IMCD News

Newsletter of the Research Network for Irrigation Management for Crop Diversification in Rice-Based Systems

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THE IRRIGATION MANAGEMENT FOR CROP DIVERSIFICATION RESEARCH NETWORK

Where It's Been, Where It's Going

The same 1960s and 1970s that saw the birth of the "Green Revolution" and its benefits of various Asian countries becoming self-sufficient in rice production for the first time also brought with it a problem - the more nations in the humid, tropical regions of Asia became self-sufficient in rice, the greater the glut of rice on the world market and the less they received for their goods. This, most would agree, is a simple illustration of the law of supply and demand. The glut in the rice supply is ascribed not only to the new rice/seed/fertilizer technology, but also to the heavy investment in irrigation to provide the necessary controlled, flooded water environment for growing rice.

By the middle of the 1980s the answer, according to governments and international agencies, was to encourage farmers to turn to non-rice crops to increase their incomes as well as to stabilize the price of rice. That answer however, is not always easy to implement. Most often, turning to non-rice crops means using lands designed to grow only rice and there is a lack of experience in managing irrigation for non-rice crops as well.

It was in this context that the International Irrigation Management Institute (IIMI) responded to a request from the Asian Development Bank (ADB) to explore the potential

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for, as well as constraints to, accommodating non-rice crops in irrigation systems which have been designed, constructed, and operated to grow rice.

The need is obviously not to displace rice, but to find better ways to grow other crops in association with rice, particularly in areas of irrigation commands suited to diversified (upland) crops during the dry season. Thus was born the Irrigation Management for Crop Diversification (IMCD) Network.

The Network, and its annual newsletter (of which this is the first) aim to aid members in the exchange and dissemination of information relating obstacles and success stories from other countries. This is necessary because much of the research to date has been country-specific, but there are certain conditions and problems that face no national boundaries and are common to Southeast and South Asia.

In 1986, with financial support from the United States Agency for International Development (USAID), a regional workshop on irrigation management for crop diversification was organized and held in Sri Lanka by IIMI which today acts as the secretariat for the Network. At the conclusion of the workshop, the idea of forming a network was recommended and agreed to by the participants.

However, it was in an organizational and planning workshop funded by ADB and held in early December 1988 at the Asian Institute of Technology in Bangkok, that the Research Network with a Steering Committee was formed which will link researchers, irrigation and agricultural agency officials, institutions and others concerned with irrigation management for crop diversification.

With financial assistance from the Government of Japan through the Ministry of Agriculture, Forestry and Fisheries (MAFF), the Network will attempt to serve as a mechanism for implementing research and information exchange in: 1) comparing differences and similarities of national objectives related to irrigated crop diversification in rice-based farming systems; 2) determining existing irrigation management technologies for non-rice crops at the main-system, tertiary system, and farm levels; 3) identifying technical, institutional, and economic potentials for diversified cropping in general, and for selected crops for each country or region under irrigated conditions; and 4) determining and evaluating alternative practices and technologies to match national objectives and goals.

Depending on the amount of support that will be generated, the next major activity of the Network will be a workshop in mid December 1990 in the Philippines. The Network Newsletter, under the managing editor Matthew Driskill, will be a forum not only for Network members to exchange experiences, ideas, news of new publications, and other workshops, but for publishing short abstracts of results generated by scientists and others intent on improving the management of irrigated land and water to improve the quality of life for the world's developing nations and the farmers that feed them.

Contributions are not only welcome, but encouraged as succes or failure of the Network will depend upon the interaction of its members and the wide dissemination of the knowledge gained by the members through their

specific and combined research enterprises.

Senen M. Miranda
Network Secretariat Coordinator

PLANS FOR THE 1990 FIRST ANNUAL IMCD RESEARCH NETWORK WORKSHOP

With the theme, "Management Arrangements for Accommodating Non-rice Crops in Rice-based Systems," the Irrigation Management for Crop Diversification Network will stage its first annual review and coordination workshop from 10-14 December in Manila.

The tentative program will see the workshop opening on the 11th with country reports focusing on the experiences of different countries on irrigation management for rice-based cropping as they relate to planning and implementation at both the system and farm levels.

Participants will be asked how irrigation agencies and farmers set objectives and how they establish appropriate conditions and identify, mobilize and use resources to attain their objectives.

Country reports will include presentations on Bangladesh, India, Indonesia, Malaysia, Nepal, the Philippines, Sri Lanka and Thailand. Following an official dinner on the evening of the 11th, and the presentation of special papers the next morning, participants will begin discussions of all papers and then will break into small groups for special sessions on Research and Development, Information Dissemination and Funding, which will be preceded by a small workshop group briefing.

The workshop will reconvene on 13 December for small group reports and discussion. This will be followed by the workshop wrap-up and closing. The afternoon will be devoted to field visits to the Japanese International Cooperation Agency-supported irrigation research farm in Bulacan before proceeding to Cabanatuan City.

There the IMCD Steering Committee will meet to hold its second planning session. The 14th will include field visits as well, to view crop diversification activities with visits to the Upper Talavera River Irrigation System and a number of stops in the provinces of Tarlac and Pangasinan.

INAUGURAL STEERING COMMITTEE MEETING HIGHLIGHTS

With 17 participants representing well over a half-dozen countries, the IMCD Network Steering Committee held its inaugural meeting on 1-2 December 1989 in Malaysia. The participants included Mr. Shahrizaila Bin Abdullah from the Department of Irrigation and Drainage in Malaysia as well as the following members of the Steering Committee itself:

* Dr. Jose A. Galvez, NIA, the Philippines (Chairman); Dr. M.A.S. Mandal, BAU, Bangladesh; Mr. R. Gopalakrishnan, IMTI, India; Mr. Sardar Ali, DID, Malaysia; Dr. Prakriti Shumsher Rana, MA, Nepal; Mr. Jayantha Jayawardane, MEA, Sri Lanka; Mr. Skulwattana Chanthrobol, Royal Irrigation Department, Thailand; Dr. Senen M. Miranda, IIMI, Sri Lanka.

Other participants included Mr. Ng Chau Chen, DID, Malaysia; Mr. Charles Abernethy, IIMI, Sri Lanka; Dr. Masao Kikuchi, IIMI, Sri Lanka; Dr. Amado R. Maglinao, IIMI, the Philippines; Mr. Akagi, Japanese Embassy, Malaysia; Mr. Tajiri, JICA, Malaysia; Mr. Adnan Mohamed Nor, DID, Malaysia; Mr. Lim Tiek Keat, DID, Malaysia.

OPENING SESSION

Mr. Shahrizaila Bin Abdullah, Director-General, the DID of the Ministry of Agriculture, Malaysia opened the meeting and said the DID and Malaysia place high importance to increasing agricultural production, thus their support of crop diversification.

Mr. Shahrizaila told the members in attendance that "there really is a need to do research to address the problems related to crop diversification." Some of the key issues that have to be considered are: appropriate irrigation techniques; management and facilities to increase the production of non-rice crops.

The national policy on agricultural diversification has resulted in a rapid increase in palm oil, cacao and rubber, he added, and the efficiency of rice production will be enhanced in the eight granary areas of the country, while crop diversification will be pursued in the non-granary areas.

With the above consideration, a project is being conducted, Mr.Shahrizaila said, first to generate baseline information on these different areas, a task that has been completed. The planning of the next step -- the actual pilot-testing of the project-- is in the process of being completed.

Mr. Charles Abernethy, Director of Programs of IIMI, thanked everyone particularly the DID, Dr. Miranda and Dr. Galvez for their support in the realization of the objectives of the network. The first meeting of the Steering Committee is the first concrete outcome. Dr. Miranda gave a brief introduction about the meeting. He said that the meeting will pave the way for putting into operation the objectives of the network as agreed to during the 1988 Bangkok Workshop.

COUNTRY PRESENTATIONS

Following the presentation of Dr. Miranda on the results of the IIMI-IRRI Collaborative Project on Irrigation Management for Crop Diversification in Rice-Based Farming Systems being conducted in the Philippines, Indonesia and Bangladesh, members of the committee received reports on irrigation management for crop diversification efforts in various countries.

Malaysia

Mr. Sardar Ali Raunkee and Mr. Ng Chau Chen presented the ongoing activities on crop diversification for non-granary irrigated areas in Malaysia. Of about 331,850 hectares (ha) of irrigated land in Malaysia, 120,000 ha are classified as non-granary areas (small irrigation schemes). Through a bilateral technical cooperation program between Malaysia and Japan, a crop diversification study is now being conducted. The survey phase has been completed and a pilot study is being planned.

The Philippines

Dr. Maglinao and Dr. Galvez discussed activities related to irrigated crop diversification in the Philippines, with special emphasis on those conducted by IIMI through the ADB grant and other research projects conducted by the national research system through the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development. Also presented was the JICA-supported project on diversified crop irrigation engineering which has a strong training component.

Bangladesh

The current research interest and activities on irrigation management for diversified cropping in rice-based systems in Bangladesh were discussed by Dr. Mandal. He mentioned that both government and nongovernment organizations (NGOs) have been supporting activities on crop diversification. There is a planned meeting in January which could pave the way for the creation of a national network on irrigation management for crop diversification.

India

Prof. Gopalakrishnan discussed an experiment in diversifying rice-based cropping by a modified operation plan in Sathanur Command (Tamil Nadu, India). This is a case study where a rice-based irrigation system is proposed to be diversified into an irrigated crop system by changing the operation plan.

Sri Lanka

Mr. Jayawardane made a brief report on the status of crop diversification activities in Sri Lanka. Certain positive steps have been taken in Sri Lanka with regard to crop diversification. Foremost of these is the presentation of a Cabinet Paper in July 1989 on the future of the country's agricultural policy by the Ministry of Agriculture. One of the strategies identified is the weaning of farmers away from monocropping systems to diversified cropping and commercial farming systems.

Nepal

Dr. Rana highlighted the major organizations involved in the development and transfer of agricultural technology in Nepal. In 1985, a major reorganization of the agricultural research program was undertaken with all research activities related to agriculture being placed under a newly created National Agricultural Research and Services Center (NARSC).

Thailand

The development and technology of irrigation for upland crops in Thailand was discussed by Mr. S. Chanthrobol. Rice will most probably continue to be the dominant irrigated dry season crop. More diversified cropping is expected in the smaller systems in the North, with some expansion in the Northeast.

STEERING COMMITTEE DELIBERATIONS

First Annual IMCD Network Workshop

The committee deliberated and decided that the first annual IMCD Network Workshop should be held in the Philippines in December of this year (see page 3), although there will not be much in the way of crops in the field. The committee felt however, that the timing would allow participants to observe the transition from rice to non-rice crops.

The workshop's theme will be "Management Arrangements for Accommodating Non-Rice Crops in Rice-Based Systems."

The four-day workshop will include paper presentations and discussion, a field visit, and the second meeting of the Network Steering Committee. Papers to be presented should include both country reports and more specific studies related to the theme selected.

Research

As chairman of the Subcommittee on Research, Dr. Mandal said that essentially little research has been carried under the banner of the IMCD Network as the Steering Committee was meeting for the first time and suggested "Methodologies for Research on Irrigation Management for Crop Diversification" as a topic. Dr. Maglinao proposed the subject of field-testing irrigation management innovations for diversified cropping. Although these were acceptable to the group, it was decided that the members should first take a closer look at the papers presented as well as the country papers during the Bangkok workshop. From these, a research proposal can be developed which can be presented and discussed during the planned workshop in the Philippines.

Related to this, the members were requested to review the format for papers with comments to be forwarded to the Chairman (Dr. Mandal).

Information Exchange

Dr. Rana, Chairman of the Sub-Committee on Information, said that no plans had been formulated for information exchange other than the Proceedings of the Bangkok Workshop and the inaugural issue of the IMCD Newsletter.

Funding

IIMI is expecting a grant from the Government of Japan, which initially has supported the Network with US$ 20,000 for promotion and IIMI contributing a smaller amount.

Other subcommittees will contribute their suggestions for funding so that the Steering Committee can devise a complete package to be used to solicit donors. The committee also requested that Mr. Akagi report the output of the meeting to the MAFF of the Japanese Government.

WELCOME ADDRESS BY DATO' IR HJ SHAHRIZAILA BIN ABDULLAH, DIRECTOR GENERAL, DEPARTMENT OF IRRIGATION AND DRAINAGE

It is indeed a great honor and privilege for me to welcome you to this First Steering Committee Meeting of the Research Network on Irrigation Management for Diversified Cropping in Rice-based systems, formed under the auspices of IIMI.

It gives me even greater pleasure to welcome all of you to Malaysia and our beautiful capital of Kuala Lumpur. Your arrival in Kuala Lumpur is indeed timely, especially so soon after Malaysia played host to the Commonwealth Heads of Governments meeting only last month. You are able to see Kuala Lumpur in its full splendor, having been spruced up for the earlier CHOGM Meeting. So now you know why when Dr. Senen Miranda approached us to host this First Steering Committee Meeting in Kuala Lumpur, I immediately consented, knowing that we would indeed be ready to receive you at least with some style. You will note even the decorative lighting in and around Kuala Lumpur is still kept on to welcome you, so to speak. I do hope that despite your busy schedule during your short stay here, you would find time to see our city, relish the variety of food that Malaysia has to offer and savor some of the warm hospitality of our people.

Malaysia and particularly my organization, that is, the Department of Irrigation and Drainage under the Ministry of Agriculture, places importance on the role of irrigation management in expanding our food production. Hence, we are keenly interested in the programme and activities of IIMI and its positive contribution to our own attempts to achieve the objectives of crop diversification, particularly in our irrigated paddy areas, raising farmers' income and reducing the level of food imports into the country.

We note that currently several research projects to finding solutions to a host of problems arising from crop diversification in irrigated paddy areas are ongoing in three countries, namely Sri Lanka, Indonesia and the Philippines. To a large extent, Malaysia faces problems which are similar to those encountered in these countries. Among the key issues that need to be addressed is the development of appropriate irrigation techniques, both in terms of management skills as well as the improvement or modification of existing facilities. Apart from this, it is also necessary to increase the production of non-rice crops. I understand that this Steering Committee meeting will be reviewing up-to-date findings of current research projects as well as cross-comparing them and discussing their applicability among participating countries, including Malaysia, in the research network.

In Malaysia, agricultural diversification from the viewpoint of increasing the cultivation of a number of crops has been the national policy for over three decades. The need for agricultural diversification arose out of a growing concern in the 1950s that the country's economy was too dependent on rubber and imported food products. This policy resulted in the rapid increase in oil palm and cocoa cultivation, while at the same time many large irrigation schemes were constructed for the purpose of increasing rice production. The irrigation development programmes were almost entirely directed towards the development and management of the country's water resources for the double-cropping of rice, with the objective of achieving a specified level of self-sufficiency.

In recent years, rice cultivation in Malaysia is faced with a number of problems arising primarily from changes in socioeconomic conditions. These include uneconomic farm sizes resulting from land fragmentation, the opportunity to earn more rewarding, off-farm income, and the

out-migration of farm labor to the urban centers for better employment opportunities. The end results are a drastic decrease in paddy cropping intensities and an increase in the incidence of paddy-land abandonment.

In 1984, the government formulated a National Agriculture Policy to provide guidelines to decision-makers and implementors on the long-term development of the agricultural sector. With regard to paddy cultivation, the policy stipulated that development efforts are to be directed towards increasing efficiency and productivity in eight existing, large-scale irrigation schemes, designated as granary areas. Towards this end, further investment in irrigation infrastructure will continue to be provided in the granary areas while rice cultivation in the non-granary irrigated areas will be gradually phased out and converted, whenever feasible, to other crops including upland crops, which can yield better economic returns.

Irrigation development for upland crops in Malaysia has been relatively slow and government involvement in the development of upland irrigation systems is minimal. Currently, about 12,000 ha are being cultivated mainly by individual smallholder farmers and are producing about 520,000 tonnes of various types of vegetables annually. The small-scale cultivation of upland crops has been successfully undertaken in some of the abandoned paddy areas faced with water shortage problems. Since the water requirements of upland crops are relatively lower, a number of areas which could not be cultivated with paddy have been converted to selected upland crops such as tobacco, vegetables and maize.

Out of the existing 120,000 ha of non-granary irrigated areas, about 3,000 ha have been cultivated with short-term cash crops in rotation with rice. Apart from this, there are another 5,000 ha of irrigated land which have been permanently converted for the cultivation of tree crops, such as oil palm and cocoa. With the large land resources that are available in Malaysia, the scope for providing new irrigation systems or modifying existing irrigation systems to cater for the growing of diversified crops is quite substantial.

However, there is currently a dearth of detailed technical and socioeconomic data on the existing conditions in those paddy areas which have been planted with upland crops. To better understand the prevailing conditions in non-granary schemes so as to be in a better position to formulate strategies for rehabilitation, the government embarked on a crop diversification study in early 1989 covering all the existing non-granary irrigated areas. The basic study objectives are to determine the prevailing site conditions and to identify the existing problems; to categorize the schemes according to their constraints and problems; and to carry out feasibility studies on selected schemes to examine their technical and economic feasibility.

It is the government's hope that the results of the study will provide a comprehensive database to be used in the formulation of crop diversification programmes within the non-granary irrigated areas. The government also intends to use this database for monitoring and evaluating the performance of irrigated schemes. In the context of the above scenario in Malaysia, it is most timely that the Irrigation

Management for Crop Diversification Research Network Steering Committee is holding the current meeting in this country. The pooled experience and knowledge of the distinguished experts gathered here today should prove invaluable in contributing not only to Malaysia's efforts to diversify into upland crop cultivation but also to the enhancement of knowledge in the field of crop diversification itself.

Let me take this opportunity also to commend IIMI for taking the initiative to establish this research network to enable the useful exchange of information and experience among participating countries. Of late, Malaysia and IIMI have strengthened ties to pave the way for further collaborative work and the most recent being the Training Needs Assessment exercise covering irrigation. We sincerely look forward to the follow-up action on this project which I am sure will further enhance the organization's skill and competence in the field of irrigation management. I am sure there are further areas of collaborative action we can venture into from time to time.

In closing, I wish all our foreign guests a pleasant and enjoyable stay in Malaysia. I understand that a site visit has been arranged for you all to visit Melaka where some of the crop diversification projects are being implemented. During the visit I hope you will take the opportunity to see some of the historical features of Melaka town as well.

May your meeting sessions generate stimulating and fruitful discussions. Finally, let me inform you that the year 1990 has been designated as "Visit Malaysia Year" by the government. A range of programmes, celebrations and entertainments have been planned throughout the year. So, please do not forget to come again with your families. Please do inform your friends back home so that they may also be able to include Malaysia in their travel programmes for the next year.

Thank you.

CROP DIVERSIFICATION FOR NON-GRANARY IRRIGATED AREAS IN MALAYSIA

Introduction

Irrigation development efforts have long been geared towards the provision of irrigation facilities for rice cultivation. They have been implemented mainly to meet the government's objectives of increasing rice self-sufficiency and raising the income of rice farmers who make up a large proportion of the country's poverty group. In recent years, however, the general trend in rice production has shown a drastic decrease in rice planting intensities coupled with an increasing incidence of idle land. This has led to the government taking steps to evaluate the performance of the irrigated schemes, especially the small schemes which have not been successful in terms of rice production. Concurrent with the evaluation exercise, it is also intended to examine and prepare programs for crop diversification, not only as a means to achieve a sustainable farming income, but also to reduce the country's food imports which currently are estimated at US$ 102 million.

The need for crop diversification programs is highlighted in the National Agriculture Policy on rice cultivation. The policy states that rice production should come mainly from the existing eight, large-scale irrigation schemes defined as granary

areas. Rice production from the other non-granary irrigated areas will be gradually phased out and the land will be converted to other crops.

Before implementing fragmented crop diversification development programs, there is an urgent need to study the prevailing conditions of the irrigated schemes so that the formulation of appropriate strategies and planning of projects can be carried out effectively. Towards this end, the government of Malaysia has embarked upon a Crop Diversification Study covering all the existing non-granary irrigated areas in Malaysia. This two-year study is undertaken through a joint bilateral technical cooperation program between the Government of Malaysia and the Government of Japan.

Current Crop Diversification in Non-Granary Irrigated Areas

Currently there are about 331,850 ha of irrigated land in the country. The irrigated areas are divided into two categories -- granary areas of 211,850 ha and non-granary areas (small irrigation schemes) totalling 120,000 ha. The granary areas comprise eight, large contiguous irrigation schemes, while the non-granary areas consist of over 900 schemes which are widely distributed throughout the country.

Rice is produced mainly from the granary areas, accounting for almost two-thirds of the total production. In 1985, total rice production in Malaysia was about 1.27 million tons, of which 67 percent was supplied from the granary areas occupying about 33 percent of the total rice area (irrigated and non-irrigated rain-fed areas).

In existing irrigated rice areas, the small-scale cultivation of upland crops has been successfully undertaken, particularly in some of the abandoned areas facing water-shortage problems. Out of the existing 120,000 ha of non-granary irrigated areas, about 3,000 ha have been cultivated with short-term cash upland crops in rotation with rice. Apart from this, there are another 5,000 ha of irrigated land which have been permanently converted for the cultivation of tree crops such as oil palm and cocoa.

Generally the non-granary irrigated areas are characterized by simple irrigation and drainage facilities, consisting mainly of run-of-river type intakes and gravity drainage. There is currently a lack of updated technical and socioeconomic data and hence knowledge of the present conditions in these irrigation schemes. Over the years, however, the general trend in rice production has shown a drastic decrease in cropping intensity and an increase in abandoned land as well as the conversion of rice to other crops and to non-agricultural purposes.

Crop Diversification Study in Non-Granary Irrigated Areas

The objectives of the study are to determine the prevailing site conditions and to identify the existing problems through an inventory-resource survey of all non-granary irrigated schemes. The study will also attempt to categorize the schemes according to their constraints and problems, which will be followed by the preparation of action programs for representative cases showing basic strategies for revitalization including the selection of suitable crops for

cultivation as well as by the proposal of appropriate cropping patterns. Finally the study will attempt to carry out feasibility research on selected representative schemes including evaluation of their technical feasibility, economic viability and social acceptability of farmers towards crop diversification. The information collected will be analyzed and from the results of the study, all the non-granary irrigation schemes will be grouped into two broad categories, one based on physical factors such as land use and infrastructure conditions; and the other based on action plans and programs for crop diversification.

Selection of Representative Schemes for Crop Diversification

Once the categorization process is completed and the identification of constraints facing crop diversification done, a number of representative schemes will be selected for a Phase II feasibility study. Supplementary data and information will be collected with particular attention on the present conditions of irrigation and drainage facilities, farm operations, farm economy, and agricultural supporting services.

Through field investigations in the selected representative schemes the present status of irrigation and drainage facilities, including their functions, will be evaluated. In addition, drainage facilities which are a prerequisite for successful crop diversification will be evaluated in terms of actual field conditions and the necessity for rehabilitation or improvement. Proposed modifications to existing irrigation facilities will also be evaluated.

INITIAL FINDINGS

The Crop Diversification Study is still ongoing with the data collection program being completed. Even though the categorization of the schemes has not been completed, some of the initial findings include:

* Upland crop cultivation has increased;
* Land utilization ratios have improved;
* A state-by-state analysis on the extent of rice cultivation indicates that the states of Kedah, Sabah and Kelantan have performed better in comparison with other states;
* The proportion of upland crop areas exceeding 20 percent is shown in Pulau Pinang, Selangor, Negri Sembilan, Melaka and Sarawak;
* Rice production from the non-granary areas amounts to about 35 percent of the country's total production.

CONCLUSION

Agricultural diversification with a view of growing a number of export crops and to avoid dependence on a single export crop such as rubber, has long been the policy of the Malaysian Government. With respect to crop diversification within irrigated systems, the Crop Diversification Study represents an important step taken by the government before formulating programs for implementation.

In the short term, the results of the Crop Diversification Study will provide a comprehensive database necessary for the formulation of crop diversification programs within non-granary irrigated areas. This is by no means adequate in the long term when it involves the preparation of a master plan in the national context for crop diversification programs where production contributions and the available resources from areas outside the non-granary irrigated areas have to be taken into account. Under the circumstances, there is a need to extend the scope of this study and identify potential areas for crop diversification in agricultural areas located outside irrigated areas.

-- Ir. Ng Chau Chen, Senior Planning Engineer, Department of Irrigation and Drainage; Ir. Sardar Ali Raunkee, State Director, Department of Irrigation and Drainage, Selangor, Malaysia.

THE NIA DIVERSIFIED CROPS IRRIGATION ENGINEERING PROJECT

Introduction

Irrigation development in the Philippines has concentrated on the provision of water for rice cultivation under wetland conditions, with almost all irrigation projects solely designed for rice production. Only a few systems, if any at all, have considered non-rice crops in the formulation stages. Consequently, irrigation in the Philippines is synonymous with rice irrigation and irrigated agriculture for non-rice crops receives little or no government assistance.

The irrigation scheme of the National Irrigation Administration (NIA), the government entity charged to develop water resources for irrigation in the Philippines, concerns itself with rice-rice cropping patterns in its irrigation areas. Recently however, the NIA started to recognize the importance of non-rice crops, particularly during the dry season when most of the irrigation systems could cover only 30-40 percent of their command area due to a limited water supply. As envisioned, dry season, non-rice crops with low water requirements in suitable areas within the irrigation systems would improve the cropping intensity and subsequently, the production and earning capacity of farmers.

As the NIA reflects the need to harness some irrigated areas for crop diversification, many questions have surfaced; How much area within the existing irrigation systems is suitable to upland and low-water requirement crops? Are the existing facilities in the irrigation systems adequate for the requirements of non-rice crops? Other questions that arise include what crops are suitable and at the same time, profitable enough to attract the farmers to shift from rice?

In May 1987, the NIA-Japanese International Cooperation Agency (JICA) Joint Diversified Crops Irrigation Engineering Project (DCIEP) was launched. The DCIEP is a five-year, Technical Assistance Project financed by JICA to undertake applied researches to provide answers to some concerns cited above.

The DCIEP

The DCIEP is a new undertaking by the NIA and the first of its kind assisted by the JICA. The project's objectives include the study of the most appropriate methods of providing irrigation to diversified crops and to establish design criteria for

irrigation and drainage facilities for non-rice crops on irrigated rice fields. The project also intends to study the importance and potential of diversified crops for developing efficient utilization methods of available water and land resources and establishing comprehensive irrigated diversified crop farming systems.

The expected output of the Project is a manual of technical criteria and procedures for the guidance of engineers and related personnel in planning, designing, operating and maintaining irrigation and drainage facilities for crop diversification in existing NIA irrigation systems. It will also devise prospects and potentials of crop diversification in these systems.

The project is made up of a number of different components. These include the deployment of Japanese experts in various fields of irrigation development, including a Team Leader, all of whom will assist in the implementation of the project and transfer of technology to a Filipino counterpart. The project will also provide equipment and vehicles to support the project implementation and will provide technical training of the Philippine personnel in Japan to enhance technology transfer for immediate use in the Project. Other components include the construction and subsequent operation of a trial farm for diversified crops, applied researches generally focused on the establishment of parameters for irrigated non-rice crop regarding soil physical characteristics, water management, agronomic characteristics, and physical facilities for irrigation and drainage.

During the initial implementation year of the DCIEP, it was observed that support facilities to the project, particularly the testing laboratories, are inconveniently located away from the Project site. Further, the existing equipment at the nearest training center is inadequate and inappropriate for the requirements of the DCIEP to make its work on transfer of technology effective.

Given all of this, a project for the establishment of the "Diversified Crops Irrigation Engineering Center" (DCIEC) was formulated as a complementary undertaking with the DCIEP. The DCIEC was envisioned to provide the support for soil and water laboratories and a training venue for the DCIEP. It would also provide the necessary continuity after the termination of the DCIEP in 1992.

The components of the DCIEC include the provision of a 5-story building to house the soil and water laboratory, training rooms, library, offices, and audio-visual room; the provision of a 3-ward building for dormitory and canteen; the provision of equipment for the soil and water laboratory and the provision of equipment for the training center which will include audio-visual equipment, computers, copying machines, and support vehicles.

In essence the DCIEC will provide the hardware and the DCIEP will provide the software for crop diversification. After the DCIEP, the NIA will continue using the DCIEC for DCIEP activities and other related activities in irrigation engineering, operation and maintenance, and water management.

The Researches under the DCIEP

The present research activities being conducted under the DCIEP are

confined to the trial farm and are mostly applied researches on soil-water relationships, irrigation-methods studies, soil physical characterization, crop selection and farm management, water-use studies, and irrigation system operation. Most are in the early stages and preliminary results are not available. However, the objectives of the research component are already defined and include:

* Testing the engineering and economics of various methods of irrigating diversified crops under different soils and agro-climatic conditions with improved crop cultural practices and cropping patterns.

* To determine the optimum amount of irrigation application and water requirements under different stages of plant growth to attain a profitable level of crop yields.

* To study the importance and potential of diversified crops in attaining efficient use of water and land resources in existing irrigation systems. This will establish the potential hectarage suitable for crop diversification in national irrigation systems that are advantageously located as sources of non-rice crops.

The Training Program in the DCIEP

One of the primary objectives of the DCIEP is the provision of a comprehensive training program and technology transfer to the NIA field personnel. These trained personnel are envisioned to promote crop diversification. The DCIEC will serve as the venue for all the training programs. For the period between 1990 to 1992 it is envisioned that some 870 NIA personnel will be trained at the center. The training program will cater to top field managers, mid-level managers and regional staff for Operation & Maintenance [O&M] and field technicians. The training courses being developed range from introductory materials such as orientation seminars to intensive programs like planning and designing diversified crop irrigation projects.

CONCLUSIONS

Crop diversification in the NIA could be institutionalized through the DCIEP. The project is a strong manifestation of the desire of the NIA to promote adoption of non-rice crops in existing irrigation systems to attain higher efficiency in water and land utilization. It is also a venue for hastening the awareness of top and mid-level field managers on the importance of crop diversification on agricultural production and profitability.

The DCIEC complements the DCIEP initially, but will eventually continue the project activities to pursue diversification as a continuing strategy in irrigation development and operations. It will provide the necessary hardware to pursue research, technology formulation and transfer, and venue for training the NIA personnel and appropriate irrigation personnel of other countries in the region.

The DCIEC facilities could also provide continuing support to the activities of the Steering Committee for the Research Network on Irrigation Management for Crop Diversification. The center would be open to the different countries in the region and could play an important role in the exchange of

technology and research findings. It could cater as a venue to workshops, seminars and training programs of the Network, while contributing its own breakthroughs and field-verified technology.

-- **Dr. Jose A. Galvez, Assistant Administrator for Systems Operations, National Irrigation Administration, Manila, Philippines.**

BRIEF REPORT ON THE IIMI-IRRI COLLABORATIVE PROJECT

Introduction

This Rockefeller Foundation - funded multi-country collaboration project which is being conducted in Bangladesh, Indonesia, and the Philippines, has six broad objectives:

1) To characterize the factors influencing the options for changes in rice-based farming systems, and to identify the more important options in selected geographic locations.

2) To determine the degree to which different levels of irrigation system performance influence the ability to incorporate changes in the farming systems effectively.

3) To develop efficient and economical methods for managing irrigation water delivery and use of post-rice residual water for rice-based systems in which non-rice crops are grown, with special reference to implications for agronomic practice and for institutional performance and change.

4) To transmit and interpret the research findings to agricultural and irrigation system managers, planners and policymakers to encourage informed and better decision-making.

5) To enhance the development of trained professionals in the area of irrigation problems through the provision of graduate research opportunities.

6) To provide an opportunity for IRRI and IIMI staff to interact in a variety of collaborative activities which would permit the development of an effective and mutually supportive long-term relationship.

The collaborative activities started with the first of a series of discussions at IRRI on 9-10, April 1987 among scientists and administrators from both institutions. In early October 1987, consultation meetings were held with national agencies in the Philippines and in Indonesia. Because of the unstable political situation in Bangladesh, only limited consultation could take place in late January 1988. In all three countries, scientific staff from IIMI and IRRI met jointly with officers of appropriate national agencies and universities in identifying the research areas and strategy for the project's implementation.

Problem Identification and Collaborative Process

While the broad project objectives were defined early on, the different implementing activities covering problem-area identification, research-site selection and various modes of interaction between the two institutes and national agencies had to be done on a country-by-country basis. The process adopted was guided by the following principles:

* Collaborative activity should be concentrated on problems of mutual concern to the two institutions.

* The activity should capitalize on the complementary strengths of the two institutions. These strengths include disciplinary expertise as well as geographic (national) experience, contacts, and logistic capabilities.

* The expected output should be greater and/or "better" than the efforts of the institutions working separately.

* The problems and opportunities addressed should be of significant scope, i.e., the potential practical impact should be large.

* Detailed planning of specific activities should be programmed to permit effective input from staff of the appropriate agencies in the countries in which the work would be carried out.

Setting Country Specific Objectives

In Bangladesh, IIMI could start its work only in November 1988 when its resident scientist was appointed. Before then, as stated earlier, the IIMI and IRRI project coordinators had limited consultation in Dhaka with senior staff of the Bangladesh Water Development Board (BWDB), the Bangladesh Rice Research Institute (BRRI), the Bangladesh Agricultural Research Council (BARC), the Bangladesh Agricultural Development Corporation (BADC), the Bangladesh Agricultural University (BAU), etc. It was recommended that the project build on the results obtained so far in the ongoing BRRI/BWDB/IRRI collaboration with IIMI's interest and emphasis on main system management complementing the on-farm mandate of IRRI.

In Indonesia, planning meetings which were held in June and October 1987 and March 1988, involved IIMI, IRRI, the Directorate General for Water Resources Development (DGWRD), the Agency for Agricultural Research and Development (AARD) and the University of Gadjah Mada (UGM). The research activities for the project as well as the detailed workplan for each of the collaborative institutions were determined during a workshop held at Cirebon, West Java, on 10 June 1988. The primary objective of the project in Indonesia, is to develop and test irrigation system management strategies that take into account variations in the physical environment, crop management, water availability, and farmers' crop decision making.

In the case of the Philippines, the project activities were discussed in consultation meetings held from 15 - 17 October 1987 and in a workshop on 27 October 1987. Local institutions which were involved from the early stages of problem identification were the National Irrigation Administration (NIA), the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), the University of the Philippines at Los Banos (UPLB), the Central Luzon State University (CLSU), the Bureau of Soils and Water Management (BSWM), the Bureau of Agricultural Research (BAR) and the Philippine Rice Research Institute (PhilRice).

Research Site Selection

In Bangladesh the research sites chosen were the Ganges-Kabodak (G-K) lift-cum-gravity irrigation system and the North Bangladesh Deep Tubewells (NBTW) where IRRI has been

conducting collaborative research for a number of years with BWDB and BRRI. While results from the IRRI research have made some significant improvements in the management of irrigation water in the two systems as well as the crop production practices of farmers, the collaborative project was conceived to enhance the process of internalization of the available results and to generate relevant new information in support of the major project objective.

In Indonesia, two sites were chosen in Cirebon, West Java, in recognition of the continuing research activities of IIMI there and its proximity to the Sukamandi Research Institute for Food Crops of the Agency for Agriculture Research and Development. The bulk of the fieldwork is done in the Maneungteung Irrigation System (MIS) which is a run-of-the river diversion. The second diversion system is at Ciwaringin (CIS). IIMI has been working for the past few years in these two sites and has established a good database in irrigation management activities.

In the Philippines, the research sites chosen, all in Luzon, are the same systems where IIMI is conducting studies on irrigation management for crop diversification with funding from the Asian Development Bank.

These are the Upper Talavera River Irrigation System (UTRIS), the Laoag-Vintar River Irrigation System (LVRIS), and the San Fabian River Irrigation System (SFRIS), which are all run-of-the river diversion types. Three other sites are used by IRRI to conduct parallel component studies. Most of the work by both IIMI and IRRI is done in the UTRIS in which IRRI has had even a longer research presence in the system.

Planning for Dry Season Cropping

Bangladesh. NBTW: A farmer's water demand is put to an irrigation committee (formed by farmers). A water demand slip from the farmer manager in charge of a block or area, rather than on an individual plot basis, is collected and is handed over to a pump operator employed by the BWDB for actual delivery with assistance from a patwari (official) also appointed by the BWDB.

Indonesia. MIS: Theoretically, the annual cropping plan is made on the basis of:

* expected water availability
* government policies
* water requirements of crops to be grown

CIS: Farmers' proposals at the village level are elevated to the district and to the regency irrigation committees. The approved plans are disseminated to the farmers and implemented.

Philippines. LVRIS: Plan prepared by the NIA (area to be planted, start of cropping season) is discussed in several farmers' meetings. No schedule is prepared for planting non-rice crops. Farmers are given the option to decide on what crops to grow in their areas.

UTRIS: Plan preparation by the NIA begins with submissions of target irrigable areas by water management technologists. The consolidated plan at the system level is presented to the Provincial Agricultural Development Coordinating Council which discusses, revises, and approves the plan. The plan is disseminated to the farmers through leaflets.

Within Season System Operation

Bangladesh. In the Ganges-Kabodak (G-K) system, in which rotational method of water delivery has been accepted as technically sound, the method has not functioned properly so far, with farmers taking water out of turn and often wasting water. The North Bangladesh Tubewell has the potential to provide a more reliable water supply. For both schemes, an improvement of the roles of the extension service and farmer groups in maintaining the water rotation is suggested.

Indonesia. In the initial stage of the first dry season, total water deliveries are above demand, discouraging farmers from establishing non-rice crops, and forcing tail-end farmers to leave a significant proportion of their land fallow. Farmers who are forced to grow rice due to excess water conditions are frequently the first to suffer when the river flow drops. This is suggestive for a more integrated plan of water management for both the wet season and dry season.

The Philippines. In many respects the situation described for the Indonesian sites is similar for the Philippine sites. Water during the early part of the dry season is continuously flowing in the main system. When the water supply becomes short, various levels of ad hoc water delivery rotations are implemented just as in Indonesia.

Use of Groundwater and Residual Soil Moisture

Bangladesh. In the NBTW, the primary water source is from deep groundwater tubewells. In the G-K which is a major river-lift irrigation scheme, the use of residual soil moisture only, (without the benefit of irrigation water) after the harvest of Kharif-II rice, is becoming a more popular practice.

The Philippines. In the LVRIS, UTRIS, and SFRIS which are all run-of-the-river, direct diversion systems, shallow groundwater pumping mostly by individual farmers at the tail end is observed to augment canal water when the supply begins to decline towards the latter part of the dry season. Residual soil moisture is used for growing mungbean after the irrigated dry season crops are harvested.

Indonesia. The MIS and CIS, which are similar to the direct diversion systems in the Philippines, also suffer from declining water supply during the dry season. Farmers in the tail-end portions are extensively using both shallow groundwater and deeper well points to augment canal water. Since three crops per year are quite ordinary in West Java, some unirrigated, short-duration third crops, such as mungbean, are presumably grown from residual moisture.

Project Agenda for 1990

For Indonesia and the Philippines

* Completion of work started, but not completed; field testing of promising innovative irrigation management procedures; holding of final national workshops to disseminate and receive feedback on research findings and recommendations, 13-14 June in Indonesia, and 10-11 September in the Philippines.

For Bangladesh

* Assessment of the practical applicability and impact of some

irrigation policy recommendations, addressing the institutional issues on farmer organizations by conducting studies on: minimum irrigated crop acreage for tubewell operation; nine-day water rotation in the Ganges-Kobodak system; Ganges-Kobodak system start-up time predictability; farmer organizational command; holding of a final review workshop in Dhaka on 23-24 September 1990.

For the Three Countries

* A final intercountry workshop on 12-14 November 1990 in Colombo to integrate research results and recommendations. Participants will include concerned staff from IIMI and IRRI, collaborators from national agencies and representatives from the Rockefeller Foundation.

-- Dr. Senen M. Miranda, Senior Irrigation Specialist, IIMI, Colombo, Sri Lanka.

MAJOR IMCD CONFERENCES IN 1990

* Regional workshop on agricultural diversification. Bogor, Indonesia, 20-22 March 1990.

* National seminar on crop diversification in non-granary irrigated areas in Malaysia. Malacca, Malaysia, 27-29 August 1990.

* Final workshop on the IIMI-IRRI Collaborative Project on Problems of Irrigation Management for Rice-Based Farming Systems to be held at IIMI headquarters. Colombo, Sri Lanka, 12-14 November 1990.

* First annual workshop on the Research Network on Irrigation Management for Diversified Cropping in Rice-Based systems to be held at the National Irrigation Association (NIA). Manila, the Philippines, 11-14 December 1990.

RECENT PUBLICATIONS

* International Irrigation Management Institute (IIMI). 1989. Research network on irrigation management for diversified cropping in rice-based systems. Proceedings of the organizational and planning workshop for a research network on irrigation management for diversified cropping in rice-based systems held at the Asian Institute of Technology, Bangkok, Thailand. IIMI, Colombo, Sri Lanka. 148 p.

* Miranda, Senen M. 1989. Irrigation management for crop diversification in Indonesia, the Philippines and Sri Lanka: A synthesis of IIMI's research. IIMI, Colombo, Sri Lanka. 120 p.

* Panabokke, C.R. 1989. Irrigation management for crop diversification in Sri Lanka: A synthesis of current research. IIMI, Colombo, Sri Lanka. 72 p.

* Valera, A. 1989. Editor, Crop Diversification in Irrigated Agriculture in the Philippines: Proceedings of a national workshop held at the Puerto Azul Beach and Country Club, Ternate, Cavite, the Philippines. IIMI, Colombo, Sri Lanka. 293 p.

The IMCD Newsletter is published annually to facilitate information exchange and dissemination on irrigation management for crop diversification in rice-based systems among research network members and others interested in the subject. Contributors are invited to submit concise news about significant research development and action-oriented related activities. Submissions should be limited to two to four double-spaced typewritten pages. Graphics or tables may accompany the articles including only references cited. All articles are subject to editing to meet space limitations.

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