

Climate adaptation through sustainable urban development

Case study of urban water system in Makassar, Indonesia

CLIMATE ADAPTATION FLAGSHIP
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The aim of this project in Makassar City, Indonesia was to inform policy development to improve access to clean water and to manage the impacts of development and climate change in the City. A two year project (September 2010 – 2012) the project engaged local policy makers, urban managers, donor agencies and researchers. It has facilitated understanding of future urban water scenarios as well as some adaptation options for consideration in the face of these scenarios.

Why the project was undertaken

Makassar is the largest and most urbanised city in eastern Indonesia and is a major economic, government and educational centre for the South Sulawesi province. The City is part of the MAMMINASATA metropolitan which consists of Makassar, Gowa, Maros and Takalar municipalities. The City is under pressure from a range of interacting pressures such as rapid urbanisation, industrialisation and the likely impacts of climate change.

Previously information on climate change specific to Makassar was unavailable: the project has helped with this knowledge gap.

Impacts

As a result of this project the following has been achieved:

- A clear consensus and common awareness amongst stakeholders of water related problems of the region
- Climate simulations and tools developed by the project provide the basis, and therefore the opportunity, for other sectors and on other municipalities to undertake climate change impacts assessment
- Local researchers have an increased capacity to undertake such assessments
- Increased learning on integrated urban water management principles, its benefits and challenges
- Collaborative learning through interactive participation in program activities, and partnership among research providers, government departments, water utilities and community members
- Enhanced capacity to mainstream the climate change into planning and into adaptation programs in the water sector at the local level
- The study is used in the ADPC's handbook to show case how to do Climate Risk Analysis



Outputs

The outputs of this project include:

- 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
- An ensemble of five climate simulations with around 14 km spatial resolution over the eastern part of Indonesia for period 1970 to 2100
- A methodology for assessment of the raw and clean water supply and demand for Makassar
- New knowledge of climate and urban development impacts on raw water supply in the greater MAMMINASATA region and on the sustainability of piped water supply in Makassar City
- A methodology for identifying alternative urban water services options under climate change conditions
- A list of adaptation options that may be helpful to improve future water security of the City
- Capacity building for the regional/local key players to conduct research on climate change, impacts, and adaptation in the water sector (see overleaf).
- Published and peer reviewed research documents including study reports (available in English and Indonesian), journal papers and conference papers

FOR FURTHER INFORMATION

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Formal capacity building

Training workshop *Modelling Climate Change* 1-13 November 2010. Two participants from Makassar learned how to run the CSIRO regional climate model (CCAM), how to use data manipulation routines and display packages, and how to use the output of the simulations for some common analysis.



Participants of training workshop on regional climate model simulation conducted in CSIRO Marine and Atmospheric Research, Melbourne, Australia in October 2010.

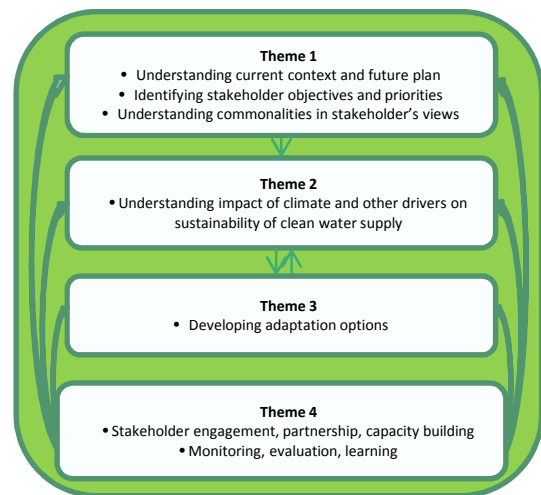
Training workshop Sustainable Urban Water Services 3-13 July 2012. Seven participants from Makassar (including academics, managers from local government and environmental ministry) undertook training, study tours and interactions with Australian scientists, government agencies, and practitioners. During this tour they learned the use of 'REALM' software for modelling water demand and supply balance over a region. They also learned from the Australian experience in planning and implementing integrated urban water management for sustainable urban adaptation to climate and population growth.

International Knowledge Sharing Workshop was held in Makassar in April 2012 with participants from 18 countries. The workshop showcased two case studies (Makassar, Indonesia and Can Tho, Vietnam) to identify common lessons useful for developing a generic framework for implementing climate adapted urban water services in developing countries.



Project frameworks

The climate change assessment was undertaken using a combination of top-down (projections) and bottom-up (observations) approaches. Adaptation options were identified by utilising the Integrated Urban Water Management principles that consider the overall water cycle in the management of water supply, stormwater and wastewater. This approach allows for assessment of a diverse range of water service options as well as consideration of criteria, such as adaptability, to anticipated climate change impacts.



The overall research framework involved four themes:

Understanding of the current and future water service provision context. This included (i) a review of the urban water current and future context which underpinned the analysis of the water management strategy, (ii) a stakeholder workshop to identify water needs at both the catchment and the urban scales and (iii) a survey of stakeholder commonalities in views.

Understanding of climate change, and its impacts on water resources in MAMINASATA and on piped water supply in Makassar. This involved the use of global and regional climate models, and related modelling techniques, to develop projections of the climate and hydrological conditions over the coming few decades.

Identification of options for a climate adapted urban water development. This research involved (i) a review of integrated water management initiatives for increasing resilience to climate change worldwide, and (ii) a stakeholder workshop to collectively identify adaptation options that may benefit Makassar.

Stakeholder engagement and communication processes. This included (i) monitoring and evaluation of engagement process and the project, and (ii) a record of lessons learnt.

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