

Understanding and Modeling Climate Variability in Ciliwung Watershed, Jakarta, Indonesia

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Abstract. Rainfall derived flow from the Ciliwung watershed is the main source of water supply for Jakarta, the capital city of Indonesia. In recent decades this region has experienced substantial increase in variability – especially with intense rainfall events during wet season (Nov-Apr) causing severe flood damage and low rainfall seasons resulting in water shortages. On the other hand, higher evaporation rates driven by increasing air temperatures contribute significantly to water losses in this region. Thus, understanding the inter-annual and multi-decadal variability of rainfall and temperature in the basin is important for efficient water resources management. To this end, the objective of this research is to investigate the relationship between large scale climate variables and basin hydroclimatology and to use these in statistical models for potential skilful prediction. We perform Principal Component Analysis on the space-time rainfall and temperature fields to identify dominant modes of variability. The modes are then related to large scale climate fields such as sea surface temperatures, sea level pressures, etc. to identify regions of high correlation and consequently, the potential physical mechanisms and predictors such as El Nino Southern Oscillation (ENSO) are isolated. Subsequently, we develop a statistical prediction model for the wet season (Nov-Apr) rainfall and temperature based on the climate predictors developed from the above diagnostics. We find significant prediction skill, improving the prospects for efficient water resources management.