

Designing water security solutions in South East Asia through collaborative research

Like many other cities throughout the world, Makassar, Indonesia faces challenges from high rates of urbanisation, population increase and looming climate change. The city, the largest and most urbanised in South Sulawesi province, faces water shortages over the next few decades unless it considers new alternatives.

Addressing water security involves more than just building bigger dams. Better solutions can be achieved by combining infrastructure and preventive measures such as demand management and behavioural changes. This was a key message from a two-year project by CSIRO, Hasanuddin University and Makassar local and provincial government agencies to investigate future options for urban water supplies.

Climate models help inform local decision making

Using global and regional climate models the project provided information on projections of the climate and status of water over the coming few decades. An analysis of climate data showed that temperature has already increased and

the rainfall pattern has changed, with dry season rainfall falling by about 36% relative to the long-term average. The climate change projections suggest the likelihood of stronger seasonal effects on water supply-demand, with draw-down of water reserves in the dry season from urban demand alone. When water demands from agricultural and industrial sectors are added the situation looks even more dire.

Project leader, Dr Dewi Kirono of CSIRO says the information about the impacts of climate change was a real eye opener for participants in the study – the city's catchment managers, water utility managers and engineers, planners, infrastructure and sanitation agencies, environmental agencies, NGOs and university academics.

“Many of the stakeholders were aware of global climate change but they didn't know how it might affect them at a city level,” Dr Kirono explains.

Makassar – water demand on the rise by 2020.

Makassar has a population of 1.3 million, however only 62% have access to mains water supply – the rest rely on groundwater or carted water. The population is expected to increase by 20% by 2020 and, as people become more affluent and more become connected to mains supply, water demand is expected to increase by more than 120%.

Dr Kirono says the project showed the city's water managers that without



Project snapshot

Funded by the AusAID-CSIRO Research for Development Alliance, CSIRO, Hasanuddin University and Makassar local and provincial government agencies – Pusat Pengelolaan Ekoregion Sulawesi Maluku dan Papua (PPE), Public Work Agency Makassar City/Sanitation Section of Infrastructure Department and the water utility company PDAM have identified future climate impacts and a number of options to help the city build a sustainable water system.

Hasanuddin University graduate students, involved in the project, at the final symposium held to launch the research products.

Photo: Dr Dewi Kirono



ABOVE Jeneberang River at the Bili-Bili Dam during wet season. Photo: Dr Dewi Kirono



Makassar, Indonesia

additional infrastructure upgrades, water shortages will be common from 2020 for areas supplied by the two major water treatment plants.

“But, even the proposed infrastructure upgrades will only provide short-term security of supply and further investment will be needed,” she says. “Other alternatives, such as demand management and leakage reduction, need to be considered as part of a suite of long-term measures.”

The City Public Work Agency is using this information now to develop a new water and sanitation masterplan.

Mr Zulkarnain Kitta, Head of the Mamminasata Technical Unit, Spatial Planning and Settlement Office said the most useful aspect of the project was how it had helped the region’s planning for land and water supply management.

The project output will help his office with spatial planning and the results will be used as part of the Mamminasata masterplan revision, which is due in 2016.

How can local water consumers help?

Maintaining individual water consumption at 160L per person per day would delay the need for infrastructure upgrade by about 10 years. Local behavioural change of water use could play an important role in a future sustainable water supply for the city.

The project developed a method for assessing raw and clean water supply and demand which allows planners to examine scenarios based on population

projections, water consumption patterns, leakage in distribution, infrastructure upgrade plans and climate options. The Mamminasata Water Board want to use this tool to assess the 2016 regional water plan update.

Researchers working with communities to design local adaptation solutions

More than 250 employees of local, provincial and national government agencies, NGOs and universities participated in the project over two years. Local research capacity has been considerably enhanced, enabling local institutions to take up the role of providing better planning advice in the future. For instance, the CSIRO team trained eight researchers at Hasanuddin University’s Centre of Climate Change Response (CCCCR) and the Bureau of Meteorology, Climatology and Geophysics (BMKG).

After taking part in workshops in Indonesia and Australia, researchers from Makassar and Jakarta have learnt how to run the CSIRO regional climate model and use output of simulations for some common analysis. Other researchers were trained in software for modelling water demand and supply balance over a region. These researchers can now help other sectors and other cities carry out their own assessments.

Local partners are also using the data generated for further research. Hasanuddin University’s Prof Amran Achmad, for example, has developed erosion maps for the region using the

climate projection data generated in the project. Professor Roland Barkey, who led the Hasanuddin University team, is using the methods learnt to address the issue of water shortages on the remote Spermonde islands and also in Jayapura, Papua province.

Benefits from the project have also carried into the next generation of researchers, increasing the interest in postgraduate research on climate change. The CCCR’s number of postgraduate students increased from three at the beginning of the project in 2010 to 17 in 2012, each of them undertaking research projects on climate related impacts in the region. The interest was so high that the centre’s lecturers had to cap the intake of postgraduate students given staff capacity limitations.

Project impacts

- ◆ Developed an understanding of Makassar’s current and future water services and challenges. This includes new knowledge of stakeholder’s social networks and perceptions of climate change.
- ◆ The project outputs are being used by the World Bank and UNHabitat to assess the feasibility of investment for infrastructure development in Makassar and other cities in Asia.
- ◆ Facilitated capacity building of the regional/local key stakeholders to conduct research on climate change, impacts, and adaptation in the water sector.

CONTACT US

t 1300 363 400
+61 3 9545 2176
e enquiries@csiro.au
w www.csiro.au

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Dr Dewi Kirono
t +61 3 9239 4651
e Dewi.Kirono@csiro.au
w www.rfdalliance.com.au