Integrated Urban Water Management in a Changing Climate in Makassar City

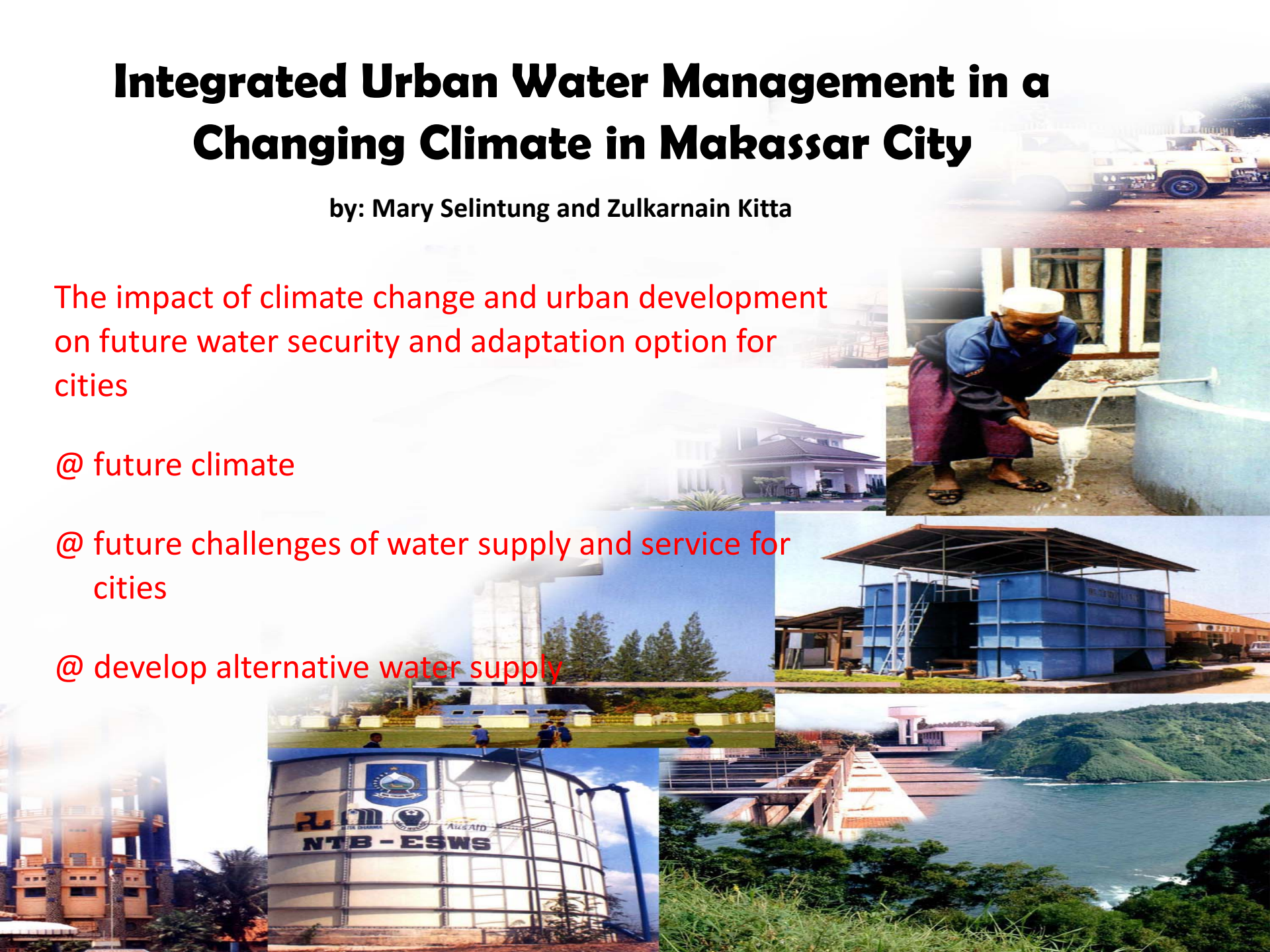
by: Mary Selintung and Zulkarnain Kitta

The impact of climate change and urban development on future water security and adaptation option for cities

@ future climate

@ future challenges of water supply and service for cities

@ develop alternative water supply



INDONESIA

- Indonesia has collaborated on Environmentally Sustainable Cities Activities.
- The First High Level Seminar Environmentally Sustainable Cities was held in Jakarta in 2010

Makassar City

Well known as “the gate way to Eastern Indonesia”

The capital city of South Sulawesi

The largest and most urbanise city in eastern Indonesia, an area of 176 km2 with 1.27 million population in 2010

A major economic, government, and educational centre of the province

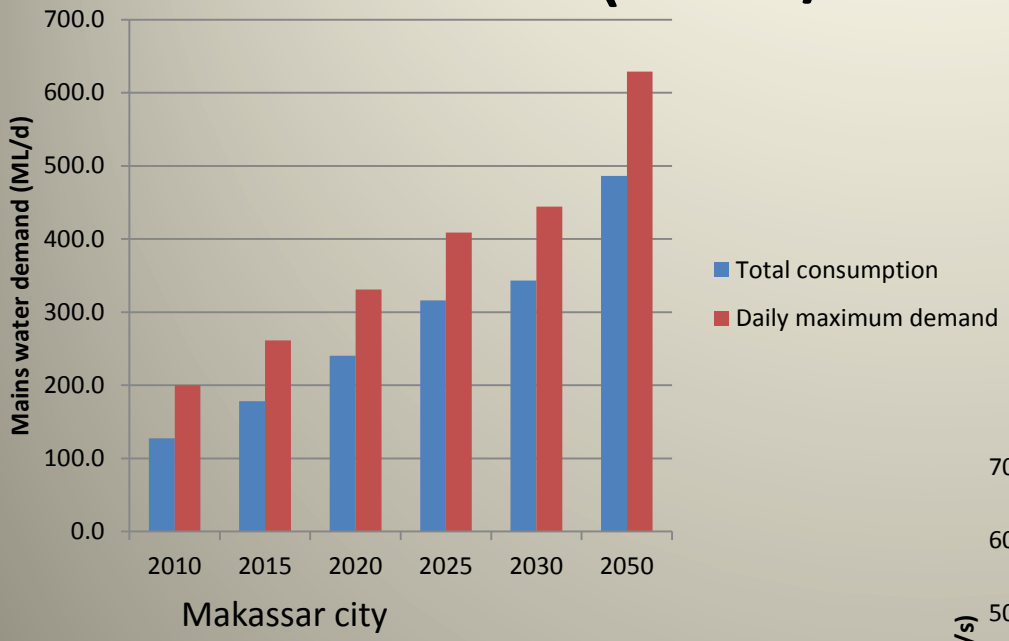
Regionally, the City is part and a satelite city of the greater *Metropolitan Mamminasata* which consist of Makassar, Gowa, Maros and Takalar regencies.

Urban Development and Water Need

Current and future water demand in Makassar

- Water demand is very much depend on the total population, people activities, social, economy, and water available
- City Water demand:
- - Domestic use
- - Non Domestic use
  - Institution
  - Industrial
  - Comersial, etc

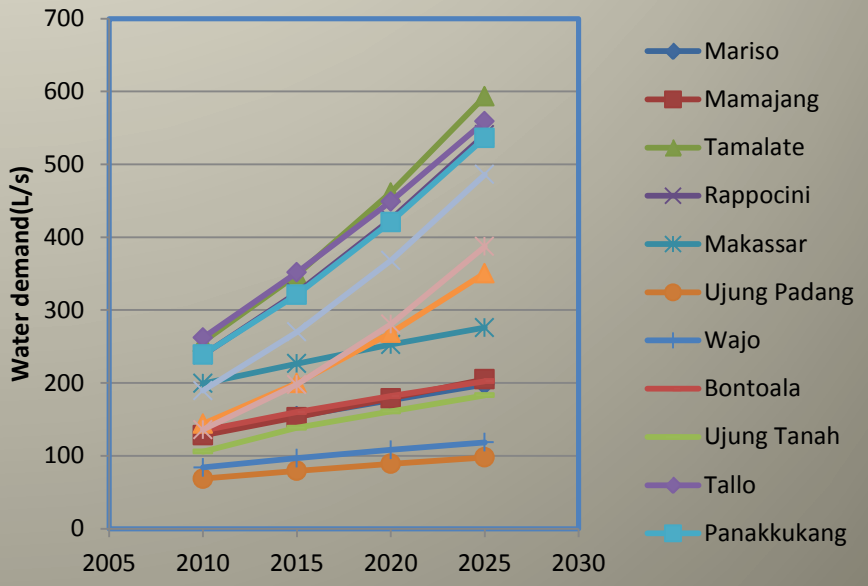
Water demand projections (JICA/CSIRO 2011)



Makassar city

Assumptions:
120L/pe/d→190L/pe/d

Reduce water use → increase water efficiency adaptation



Makassar regions

Makassar City Water Resources

- Ground Water
  - shallow well (some community)
  - dip well (industry and hotel)
- Municipal Water Supply (river water resources)
- Rain Water (coastal area)

Surface Water Resources Survey

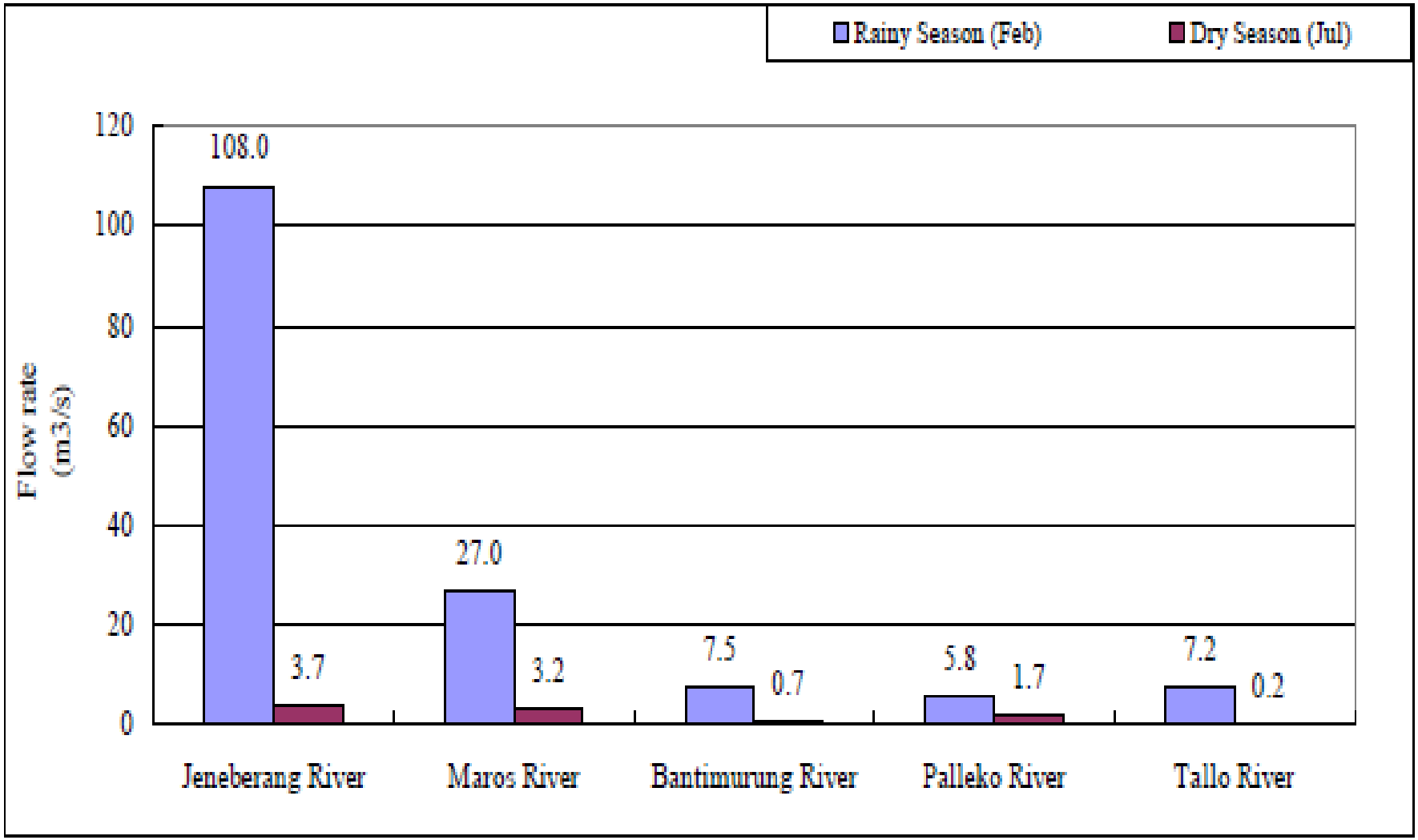
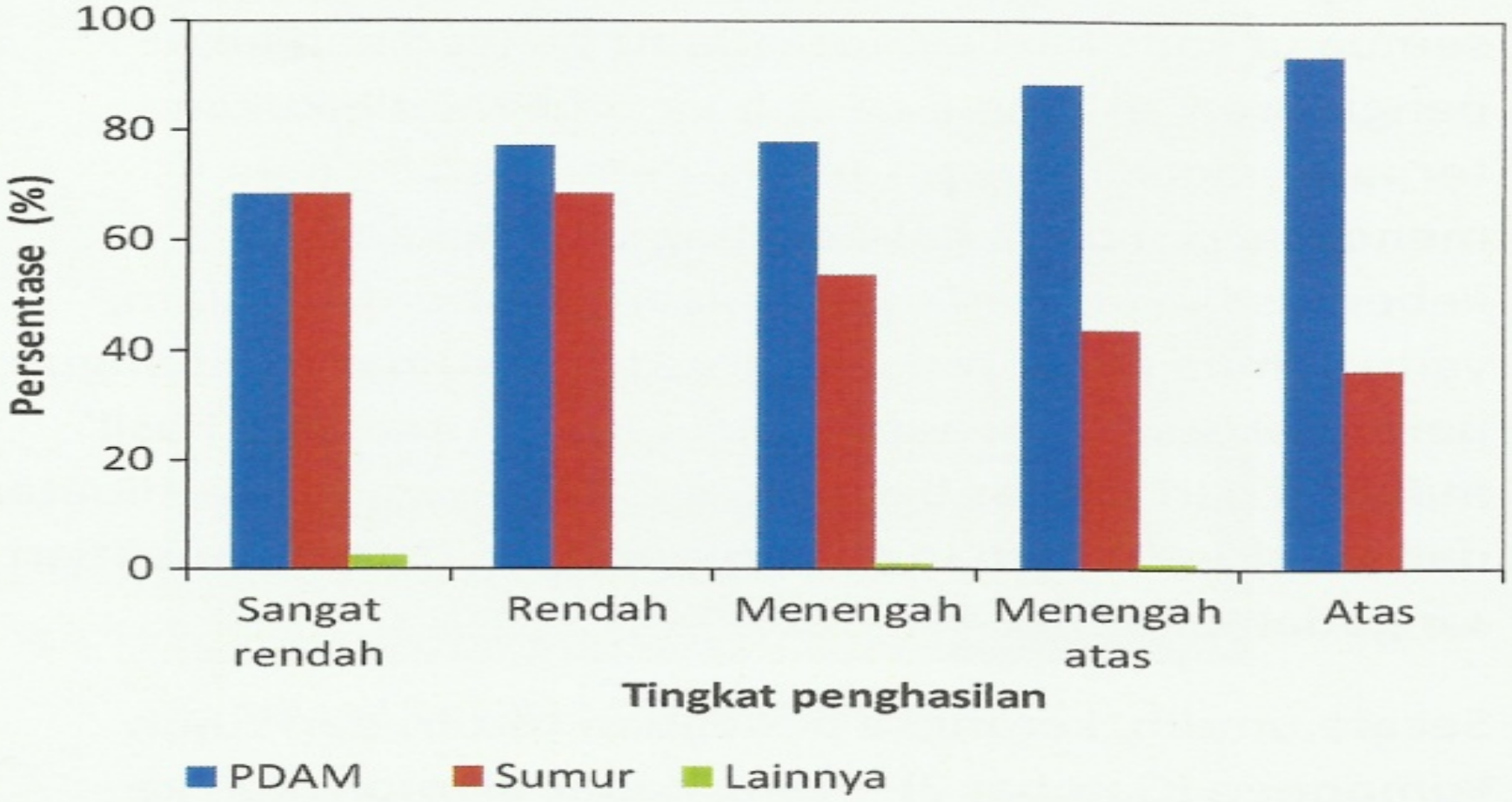


Figure S3.1-1 The results of Flow rate survey

JICA Survey Sept 2011



Gambar 3 Sumber air yang digunakan pada rumah tangga di Mamajang, Tallo, Ujung Tanah and Makassar (Sumber: Selintung dkk. tanpa tanggal).

Makassar's urban water service

Three rivers *(Jeneberang, Tallo and Maros)* are important for the water supply and drainage of Makassar City. The Maros and Jeneberang rivers, in particular, are the main sources of water supply for Makassar and also for Mamminasata region,. Around 80 percent of the current water supply to the city provided by the Jeneberang River through the Bili-Bili Dam..

The Makassar municipal water company (PDAM) **supplies around 62 percent of the population, while *City's Millenium Development Goal(MDG's)* target is to increase this coverage to 78 percent by 2015.**

The City is experience an increased pressure from urbanisation, population growth, limited economic resources, limited infrastructure and any potential climate change.

Cimate Change

The Climate Adaptation Through Sustainable Urban Development (SUD) project undertaken over 2 years from September 2010 to 2012, the project engaged local policy makers, urban managers, donor agencies (funded by the CSIRO- AusAID Research for Development Alliance) and researches (Macquarie University and Hasanuddin University).

CLIMATE CHANGE AND ITS POTENTIAL IMPACTS ON THE SUSTAINABILITY OF WATER SUPPLY

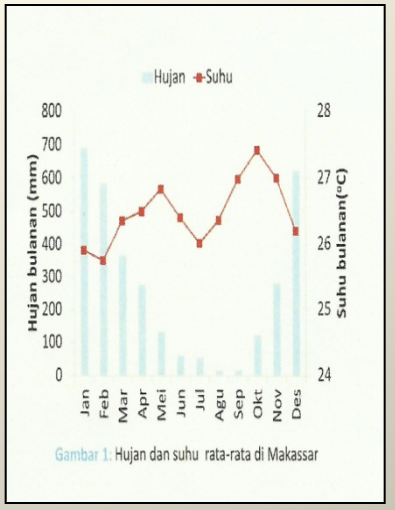
This project facilitated understanding of (i) future urban water scenarios that Makassar City needs to consider and (ii) some adaption options that will be most helpful in facing the scenarios.

The aim was to inform policy development to improve access to clean water and to manage the impacts of development and climate changing Makassar City.

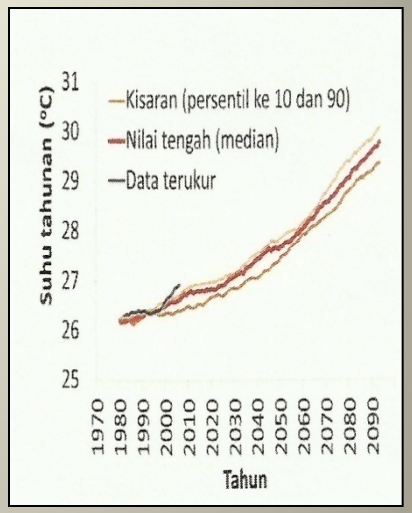
The identification of adaptation options was performed by utilizing *Integrated Urban Water Management (IUWM)* principles that consider the overall water cycle in the management of water supply, storm water and wastewater. This approach allows for assessment of a diverse range of water service options as well as consideration of criteria, such as adaptability, to anticipated climate change impacts.

CLIMATE CHANGE AND ITS POTENTIAL IMPACT ON THE SUSTAINABILITY OF WATER SUPPLY

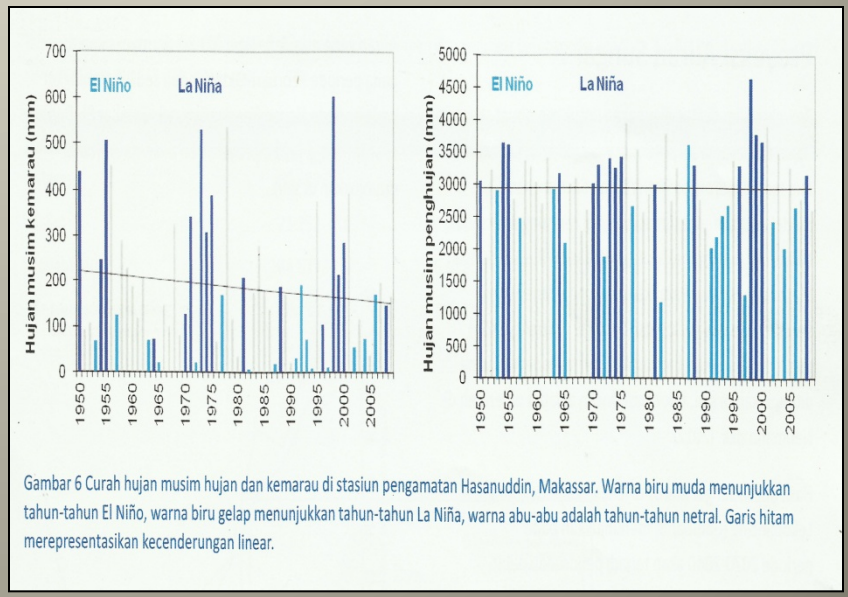
- Available data since 1981 in Makassar indicates an increase in mean annual temperature at rate of 0,27°C per decade. Rainfall data since 1950 shows a decreasing rainfall trend for the dry season.



Gambar 1: Hujan dan suhu rata-rata di Makassar



- Regional climate model simulations over South Sulawesi indicate that Makassar's annual mean temperature will increase around 0,29 -0,39°C per decade. Rainfall projections suggest a decrease in rainfall over the Makassar area. The wet season onset is unchanged but its retreat is expected to occur earlier, with the lenght of the wet monsoon expected to shorten by 12 days. Intensity of extreme high rainfall is projected to decrease slightly to November.

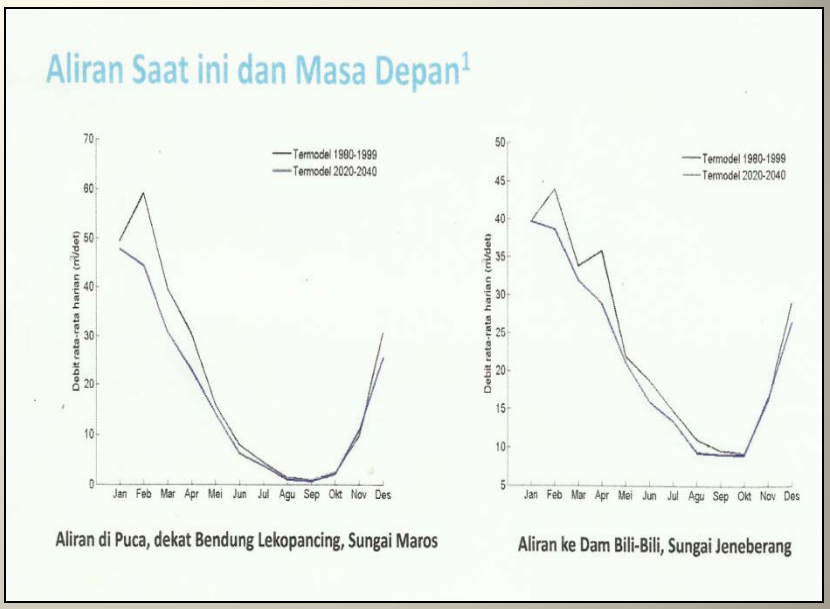


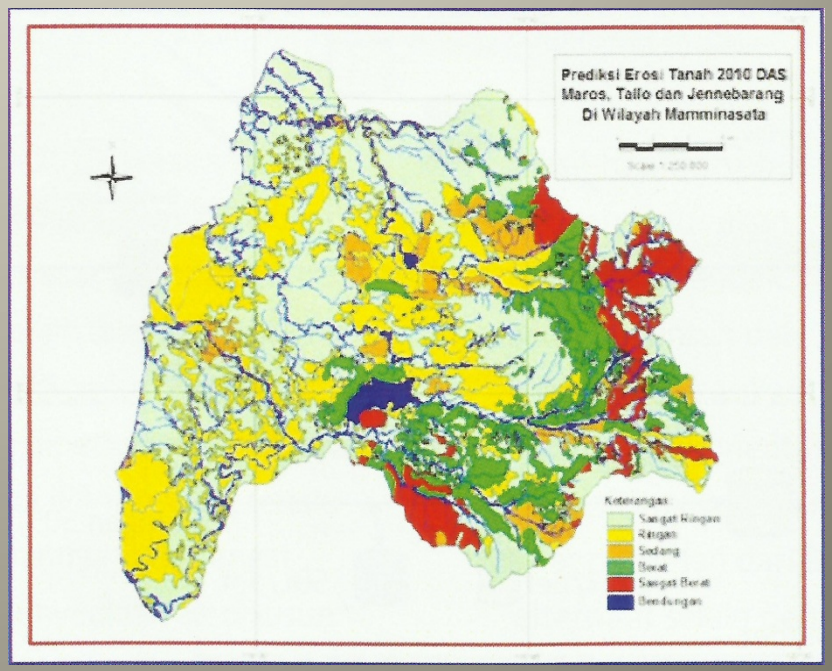
Gambar 6 Curah hujan musim hujan dan kemarau di stasiun pengamatan Hasanuddin, Makassar. Warna biru muda menunjukkan tahun-tahun El Niño, warna biru gelap menunjukkan tahun-tahun La Niña, warna abu-abu adalah tahun-tahun netral. Garis hitam merepresentasikan kecenderungan linear.

CLIMATE CHANGE AND ITS POTENTIAL IMPACT ON THE SUSTAINABILITY OF WATER SUPPLY

- Simulation rainfall-runoff model and future local climate scenarios suggest a reduction of 18 percent in the mean stream flow for the Maros catchment near the Lekopancing weir in 2020-2040 relative to the period 1980-1999. The number of days with low flow may increase up to 20 percent. The inflows to Bili-Bili dam are projected to decrease for most of the year, with a slight increase for periods between October to November.

- Magnitude of soil erosion in the future is projected to decrease by around 35 percent, but the overall rates will be similar to the present for most of the regions. This suggest that the current issue of high turbidity of the raw water supply - due to the high sedimentation induced by soil erosion over the Mamminasata Region - will likely persist in the future.





RECOMMENDATIONS

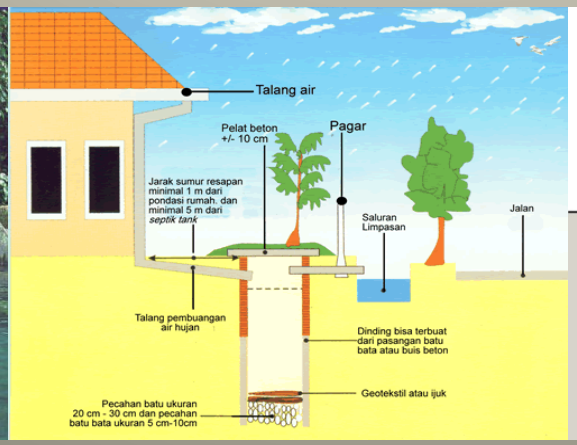
There are some alternatives that maybe helpful to address this issue via technological solutions for new sources, management of existing sources, operation and maintenance of existing infrastructure, and programs to promote mindset change.

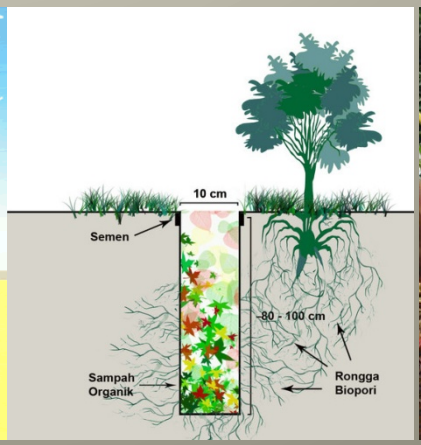
Our future recommendations are to ;

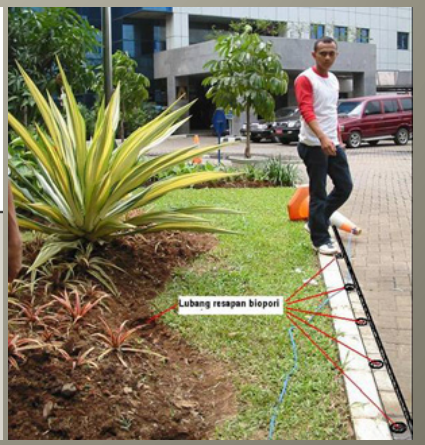
1. Extend the future water security assessment and ensure project findings are incorporated into future planning efforts
2. Undertake community campaigns to raise awareness of sustainability and climate adaptation across the wider community

RECOMMENDATIONS

3. Protect water source area, forest, RTH (green public space), etc, by government land use permit (regulatory measures)
4. Leak reduction program; the largest saving came from NRW program
5. Water efficiently programs; partnerships with industry for water efficiency and recycled water, community campaigns on water efficiency, promotion of low water use appliances, groundwater recharge using Biopore - a low and simple technology, etc.








cảm ơn bạn
Thank You