

Impacts of climate changes through variations of evapotranspiration on rice market and production capacity in the lower Mekong River Basin region

Supply of water to farms will be varied by climate changes. On the other hand, per capita demand of rice will decrease in the lower Mekong River Basin, where two major rice exporting countries are situated and remarkable economic growth is taking place. Thus, supply and demand analyses of agricultural products are important in this region where fluctuating water supply and a decrease in per capita rice consumption is anticipated. In this study, the impacts of water supply fluctuations on the rice market are analyzed by using supply and demand models of rice including water variables. The results of this study will help in the preparation of agricultural policies and plans for the lower Mekong River Basin.

A supply and demand model of rice in the lower Mekong River countries was used for the analysis. The structure and the data of the model are written down in Furuya *et al.* (2010), and it can evaluate the impacts of climate change through variations in evapotranspiration.

The following two simulations were conducted: 1) base-line, 2) CC_B2 (Climate Change for scenario B2). Base-line simulations assume that the evapotranspiration in each province or region after 2000 is the average during 1995-1999 and that the population and gross domestic product (GDP) of each country follow B2 scenario of the Intergovernmental Panel on Climate Change (IPCC). The B2 scenario refers to the socio-economic scenario which prioritizes environment over economy and region over globe, with population and GDP projections deemed intermediate in the four scenarios. CC_B2 simulations assume that the evapotranspiration in each province or region follows the B2 scenario and population and GDP are same as those of the base-line scenario. The evapotranspiration of CC_B2 to that of base-line in rainy season will increase in Laos and northeast Thailand at trans-planting season and will decrease in all regions at flowering season.

Based on model simulations, climate change will decrease wet season rice production in Cambodia (Fig. 1) and will decrease dry season rice production in Mekong Delta region (Fig. 2). Furthermore, climate change will increase farm prices of rice in Cambodia, Thailand, and Viet Nam (Fig. 3), and these price spikes will weigh on the living costs of consumers.

The gaps between the forecasted planted area of rice and irrigation area of the basin development plan of the Mekong River Commission in 2030 were investigated for each province and region. The results suggest that planted areas of dry season rice on the west side of the Mekong River Basin and Mekong Delta region will reach the upper limit of the irrigation area for rice cultivation as shown by the yellow-colored regions (Fig. 4).

The results of this study (specifically, forecasting rice productions and farm price of rice, etc. for each province and region) will contribute to making a feasible agricultural production plan for the lower Mekong River Basin countries.

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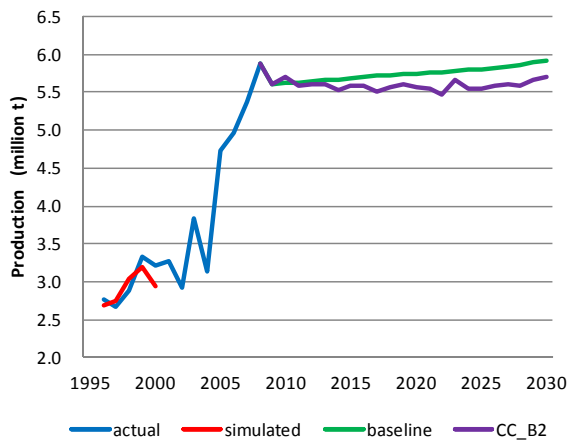


Fig. 1. Wet season rice production in Cambodia

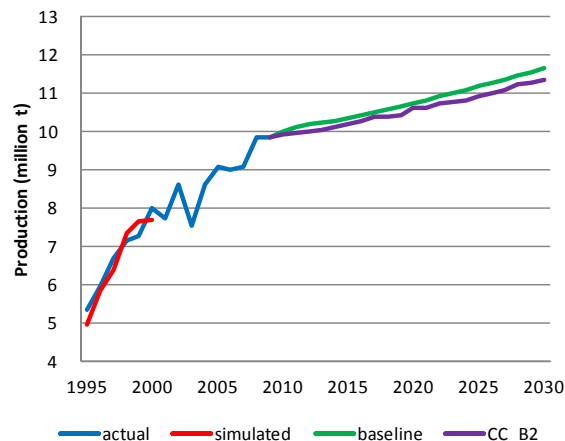


Fig. 2. Spring season rice production in Mekong Delta

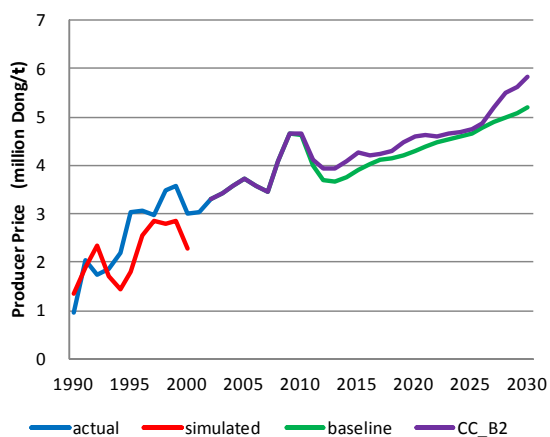


Fig. 3. Farm price in Viet Nam

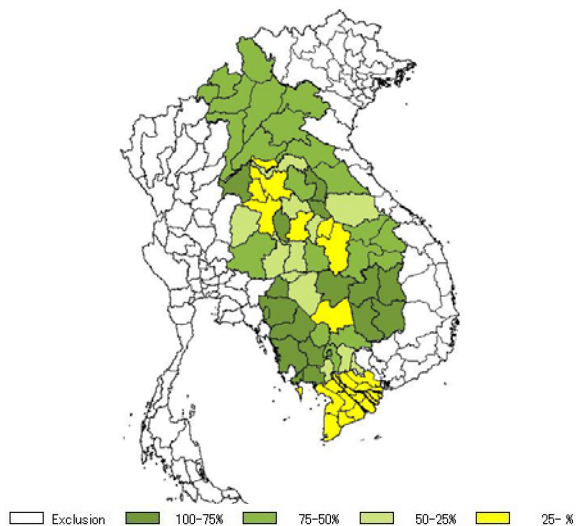


Fig. 4. Rice production capacity

Note: “Simulated” in Figures 1-3 shows estimation results of the model.

References

Furuya J, *et al.* (2010), Development of Supply and Demand Models of Rice in Lower Mekong River Basin Countries: REMEW-Mekong, JIRCAS Working Report 68.