

General Comment 3: GIS studies on issues relating to environmental resources at JIRCAS

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In developing regions, increasing the supply of agricultural products and stabilizing agricultural productivity are matters of great urgency due to population pressure and the improvement in the standard of living. In these regions, the major challenge for agriculture today is to sustain agricultural production under adverse soil and climatic conditions. On the other hand, recently many attempts have been made to increase food production in these regions. However, these efforts have led to a deterioration of agricultural environments and global environmental problems such as global warming, pollution of water, soil degradation, deforestation, etc. Accordingly, sustainable agricultural technologies compatible with environmental preservation should be developed.

Agriculture in these regions is practiced under various natural and social environments. Therefore, it is necessary to analyze the actual conditions and characteristics of the environmental resources to develop sustainable agriculture compatible with environmental conservation. However, geographic information on land and environmental resources is lacking in many of these regions. Geographic information systems (GIS), are now expected to become an effective tool for developing methods for the analysis and evaluation of the spatial and temporal changes of environmental resources and for producing various kinds of evaluation maps on the environment by overlaying multiple geographic data including remote sensing data.

To achieve these objectives, JIRCAS is promoting research on GIS and remote sensing as mentioned by Drs. Uchida and Yamamoto. Within the framework of the comprehensive research projects on sustainable agricultural systems in Northeast Thailand and on the evaluation and improvement of regional farming systems in Indonesia, JIRCAS researchers are analyzing the mechanisms of land use changes and physical factors for regional farming systems. Additionally, in the comprehensive research project on sustainable production and utilization of major food resources in China, GIS researchers are studying the spatial and temporal characteristics of environmental conditions of agricultural lands including socio-economic conditions. Furthermore, one researcher is developing monitoring systems of the spatial distribution of water resources such as depth of snow and soil moisture under the harsh climatic conditions in the Mongolian plateau using GIS and microwave remote sensing data. JIRCAS will pursue these research activities to promote sustainable agriculture in harmony with the conservation of the environment in these regions.

Finally I would like to show the general flow of the current and future GIS studies at JIRCAS. In the first step, analysis of spatial and temporal changes of environmental resources is performed through field surveys and monitoring of environmental resources, and collection of geographical data including remote sensing data. The collection of geographical information of the world, especially in the developing regions, is an important activity of JIRCAS. Then methods for evaluation of the impacts by land use changes or simulation models for land use changes integrated with socioeconomic and physical factors are developed. Next, evaluation methods or simulation models are executed or verified. If the method or model is not fit for the purpose, it must be improved. The final objective of GIS studies at JIRCAS is to develop methods for land use planning for sustainable agriculture compatible with environmental conservation in collaboration with foreign institutes.