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Modeling the Basin-wide Impacts of Climate Change on Ecosystem Services in the Lower Mekong Basin: Water-provisioning and food production

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Abstract (250 words limit):

Ecosystem services are recognized as crucial for national economies and sustainable development in the Lower Mekong Basin (LMB), with ecological needs of rivers competing with the food security and livelihoods of more than 60 million people. We quantified water provisioning under near- and long-term climate scenarios to assess potential impacts on rice cultivation. The InVEST model (Integrated Valuation of Ecosystem Services and Tradeoffs) was selected based on its flexibility to address multiple spatial scales, the availability of regional data, and economic valuation methods. InVEST forecasted water yield, and land evaluation was used to delineate suitability classes for rice production. Pattern-downscaled climate data were generated for the LMB from selected Global Climate Models with overall drier, wetter and increased seasonality. Predicted annual water yields for 2030 and 2060, derived from a drier

overall scenario in combination with medium and high greenhouse gas emissions, indicated runoff reduction of 9-24% from baseline (average 1986-2005). In contrast, increased seasonality and wetter rainfall scenarios increased annual runoff by 6-26%. Extreme drought decreased suitability of transplanted rice cultivation by 3%, and rice production was reduced by 4.2% and 4%, with and without irrigation projects, relative to baseline. Greatest rice reduction was predicted for Thailand, followed by Lao PDR and Cambodia, and was stable for Vietnam. Rice production in the LMB appears sufficient to feed the LMB population in 2030, while rice production in Lao PDR and Cambodia are not expected to be sufficient for domestic consumption due to steep topography, sandy soils and drought.