

Developing and Applying Climate Information for Supporting Adaptation in South East Asia

Climate Projections and Drought Hazard Assessments in East Java Province

This case study demonstrates the use of both statistically and dynamically downscaled climate model outputs for developing rainfall projections and drought hazard assessment in Indonesia's East Java province.

The use of climate services to support climate adaptation in Asia and the Pacific, in particular, is challenged by limited reliable climate information, insufficient capacity to interpret and use of climate information, and limited technical and financial resources.

To address this, the Asian Development Bank supported a technical assistance (TA) project, TA-8359 REG: Regional Climate Projections Consortium and Data Facility for Asia and the Pacific. One of the core activities of this project was to engage on-country project teams to conduct case studies whereby in-country capacities are strengthened through direct involvement in the development and use of climate information in climate change impact assessments.

Following the 10-step approach outlined in the guideline (available at www.rccap.org), this case study in Indonesia focuses on the development of climate information for drought hazard assessment.

Context

The East Java Province is one of the major rice producing regions in Indonesia. One of the hazards

likely to impact agricultural lands over the province is drought.

In this case study, climate change information is used to examine the future frequency of drought in the province. The results of this study can be used to make management decisions about agricultural lands under a changing climate through different adaptation options.

Results

The results suggest that monthly rainfall distribution over the province in the coming decades is likely to be similar to that of the historical baseline period, but with less probability of receiving rainfall greater than 300 mm.

The potential increase in drought risk as measured by the Drought Hazard Index (DHI) in the future is noteworthy, with some locations showing a probability of increased drought of up to 45%.

The Ministry of Agrarian and Spatial Planning, the Local Government of East Java Province and researchers from Bandung Institute of Technology (ITB) have used the study outputs as part of their comprehensive risk assessment.

Data and Methods

Location

East Java Province of Indonesia

Latitude: 9.125 °S – 5.875 °S, Longitude: 110.125 °E – 115.125 °E

Climate variables

Rainfall

Time period

1981–2010 (baseline) and 2011–2040 (projections)

Climate data

Observed climate data baseline

- Gridded daily and monthly rainfall datasets with resolution of 0.25° from:
 1. Asian Precipitation-Highly-Resolved Observational Data Integration Towards Evaluation of the Water Resources (APHRODITE)
 2. Tropical Rainfall Measuring Mission (TRMM) Multisatellite Precipitation Analysis (TMPA)
- Point observed dataset for gridded data correction:
 1. SACA&D (Southeast Asian Climate Assessment & Dataset) project cooperation between BMKG (Agency for Meteorology, Climatology, and Geophysics) Indonesia and KNMI (Royal Netherlands Meteorological Institute)
 2. PUSAIR (Research and Development Center of Water Resources–Ministry of Public Work and Settlement).

Statistically downscaled climate data

- Based on three models: Nor-ESM1-M, MIROC5, IPSL-CM5A-MR
- Forcing scenarios: RCP4.5, RCP8.5
- Rainfall and temperature
- Model resolution: 2.5°

Dynamically downscaled climate data

- The daily and monthly rainfall datasets (data range 1970–2099) as outputs from six global climate models (ACCESS, CCSM4, CNRM, GFDL, MPI, and NorESM1)
- Forcing scenarios: RCP4.5, RCP8.5
- Rainfall and temperature
- Model resolution of 0.25°

The full case study report, along with the 10-step guideline, is available on the RCCAP portal at www.rccap.org.

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