

## **General Comment 1: GIS and sustainable agriculture and the role of JIRCAS**

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### **Comparative advantages of JIRCAS**

I was asked by the symposium organizers to comment briefly on the role of JIRCAS in the use of GIS and RS for sustainable agriculture in developing countries.

Comparative advantages of JIRCAS are as follows:

#### **1 Research**

JIRCAS is a research organization, with emphasis placed on developing research capacity in developing countries, through the execution of research projects in collaboration with counterparts in developing countries, as well as hosting of researchers in Japan, to work on projects.

Training in GIS and remote sensing is time consuming and expensive; it may be more efficient if routine technical training in GIS and remote sensing were to be undertaken at Japanese universities, while JIRCAS staff could specialize in transferring knowledge about research methods to visiting scholars.

#### **2 Regional focus**

The comparative advantage of JIRCAS is to undertake core work in the Asian region. Indeed, this is where most of the projects to date have been undertaken, and where the expertise of JIRCAS staff lies.

#### **3 Agricultural production**

JIRCAS specializes in agricultural research, especially assisting in raising agricultural production, and hence overall economic activity in developing countries. The agricultural systems should be sustainable which implies that increasing emphasis should be placed on environmental issues in JIRCAS projects.

#### **4 Economics**

Within JIRCAS, there is expertise not only in the physical environment, but also in the economic and social conditions in which farming systems operate. This balance between the socio-economic and physical sciences is a key strength of JIRCAS.

These points are now elaborated.

### **Research**

Some more detailed comments on the contribution of JIRCAS to research in developing countries follow:

#### **1 Training in research methodologies**

There continues to be a strong requirement to develop effective research skills for developing country personnel. As noted above, technical training in GIS and remote sensing may be more efficiently executed through regular (short) courses at universities.

#### **2 Developing and transferring research skills**

Development and transfer of research skills in the area of applied science to solve agricultural and environmental problems within a geographical context, can be adequately tackled by JIRCAS, and should be a focus of its GIS projects.

#### **3 Promoting international networks and linking partners**

##### **1) Developed regions(North America, Europe)**

There is a need to link the rapidly emerging countries of Asia with research and technical expertise in

Europe and North America. Japan in general, and JIRCAS in particular, may assist in this, by developing networks linking these groups.

## **2) Less developed regions**

The poorest countries of the world have weak international connections, and lack basic research capacities. Until the networks for scientists are improved, and the research capacity of staff is increased, the domestic capacity within these poorest countries to develop new and innovative methods and production systems aimed at increasing agricultural production, will remain difficult. JIRCAS may assist in focusing its attention on the less developed countries, and raising the capacity of their researchers.

## **Regional focus**

### **1 Asia**

#### **1) Proximity**

Japan is geographically situated in the Asian region and JIRCAS has focused its activities on raising the research capacity in a number of key Asian institutes and countries. This overall policy should continue, especially for GIS and remote sensing projects. The policy permits efficient use of new or established GIS infrastructure, and the development of a core group of expertise. In other words, the GIS projects within JIRCAS should focus on a limited number of countries.

#### **2) Influence**

The influence of Japan as a major donor, and industrial power, in Asia, ensures that its projects are well received and the networks developed allow the projects to become self-sustaining once the formal project ends.

### **2 Africa**

Africa contains some of the poorest countries of the world, and consequently JIRCAS may consider developing projects in Africa in order to meet the development objectives of the organization as well as the Japanese Government. It may be beneficial for JIRCAS to forge links with European organizations active in Africa, in order to make use of existing networks and contacts, especially when developing new projects in new countries.

## **Agricultural production**

A number of projects may be continued or new projects initiated.

### **1 Identify areas suitable for new crop options (LE, LUP)**

By identifying areas suitable for new crops, farmers may become acquainted with potential new cash crops, or more productive crops for self-sufficiency. In addition, Japan has an expertise in intensive agriculture that is particularly useful as input to the land evaluation and land use planning process. These skills can be included in the GIS planning process.

### **2 Model areas requiring different levels of input**

Intensive agriculture requires raised input, for example fertilizers, pesticides, improved seeds and mechanization. As a farming system is modified in order to increase output, these factors must be incorporated into the model; the input of these factors will vary spatially and temporally, and can therefore be effectively modeled using GIS and remote sensing.

### **3 Identify and transfer elements of successful applications between regions and countries**

JIRCAS, as a result of its specialized role in agricultural research, is in a unique position to transfer research results and successfully applied research projects between regions and countries.

### **4 Agricultural sustainability**

The long-term sustainability of agricultural systems can be modeled using GIS and remote sensing. Examples of successful applications of the technology presented at the seminar include erosion and land degradation models, as well as biodiversity models.

## **Economics**

JIRCAS has both socio-economic and physical sciences divisions. By combining the activities of these divisions, research on real world systems will be more effective. Geo-information may be the "glue" that can assist in this process. By using GIS and remote sensing, it is possible to inventory land resources, crop production, land suitability, water quality and wildlife production. However, few organizations or groups have successfully linked resources production to resources value. This linkage requires knowledge about the economic, social and political systems within which the farming systems operate.

In particular, JIRCAS may focus on valuing and planning resources. In addition, JIRCAS could model the methods farmers use to assess the economic value of advice on new farming systems and farm products.