The Intervening Roles of Bogor Agricultural University’s Library for Food Crops Production in Indonesia on the Events of Natural Disasters

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Abstract

Climate-related natural disasters (droughts and floods) are the principals sources of risk and uncertainty in agriculture in Indonesia. Although attempts have been made to reduce the adverse effects of weather on agricultural through scientific research and technology development, the performance of agriculture still depends largely on the weather. The need to improve agricultural production capacity is important to the national economy of Indonesia.

The value of agricultural information to the development and management of the country agriculture is essential. The role of information in this context for the decision-makers is presented. Strategies are proposed for improving access to and dissemination of online information for agricultural sector. These include improving the publication, management and dissemination of information produced by the Indonesian scientists and providing access to Regional and global information. To have a portal makes it possible to identify and locate sources of information in agricultural fields, especially the eJournal is analyzed. The remarkable potential of electronic media to store and manipulate information is emphasized.

Keywords: Natural disasters, Agricultural products, Food crops, Information systems, Information dissemination, Indonesia

Introduction

Floods and drought, both those climate related disasters, are the major constraint that affect the agricultural products, especially rice in Indonesia. In general, rice is the most important and dominant commodity, as it primarily is the staple food for more than 80% of the population. Those disasters have imposed a serious economic burden on society and have been historically associated with food shortages of varying intensities. The disasters may lead to shortage of pure water for domestic and other uses, a loss of livestock, a depletion of common resources such as forests and grazing land, withdrawal of children from school, and distress migration.

Indonesia is a country comprising 17,000 islands stretching across some 3,200 miles along the equator between the Indian and Pacific Oceans, sandwiched between the continents of Asia and Australia. A country rich in natural resources, Indonesia’s population stood at more than 215 million people in 2004 with more than 50% inhabiting the island of Java and the remainder distributed over Sumatra, Kalimantan, Sulawesi, Papua (Formerly Irian Jaya) and other islands.

In Indonesia, agriculture is the backbone of the economy and the major propeller of national development. The role of agriculture in the economy of the nation, is to provide food, foreign exchange earnings, job opportunities, and to contribute to the development of other sectors especially through provision of raw materials for industry to meet the expansion of
domestic demands. According to Oka (1996), during the fifth five-year Development Plan (1988 - 93) the agricultural sector contributed about 19% of the Gross Domestic Product (GDP), and more than 7.8% of the export earnings or 12.5% of the total of non-oil exports. According to the latest census as stated in Statistik Indonesia 2007, agriculture employs 42.3 million people, or 59.9% of the total labor force. Thus, with half of the country's workforce directly dependent upon agriculture for their livelihoods, it remains an important sector of the economy.

For the first time in the rice history of Indonesia, self-sufficiency in rice was attained in 1984 (Ministry of Agriculture, 1992). The introduction of improved technologies and strong institutional support systems to farmers, have enabled Indonesia to become a rice exporter in the nineteen eighties. Efforts have been made to sustain this rice self-sufficiency through further improvements. Although the production of rice has increased over time in the wake of green revolution in Indonesia, major shortfalls caused by climatic aberrations such as floods and drought are frequent. Especially in the last few years, during 2006-2007 some areas in Indonesia, particularly southern part of Aceh, Sulawesi, Java and Kalimantan experienced huge floods and landslides. In Sulawesi region, heavy rains were triggered by tropical storm, called Usagi, which occurred in eastern part of Philippines.

Although efforts have been made to reduce the adverse effect of weather on agriculture through scientific research and technology, however, the agricultural performance still depend very much on the weather.

**Climate Change and Natural Disasters in Indonesia**

Most medium- and long-term planning of agricultural research of Indonesia in past has tacitly assume that the state of the atmosphere and the climate will remain constant, and most of our assumption about agricultural sustainability depend upon this. This can no longer be taken for granted, because of the anthropogenically caused global change, the three drivers for which are land use change, atmospheric change and climatic change. The increase in concentration of carbon dioxide in the atmosphere is proven fact, and it will continue to increase for many years, even on optimistic assumption. Report on “the Indonesia Early Warning Bulletin on Natural Hazards 2007”, La Nina that cause tropical cyclones occur seasonally, with the majority occurring Jul-Aug-Sep season through Sep-Oct-Nov, has caused by such phenomena. This tropical cyclones develop over the warm oceans in Australia and can produce destructive winds, torrential rains, storm tides, and phenomenal seas.

Climate change as result of global warming also has caused sea levels rise, inundating productive coastal zones and reducing farming in such communities. For instance, in West Java province’s Karawang region, Indonesia, a huge reduction in local rice supply is estimated as a result of inundation and loss in fish and prawn production could go over 7,000 tons. Climate change could cause the changes in composition of the global atmosphere and natural climate varieties, which is observed over comparable time periods.

To a large extent the weather - temperature and water availability - determines people's ability to grow enough to feed themselves and their animals. Climate variability and climate change can cause short or long-term fluctuations in weather patterns and can have extreme impacts on agricultural production. Any significant change in climate on a global scale is likely to affect local agriculture and so affect the world's food supply. Climate-related natural disasters, particularly drought and floods are the principal sources of risk and uncertainty in agriculture.
Impacts of Natural Disasters on food security in Indonesia

Indonesia's climate is tropical, and the terrain relatively flat with some volcanoes in the middle of the archipelago. MacKinnon (1992) in her book mentioned that two monsoon determine the climate of Indonesia and the whole of tropical Asia. During the wet monsoon (November – April) rain bearing winds bring rainfall to most of the islands of Indonesia. According to Asia Intelligence Wire from FT Information (Dec 13, 2000) Indonesia is vulnerable to the impacts of climate change including prolonged droughts and floods raising serious food security and health threats while endangering the habitats and livelihoods of coastal communities.

Heavy rainfalls in the last few years have caused both the riverine floods and flash floods in the country. The floods caused thousand of hectares of extensive agriculture as well as fish ponds were reported losses. Early in the year 2007, a week of torrential rains has devastated many parts of western Indonesia. The worst floods have been in northern Sumatra where more than 100 people have been killed, 200 are missing and up to 400,000 have evacuated. Heavy rain is forecast to continue for weeks.

The government has predicted that approximately 200,000 hectares of riceland could be unusable this year because of flooding, out of approximately 11.5 million hectares total (less than 2 percent). (This estimate is controversial, however. In the La Nina year 1995/96, 38,000 hectares of rice crop area were lost to flooding). However, an increase in rice yields, as usually occurs during La Nina years, could offset the loss of some normally planted area.

Rice production in Indonesia is heavily influenced by the monsoon rain patterns, which have an important bearing on agricultural performance during the main (wet) and secondary (dry) seasons. Rice is cultivated in both the wet and dry seasons. The wet season is the main rice growing season. Wet-season rice is planted during early May to mid-August and harvested during mid-November to late December. Dry-season rice is grown in limited irrigated areas during November to late March. The dry season covers April to September, during which the remaining annual crops are produced, such as maize, soybean and groundnuts. Oka (1996), mentioned that the country produces 60 percent of the country's annual rice crop during the wet season. The reduced rice production, coinciding with the economic crisis which began in 1997, led to a 300 percent increase in the price of rice. The government of Indonesia imported over 5 million metric tons of rice in order to maintain price levels and to ensure the availability of food to the economically weaker sections of the population.

Information Gaps and Bogor Agricultural University’s Research Programs

Information on climate related disasters, especially the food crops improvements, socioeconomic impacts and related fields appears to be adequate. However, lack of location specific and abundance data in most inventories limit their utility. The links between climate change and food security are poorly researched, makes it difficult for government to prioritize to carry out for management of food security problems due to climate related disasters. This is information is urgently needed.

It is well understood, that local supply of rice is a national priority. Under the country's First Long-term Development Plan (PJP 1), Indonesia achieved the goal of self-sufficiency in the production of rice, through both major increases in productivity and expansion of the area under rice cultivation by more than a third. The challenge of self-sufficiency remains, however, due to rapid population growth and pressures on agricultural land. The national demand for rice is expected to converge with the supply at 32.3 million tons in 2003 and then surpass it - projections suggest increasing rice imports in the mid to long term. Within the context of these
concerns, **Bogor Agricultural University (BAU)** needs to address a broad set of priority issues related to food security, especially the food crops development, natural resources management and sustainable development.

Furthermore, as stated by Dressrusse (1996) in his report stated that agricultural research programs to meet food sufficiency must be initiated, without delay, since the interval between investment in research and visible results at the farm level is between ten to twenty years. Therefore, research programs in areas such as water and natural resources management, pest and diseases management, fertilizers, land preparation, farm management and marketing, harvesting and post harvest technology have to be implemented to help Indonesia to solve its food insecurity problems.

It is expected that the BAU will enable assist the Indonesian government to achieve its program for food security and rural development. In order to face future challenges strategy should be changed whereby environmental considerations are integrated into agricultural practices, with the final objective being the sustainable provision of food which is safe for public health. The following six Program Areas in the Indonesian Agenda 21 have been appraised and will be utilized as priority importance to the implementation of sustainable development in agriculture:

- The Development of Agricultural Policy, Planning and Integrated Programs to Promote Food Security and Sustainable Development;
- Improvement in Agricultural Products and Farming Systems through Diversification of Farming and Development of Supporting Infrastructure,
- Enhancing Community Participation and the Quality of Human Resources;
- Conservation and Rehabilitation of Agricultural Land;
- Integrated Pest Control; and
- Nutrients for Increasing Food Production.

**The Intervening Role of BAU Research Programs for Food Security**

The experimental results of the BAU have to be disseminated to professionals in Indonesia as well as for the international communities through the scientific meetings, training courses, consultations or other activities organized by BAU. Those activities that are organized by BAU professionals stimulate further agricultural research and related fields, thus producing the maximum multiplier effect from BAU objectives and missions.

BAU as one of a major agricultural research institution, its university communities that includes scientists and its students have an absolute obligation to disseminate their research results in the form of presentation papers at professional meetings and through formal publication in journals. Not to do so is an absolute waste of research effort, expenditure, and precious laboratory space. In implementing their research, they cannot plan, monitor, or evaluate research without information on that research. Management must know who is employed, what funds are available, and what research is being done. Such information is usually recorded somewhere, although the records may be kept by different people in different places and used for totally different purposes.
In essence, preparation of a manuscript for formal publication in a refereed journal serves some important objectives. The first is to share the results from the communities research activity with the scientific community as well as with those who directly stand to gain from its benefits in an applied setting. To this end, every investigator has an obligation to disseminate the results, generated from her/his research activities. In fact, research that is carried out without attention to publication of the results, is not worth doing and is a total waste of the money and efforts expanded to conduct the activity. Neither the investigator nor anyone else stands to gain from it. Furthermore, the investigator becomes totally isolated and results, not subjected to the scrutiny of scientific evaluation by peers, become entirely meaningless.

Secondly, dissemination of research results, subjected to peer evaluation, provides valuable input to the investigator, as such constructive criticism greatly benefits to course of the investigation.

Thirdly, publication alerts the scientific community to the specific topic that their research is focusing on. This avoid duplication of research effort by others. More importantly, this avoid duplication of effort on their part that otherwise would prelude publication of their results at a future date or reduce the likelihood of soliciting funding support later on.

Fourthly, preparation of a manuscript for publication automatically provides investigators with the opportunity to review and assess the significance of what the BAU communities have accomplished to date. This is an important exercise for every investigator to carry out from time to time, to assess whether the investigation is still on course in keeping with the intended objectives, or require some “midcourse” modification in the approach that was followed thus far. It lets you know whether or not their research progresses on the right track.

Lastly, publication promotes interaction and exchange of ideas with other scientists working on the information in an area of research related to them. As they build up their publication record, it enhances the credibility of their findings, and increases their chances for future funding support, and intervening the decision they plan to decide.

Role of BAU’s Library on the Dissemination of Agricultural Information

Among the functional goals of the University Library of BAU are to disseminate information on its programs and research findings to users of such information in Indonesia and the international community as well. In addition, the BAU library also has its functions to act as a clearinghouse for processing, storage, and exchange of agricultural information within the region and foster international cooperation, communication and exchange of scientific information among scientists interested in BAU subject coverage. The University Library of BAU, has the objective of creating and maintaining a bibliographic database in selected area of agriculture. To allow easy access to information resources available at BAU library, under the funding support of World Bank, the BAU Library has established knowledge Management System (KMS), which later on will be shortened by IPB – KMS.

Knowledge management (KM), the ability to create, store, transfer, and use knowledge, is likely to play a significant role in improving and sustaining university research activities. Therefore, the university under the funding support World Bank has decided to develop Knowledge Management System into its research strategies and processes in order to overcome resource problem and better achieve their goals. Initial findings in the development process had found out that (1) Knowledge identification and knowledge integration are key processes that help achieving research goals; (2) Knowledge acquisition through collaboration helps fill in-house knowledge gaps, but in-house knowledge development is still the most important process for building research competence; (3) On-the-job training is the most popular practice
for tacit knowledge transfer across research projects. (4) Individual research knowledge with people and shared knowledge pools are essential for creating better research plans and reducing the repetition of previous mistakes.

This component includes the design and establishment of a computer database and a local area network capable of basic specimens data entry, automated label production, collection management functions, and information dissemination. The system would complement and compromise a node of a wider network, which the Director General of Higher Learning of the Ministry of Education plans to develop. Inputs comprise technical assistance, computer and network equipment and installation, software development and support, and the establishment of a new sub-division.

The system is equipped with a search engine component (similar to Google) and an order form/question form. Remote users can place photocopy orders or request further detail on this site. Such requests or questions are sent automatically directly to a librarian mailbox by e-mail. To complement the information retrieval service, the BAU Library offers back up service by providing photocopies of the original documents.

Conclusions

In rural areas agricultural production is the major source of income and employment, a decrease in agricultural production will set off second-round effects through forward and backward linkages of agricultural with other sectors.

Although technological interventions can be critical in some cases, these are not the only option for improving the management of floods and drought. Policy intervention may improve farmers’ capacity to manage floods and drought through more effective income- and consumption

Drought and other climatic risks are intrinsic to agricultural production. Hence, strategies and policies for effective management of floods and drought should be an integral part of the broader rural development policy. Policies that promote income growth and enterprise diversification in rural areas, which facilitate more efficient management of various risks, are potential instruments for floods and drought mitigation.

For better preparedness to deal with floods and drought, the importance of early-warning systems cannot be overemphasized. Prediction of torrential rains as well as drought based on El Nino and local climatic factors is now scientifically quite advanced. Although such prediction are used routinely by various government departments for planning, such information is not yet made available in timely manner and in a form that could assist farmers in making better decision regarding the choice of crops to grow and management plans to follow. Lessons from countries such as Australia, which have now developed mechanisms to use weather predictions to improve farm management decisions, could be potentially useful in this regard.

Improvement of the state of information on land and water degradation and its impacts on agricultural, forestry and fisheries productions is really required for the successful implementation program of food security of Indonesia.

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