Current and future climate of Makassar

Climate impacts many aspects of life in Makassar including water availability. Understanding current climate variability, and the possible future climate of Makassar, is important so people and the government can plan for changes.

Current Climate

Makassar's climate is tropical with a distinct wet and dry season (Fig. 1). The rainfall varies considerably from year to year due to the El Niño Southern Oscillation. This is a natural climate pattern that occurs across the tropical Pacific Ocean and affects weather around the world. El Nino events tend to delay the onset of a wet season and bring drier conditions, while La Niña events tend to trigger wetter conditions than normal.

Temperature has increased

For Makassar, the annual mean temperature data since 1981 indicate an increase of 0.27°C per decade. This increase is consistent with the global pattern of warming, and an 0.3°C increase observed across the Indonesian region during the 20th century[1].

Rainfall pattern has changed

Analysis of rainfall data since 1950 shows no clear trend for the wet season, but a decrease trend of around 36% relative to the long term mean for the dry season rainfall (Fig. 2). Makassar's rainfall has also became more variable.

A survey, conducted at institutional level in Makassar, suggested that all respondents believe climate change is happening[2]. Furthermore, 14 percent of respondents think that this is a natural fluctuation, while others think that this is caused by human activity.

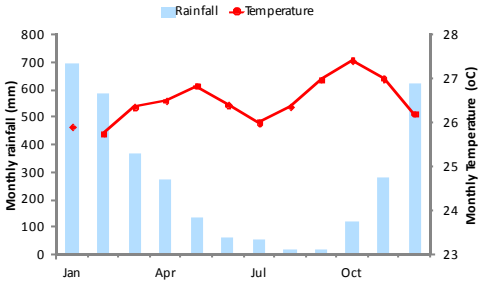


Fig. 1: Long-term mean of rainfall and temperature at Makassar

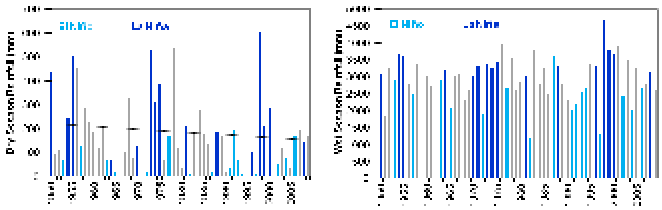


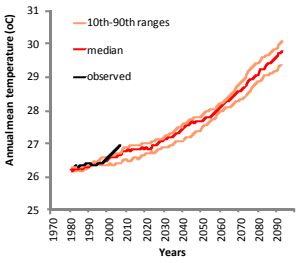
Fig. 2: Dry and wet seasons rainfall for Makassar. Light blue bars indicate El Niño years, dark blue bars indicate La Niña years and the grey bars indicate neutral years. Black line represent linear trend.

Future climate

Projected climate of Makassar

Temperature

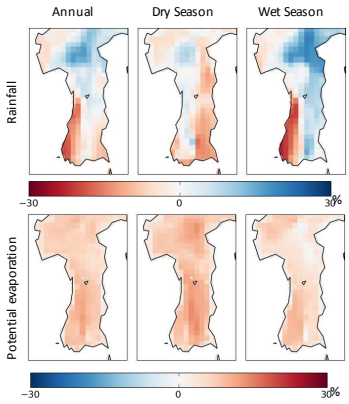
Annual mean temperature will continue to increase at 0.29 to 0.39°C per decade



Observed and projected annual temperature for Makassar, based on 5 models. The red line is the multi-model median while the light red lines show the range between the lowest and highest 10% of model results. All smoothed by 11-year moving average.

Rainfall

- Majority of models suggest a decrease in rainfall over the Makassar area
- Wet season onset is unchanged but its retreat is expected to occur earlier, and the length of the wet monsoon will be shortened by 12 days
- Intensity of extremely high rainfall in Makassar is projected to slightly decrease.



Projected changes in rainfall and potential evaporation for the 2030s relative to the 1990s for the South Sulawesi region (indicated as the median of five regional climate simulations).

How do scientists develop climate projections?

Global climate models are tools for understanding future climate change. The models are mathematical representations of the climate system. They are based on the laws of physics and include information about the atmosphere, ocean, land and ice.

The future climate is simulated by a combination of natural and human factors: the human factor is represented in the model by the greenhouse gas and aerosol emissions scenarios.

The Intergovernmental Panel on Climate Change (IPCC) has developed a series of plausible scenarios based on a set of assumptions about future population changes, economic development and technological advances. For example, the A2 emission scenario envisages continuously increasing population and slow economic growth.

In the global climate model, the grid-cell resolution is typically 100 to 500 kms. Therefore, due to the shape and topography of the island shape and topography the global climate model cannot account for some important local climate effects.

Scientists from the SUD Project used the Conformal Cubic Atmospheric Model (CCAM) to dynamically downscale output from five global climate models, run using the IPCC-A2 emission scenario, to simulate the climate over the Sulawesi island region for 1970-2100.

The simulation data has a ~14 km spatial resolution and includes many climate variables such as rainfall, temperature, solar radiation, etc.

FURTHER INFORMATION

Dr Dewi Kirono, MSc
e dewi.kirono@csiro.au
p +61 3 9239 4651

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