offers a platform for Australians and Indonesians to share their own stories by way of this most compelling and creative medium, short film.

Now in its third year, ReelOzInd! enriches the already significant range of cultural exchange programs, events and activities that bring Indonesians and Australians together.

ReelOzInd! engages people from a wide range of backgrounds – from students to more established filmmakers – in a competition that showcases their talents before audiences in Australia and Indonesia and also to a worldwide online audience.

Year-on-year the festival has attracted more and better quality submissions from Indonesian and Australian filmmakers, and audience sizes have expanded with our pop-up screening program.

The number of screening venues has more than doubled from 15 in 2016 to over 30 in 2018. This program is largely facilitated on an in-kind basis by festival and screening partners, translating to a ROI of up to 300% for the festival as a whole.

Sponsors



Partners

- 30 Educational partners
- 26 Screening partners
- 7 Community partners
- 5 Media partners

PARTNERSHIPS AND ENGAGEMENT

Educational Institutions (2016-2018)

Indonesia	Universitas Indonesia, Depok Universitas Kristen Petra, Surabaya SMK Negeri 3, Jember Universitas Parahyangan, Bandung Universitas Pelita Harapan, Tangerang Universitas Padjadjaran, Jatinagor	Universitas Multimedia Nusantara, Tangerang Universitas Jember Universitas Udayana, Denpasar	Australia	LaTrobe University Monash University Flinders University University of Western Australia Griffith University (Griffith Film School) Lyneham High School, ACT Queensland University of Technology
Pondok Pesantren Darussalam, Ciamis Universitas Brawijaya, Malang Universitas Atma Jaya, Jakarta Universitas Gadjah Mada, Yogyakarta Celebes Global School, Makassar				

OTHER PARTNERS IN INDONESIA AND AUSTRALIA

Festival partners/*Sponsors (2018 only)	Marzuki, Jakarta Kinetic Collective, Brisbane Kinotika Film Society, Makassar Klub DIY Menonton, Yogyakarta Miles Films	Indonesian Studies and Language Association (ISLA), University of Melbourne Indonesian Teachers Association of South Australia (INTAN) Victorian Indonesian Language Teachers Association (VILTA)	Novi Kurnia Riri Riza Sonia von Bibra Tom Gleisner Yosep Anggi Noen
Creative Victoria (Platinum) International Internships (Silver) Project 11 (Bronze)	Minihall Irama Indah, Denpasar Minikino, Bali National Film and Sound Archive (NFSA), Canberra Petra Little Theatre, Surabaya Ranu Wellam Foundation, Palangka Raya Rumata ArtSpace, Makassar Sleman Creative Space, Yogyakarta St Ali, Jakarta You Space, Samarinda	Community Partners ACICIS ACMI X, Melbourne Asia Education Foundation (AEF) Australia Indonesia Youth Association (AIYA) iPitch.tv Kinosaurus, Jakarta Viddsee	Voluntary Advisory Committee Members Arsisto Ambyo Clarice Campbell Deryn Mansell Gaston Soehadi Lily Yulianti Farid
Screening Partners	Minihall Irama Indah, Denpasar Minikino, Bali National Film and Sound Archive (NFSA), Canberra Petra Little Theatre, Surabaya Ranu Wellam Foundation, Palangka Raya Rumata ArtSpace, Makassar Sleman Creative Space, Yogyakarta St Ali, Jakarta You Space, Samarinda	Media Partners Australia Plus (ABC) Buset Magazine Inside Indonesia OZIP Magazine SBS Indonesian	Sample of Media coverage <i>Film Tentang Keberagaman Islam di Indonesian Menang Festival</i> <i>Juara 'DigiICON6 Asia 2018', Mahasiswa UMN Wakili Indonesia ke Jepang</i> <i>Berhadiah Rp150 Juta, Kompetisi Film Pendek Australia-Indonesia Kembali Digela</i> <i>ReelOzInd 2018: Let's make a short film</i> <i>ReelOzInd Dan Klub DIY Menonton Mempersembahkan Water & Waterproof</i>
Association of Indonesian Film Producers Australian Centre for the Moving Image (ACMI), Melbourne Australian Mediatheque, ACMI, Melbourne Corethics, Newcastle Deckchair Cinema, Darwin Festival Pelajar Kota, Probolinggo FFD School Docs Program, DKI Yogyakarta (3 schools) IndoFest, Adelaide Indonesian Film Festival (IFF), Melbourne Indonesian Program, Cairns FM 89.1 FM Community Radio Institut Francais Indonesia, Yogyakarta Kampus Kedua, Makassar Kineforum Taman Ismail	Asia Education Foundation (AEF) & BRIDGE Program Indonesia Australian Consortium for In-Country Indonesian Studies (ACICIS) Dinas Pendidikan, Kota Probolinggo, East Java	Jury Members Andrew Mason Fransiska Prihardi Krishna Sen Mira Lesmana	



Themes
Neighbour (2016)
Water (2017)
Youth (2018)



68
Screenings
40 in Indonesia
28 in Australia



14,000
Online audience



3,900
Live audience



416
Submissions



Succeeding Together Report

PROJECT LEADS

ANZ
PwC Australia
The Australia-Indonesia Centre

PROJECT SUMMARY

In 2015, the Australia-Indonesia Centre commissioned ANZ and PwC to identify trade sectors where both nations could develop joint competitive advantage in the global market.

The 'Succeeding Together' report, prepared by ANZ and PwC for the Australia-Indonesia Centre, was launched at the Indonesia Australia Business Council conference in Yogyakarta by the then Australian Minister for Trade and Investment, Andrew Robb.

It highlighted that there is a \$3 trillion opportunity in trade opening up in Southeast Asia, and Australia and Indonesia can be winners if they work together to secure parts of global supply chains. Moreover, neither nation has to do too much – just rethink commercial relationships and create new joint business partnerships in high-potential areas.

It identified four sectors as having high potential to create these new partnerships – animal products, food processing, textiles and logistics – and emphasised that if Australia and Indonesia don't take advantage of these opportunities, they will be taken by other nations.

The report's approach complemented the Australian Government's commitment to building closer trade and investment ties through trade agreements with China, Japan and Korea, and other broader trade initiatives including the ASEAN-Australia-New Zealand Free Trade Agreement, the continuing Regional Comprehensive Economic Partnership and the Trans Pacific Partnership.

OUTCOMES

Report

A., P., Rivers, P. G., & Tradenta, J.. (2017, February 7). Succeeding Together: Maximising the potential for joint opportunities between Australia and Indonesia. figshare. Retrieved February 26, 2019, from https://monash.figshare.com/articles/Succeeding_Together_Maximising_the_potential_for_joint_opportunities_between_Australia_and_Indonesia/4625890/1

Media

The Jakarta Post

Australia keen on business opportunities in RI

Australian businesses are keen to explore business opportunities with their Indonesian counterparts, as reflected in a bilateral business conference that is currently ongoing.

Sydney Morning Herald

Harold Mitchell: Let's beef up our relationship with Indonesia

It's all too easy in times like these to think that the world is dominated and controlled by conflict and violence. But it's important to remember that the opposite is far more the case. People are great co-operators.

International Business Times

Australian trade minister Andrew Robb heads to Indonesia with a huge delegation to attend Indonesia-Australia Business Week

Australia's Minister for Trade and Investment, Andrew Robb, is leading the country's largest ever trade and investment business delegation to Indonesia, projecting Australian capability in major industry sectors.

The Jakarta Post

A new business catchcry for Indonesia and Australia

Indonesia is not in Australia's top 10 trading partners, and Australia just scrapes into Indonesia's top 10.

Australian Financial Review

Asia's odd couple: Australia and Indonesia need each other after mining bust

Australian business has been told to grab a new opportunity for joint ventures in Indonesia in industries such as textiles, logistics and animal products so both countries can pool their expertise to create new areas of export competitiveness.

Australian Financial Review

Australia and Indonesia must find new sources of economic growth

Indonesia and Australia must diversify from their traditional strengths in the face of slowing global growth, and joint development could help to lever competitive advantages

The Age

Australia and Indonesia need to rethink economic ties and work together: report

Australia and Indonesia need to rethink their weak economic ties and work together in areas such as fashion, food-processing, animal products and logistics to seize trillion-dollar trade opportunities in southeast Asia, according to a new report.

ABC

Australia and Indonesia well positioned to build strong trade and investment relations: Australia-Indonesia Centre

The relationship with our near neighbour Indonesia is strategically important but historically difficult.

ANZ BlueNotes

Australia and Indonesia can succeed together

Indonesia and Australia are surrounded by opportunity now. Quick action is required to capture these before they are whittled away by others. But succeeding together is attainable.



Australia-Indonesia Perceptions Report

PROJECT LEADS

EY Sweeney
Australia-Indonesia Centre

PROJECT SUMMARY

EY Sweeney was commissioned to conduct a comprehensive study on the attitudes of Indonesians to Australia and the attitudes of Australians towards Indonesia.

The study involved both qualitative and quantitative research in Indonesia and Australia. The Australian phase of the study was conducted from October to November, 2015. The Indonesian phase of the study was conducted from February to June, 2016.

The aims of the study were twofold:

- To understand the awareness, perceptions and knowledge of the citizens of each country towards the other nation
- To identify the influences and drivers of attitudes and perceptions

The research involved 24 focus groups and more than 4000 surveys across both countries. The design of the methodology and the sample structure was set in place after careful consideration and through a consultation process involving the Australia-Indonesia Centre, EY Sweeney, academics and research experts in Indonesia. The aim was to confirm the research approach was robust and the sample structure as comprehensive as feasible across each country.

Specific parameters were set for the Indonesian research to reflect the focus of the AIC and to take into account some of the challenges of conducting research in Indonesia. The quantitative surveys were conducted face-to-face (as opposed to online) to maximise reach, and some specific screening criteria included. These differences need to be considered when interpreting the survey results. The areas of coverage in the focus groups and in the surveys were mirrored in Indonesia and Australia.

In August 2016, the Australia-Indonesia Centre released the findings of the project. It produced some deep insights and a powerful ‘fact base’ to generate discussion and promote thinking about how the countries can be brought closer together. The research emphasised the importance of the opportunity and the scale of the challenge. It also showed that what is required is a medium- to long-

term approach that is holistic in nature; an approach that focuses as much on the ‘people’ side and building emotional engagement as on economic benefits.

At an overarching level, three key points emerge when reflecting on the project and thinking about engagement:

Think local, not international

International relations are not top-of-mind for most. While this sounds obvious, it is an important consideration when thinking through engagement strategies. It is important for nations to engage with each other’s citizens on topics of interest or in areas where the personal benefit is clear.

Rapport requires understanding and empathy

The report highlights that the differences between the two countries are profound and that there are significant domestic complexities. However, when you sit down and listen to people talk about their lives, their aspirations and ‘what’s important’, many similarities emerge. It underlines that building greater connection and trust will only occur by demystifying and building greater understanding. There can only be rapport if there is respect and an appreciation of the shared values.

Think beyond economic benefit

There is no simple solution to bringing the people of Indonesia and Australia closer together for the benefit of both nations. It requires a strategy that needs to be underpinned by a number of pillars – economic, political, social and cultural. It also requires a different focus in each country as the mindset, challenges and opportunities are different. The study found there was support for the countries to be brought closer together – although the terrain is more challenging in Australia.

As engagement and intervention strategies are developed, they should be multi-layered and focused on the medium to long term. At the heart of any strategy needs to be a focus on building a much greater ‘emotional connection’ between the two countries. It is about elevating the level of understanding and empathy to create true rapport. Over time, that will build trust. Improved trust will also deliver the right environment to strengthen the economic ties that are important for the future prosperity of both nations and the aspirations of the people.

Full results of the research can be viewed at the Australia Indonesia Perceptions Report microsite.

OUTCOMES

Report

[The Australia-Indonesia Perceptions Report 2016](#)

Media

The Jakarta Post

[Indonesia and Australia – opportunities abound](#)

The reality is that progressive, outwardly focused nations like to maximise the opportunities for closer relationships with important neighbors and trading partners, while reducing the impact of points of difference.

Tempo

[Indonesia think highly of Australia – AIC Survey](#)

Indonesians think highly of Australia as a neighboring country, according to the latest research by the Australia Indonesia Center (AIC).

The Age

[Time to look beyond Bali](#)

The research suggests it is time for Australians to re-examine Indonesia and to think more deeply about the opportunities for shared cultural awareness, education programs and student exchanges like the New Colombo Plan, business partnerships, and two-way travel that goes beyond Bali and traditional Australian destinations.

The Conversation

[Between perceptions and realities of Australian-Indonesian attitudes: a view from Indonesia](#)

According to a new survey of Australian and Indonesian perceptions, Indonesians feel they understand Australia quite well, while few Australians feel they have good knowledge about Indonesia.

ABC News 24 – The World

[How do Australians feel about Indonesians? \(Click to view video\)](#)

CNN Indonesia

[Hubungan Indonesia Dan Australia \(Click to view video\)](#)

Lupitan6

[Survei: Hanya 19 Persen WN Australia Tahu Benar Soal Indonesia \(Click to view video\)](#)

BBC Indonesia

[Apa kata orang Australia tentang Indonesia? \(Click to view video\)](#)

Asian Currents

[People-to-people connections key to improving Australia-Indonesia understanding](#)



Australia-Indonesia Attitudes Impact Study – Historical

PROJECT LEAD

DR AGNIESZKA SOBOCINSKA

Senior Research Fellow
Monash University

PROJECT SUMMARY

This report aimed to build a more complex understanding of what Australians think about Indonesia and why, along with the effect of public attitudes on bilateral relations.

It analysed data from the 1940s until the present day to determine long-term trends in Australian attitudes towards Indonesia, and the extent to which they continue to affect contemporary relations. It combined more than six decades of polling data with qualitative research from the humanities and social sciences, analysis of literature examining the impact of public opinion on foreign policy, as well as interviews with key figures from government, academia and policy think-tanks. What resulted is a holistic analysis of what Australians think about Indonesia, why they hold these attitudes, and how popular perceptions are politically significant in Australian-Indonesian relations.

KEY FINDINGS

- An integrated analysis of popular opinion polling and qualitative/historical research on public attitudes reveals that Australian views about Indonesia are surprisingly stable and function on a dual track, with many Australians expressing a desire for closer relations with Indonesia while simultaneously nurturing a deep suspicion and anxiety that Indonesia poses a threat to Australian security.
- Insecurity about Australia's nationhood and capacity for self-defence is a fundamental driver of anxiety regarding Indonesia.
- Anxiety is compounded by widespread ignorance about Indonesian society and the widespread (false) assumption that Indonesia is militaristic and possibly expansionist. Dominant images were formed at a time when Indonesia was under authoritarian rule, and a lack of awareness of Indonesia's democratisation since 1998 means those images continue to hold sway.
- Popular attitudes towards Indonesia are related to deeply ingrained historical anxieties about Asia as Australia's Other. They are affected by depictions in the media and public statements by politicians and policy-making elites, by cultural productions, and by direct personal contact, particularly through travel and tourism.

— Popular attitudes towards Indonesia have had both direct and indirect influence on Australian foreign policy. Although policy makers deny that they are unduly affected by popular opinion, increasingly vehement expressions of negative attitudes towards Indonesia have affected the government's management of numerous issues, including those relating to Australians caught up in the Indonesian justice system, and the treatment of live cattle exported to Indonesia. Enduring negative opinions also bestow a legacy of tension and ongoing distrust in the bilateral relationship. However, Australian public opinion has also facilitated positive relations, with popular sympathy following the 2004 Asian Tsunami (to take one example) underpinning Australia's subsequent aid package to Indonesia.

KEY RECOMMENDATIONS

Indonesia has been a focal point for a deep well of insecurity about Australia's capacity for self-defence. This report recommends research on the causes of Australians' sense of insecurity, and why it persists despite ongoing peace and stability. It is also recommended that political rhetoric that emphasises a narrative of threat or insecurity be muted.

This report recommends that Australian policy makers be realistic about the nature of Australian public opinion, recognising that popular wariness of Indonesia places limitations on the relationship.

Public opinion polls regarding Indonesia have provided consistent results over decades. It is recommended that more resources be dedicated to identifying and analysing the causes and drivers of perceptions, rather than merely repeating polling.

Considering the mediating effect on popular opinion of travel, it is recommended that programs encouraging travel and people-to-people relations between Australians and Indonesians receive widespread support. To avoid the risk of conflating experiences of Bali with Indonesia, these programs should aim to expose Australians to other parts of Indonesia.

The study was published in November 2015 and Dr Sobocinska presented the findings at the Australia-Indonesia Attitudes Seminar, hosted by Monash University in May 2016.

OUTCOMES

Report

Sobocinska, A. (2017): Australia-Indonesia Attitudes Impact Study – Historical. Retrieved from <https://doi.org/10.4225/03/589a5094881a7>

Dr Sobocinska presented findings at the Australia-Indonesia Attitudes Seminar in May 2016.

Refereed journal article

Sobocinska, A. (2017). Measuring or Creating Attitudes? Seventy Years of Australian Public Opinion Polling about Indonesia. *Asian Studies Review*, 41(3), 371-388. <https://doi.org/10.1080/10357823.2017.1334041>

Media

Engaging Asia



Australia-Indonesia: Qualitative research of contemporary attitudes and interventions

PROJECT LEADS

DR ROSE ANNE MISAJON

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Monash University

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DR ANA-MARIA BLIUC

Lecturer
Monash University

MUHAMMAD IQBAL

Researcher
Monash University

PROJECT SUMMARY

This project explored Indonesians' and Australians' respective attitudes toward one another, using a multi-method, two-part approach. A key goal of the project was to form a framework and baseline for ongoing empirical research, in order to contribute to the development of a research roadmap for better understanding of the Australia-Indonesia relationship.

The first part of the project focused on the adaption of the Linguistic Inquiry Word Count (LIWC) software to understand Australian-Indonesian relations, including the development of an Indonesian language version of the software to analyse Indonesian texts.

The aim was to translate, adapt and validate LIWC software, and to trial this LIWC Indonesian dictionary in analysis of online media content. This sat alongside the use of the English-language version of LIWC to analyse Australian newspapers.

The second aim was to provide qualitative baseline data on Australians' attitudes to Indonesia and vice versa, and to suggest research themes that could be explored further using qualitative or quantitative research methods.

PART ONE

This stage of the project involved the application of the LIWC software for analysing Australian-Indonesian relations. Most significantly in terms of sustainability, this entailed the translation, adaptation and validation of the software for use in the Indonesian language and consequently as a tool for understanding the Indonesian context. To trial the use of LIWC, we selected two media outlets from Indonesia and two from Australia. We undertook textual data scraping of content from these outlets immediately prior, during and after dates coinciding to key events of interest to both Australia and Indonesia.

With the translation and validation of the LIWC software for use in analysing Indonesian text, we have provided a unique tool that can be used for a wide range of research questions, including (but not limited to) ongoing examination of online media content.

PART TWO

The aim of this stage was to establish some form of baseline qualitative data regarding attitudes in the two countries by determining themes relevant to the Australia-Indonesia relationship. Qualitative data was collected via focus groups conducted in Australia and Indonesia, followed by thematic analysis of the data obtained. The themes arising from the focus groups were then examined in relation to the initial findings from LIWC, but also from the historical study conducted by Monash in parallel to this study.

While the findings are not new regarding attitudes of Australians towards Indonesia and vice versa (e.g. ambivalence), as these have remained stable over time, this should be included in any longitudinal qualitative or quantitative research, and include concepts such as perceived levels of trust, respect and understanding/knowledge across the two cultures.

FINDINGS AND RECOMMENDATIONS

Articles around key events in the Australian-Indonesian relationship were analysed from two major Indonesian news outlets: Java Post and Kompas. In addition to expected differences stemming from the differences in ideology and the specific intended audience for these outlets, the analysis produced some intriguing findings. We found, for instance, that articles covering the Australian spy scandal tended to reflect more anger than other articles in Kompas, and more anger coupled with anxiety in the more conservative Java Post. In addition, Kompas tended to use a more objective language that included more quantifiers and numbers when discussing the spy scandal compared to Java Post. The effects of these differences in language on public opinion need to be further investigated.

The analysis conducted on Indonesian media was replicated in the Australian context by analysing articles around the same key events from the Sydney Morning Herald and Daily Telegraph. We found significant differences in how more progressive media outlets reported the events, compared to

the more ideologically conservative ones. These differences and their effects on public opinion, and more specifically on attitudes towards Indonesia, need to be further investigated.

Future research on the extent to which factors (such as age, travel experience, person-to-person contact, education and region) influence perceptions (including stereotypes) of Australians/Indonesians; and how the media reports on Indonesia/Australia and frames key events relevant to the two countries is recommended.

The LIWC software can be used as a powerful tool to contribute to greater understanding of the impact that media may have and could be extended to include terms that may be used on social media platforms such as Twitter.

Improving cultural awareness and language proficiency

Programs, events and interventions that improve awareness and visibility of Australian culture in Indonesia (beyond politics and beyond Bali) should be considered, as should programs aimed at improving language proficiency (English and Indonesian).

OUTCOMES

Analysis tool

Development of an Indonesian language version of an existing psychological text analysis software tool (Linguistic Inquiry and Word Count or LIWC).

Report

Misajon, R., Manns, H., Bliuc, A., & Iqbal, M. (2017). Australia-Indonesia Attitudes and Understanding Research: Qualitative research of contemporary attitudes and interventions. Retrieved from <https://doi.org/10.4225/03/589a51d9e7b7d>

Dr Misajon, Dr Manns and Mr Iqbal presented findings at the Australia-Indonesia Attitudes Seminar in May 2016.



Perceptions of Indonesian youth on their role in Indonesia and Indonesia's role in the region

PROJECT LEADS

DR ANTJE MISSBACH
Senior Research Fellow
Monash University

DR DAVE LUMENTA
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PROJECT SUMMARY

This project sought to understand young people's engagement in shaping Indonesia's domestic agenda and their perceptions of Indonesia's role in the region and internationally within the context of seemingly contradictory trends of westernisation and Islamicisation.

Despite its great potential, Indonesia has been dubbed the 'biggest invisible thing on the planet' for its poor ability to explain itself to the world. However, this has begun to change as a generation who grew up after the 1998 fall of the authoritarian New Order regime comes of age. Indonesia's digital natives are increasingly working to project a more positive image of Indonesia to the world. At the same time, there is rising religious and ethnic intolerance that is threatening the country's 'unity in diversity'. Yet, not much is known of the political views and levels of engagement of the growing youth population in contemporary, post-New Order Indonesia and its context of seemingly contradictory trends of greater international openness and rising domestic intolerance.

By studying their views of authority, diversity, human rights and political participation, this project has sought to understand the perceptions of urban, middle-class youth about how Indonesians should participate in shaping public debate on domestic political and social issues. The project also sought to gain insight into the impact of the media and education on young people's perceptions of Indonesia's role in the region and their attitudes towards Indonesia's relationship with others in the region, including Australia. It used the asylum seeker issue as a case study.

The asylum-seeker issue was selected as it brings the relationship with Australia within view, enabling better understanding of how Indonesia's youth see their country's role in this relationship, as well as how they perceive Indonesia's position more broadly in the region.

Alongside the project's scholarly collaboration between Australian and Indonesian researchers, it also produced creative outputs to promote the sharing of ethnographic research to the wider public. This involved the production of two short films, *Respite* and *Performing Out of Limbo*, which depict the people-to-people engagement between Indonesian and refugee youth in Jakarta and Makassar.

OBJECTIVES

- To gain insight into the perceptions of urban, middle-class youth regarding who or how Indonesians should effect political and social change by studying their perceptions of authority, diversity, human rights, regional engagement and solidarity and democracy
- To gain insight into the impact of the media and education on young people's perceptions of Indonesia's role in the region and their attitudes towards Indonesia's relationship with others in the region, including Australia, by using the asylum-seeker issue as a case study
- To engage Indonesian youth directly in the research through a competition for short films reflecting on the way they think of their role in Indonesia and Indonesia's role in the region
- To engage Indonesian and Australian researchers in a collaborative project that builds on previous collaborations and includes senior researchers

This qualitative study was conducted in Greater Jakarta (Jabodetabek) and Makassar and had three components: Focus group discussions (FGDs), semi-structured interviews and two short films.

KEY FINDINGS

Media credibility and fake news: The data confirmed previous findings that there is a high level of distrust towards the mainstream media among young people, as in other segments of the Indonesian population. Among the research participants in this project, much of the distrust was fueled by the apparent political bias of the mainstream media, which is attributed to the fact that many media moguls have expressed political ambitions as presidential or vice-presidential candidates in the past. However, this high level of distrust is not accompanied by the ability to filter the information presented by the media or verify its credibility.

Democracy: Participants were adept at identifying political and social issues that affect Indonesia, but almost all sought the solution to these issues in a strong, benign leader (a perception that persists even 20 years after the fall of the New Order regime, which promoted former president Suharto as the benign father of the nation), rather than a stronger democratic system. This was uniform across the board, regardless of the participant's stated preferred leader (e.g. Jokowi or Prabowo).

Education: One participant in the study claimed that he wanted to become the head of his village and had become interested in studying international relations to further this dream, as Australia had supported his village school. Australia's aid appears to have had a significant impact on

his view of the importance of maintaining relations with those beyond Indonesia's borders. It is significant that Australia's efforts to invest in education in Indonesia is having a tangible positive impact on the perceptions of Indonesian youth towards Australia and their understanding (even if it is to a limited degree) of governance.

People-to-people links: The production and dissemination of the short films confirmed that the formation of people-to-people links on the ground through direct engagement can overcome differences. For example, the ethnographic research depicted in the short films demonstrated that the participants found it easier to overcome cultural barriers than generational barriers. The Indonesian university students found it easier to 'connect' with the refugee youth than with their Indonesian lecturers, which appears to have come as a surprise to all three parties. It was also clear that most Indonesians are not aware that there are refugees living in Indonesia and in general have a negative view of refugees, due to a lack of information or opportunities to engage with them.

OUTCOMES

Journal articles

Tanu, D., Missbach, A., & Lumenta, D. (2017). Introduction to Special Edition, *Jurnal Antropologi Indonesia*, 38(1), 1-5. Retrieved from <http://journal.ui.ac.id/index.php/jai/article/view/8754/3991>

Lumenta, D., Ariefiansyah, R., & Nuhadist, B. (2017). Performing Out of Limbo: Reflections on Doing Anthropology through Music with Oromo Refugees in Indonesia, *Jurnal Antropologi Indonesia*, 38(1), 51-63. Retrieved from <http://journal.ui.ac.id/index.php/jai/article/view/8756/3993>

Levriana Yustriani and Danau Tanu, '*The hoax emergency*', Inside Indonesia, Edition 134 (Oct-Dec 2018).

Danau Tanu, Antje Missbach, Dave Lumenta (eds), *Special Edition: Youth*, Inside Indonesia, Number 134 (Oct-Dec 2018).

Other

Film screenings, discussion panels, and musical concerts for Respite and Performing Out of Limbo held at the Goethe Institute, Jakarta and the Immigration Museum, Melbourne.

Media

<https://jakartaglobe.id/movies/documentary-films-offer-glimpse-lives-asylum-seekers-indonesia/>

<https://www.sbs.com.au/yourlanguage/indonesian/en/audiotrack/limbo>



Celebrating everyday life in the Australia-Indonesia neighbourhood

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PROJECT SUMMARY

The project addressed key issues under the Australia-Indonesia Centre themes of culture and identity, youth and generations. Building on previous studies, it aimed to investigate and imagine possible scenarios where more Australians and Indonesians enjoy significant intimate and productive engagements.

This small project sought to uncover Australia-Indonesia people-to-people links that were not primarily private, and yet were not widely known in public and were deserving of greater recognition and appreciation. Findings may indicate ways to forge friendships between the two neighbours.

Much has been done in Australia to boost public interest in Indonesian affairs and cultural heritage. Many of these events are extravagant and costly. Unfortunately, most events are one-off, or ad-hoc initiatives with no systematic documentation or follow-up. Being future-oriented, this project aimed to explore how we might sustain a series of activities, no matter how simple or small, that will endure and expand over a longer term. This project collected materials and stories for their potential to inspire future Australia-Indonesia links. These materials demonstrated grounded, everyday moments of Australia-Indonesia friendship that, for various reasons, have been little known.

The research team conducted 30 in-depth interviews with Indonesians and Australians living and working in Jakarta (10 interviewees), Denpasar (10) and Yogyakarta (10). The interviewees were selected based on age, and the experience of having spent at least a year in Australia (for Indonesian citizens) and Indonesia (for Australian citizens).

It was found that the strongest driver to live in and understand the other country came from higher education. It was through scholarships for higher degrees and language exchanges that the interviewees had started to become more familiar and deeply engaged with the other country.

It was with this in mind that follow-up focus group discussions in these three cities mostly engaged Indonesians who were alumni of Australian universities. Group participants ranged from NGO workers to artists, government officers, homemakers and social activists.

It was found that the most significant non-private relationships between young Indonesians and Australians lie in arts and culture. Insight regarding coffee and independent film culture was gained from the discussions in Jakarta and Yogyakarta. As such, the final workshop in Jakarta focused on the link between these two aspects when selecting participants for the closing activity.

FINDINGS

Building on existing knowledge, this project explored the domains that 'ordinary' citizens in both countries participated in every day, as well as the social relationships they had built over time. The project aimed to be inclusive, focusing on people with average levels of economic, political or cultural capital.

A number of Australians and Indonesians enjoy intimate or productive Australian-Indonesian links, and have made great achievements in their fields. Most do so quietly. Their stories may act as examples to inspire others. This project examined their cases, and sought ways to recognise their achievements, services and potential impacts on the future of Australia-Indonesia friendship.

The research team found 'coffee culture' to be a significant but relatively little-known area of Australia-Indonesia people-to-people engagement that has the potential for deeper impacts in both countries. As it develops, links through 'coffee culture' may connect with other areas of engagement, including independent filmmaking and film screenings, as well as inclusive development in coffee-producing rural areas.

Other areas of people-to-people engagements we examined were sports and youth associations.

Coffee Culture: While Indonesia is home to one of the richest varieties of coffee in the world, Australia is reportedly one of the world's new leading 'coffee specialists'. Instead of focusing on coffee as a commodity, researchers collected stories of Indonesians and Australians who have been quietly but deeply involved in the pioneering work of bringing 'coffee culture' to the next level of partnership between peoples and communities in both countries. The research team was inspired by the experiences of Siti Maryam Rodja (Baraka Nusantara, Nusa Tenggara-Brisbane) and Jeffrey Neilson (University of Sydney, Sydney-Toraja). Both have pioneered grass roots collaborations between Indonesian coffee farmers and coffee roasters in Australia. Their stories indicate the great potential of a new area for people-to-people engagement with impacts beyond the two nations.

Independent Film: In Indonesia, coffee culture is a new urban phenomenon, particularly prominent among young people and independent film communities. Several existing film-related activities involve Indonesia and Australia, such as ReelOzInd!, EngageMedia, and Festival Sinema Indonesia-Australia. Coffee is almost always present in small social gatherings in cafes to talk about arts, films and social concerns.

Youth Communities and Associations: Young people in Indonesia organise themselves around the types of relationships they have with their Australian friends. Some form communities around hobbies and others form more formal organisations. They voice different kinds of aspirations for future relationships. Both the Conference of Australian and Indonesian Youth and the Australia-Indonesia Youth Association received positive mentions, but multiple fluid networks have developed outside those two well-known organisations.

RECOMMENDATIONS

- More in-depth research for the study of Australia-Indonesia coffee culture and support for rural coffee farmers in Indonesia. Coffee farmers and local actors in Indonesia can be better trained through multiple media platforms.
- Further support for independent and non-commercial filmmaking and other cultural events, highlighting and celebrating non-private aspects of Australia-Indonesia engagements outside the usual paths of state-led strategic diplomacy and large industry and finance corporations.
- Festivals that celebrate coffee culture and the stories of community social activists are potential sites for strengthening Australia-Indonesia people-to-people engagements in intimate and meaningful ways. Coffee/film festivals under our mini study highlight the importance of human stories shared in short documentary films.

OUTCOMES

Media

Celebrating Everyday Life in Australia-Indonesia Neighbourhood

Seminar

Public Seminar, 'Celebrating the everydayness of the Australia-Indonesia relationship', St Ali Jakarta, 15 November 2018



Islamic morality and challenges to democracy: A study of urban lower and middle class responses

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PROJECT SUMMARY

Studies on the relationship between Indonesia and Australia have shown that there are many areas where mutual understanding must be improved. One such area highlighted in the 2016 Australia-Indonesia Perceptions Report concerns Australians' understandings of Islam in Indonesia.

It is perceived that there is rising intolerance and Islamic conservatism in Indonesia, which is understood by some to be linked to the damaging effects of economic inequality and/or increasingly strong primordial, religious sentiment.

In an effort to provide greater insight on these themes, this study examined the link between adherence to conservative attitudes on Islamic morality and growing precarity among a large cross-section of Indonesian society. It investigated, in particular, how and why younger and more educated members of society within the urban lower and middle classes are attracted to the ideas and rhetoric of conservative and often fringe Islamic organisations.

The study surveyed 600 people who participated in the largest religiously motivated mass rallies in Indonesian history – those against the Chinese Christian former governor of Jakarta, Basuki Tjahaja Purnama, known as Ahok, in 2016 and 2017. The survey was followed by in-depth interviews with selected participants. This research provided an explanation of their motivations and what it means for Indonesia at home and in its relations with the rest of the world, including Australia.

The study was designed to achieve the following objectives:

- To identify the occupations and educational background of urban, lower and middle class Muslims involved in the activities of conservative Islamic groups
- To explore their experience in dealing with conditions of precarity
- To analyse the relationship between precarity and political Islamic identities
- To provide practical recommendations to improve understanding regarding urbanised Indonesian Muslims

FINDINGS AND RECOMMENDATIONS

This study employed both quantitative (assisted survey) and qualitative (in-depth interviews and focus group discussions) methods. It gathered empirical evidence regarding the social background and political identities of urban lower and middle class Muslims in urban Indonesia and their attitudes to a range of moral issues that have broader social and political resonance.

The study found that rising Islamic conservatism was significantly related to the failed promises of modernity, including the fact that education has not provided more secure social status for many. Large numbers of people have grievances towards other social groups perceived to have attained economic and social access unfairly. The research also found that moderate Muslim organisations, namely Muhammadiyah and Nahdlatul Ulama, are perceived as incapable of addressing these commonly held gripes. Likewise, many young Muslims feel that none of the mainstream Islamic organisations embody their aspirations, which is why more conservative narratives appeal to them and, as a consequence, are becoming mainstream in the political arena.

The anti-Ahok rallies in Jakarta were not solely religiously motivated, nor were they entirely motivated by socio-economic grievances. There is a link between the two, whereby one must take seriously the way that religiously derived political language resonates with large cross-sections of the populace, as well as the broader social context within which this political language has grown to become more powerful – to the extent of possibly being deployed effectively by some political elites in contests with each other. This has important implications for future research on Indonesian Islamic politics, as well as for policy-makers who have an interest in the implications of hard-line Islamic discourses on the future of Indonesian democracy.

Based on these findings, we propose that more critical attention be given to the role of education in assisting young Muslims in particular, and Indonesian citizens in general, to understand the social effects of the neoliberal economic transformations that have produced the social precarity they are anxious about. We also propose strengthening and grounding moderate Muslim organisations in reforming the social structure that maintains their congregation in a time of high political pressure. We recommend civil society organisations with legitimacy in working with these issues to refer to fundamental research in strategising to push for the common democratic agenda desired by many Indonesians and Australians alike.

OUTCOMES

Journal articles

Hadiz, V. R. (2018). The Floating Ummah in the Fall of Ahok in Indonesia, *Trans: Trans-Regional and National Studies of Southeast Asia*, 1-20.

<https://doi.org/10.1017/trn.2018.16>

Rakhmani, I. (2018). The Politics of Gendered Halal Consumerism in Indonesia, *Trans: Trans-Regional and National Studies of Southeast Asia*.

Media

Australia-Indonesia Centre

[Study links rising Islamic conservatism to urban youth's socio-economic frustrations](#)

The Conversation

[Memasarkan moralitas dalam demokrasi Indonesia](#)

Asian Studies Association of Australia

[Marketing morality in Indonesia's democracy](#)

East Asia Forum

[Marketing morality in Indonesia's democracy](#)

Channel News Asia

[Marketing morality a winning strategy for Indonesian hardline groups](#)



Are Islamic schools in Indonesia educating for or against religious extremism?

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PROJECT SUMMARY

In an effort to counter religious extremism in Indonesia and Australia, it is critical to understand how and in what ways formal schooling influences the radicalisation process and contributes to the development of extremist worldviews. Accordingly, this project sought to explore the crucial role of Indonesian Islamic school principals. Formal education that counters extremist thought and behaviour most commonly centres on the teaching of civic values, citizenship, democracy and tolerance.

Yet imparting these values in schools does not necessarily mean that students have the ability to recognise radical or extremist propaganda. Schools may, through their systems of practice or curricula, unknowingly support or advance extremism.

The purpose of this research was to better understand how the role of Indonesian Islamic school principals may mitigate or augment radicalisation processes leading to religious extremism. This project sought to better understand specific components of school leadership to identify how school leaders promote or mitigate extremist thought. In addition, this research sought to identify actions school principals can take that may impede the development of extremist belief systems through the development of a ‘Leading Against Extremism Framework’ that is applicable to the Central Java context. This framework can be retested in other areas in Indonesia and expanded to Australia in order to ascertain the influence culture may have on the development of religious extremism in educational settings.

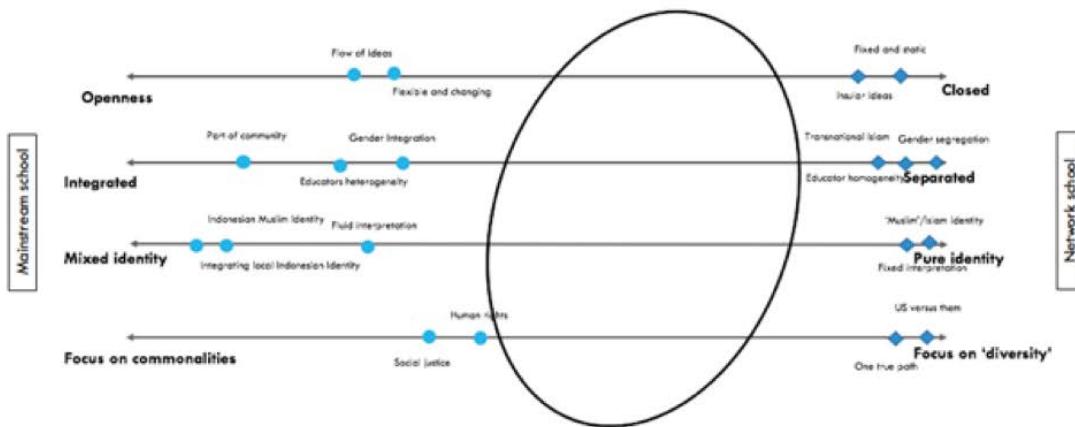
The project was a qualitative case study of 20 Islamic private schools in central Java. We used three data collection techniques: semi-structured individual interviews, school site observations, and document analysis.

FINDINGS AND RECOMMENDATIONS

After analysis of the data through open coding, the findings identified similarities and differences between mainstream and networked private Islamic schools. Islamic schools were similar in the following aspects: flow of authority; approach to punishment; use of direct instruction; expectation of rote memorisation; infrastructure; and policy environment.

Islamic schools differed in the following aspects: openness; integration between schools, communities and society; interpretation of identity; and view of diversity. From these findings, we developed an Indonesia Islamic Education Continuum where we located aggregate mainstream Islamic and networked schools on continuums in terms of openness, integration, identity, and diversity. From these aggregate profiles, we identified an ‘extremism gap’ that shows disparities in leadership between mainstream Islamic schools versus network schools, which may influence potential drivers of radicalisation (see figure on next page).

THE EXTREMISM GAP



Mainstream school leaders supported schools that were more open and integrated. They hired teachers from various backgrounds and understood that people can have multiple identities alongside their Muslim identity.

Network Islamic school leaders led schools that were typically closed and segregated from community and society. They led schools that taught that the idea of having a pure 'Muslim' identity (as defined by the school) was essential to their life as Muslims.

They also led schools that taught students to see diversity as 'the other', different, not part of their group, and not following the proper religious path.

Several recommendations came out of the study for school leadership, for Indonesian Islamic schools, and to address issues of extremism in schools.

For school leadership:

- Pre-service preparation programs need to influence school leaders to value open schools that are integrated, support mixed identities of teachers and students, and teach the importance of what is commonly held by all members of their community, society, Indonesia and the world.
- School leaders need to connect their schools to local, national and global communities.
- School leaders need to lead schools via shared decision-making processes.
- School leaders need to build links across mainstream and network schools.

For Indonesian Islamic schools:

- Integrate critical thinking skills into the curricula rather than emphasising rote memorisation.
- Promote the adoption of 'Indonesian Muslim identity', along with supporting the notion of individuals having mixed identities.
- Develop inter/intrafaith activities.
- Create proactive redundancies throughout the system to address issues of openness, integration, identity and diversity.

To address issues of extremism:

- Clear need for larger and broader studies to allow us to deepen and refine our understanding of the extremism gap.
- Develop and implement a survey to pilot an 'extremism gap' research instrument.
- Continue this study in other sectors.
- Uncover promising strategies school leaders are currently using.
- Collaborate with educational stakeholders to lead workshops on topics related to issues of extremism and education.

OUTCOMES

Journal Articles

Brooks, M.C., Brooks, J.S., Mutohar, A., & Taufiq, Imam. (in development). Islamic school leadership in Indonesia: Exploring the gap between moderation and extremism.

Fully refereed conference proceedings

Brooks, J., Melanie, B., Mutohar, A., Taufiq, I., & Abdullah, I (2017, November). Exploring Religious Extremism in Indonesian Islamic Schools. Paper presented at Australian Association for Research in Education (AARE) Conference, Canberra.

Presentations

Professor Jeffrey Brooks presented topics on conducting qualitative analysis, introduction to the research study, and key issues in data collection.

In the research dissemination, Dr Melanie Brooks presented the research findings in a session attended by 20 Islamic school leaders and 15 Islamic education lecturers. The session was followed by a discussion on how to counter extremism issues in Islamic schools.

Public Seminar, Monash University, 15 November 2018.

Media

The Conversation

Mutohar, A. (2018). *'Countering the rise of radicalism in private Islamic schools in Indonesia'*, *The Conversation*; 17 May

ABC

Kesenjangan Sekolah Islam Bisa Picu Ekstrimisme

Suaramerdeka

Radikalisme Muncul dari Pendidikan Ekstrem



How images and stereotypes influence travellers' attitudes toward tourism destinations

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PROJECT SUMMARY

Both Australia and Indonesia recognise the potential for growth within the tourism sector and have supported each other in this sphere for the past decade.

In particular, two-way tourism represents a tremendous economic opportunity that can bring mutually beneficial outcomes, so it is therefore not surprising that Australia and Indonesia continuously aim to enhance bilateral tourism cooperation. More than 1.2 million Australians visited Indonesia in 2016 and Australia was the 10th most popular destination for Indonesian tourists, with around 150,000 visitors in the same period. However, despite the two countries increasingly promoting new destinations, Bali is still the top Indonesian destination for Australian tourists. Similarly, Sydney and Melbourne are still the most popular cities for Indonesian tourists.

This research aimed to provide data towards development of a tourism marketing campaign that can potentially renew how Australian and Indonesian tourists perceive each country as a destination. The overall aim was to understand how Australian and Indonesian tourists might be encouraged to expand their travel experiences in the other country and by extension come to know more of its society and culture.

Through a series of surveys and experimental studies, this research found that better alignment between tourists' travelling motivations and destination image led to more positive attitudes toward newly promoted tourist destinations. It further revealed that the destination community's support for tourism played a more significant role when promoting new destinations in developed countries compared to developing countries.

This research aimed to find the optimal match between destination images and societal stereotypes for developing positive attitudes in potential tourists, and to determine under which conditions the match would be most optimal.

The findings are expected to bring new insights in how to better promote destinations in both countries not normally considered by potential tourists. The idea of tourism powering economies and supporting communities can thereby be enhanced. Successful implementation of such a marketing campaign would not only strengthen Australia and Indonesia's bilateral tourism flows, but extend beyond tourism to realms including defence, trade and political relations.

This survey was a preliminary study to explore whether mapping tourists' travelling motivations and images of a newly promoted destination would influence attitudes toward the tourist destination. To examine this effect, after Australian and Indonesian participants indicated their main reason for travelling to the other country in their last visit, they were presented with three pictures of newly promoted tourist destinations. Each picture portrayed one attribute representing the image this particular destination was seeking to portray. They were then asked to select a destination they would consider in a future visit. In this research, we focused on three travelling motivations: seeing beautiful scenery, experiencing cultural richness, and shopping/culinary adventure.

FINDINGS AND RECOMMENDATIONS

The study found that Australian tourists who travelled to Indonesia for cultural richness were more likely to choose a new destination that similarly highlighted cultural richness. However, it also found that those who travelled to Indonesia to 'see beautiful scenery' were also willing to expand their repertoire by choosing a new tourist destination that highlighted cultural richness.

Indonesian tourists similarly selected 'seeing beautiful scenery' as the primary motivation for travel to Australia and were, in turn, likely to choose a new tourist destination that also highlighted beautiful scenery. However, like the Australians surveyed, some could also be persuaded to shift

their motivations, with those travelling for 'cultural richness' also likely to explore a new tourist destination highlighting beautiful scenery.

The main conclusion of this research was that in order to increase the attractiveness of a 'new' tourist destination in both countries, a marketing campaign should map travellers' motivations to travel and then match them with a like image. Significantly, the research also found that potential travellers could be persuaded to try new experiences on their next visit, including those which are 'cultural' in nature. This aligns with the findings of the AIC Perceptions report.

Another related and important finding in the study concerned congruity with destination community support for tourism. Where there is a high level of support, in general this will increase the attractiveness of the tourist destination to potential visitors.

OUTPUTS

Public seminar

'Tourism between Australia and Indonesia: Understanding travellers' motives, influences and experiences', Monash University, 23 November 2018.



Youth perceptions: Improving Australia-Indonesia relations through education

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PROJECT SUMMARY

This project explored the role of tertiary education in shaping how young people in Australia and Indonesia perceived the other country. More specifically, it examined how undertaking Indonesian studies at Australian universities, and Australian studies at Indonesian universities, may shape the perceptions of young people over time.

Research by the Australia-Indonesia Centre in 2016 suggests that nearly 50 per cent of Australians have unfavourable views of Indonesia. Levels of misperception and ignorance about Indonesia are also high. For example, in a 2013 survey commissioned by the Australian Department of Foreign Affairs and Trade, less than half the respondents knew that Indonesia is a democracy, and the majority believed that Indonesian laws were based on Islamic codes. In contrast, the AIC survey found that only about 10 per cent of Indonesians have unfavourable views of Australia.

To what extent does tertiary study shape attitudes and perceptions of other countries? While it is an intuitive assumption that learning about the language, society and culture of another country encourages a more sympathetic attitude towards that country, there is a lack of academic studies demonstrating this. We were interested in questions such as; why Australians who undertake Indonesian studies, and Indonesians who undertake Australian studies, choose to undertake these subjects as part of their university studies; their previous level of exposure to the other country (for example, at secondary school); and, crucially, whether they felt their perceptions of the other country had evolved over time and, if so, how and why they had evolved.

The project used qualitative methods including a literature review and analysis, focus group discussions and interviews.

First, we undertook an extensive literature review, with particular attention to existing survey research (such as the aforementioned AIC and DFAT surveys), academic publications (such as peer-reviewed journal articles and books), commentaries, reports and news articles. The purpose of this review was to gauge understanding of topics such as; attitudes and perceptions in Australia and

Indonesia in regard to the other country; the state of Indonesian studies in Australia; the state of Australian studies in Indonesia; and the role of the internationalisation of education in diplomacy. We also compiled a comprehensive list of all the Indonesian studies offerings in Australian universities.

Second, we held several focus-group discussions in Yogyakarta and Melbourne, with students from seven universities (four in Indonesia and three in Australia). In these discussions, we asked questions such as; why students enrol in Indonesian or Australian studies subjects as part of their university courses; whether they had undertaken studies in these areas during secondary schooling; whether they had visited or been otherwise exposed to the other country; whether they felt that their perceptions had changed over time; whether they felt their Indonesian or Australian studies would shape their careers; and various other topics which were driven in part by the students themselves.

Finally, we conducted some interviews with individuals who work in the tertiary sector in roles relating to Indonesian studies. They included; lecturers who teach Indonesian studies and Australian studies subjects at universities; people working in student mobility/exchange roles in universities; officeholders in student organisations such as Australia-Indonesia Youth Association (AIYA) and Conference of Australian and Indonesian Youth (CAUSINDY); and people working in the public sector in roles relating to advancing the study of Indonesia and Australia (e.g. Australia Awards in DFAT, Indonesian Ministry of Youth and Sports).

FINDINGS AND RECOMMENDATIONS

In the Melbourne focus group discussions, many students reported that they had been quite ignorant of Indonesia before undertaking Indonesian studies subjects, and that undertaking Indonesian studies had broadened their perspectives and helped them to realise that there is more diversity and modernity in Indonesia than they had realised. Many expressed concern about the impact of negative media reporting on the perceptions of the general public in Australia. Many students saw Indonesia as close to Australia and important to Australia's foreign relations, and saw Indonesian studies as important to their future careers. Some described 'falling in love' with Indonesia and continuing their Indonesian studies irrespective of career ambitions.

In the Yogyakarta focus group discussions, many students already had positive views towards Australia before undertaking Australian studies subjects at university. The key way in which their perceptions evolved as a result of their studies was learning that views expressed by politicians, which are sometimes negative about Indonesia and the Australia-Indonesia relationship, are not necessarily representative of the broader population. While some students disliked aspects of Australian politics and sometimes actively protested against it, they developed

the ability to critically analyse the available evidence and not necessarily take news reports as evidence of broader Australian public perceptions. Many undertook Australian studies for career or travel reasons.

Our findings suggest that undertaking Australian studies at Indonesian universities, and Indonesian studies at Australian universities, have an important role in shaping perceptions of Australia and Indonesia. For students in Australia, ignorant and/or negative perceptions of Indonesia are challenged and reversed by taking Indonesian studies, by learning about Indonesian language, culture and society, but also, crucially, by facilitating travel to Indonesia and interaction with Indonesian people. These processes of learning and shaping perceptions often begin in high school, but university has an important role in continuing and expanding the journey and leading to career opportunities that involve Indonesia.

For students in Indonesia, perceptions of Australia were generally already positive, but taking Australian studies leads to a more nuanced understanding of Australia and Australians, and may facilitate travel and career opportunities involving Australia. For both groups of students, undertaking Australian or Indonesian studies helps them to develop the skills to critically analyse evidence and understand, for example, that negative representations of the other country must be critically examined, and that the rhetoric used by political leaders is not necessarily representative of the views of the general public. The peaks and troughs in the Indonesia-Australia relationship belie the complex ties among people in both countries, particularly in the education and travel sectors.

In Australia, greater knowledge about Indonesia would help mitigate the high levels of ignorance and misperception among the broader public. It would be useful to expand the opportunities for Indonesian studies at all levels of education – primary, secondary and university. Universities should engage in more outreach to encourage high school students to continue their Indonesian studies at university. In Indonesia, an expansion of Australian studies offerings to more universities would contribute to greater knowledge of Australia, and to the possibilities for travel and career development involving Australia.

OUTCOMES

Public seminar

'Youth perceptions: Findings', Monash University, 23 November 2018.



Internet-based ICT and MSEs' attitudes towards participating in international transactions

PROJECT LEADS

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DR ENY SULISTYANINGRUM

Lecturer
Universitas Gadjah Mada

ASSOCIATED RESEARCHERS

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Lecturer
Universitas Gadjah Mada

ANNA FALENTINA

PhD Scholar
Australian National University

PROJECT SUMMARY

Micro and small enterprises (MSEs) play a major role in the Indonesian economy. In 2016, there were more than 26 million MSEs in various sectors, generating employment for more than 53 million people – approximately 76 per cent of the total labour force for that year (BPS, 2017).

The majority of these MSEs are suspected of operating with relatively small profit margins and are informal business activities. Hence, households participating in MSEs are relatively poor, or at least not rich enough for the government to tax them.

In the past decade, there seems to have been an increasing trend for MSEs to engage in international transactions; i.e. conducting export-import activities and participating in international trade networks. This development has been seen to benefit Indonesian MSEs and their international partners. However, it is not yet clear which MSEs tend to participate in international transactions and which do not. One argument is that MSEs adopting internet-based information and communication technology (ICT) will have the opportunity to engage in international transactions. Studies have shown ICT has enabled firms to reshape business processes, to improve productivity, to achieve faster communication and to reach new clients (Bresnahan & Trajtenberg, 1995; Clarke, Qiang & Xu, 2015).

The main focus of this project was to observe whether or not internet-based ICT changed micro and small-sized enterprises' attitudes toward participating in international transactions, including with Australian counterparts.

In January 2017, researchers carried out interviews with approximately 500 MSEs in Yogyakarta province, particularly in Bantul district and Yogyakarta city, to reveal their attitudes towards the adoption of ICT for their business activities. It sought to explore whether or not adopting ICT encourages them to participate in international transactions, such as exporting products, the provision of services for customers abroad, and importing intermediary inputs; in particular with Australian counterparts. Bantul district and Yogyakarta city in the Yogyakarta province were randomly selected based on the number of MSEs in the district relative to the total province figure.

FINDINGS

We found that internet use among MSEs was still in the early stages. While more than 61.8 per cent of our samples accessed the internet, most used smartphones to connect to the internet (95.2 per cent) and used it for communication purposes (94.7 per cent). This finding is in contradiction to the situation in developed countries, where mostly desktop computers are used to access the internet for beyond-communicational purposes (Pangestu & Grace, 2017).

It appeared that the top three reasons for not accessing the internet were the lack of know-how, the lack of need and the lack of capability, while cellular signal strength is not a main concern. This is not surprising given that Yogyakarta is more developed compared to other provinces in Indonesia. The data revealed a divide in terms of revenue and education between those MSEs adopting internet-based ICT and those that do not. Similarly, the entrepreneur of the internet-connected MSE usually holds a higher educational qualification, while that of the non-connected MSE graduated from primary and secondary education.

The study found that, in most cases, use of the internet for business activities was limited to social media, such as to communicate with customers and suppliers, and to promote products and services. In contrast, the proportion of those with websites or e-commerce platforms was very low.

Nonetheless, internet-based ICT has enabled MSEs to engage in the digital economy and improved their productivity. We found that the internet uptake was positively correlated with export and import performance, and labour productivity.

MSEs export products either directly or through domestic distributors. The top two destinations were the United States (33.1 per cent) and Australia (31.5 per cent). Among those exporters, approximately 89.8 per cent used ICT, while ICT use among non-exporters was approximately 53.9 per cent.

MSEs also directly (26.3 per cent) or through domestic distributors (73.7 per cent) import materials for their activities. The top country of origin was China (35.1 per cent), with only 9.7 per cent coming from Australia. Among those MSEs importing materials for their activities, approximately 77.2 per cent used ICT, while for non-importers ICT usage was 58 per cent.

Regarding labour productivity, we found it was higher among MSEs utilising ICT compared to that of those that did not. The average revenue per worker of MSEs adopting ICT was Rp10.1 million, while the figure for those not connected to the internet was only Rp3.8 million. In terms of profit per worker, the former earned Rp4.2 million and the latter only Rp1.9 million.

RECOMMENDATIONS

This project concluded that ICT uptake is positively correlated with MSEs' export and import performance and labour productivity. In general, it observed that those who use ICT have a higher probability of conducting export-import activities as well as the ability to attain higher labour productivity than those who do not.

This project, hence, supports the argument that the digital economy, represented by access to and the use of ICT, has significant potential to contribute to development and inclusiveness by expanding trade opportunities and encouraging financial inclusion.

These gains justify public policies aimed at fostering firms' use of the internet. If the internet is to support firms' exports and productivity, then complementary policies aimed at building a firm's capability matter. Hence, the government needs not only to provide ICT infrastructure but also to increase the readiness of MSE entrepreneurs to benefit from the technology.



The effect of acculturation on citizens' attitudes toward Australia and Indonesia

PROJECT LEADS

A/PROF SEN SENDJAYA
Associate Professor
Monash University

DR SONY KUSUMASONDJAJA
Lecturer
Universitas Airlangga

PROJECT SUMMARY

Studies have consistently indicated that there is a gap between Indonesians' and Australians' attitudes toward each other.

Indonesians are on the whole overwhelmingly positive toward Australia while Australians are less positive toward Indonesia (Australia-Indonesia Centre 2016). The details, however, are at best sketchy. Given the long-term strategic importance of the relationship between the countries, the need to investigate this discrepancy in attitudes cannot be overstated. The number of Indonesian-born migrants in Australia has been on the increase (63,160 according to the 2011 national census, nearly 25 per cent higher than the last census). Little is known, however, about the Indonesian diaspora in Australia (or Australian expatriates in Indonesia), particularly about their acculturation and adaptation strategies.

This study focused on a theme of culture and identity, organised around three objectives:

- To compare and contrast attitudes and perceptions toward Australia and Indonesia between migrants, expats and citizens of both countries. Through cross-cultural comparison, we examined the impact of acculturation on individuals' attitudes and perceptions toward both their home and host countries. People who have lived in both countries will have a different perspective to citizens who rely on media.
- To explore the role of social media in influencing citizens' attitudes toward Australia and Indonesia. Communication is an important feature in intercultural process. A report suggests that 66 per cent of social media users used the site for news (Pew Research Center 2016). Indonesia is the fourth largest user of Facebook with 77 million active users (Statista 2016) compared to 15 million in Australia.
- To create an effective campaign to bridge the gap of attitudes between Australians and Indonesians. Portraying a clear and authentic image of each country through the lenses of individuals who have lived in both will reduce the gap of attitude and perception toward Australia and Indonesia.

The researchers undertook a series of qualitative and quantitative analyses including:

- Netnography study (of the internet), exploring several online communities: Perhimpunan Pelajar Indonesia Australia (11,321 likes), Australia-Indonesia Youth Association (AIYA) (3153 likes), Indonesian Community in Australia (1003 likes) and End Australian aid to Indonesia (3450 likes).
- A combination of online and paper-based surveys distributed to respondents and focus groups in Indonesia (Jakarta, Surabaya, Denpasar) and Australia (Sydney, Melbourne, Brisbane, Perth). Participants came from 'migrant', 'expatriate' and 'citizen' groups in both countries.

FINDINGS AND RECOMMENDATIONS

From our qualitative research, the study found that Australians have a positive view of Indonesia. However, perceptions of some aspects are quite negative – such as corruption, environmental management, human rights and health care. The Indonesian government needs to work closely with the media to improve the image of Indonesia overseas. Moreover, the Indonesian government needs to increase awareness of environmental issues in Indonesia – for instance, reducing the use of plastic bags, and social marketing campaigns to keep cities and towns clean.

From our quantitative research, the study found that both Australians and Indonesians have a relatively positive view of each other. However there is a pattern where Australians in Indonesia do not identify with Indonesia.

OUTCOMES

Presentation of research, Faculty of Economics and Business, University of Airlangga, Surabaya, 10 July 2018.

Australia-Indonesia essay series

This bilingual series showcases leading Australian and Indonesian writers and thinkers reflecting on the issues that they see as important challenges and preoccupations facing their societies today and into the future. The series aims to highlight the ways in which the peoples of Australia and Indonesia have common and shared hopes, values and challenges.

In 2016, The Australia-Indonesia Centre commissioned a series of essays aimed at bringing new voices and perspectives from Australians and Indonesians telling their stories.

The series began by asking essayists to respond to the question ‘What does it mean to be Indonesian/Australian?’ and invited them to reflect on the issues that they see as important challenges and preoccupations facing their societies today and into the future. Our writers will also consider the ways in which Australians and Indonesians might share and read each others’ stories, thereby gaining greater insight into our complex and often complementary cultures.

The essays in this series come from leading writers and commentators from Indonesia and Australia each looking closely at their own society, cultures and political situations. They have been published through the Centre’s website and in *The Guardian Australia*.

WRITERS



Alice Pung

Alice Pung is an award-winning Australian writer whose books include *Unpolished Gem*, *Her Father's Daughter* and *Laurinda*. She edited *Growing Up Asian in Australia*, a collection of stories which has now become a high school textbook, and *Unpolished Gem* has been translated and published in Indonesian, German and Italian. Alice's books have also been published in the US and UK. She is currently the Artist in Residence at Janet Clarke Hall, the University of Melbourne, and writes frequently for Australian magazines and newspapers. In 2016, Alice was RMIT's Established Writer on the Writers on Cultural Exchange Program to Sun Yat Sen University, Guangzhou. She is an Ambassador of the 100 Story Building and Room to Read.



Leila S. Chudori

Leila S. Chudori is a novelist and journalist at *Tempo* magazine. She is also the author of *9 dari Nadira*, Kepustakaan Populer Gramedia, 2009. In December 2013, *Pulang* (Home) received Indonesia's preeminent prize for literature, the Khatulistiwa Literary Award for a work of outstanding literature. *Home* examines the tragedy of political exiles during Suharto's regime (1965-1998) forced out of Indonesia after the 1965 massacres. It has been translated into English, French, German and Italian.



Eliza Vitri Handayani

Eliza Vitri Handayani has been writing and publishing since she was in her teens. Her novel *From Now On Everything Will Be Different* came out in 2015 and was launched internationally. The book's launch at Ubud Writers & Readers Festival was cancelled due to police warnings, and Eliza protested by wearing to the festival T-shirts printed with excerpts from her novel. Her short works have appeared in places including the Griffith Review, Asia Literary Review, Exchanges Journal, Magdalene, Jakarta Post, Tempo, and Inside Indonesia. In 2016 Eliza was selected as a WrlCE fellow and participated in residencies in China and Australia. Eliza has appeared at Northern Territory Writers Festival, Makassar International Writers Festival, and Melbourne Writers Festival. Eliza manages InterSastra, a platform for literary exchange between Indonesia and the world.



Sanaz Fotouhi

Sanaz Fotouhi is an Iranian-Australian writer, filmmaker and academic. She holds a PhD in English Literature from the University of New South Wales. She is interested in diasporic and migrant narratives. Her book *The Literature of the Iranian Diaspora: Meaning and Identity since the Islamic Revolution* was published in March 2015 (I.B. Tauris). Sanaz is one of the founding members of the Persian Film Festival in Australia, and the co-producer of the multi-award winning documentary *Love Marriage in Kabul*. Sanaz is currently the Assistant Executive Director of the Asia Pacific Writers and Translators, (www.apwriters.com).

OUTCOMES

Essay Series: '*Caution! Danger! Stop Race Mixing!: Class and Race in the formation of Australian National Identity*' by Alice Pung, October 6, 2016

Essay Series: '*Mencari Identitas, Memetik I.N.D.O.N.E.S.I.A'* by Leila S. Chudori & '*Redefining Indonesia*' by Leila S. Chudori, October 5, 2016

Essay Series: '*Eighteen Years Later*' by Eliza Vitri Handayani & '*Delapan Belas Tahun Kemudian*' by Eliza Vitri Handayani, November 21, 2016

Essay Series: '*An Ode to my Australian Identity*' by Sanaz Fotouhi & '*Ode untuk 'keaustraliaan' saya*' by Sanaz Fotouhi, November 14, 2016

Report

Pung, Alice; Chudori, Leila S; Handayani, Eliza Vitri; Fotouhi, Sanaz (2017): Australia Indonesia Essay Series. figshare. Paper. <https://doi.org/10.4225/03/58abb84b6c6ca>



Relationships

Strengthening Australia-Indonesia linkages in
government, business, education, science, research, and communities.



The Australia-Indonesia Centre brings together leaders from both nations to **strengthen relationships, exchange knowledge, and establish new networks that increase prosperity in our region.**

The Centre pursues this goal through a series of programs, dialogues, and partnerships in Indonesia and Australia.

Australia-Indonesia Leaders Program



A flagship initiative of the Centre, the Australia-Indonesia Leaders Program built relationships with an influential alumni of 162 emerging leaders from 37 government, business, academic institutions in both countries.

The Australia-Indonesia Leaders Program was launched in 2015 as an initiative of the Australia-Indonesia Centre in partnership with Indonesia's Ministry of Foreign Affairs. In 2016, the Centre delivered the Financial Leaders Program in partnership with Indonesia's Financial Services Authority (OJK). The goal of the program is to develop strong relationships between future leaders from both nations as they move into national leadership positions.

Between May 2015 and 2017, the Leaders Program was delivered twice annually over 10 days across Melbourne, Canberra and Sydney. Up to 30 delegates from government, business, academia and media participated in each program.

Highlights include:

- Executive leadership training courses at Monash University, The University of Melbourne, Australian National University and The University of Sydney
- Roundtable dialogues with Australian government ministers and senior representatives
- Masterclasses with former Australian ambassadors
- Case study workshops with business leaders
- Cultural and networking functions

ALUMNI

AUSTRALIA – Participating Organisations

Department of Foreign Affairs and Trade
 Department of Education and Training
 Department of Industry, Innovation and Science
 Austrade
 Victoria State Government
 City of Melbourne
 Monash University
 The University of Melbourne
 Australian National University
 The University of Sydney
 ANZ

INDONESIA – Participating Organisations

Executive Office of the President (KSP)
 Presidential Advisory Council (Wantimpres)
 Coordinating Ministry for Economic Affairs
 Coordinating Ministry for Political, Legal and Security Affairs
 Ministry of Foreign Affairs
 Ministry of Trade
 Ministry of Energy and Mineral Resources
 Ministry of Industry
 Ministry of National Development Planning
 Indonesia Financial Services Authority (OJK)
 West Java Provincial Government
 Jakarta Regional Development Planning Board (BAPPEDA Jakarta)
 MRT Jakarta

Indonesia Infrastructure Guarantee Fund
 Indonesia Young Entrepreneurs Association (HIPMI)
 JAVARA
 Veritrans
 Universitas Indonesia (UI)
 Institut Teknologi Bandung (ITB)
 Institut Pertanian Bogor (IPB)
 Institut Teknologi Sepuluh Nopember (ITS)
 Paramadina University
 Center for Strategic and International Studies (CSIS)
 Centre of Reform Economics
 People Centred Economic and Business Institute (IBEKA)
 Indonesia Institute for Defense and Strategic Studies
 Kompas TV
 PwC Indonesia
 ANZ Indonesia
 QBE Indonesia
 Asuransi Jasa Indonesia
 Bank Negara Indonesia (BNI)
 Asuransi Jiwasraya
 Indonesia Central Securities Depository (KSEI)
 AXA Mandiri Financial Services
 Asuransi Central Asia
 Bank Tabungan Negara
 Tabungan dan Asuransi Pensiun (TASPEN)
 Bank Bukopin
 Pegadaian

The Centre has engaged 33 program partners and sponsors to deliver 6 programs between 2015–2017.



Baker
McKenzie.

Australia-Indonesia leaders program



MAY 2017: FUTURE CITIES

"The Australia-Indonesia Leaders Program was a valuable opportunity to learn detailed and relevant information on one of Australia's closest neighbours and the challenges Indonesia faces in transforming their cities to modern global communities. The program also provided Australian participants with the chance to focus the lens on ourselves. A highly relevant program delivered by a highly professional AIC team!"

Shane McIlroy, City of Melbourne



NOVEMBER 2016: PUBLIC DIPLOMACY, INFRASTRUCTURE, AND INNOVATION

"I found this program immensely valuable in terms of building networks, both in Indonesia and at home, and expanding my knowledge of Australia's innovation ecosystem. It was expertly coordinated and I would highly recommend the program to anyone working or looking to work with Indonesian partners."

Amelia Fyfield, Beanstalk AgTech



OCTOBER 2016: FINANCIAL LEADERS PROGRAM

"The Indonesian saying 'tak kenal maka tak sayang' is so appropriate. This program is so important for both Indonesia and Australia's financial leaders to know each other and start to trust each other and build a mutual relationship between the two countries."

Yunita Linda Sari, Indonesia Financial Services Authority (OJK)



MAY 2016: ENERGY, ECONOMIC DIPLOMACY, AND INNOVATION

"Quality well designed program that is instrumental in bridging relations between Indonesia and Australia.

Any leadership that is serious in committing towards the relationship could not afford to not send their best people to this program. Thank you so much to the Australia-Indonesia Centre for the job well done! After hosting us, Australia could not be closer to our hearts. We miss you and the new friends made during our too short of a stay in Australia. May these friendships be lifelong. Count me in for support in strengthening the relationship between Australia and Indonesia."

RM Aria Wibisono, Ministry of Foreign Affairs



NOVEMBER 2015: ECONOMIC DIPLOMACY

"AIC through the Australia-Indonesia Leaders Program plays significant role in providing valuable insight into global economy issues and leveraging the bilateral trade

between Australia and Indonesia. More importantly, this program has led to improved trust and mutual understanding between both countries."

Eva Armila, Armila & Rako



MAY 2015: DIPLOMACY IN A COMPLEX WORLD

"The leadership programs were memorable in their own way, and my colleagues walked away with a new found sense of Australia as Indonesia's partner in the region."

Odo Manuhutu, Ministry of Foreign Affairs

In Conversation dialogues

The Centre hosted a series of dialogues and produced interviews with leaders in government, business, and academia from both nations to promote **contemporary understanding of Indonesia** to Australian audiences.



MAHENDRA SIREGAR

Special Advisor to the Minister of Foreign Affairs of Indonesia



DINO PATTI DJALAL

(in partnership with PwC and Perth USAsia Centre)
Former Deputy Minister of Foreign Affairs of Indonesia



H.E. KRISTIARTO LEGOWO

Indonesian Ambassador to Australia



RICHARD MATHEWS

Australian Consul General to Makassar



ARIF SATRIA

Rector of Bogor Agricultural University



DIGITAL ECONOMY: NEW FRONTIER IN THE INDONESIA-AUSTRALIA RELATIONSHIP (IN PARTNERSHIP WITH TRADE VICTORIA, AIBC, ASIALINK BUSINESS)

Panel: Laura Anderson (LaunchVic), Dr Stephanie Fahey (Austrade), Andrew Parker (PwC)

Moderator: Helen Brown

AUSTRALIAN FOREIGN AFFAIRS JOURNAL 3RD EDITION LAUNCH: AUSTRALIA-INDONESIA – CAN WE BE FRIENDS? (IN PARTNERSHIP WITH AFA)

Panel: Professor Gareth Evans AC (ANU), Professor Tim Lindsey AO (The University of Melbourne), Dr Nasya Bahfen (La Trobe University)

Moderator: Helen Brown

POLITICAL AND EDUCATION UPDATE (IN PARTNERSHIP WITH AIBC)

Kevin Evans | Indonesia Director, AIC

Professor Ainun Na'im | Secretary General, Ministry of Research, Technology, and Higher Education

11 September 2018, PwC Barangaroo, Sydney

19 September 2018, International Chamber House, Melbourne

AIBC CONFERENCE SESSION 4: THE DIGITAL ERA – THE NEW WAVE OF SERVICES (IN PARTNERSHIP WITH AIBC)

Chloe Martinez (Dragoman), Merrick Spain (Telstra), Kevin Evans (AIC), Gordon Scott (Successful Graduate), Katrina Reid (Study Gold Coast)

13 November 2018, Surfers Paradise Marriott Resort & Spa, Gold Coast

In Conversation series | Indonesia



THOMAS LEMBONG

Chair of Indonesia Investment
Coordinating Board (BKPM)



RIDWAN KAMIL

Governor of West Java



BAMBANG BRODJONEGORO

Minister of National Development
Planning of Indonesia



MARI PANGESTU & CHATIB BASRI

Former Minister of Trade and Former
Minister of Finance



DINO PATTI DJALAL

Former Deputy Minister of Foreign Affairs
of Indonesia



ARIF SATRIA

Rector of Bogor Agricultural University



RACHMAT WITOELAR

Indonesia's Presidential Envoy for
Climate Change



SPICA TUTUHATUNEWA

Indonesian Consul General to Victoria
and Tasmania



ODO MANUHUTU

Deputy Assistant Director at Coordinating
Ministry for Maritime Affairs of Indonesia



INDONESIAN FINTECH ENTREPRENEURS



INDONESIA-AUSTRALIA DIGITAL FORUM: WILLIX HALIM (BUKALAPAK)



INDONESIA-AUSTRALIA DIGITAL FORUM: EKA PAMITRA (TANIHUB)

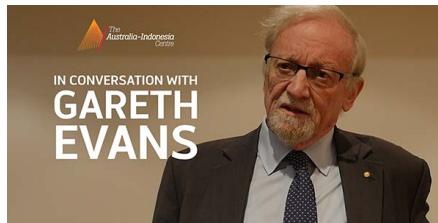


INDONESIA-AUSTRALIA DIGITAL FORUM: LLIA HALIMATUSSADIAH (ZETTA MEDIA)



INDONESIA-AUSTRALIA DIGITAL FORUM: ELISABETH YUNARKO (SPOKLE)

In Conversation series | Australia



PROFESSOR GARETH EVANS

Chancellor, ANU



PROFESSOR TIM LINDSEY

Director of the Centre for Indonesian Law, Islam and Society, Melbourne Law School



ELENA WILLIAMS

Immediate past Resident Director, ACICIS



NIGEL CARPENTER

CEO, Sustainable Skills



KEVIN EVANS

Indonesia Director,
The Australia-Indonesia Centre



JEWEL TOPSFIELD

Former Indonesia Correspondent, Fairfax Media



INDONESIA-AUSTRALIA

DIGITAL FORUM:

ALISON HARDACRE (HEALTHKIT)



INDONESIA-AUSTRALIA

DIGITAL FORUM:

JAMES BOSTON (PAPERLUST)

Indonesia Now roadshow

In partnership with Austrade, The Australia-Indonesia Centre delivered **a series of seminars around Australia** to promote Indonesia Australia Business Week 2015.



DARWIN

21 September 2015

Indonesian Consulate to Northern Territory

Katrina Fong Lim (Lord Mayor of Darwin)

Mahendra Siregar (Special Advisor to Foreign Affairs Minister of Indonesia & Former Chair of BKPM)

Russell Good (Regional Executive Northern Territory, ANZ)

Bruce Wallner (Manager – East Asian Growth Markets, Austrade)

Tracey Hayes (Former CEO, Northern Territory Cattlemen's Association)



PERTH

23 September 2015

PwC Perth

Patrick Kearins (State Director – South Australia, Austrade)

Dino Patti Djalal (Former Deputy Foreign Affairs Minister of Indonesia)

Greg Gaunt (Former Western Australia Chair, AIBC)

Mark Switkowski (Former Director, PwC)

Jason Craig (GM, Marketing and Trading, CBH Group)

Astrid Vasile (Executive Chair, Aus-Ind Businesswomen's Network)



ADELAIDE

24 September 2015

PwC Adelaide

Patrick Kearins (State Director – South Australia, Austrade)

Kevin Evans (Indonesia Director, AIC)

Nathan Grey (Managing Partner, AsiaAustralis)

Anthony Hodge (Partner, PwC)

Will Angove (CEO, Automotive Planning Asia P.L.)

Kelly Matthews (Austrade)

More than 300 business people joined the seminars in Perth, Adelaide, Sydney, Brisbane, Melbourne and Darwin from September 21 to 30. The seminars were hosted by PwC and the Indonesian Consulate in Darwin.

All across the country, the Centre collaborated with the Australia-Indonesia Business Council, state governments, Indonesian government missions and peak industry associations to promote business opportunities in Indonesia.

The seminars covered a wide variety of opportunities in education, agriculture, manufacturing, tourism, resources, energy, infrastructure, healthcare, food and beverage, design, and the creative industries.



SYDNEY

28 September 2015

PwC Sydney

Duncan Challan (Executive Director of International Trade and Investment, NSW Department of Premier and Cabinet)
Brent Barnes (GM Asia Growth Markets, Cochlear)
Michael Fay (NSW Chair, AIBC)
David Landers (Former Head of Global Markets, Austrade)
Rob Langtry (Former Global Chief Strategy & Marketing Officer, Woolmark)
Ashley Wood (Partner, PwC)



BRISBANE

29 September 2015

PwC Brisbane

Andrew Tulloch (CEO, Department of Trade & Investment Queensland)
Andrew Burnes (CEO, AOT Group)
Wendy Hartanti (Senior Manager, PwC)
David Widjaja (Queensland Chair, AIBC)
Luisa Rust (Former Acting State Director Queensland and Northern Territory, Austrade)



MELBOURNE

30 September 2015

PwC Melbourne

Sri Sultan Hamengku Buwono X (Sultan of Yogyakarta)
Nadjib Riphat Kesoema (Former Indonesian Ambassador to Australia)
Philip Dalidakis (Victorian Minister for Small Business, Innovation and Trade)
Allaster Cox (Deputy Head of Mission, Australian Embassy Jakarta)
Debnath Guharoy (Former National President, AIBC)
Kiri Delly (Former CEO, Council of Textile and Fashion Industries)
David Landers (Former Head of Global Markets, Austrade)
Mark Switkowski (Former Director, PwC)

Research capacity



GRADUATE RESEARCH INTERDISCIPLINARY NETWORK

Early career and graduate research students from the Centre's 11 participating universities form the Graduate Research Interdisciplinary Network (GRIN). In association with the Australian Government's Knowledge Sector Initiative team, the GRIN Program took place across seven days in late November 2016, stopping in Melbourne and Canberra to participate in the first Joint Science Symposium of the Indonesian Academy of Sciences and the Australian Academy of Science. A total of 22 graduate researchers, representing the Energy, Infrastructure, Health, and Urban Water clusters across both countries, were joined by four academic delegates at professor and associate professor level for a series of workshops, site visits, lectures and cultural experiences spanning big data, policy, innovation, interdisciplinary research, career pathways and research impact.

FUTURE RESEARCHERS OF INDONESIA PROGRAM

The Future Researchers of Indonesia Program (FRIP) was a five-day intensive program designed to inspire, encourage, and help sharpen the research skills of advanced undergraduate students from the partner universities of the Australia-Indonesia Centre. The program focused on many skills essential for successful research outcomes, including basic research skills in critical thinking and writing, assessing the major contemporary themes and debates in a range of disciplines, considering the big public policy questions facing Indonesia (including those the AIC is addressing through its research themes and how research is advancing them), and examining career paths in academic, think-tank, policy, private sector, non-government organisations, and more. A total of 49 students from both nations participated in workshops and engaged in dialogues with academics and experts from the Australian National University, the University of Melbourne, Universitas Indonesia, and Monash University, across a range of disciplines including foreign policy, economics, environmental sustainability, data processing, anthropology, history, and language.

Youth leaders



AUSTRALIA-INDONESIA YOUTH ASSOCIATION

The Centre partners with the Australia-Indonesia Youth Association (AIYA) to empower the next generation of Australian and Indonesian leaders. AIYA is a non-government, youth-led organisation helping connect young Indonesians and Australians to each other and to Indonesia-related opportunities. The peak body for young people in the Australia-Indonesia relationship, AIYA aims to connect, inform and inspire young people, business, government and other organisations to facilitate youth engagement between the two countries. In 2018, the Centre provided financial & in-kind support and hosted AIYA's flagship panel discussion event Basa-Basi with the theme of "Foreign Correspondence in Indonesia". As part of the event, the Centre produced an In Conversation video interview with Jewel Topsfield, former Indonesia correspondent of Fairfax Media.



CONFERENCE OF AUSTRALIAN AND INDONESIA YOUTH (CAUSINDY)

CAUSINDY is an annual conference, bringing together young Indonesians and Australians for a series of workshops, networking events and cultural activities to strengthen people-to-people ties between the two nations. In 2018, The Centre provided financial & in-kind support to the Conference of Australian and Indonesian Youth (CAUSINDY) 2018. Thirty young leaders from both nations participated in this year's conference held in Makassar with the theme of "Connected by Sea".



NATIONAL AUSTRALIA INDONESIA LANGUAGE AWARDS

An initiative of AIYA, the National Australia Indonesia Language Awards aims to foster Indonesian language study in Australia. The Awards encourage Indonesia language speakers – from school-age learners to executive level speakers – to showcase their language skills, discuss bilateral issues and share traditional arts, culture and musical performances with the public. In 2018, The Centre provided financial & in-kind support to the National Australia Indonesia Language Awards (NAILA) 2018. The Centre secured the venue of the Awards Night at the Monash Conference Centre. The Australia-Indonesia Centre Tertiary Award winner is Ellen House from the University of Sydney.

Australia-Indonesia Fashion Exchange

The Centre facilitated a partnership between **Jakarta Fashion Week** and **Virgin Australia Melbourne Fashion Festival**, supported by Creative Victoria and Indonesia Creative Economy Agency (BEKRAF), to deliver runway exchanges over 3 years featuring 6 emerging fashion labels in both nations: Patrick Owen, PAGEANT, ETU, HAN, I.K.Y.K., and Peggy Hartanto.

The Succeeding Together report identified textile as an area where Australia and Indonesia has the potential to capture opportunities in the region together. Fashion partnership opens opportunities of further creative collaborations between designers, manufacturers and businesses from Australia and Indonesia.



Melbourne Symphony Orchestra – Yogyakarta

The Australia-Indonesia Centre facilitated a partnership between the **Melbourne Symphony Orchestra and the Yogyakarta Special Region** to present a music camp and performance in Indonesia in 2016 and 2017.

An agreement signed by the Centre and the Region pledged to bring up to 20 performers from the MSO to attend a music camp in Yogyakarta in 2016 and return for a performance at the ancient Prambanan Temple in 2017.

The collaboration built enduring relationships between the musicians and has seen the MSO provide mentoring support to a local orchestra in Bandung.



"The Australia-Indonesia Centre has provided a working model for productive institutional collaboration that leads to better outcomes than either side would have achieved on their own."

JANE FISHER AO, FINKEL
PROFESSOR OF GLOBAL HEALTH, MONASH UNIVERSITY

"Researching on a multi-disciplinary basis means that as an engineer, I have learned how to work with researchers from other disciplines like politics. Amazingly I have been able to develop great partnerships with people from other faculties in my own university that I never met before. These experiences have really enriched my skills and capacity as a researcher to think across boundaries and outside the box."

DR. RR. DWINANTI RIKA MARTHANTY
CIVIL ENGINEERING, UNIVERSITAS INDONESIA

When you begin a journey of discovery, you never know where you will end up, or what you might find along the way.

Very often you will set out looking for a particular thing, but find something else altogether – something that may be more valuable than what you were searching for in the first place. True discovery is not just about finding new territory, but about exploring, and expanding, the limits of your own knowledge.

When the Australia-Indonesia Centre was launched in 2014, it had clear objectives: build the bond between the two countries, deliver groundbreaking research, foster leadership. Over the next five years it did just that. But because we were working in ways and at scale that hadn't been tried before, we were also on a journey of discovery. What we learned has made us wiser, more resilient, and strongly optimistic about the future. As the first phase of our existence draws to a close, it is worth reflecting on where we have come from, and where we are going.

Two factors have made the Centre unique since day one: its structured approach, and the scope of its ambitions. It was always explicitly about the big picture, about making connections, finding solutions and creating a cohesive body of knowledge that could benefit both Australia and Indonesia. The challenge, of course, was that neither country had ever before attempted anything like it.

It was a challenge that expressed itself most fundamentally as the question 'What do we do?' How should we invest to ensure maximum return for both countries? What sort of work would be of most benefit? The Centre was never about Australians studying Indonesia, or Indonesians studying Australia. It was about creating opportunities for Australians and Indonesians to work side by side on research of shared and lasting value. Choosing projects and programs that met that brief would define the success or failure of the Centre.

To begin with, the Centre backed a series of small and rapid-start projects designed to explore possible pathways and open up fields of inquiry. As time went by, we were able to be more strategic and informed. We were able to ask of a proposal not just whether it was in itself worthy, but what problem would it solve? The quality of the resulting research, and the depth of the resulting engagement, tells us we got it right.

Beyond that greater challenge of vision, however, were myriad smaller ones.

There were language and cultural differences. (Consider that more than 60 per cent of the researchers had never previously worked in the other country, and that Indonesian and Australian universities have different academic years, research expectations, holidays and funding models.) There was the geographic spread of institutions and projects, the sheer number of stakeholders, and the natural tendency for research teams to become silos, working independently or even at odds with other teams. These were smaller challenges, but not trivial.

Finding our way past these roadblocks opened up new ways of collaborating and taught us invaluable lessons about what works and what doesn't. Our Urban Water Cluster, for instance, started out with six sub-projects, each with a particular theme. As time went by, problems appeared. Teaching loads meant the Indonesian partners had much less time for research than their Australian counterparts, and less access to postgraduate assistance. The majority of the projects were addressing Indonesian issues, but were run from Australia. The sub-projects were turning into silos.

So the team decided to stop, think and reframe their work as a series of deliverables that the whole Cluster would respond to in an actively interdisciplinary manner. The water systems of Greater Bogor continued to be the focus, with the goal of exploring pathways to water sensitive cities. The research became truly interdisciplinary, with teams looking at social, political and biophysical factors.

The result was greatly improved collaboration and performance, a cohesive and valuable body of work, and a vivid demonstration of the power of the interdisciplinary approach. It also built networks of researchers and government and industry stakeholders that are bearing fruit in the form of further opportunities to scale their work in West Java.

This work in Bogor, along with the Food and Agriculture Cluster's discoveries about the unexpected ways problems in different research areas can cross over, helped inform the approach for the next stage of our existence. Instead of dividing researchers into Clusters, we will now focus on people and place, bringing integrated and interdisciplinary teams to study the issues of a particular location. Led by and involving local voices, we will explore holistic solutions to existing problems, with the ultimate vision of taking those solutions, scaling them, and applying them elsewhere.

As important as anything else the Centre has done has been the investment it has made in people, both in building their individual capacity (for instance, the 120 research students who participated in projects), and in building connections between them. The beauty of this investment is that it is compounding – the bridges built in the past five years will smooth the path of future work – and will keep paying off for years to come.

An excellent case in point are the alumni of our Leaders Program. We selected 162 people considered to be future leaders of Indonesia and Australia and gave them the chance to interact and create networks over a series of events and workshops.

One of the 2015 participants, Dr Agung Wicaksono, went on to be appointed Director of Operations for the Jakarta MRT, where he helped facilitate the research partnership that underpinned our work on real-time rail track monitoring. In late 2018 he became President Director of PT Transjakarta, the world's longest bus rapid-transit system.

The power of relationships, of course, goes far beyond their transactional value. You cannot put a price on good will and understanding, particularly when it manages to cross cultural divides. The Centre's Australia-Indonesia Perceptions

Report found that citizens of both countries held inaccurate perceptions of the other, coupled on the Australian side with a substantial degree of wariness. As the report pointed out, "There is no simple solution to bringing the people of Indonesia and Australia closer together". Part of any solution, though, is an understanding of shared qualities and values. Through its institutional partnerships and people-to-people connections, the Centre is working toward spreading that understanding.

As phase one of the Centre's operations drew to a close, we commissioned a review of the Centre's collaborative practices. A number of Indonesian and Australian academics who worked with the Centre were interviewed. They identified some of the problems it encountered and barriers it faced, but the overall sentiment was one of enthusiasm for the Centre and pride in its collective work.

"From these participants," the report concluded, *"it becomes clear that the AIC has been able to make remarkable achievements with regards to research, public impact and the engagement of stakeholders at all levels of society."*

Our networks and our expertise in cross-cultural collaboration have been hard won, and they put us in a unique position. We have learned that relationships matter, and so do solutions. We have learned the best solutions come from working across disciplines, breaking down barriers and looking outside siloes. We have learned the value of asking communities what problems they need solved, and engaging with them every step of the way. We have learned those problems won't exist in isolation.

Looking back on the past five years, we believe we can be justifiably proud of our achievements, and justifiably confident that they have equipped us for an even brighter future. In many ways our journey has been long and fruitful, but in others, it has only just begun.



V01009

GRANTOR: Department of Education and Training
GRANTEE: Monash University
PROJECT REF: Australia-Indonesia Centre

**STATEMENT OF INCOME AND EXPENDITURE
FOR THE PERIOD ENDED 31 DECEMBER 2018**

	\$	\$
OPENING BALANCE AS AT 1 JULY 2018		1,502,136
INCOME		
Additional Monash Contribution	265,095	
Interest Earned	6,155	
Other Income	21,000	
Total Income	<hr/>	292,250
EXPENDITURE		
Personnel Related	737,400	
Grant Payments	539,616	
Workshop Related	9,116	
Consultants	111,033	
Travel Related	146,165	
Advertising and Promotions	30,913	
Central Support Charges	134,360	
Building and Equipment Related	15,871	
Other Operating Expenses	69,912	
Total Expenditure	<hr/>	1,794,386
NET BALANCE FOR THE PERIOD		(1,502,136)
CLOSING BALANCE AS AT 31 DECEMBER 2018		<hr/>

I certify that the above Statement correctly reflects the income and expenditure as recorded in the Monash University Accounting and Financial Reporting System against the grant monies received from Department of Education and Training and has been expended in accordance with the Funding Agreement.

May Cheng

Manager, Research and Revenue Accounting Services

Date : 19/3/2019

ENERGY

INFRASTRUCTURE

URBAN WATER

"The Energy Cluster's strength lies in its ability to draw together key Australian and Indonesian players in the field of energy to work on complex issues, some that need a deep understanding of social and regulatory challenges combined with cutting edge technology research."

Dr Igor Skryabin
ANU Energy Change Institute

"It is important to engage local stakeholders in conducting research. In our research to help improve port efficiency, accessibility and connectivity, we have consulted the local port company, regional government, and state-owned enterprise. This way, our research will have more chance to create positive impact on employment, health, and transportation in the region."

Dr Hera Widystutti
Head of the Transport Laboratory
Institut Teknologi Sepuluh Nopember

"The AIC has been an amazing initiative that has led to a much better understanding of the challenges of working with Indonesia. Perhaps the most valuable aspect has been the networks it has created."

Professor Diego Ramirez-Lovering
Deputy Dean,
Monash Art Design & Architecture

HEALTH

FOOD & AGRICULTURE

REELOZIND

"Indonesia's biggest health problem now is facing the double burden of dealing with infectious diseases at the same time as emerging challenge of non-communicable diseases. Through our research, I can now advocate better on the importance of addressing mental health and to improve the capacity of regional and rural health services."

Dr Sudirman Nasir
Faculty of Public Health,
Universitas Hasanuddin

"When we tried to identify ways to improve cocoa production – a major commodity in Sulawesi, we learned that there are strong links between farmers' health and cocoa yields. This finding can only be uncovered from the interdisciplinary approach to research that the AIC is championing."

Dr Nunung Nuryartono
Dean of Faculty of Business and Economics,
Institut Pertanian Bogor

"ReelOzInd changed my life. For me, ReelOzInd is like home where you can develop yourself. From there, I had many extraordinary opportunities related to filmmaking. Beside my film being screened in many places in Indonesia and Australia, the most important thing is meeting with many peoples and opening new possibilities in the future

Dery Prananda
Documentary Filmmaker & ReelOzInd Winner

SUCCEEDING TOGETHER

"Given complementarities and proximity between Indonesia and Australia, serious consideration should be given to the possibilities for joint development for competitive advantage to face the challenges ahead as well as to take advantage of the opportunities opening up. This, of course, is the subject of this study and thus its recommendations could not come at a more timely moment."

Dr Mari Pangestu

Former Minister of Trade of Indonesia

AUSTRALIA-INDONESIA LEADERS PROGRAM

"The leadership programs were memorable in their own way, and my colleagues walked away with a new found sense of Australia as Indonesia's partner in the region."

Odo Manuhutu

Deputy Assistant Director on
Maritime & Navigation Safety,
Coordinating Ministry for Maritime Affairs

AUSTRALIA-INDONESIA LEADERS PROGRAM

"I found this program immensely valuable in terms of building networks, both in Indonesia and at home. It was expertly coordinated and I would highly recommend the program to anyone working or looking to work with Indonesian partners."

Amelia Fyfield
Beanstalk AgTech



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