Preface

Severe drought in Australia in 2006, the rapid rise of maize demand for bio-ethanol, and increasing food demand in rapidly developing countries such as China and India, seemingly conter productive policies and other factors led to soaring crop prices from 2007 to mid 2008. These skyrocketing crop prices and rising crude oil prices threaten the livelihoods of people who lives in developing countries.

Production and consumption of rice is widespread in developing countries; however, the ratio of total exports to total production of rice in the world is only an average of 6.35% from 2004 to 2006. The same ratio of wheat is 19.69% over the same period, suggesting that the variance of the world price of rice will be greater than those of other crops.

Thailand is the world biggest exporter, and the country exported 7.43 million metric tons (mMT) of rice in 2006. India, Vietnam, Pakistan, and the U.S. followed, exporting 4.74 mMT, 4.64 mMT, 3.69 mMT, and 3.30 mMT of rice respectively.

Among the lower Mekong River countries, two of four countries are major rice exporter, i.e., Thailand and Vietnam, and the region dominates the world rice market trade. Changes in climate conditions in the contiguous countries in the lower Mekong basin are therefore likely to affect the world grain market through the domestic rice market in the two major rice exporting countries.

Water is an important input factor for rice cultivation and the supply is affected by climate changes. On the other hand, it is anticipated that high economic growth in these countries will reduce the per capita consumption of rice as incomes grow. Thus, there is a need to investigate changes in supply and demand simultaneously with the use of econometric models of rice markets in the lower Mekong countries which water supply changes. Such a tool is a quite important to evaluate policies for price stabilization under climate changes.

This working report describes supply and demand models of rice in Laos, Cambodia, Thailand, and Vietnam. The yield and planted area functions of these models respond to evaporation on cultivated land and transpiration of crops, then, these models can evaluate water supply changes in economic terms.

Chapter two through chapter five describe agricultural policies related to rice production briefly first, then, the structure, the estimation results of functions, and the simulation results of supply and demand models of rice in Laos, Cambodia, Thailand, and Vietnam are discribed. These models are named Rice Econometric Model Edogenous Water (REMEW) in Laos, Cambodia, Thailand, and Vietnam, i.e., REMEW-LAO, REMEW-CAM, REMEW-THAI, and REMEW-VIET.

These models are developed independently; however, impacts of water supply changes on rice production cross borders. To bring the countries together, the four models respond to the world price of rice, i.e., retail price of rice in Thailand, then, one integrated model of the lower Mekong countries is built responding to the world price of rice. The integrated model is named REMEW-MEKONG.

REMEW-LAO and REMEW-CAM are the first supply and demand models of rice in Laos and Cambodia, and these models are extended to stochastic models. The historical fluctuation of water supply is first simulated and then will be increased as a result of global warming. The analyses using stochastic model are necessary for the evaluation of water cycle changes where moments of water distribution beyond the mean may be quite important. Chapter 7 describes the methodology of the stochastic analysis, structure of the model, and results of the simulations.

The budget for model development comes from the project “Assessment of the Impact of Global-Scale Change in Water Cycles on Food Production and Alternative Policy Scenarios” funded by the Agriculture, Forestry, and Fisheries Research Council Secretariat, the Ministry of Agriculture, Forestry, and Fisheries (MAFF). The implementation period of the MAFF project was form 2003 to 2007. In addition to the MAFF project, a project in JIRCAS named “Analysis of impacts of water supply changes in Indochina region” encouraged the development of the models.

Dr. Kageyama and Dr. Jin developed REMEW-THAI and Dr. Meyer developed REMEW-VIET and stochastic model of REMEW-LAO. The reminder of the models are developed by Dr. Furuya. He has responsibility for results of simulations of all models. The procedure of the stochastic analyses is developed at the Food and Agricultural Policy Research Institute at University of Missouri (MU-FAPRI), and Dr. Meyer taught it to other members who developed these four models. The analyses using these models are shown in Furuya and Meyer (2006), Furuya and Meyer (2008), and Furuya *et al* (2008).

Ms. Nagaki and Ms. Ohta who are JIRCAS staff members entered data for yield, planted area, harvested area, and production of rice for each province in the

four countries. The data were obtained by visiting agricultural statistics offices in each of the four countries in 2004, and some data were added later.

The data related to rice production in Laos were provided by the Department of Planning, the Ministry of Agriculture and Forestry of the Lao PDR. Mr. Takashima, who was an expert of the Japan International Cooperation Agency (JICA) for agricultural policy, and Mr. Sakudo, an assistant resident representative of Laos JICA office, assisted in gathering the information about agricultural policies in Laos. Furthermore, librarians and officers of the United Nations Development Programme (UNDP), the Food and Agriculture Organization (FAO), and the United Nations World Food Programme (WFP) in Vientiane provided us historical data for rice production and marketing.

The data related to rice production in Cambodia were provided by the Department of Planning, Statistics and International Cooperation, Ministry of Agriculture, Forestry, and Fisheries in Cambodia. Furthermore, the Department of Meteolology, the Ministry of Water Resources and Meteorology in Cambodia provided the climate data for the main provinces in Cambodia. Mr. Takeichi, who was a project formation advisor of JICA Cambodia Office, provided us information about ongoing projects and introduced the authoros to officers of JICA in Laos and Vietnam.

The data related to rice production in Thailand were provided by the Center for Agricultural Information, Office of Agricultural Economics of Thailand. The data were in electronic format and Mr. Kawasaki, Mr. Jinguji, and Mr. Yokobori, who were statistical experts at JICA, assisted in obtaining the data. Furthermore, Mr. Konuma, a dupty regional representative of FAO Regional Office for Asia and the Pacific, provided us general information about the four countries.

The data related to rice production in Vietnam were from statistics of the General Statistics Office of Vietnam. Mr. Nakasone, who was a deputy resident representative of the JICA Vietnam office, and Mr. Naito, who was a JICA expert on irrigation and rural infrastructure, provided information related to rice production and policies in Vietnam. Furthermore, librarians at UNDP, FAO, and the World Bank at Hanoi assisted in obtaining historical data on rice production and previous analyses of rice policy in Vietnam.

Farm surveys were conducted in Savannakhet province of Laos in 2005 and 2006 and in Takeo province of Cambodia in 2007. The purpose of these farm surveys was to collect data on rice production costs from producers. It is these data which are used to evaluate impacts of water supply changes on individual or average farms. The analyses of the survey are ongoing and the complete results are not included in this working report; however, the information about rice cultivation obtained by the farm survey are used in the analytical part of each chapter.

Dr. Bouahom, Director General of the National Agriculture and Forestry Research Institute (NAFRI) of the Ministry of Agriculture and Forestry of LaoPDR assisted the farm surveys in Laos. The farm surveys in Laos were conducted by Dr. Furuya along with Mr. Sayxomephou, an assistant researcher of NAFRI, Mr. Malaikham, officer of Champong district in Savannakhet province, and Mr. Phomphakdy, an interpreter and guide.

Assistance in the conducting of farm surveys in Cambodia was provided by Dr. Sarom, Director General of the Cambodian Agricultural Research and Development Institute (CARDI), and Dr. Vang, Director of CARDI. Furthermore, Mr. Tsukamoto, Mr. Moriyama, and Mr. Araki, who are chief advisors at JICA provided information about ongoing JICA projects in Cambodia. The farm surveys were conducted by Dr. Sothea, who was a researcher of JIRCAS and is currently a staff of the Mekong River Commission (MRC), and Dr. Furuya with Mr. Veasna, a researcher at CARDI, Mr. Sok, an officer of Takeo province, and Mr. Heam, an interpreter and guide.
Without their assistance, our models which are described in this working report would not have been possible. The authors of this working report hope that our models contribute to economic progress for the people in Laos, Cambodia, Thailand ,and Vietnam.