

# Designing water security solutions, Makassar Indonesia

Enhancing the effective and sustainable urban water system for Makassar, a rapidly growing city already facing water shortages and vulnerable to a changing climate.



## The issue

As an archipelago country, Indonesia is vulnerable to the impact of climate change. Makassar, the capital city of the South Sulawesi Province, is the most urbanised city in the eastern part of Indonesia with a population of more than 1.2 million (2006). Makassar is already struggling to meet the demand for clean water supply, in 2012 only 62% of the population had access to mains water supply. Increasingly, climate change and its subsequent impact will likely exacerbate an already critical situation. There is limited knowledge available for informing climate adaptation at local level, and the capacity of local institutions needs to be enhanced to enable them to mainstream adaptation and mitigation responses into local development planning.

## Key lessons for development

- Addressing water security involves more than just building bigger dams. Better solutions can be attained by combining infrastructure and preventative measures, such as demand management and behaviour changes.
- Water stakeholders in Makassar now share similar views regarding water resources, which means they are well placed to start developing adaptation thinking and practices.
- Two adaptation strategies, broken down into twelve options, were identified to help the City sustain its urban water supply under a changing world.
- The projections suggest a potential decrease in rainfall over Makassar, a shortening of the wet monsoon and an increase in evaporation. Subsequently, these projected changes will effect future streamflow in the catchments around Makassar.
- The population of Makassar is expected to increase by 20% by 2020, and, as people become more affluent and more connected to mains water supply, water demand is expected to increase by more than 120%.

## What did the project deliver?

**Fine-resolution climate change simulation and projections** were developed to inform climate change impact and adaptation assessment at a local scale. This included the development of briefing papers, fact sheets, reports, data and journal papers. Information developed by the project is being used by the World Bank for a new feasibility study, and by the UN Habitat for a vulnerability assessment of large infrastructure in Makassar. The project has also been selected as a case study for inclusion in the Urban Climate Change Research Network's Second Assessment Report on Climate Change and Cities (ARC3-2) to be published in late 2015.

**A set of adaptation options and implementation strategies** to improve water provision sustainability for the city were proposed. This included developing an understanding of Makassar's current and future challenges associated with water security, as well as assessing the suitability of the Infrastructure Master Plan to meet demand. It concluded that infrastructure and population are major drivers in water service problems.

**UNHAS emerged as a Centre for Excellence** to help local government address climate change adaptation and mitigation issues. The Centre is becoming well known, both nationally and internationally, with enrolment growing from two to 17 students. It now has a waiting list for admission. In addition, UNHAS was recently awarded an "A" National Education Accreditation, with requests from local government to undertake further work. The appointment of Dr Roland as the key UNHAS representative in the Indonesia-France Joint Working Group is a further indication of the project's influence.



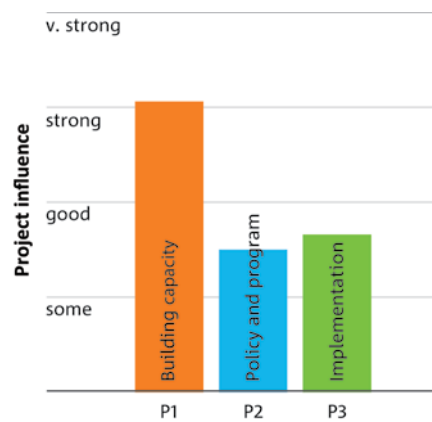
## Project evaluation and impact

In April 2014, UNHAS and CSIRO undertook an evaluation to assess the project's influence on participants' adaptive capacity. The project consisted of three linked phases across which impact was achieved. Phase 1 focused on 'building, planning, capacity and tools'. This enabled Phase 2 'policy and program development', which was then followed by Phase 3 'implementation, adoption and scaling-out'. Phase 1 encompassed the project's activities, while Phases 2 and 3 were out of the project team's direct control. Parts of Phase 2 and all of Phase 3's 'impact with beneficiaries' extended beyond the life of the individual projects and were dependent on key stakeholder support over time.

The results showed that the participatory approach and training significantly built the capacity and social networks of the UNHAS research team to understand the problem and to develop solutions which would improve the management of water resources for Makassar. These skills and the project's participatory planning

process influenced management plans and resources in Phase 2, resulting in improved cross scale social networks and new partnerships in Phase 3.

The project developed an understanding of Makassar's current and future water services and challenges. This included new knowledge of stakeholder's social networks and perceptions of climate change. New partnerships were forged, including those between UNHAS researchers and the Public Works Agency and the City Company for Drinking Water.



Summary evaluation results for the three phases of the project impact pathway

The project outputs are being used by the City Public Work Agency to develop a new water and sanitation master plan, as well as by the World Bank, UN Habitat and other institution to assess the feasibility of investment for infrastructure development in Makassar and other cities in Asia. Five out of twelve adaptation option identified by the project have been implemented in Makassar.



## Project partners

This 3 year collaborative project was led by CSIRO and Hasanuddin University (UNHAS), in partnership with the Bureau of Meteorology, Climatology and Geophysics (BMKG – National office and Makassar regional office); PPE: State Ministry of Environment – the EcoRegion Management Center for SUMAPAPUA, Makassar; PDAM: Municipal Water Supply Company, Makassar; PU: Public Work Agency, Makassar; BLHD: Environmental Agency, Makassar and the Australian Department of Foreign Affairs and Trade (DFAT).



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**FOR FURTHER INFORMATION**  
**Land and Water**  
Dewi Kirono  
**t** +61 3 9239 4651  
**e** dewi.kirono@csiro.au  
**w** www.csiro.au/LWF