IMPLEMENTATION OF JOINT MANAGEMENT IN NIGERIA

REPORT ON JIMI-NIGERIA PHASE II PROGRAM

FINAL REPORT

August 1994

International Irrigation Management Institute
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<th>Description</th>
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<tbody>
<tr>
<td>ADP</td>
<td>Agriculture Development Project</td>
</tr>
<tr>
<td>DC</td>
<td>Distributary Channel</td>
</tr>
<tr>
<td>EC</td>
<td>Economic Commission</td>
</tr>
<tr>
<td>FC</td>
<td>Field Channel</td>
</tr>
<tr>
<td>FUA</td>
<td>Fadama Users' Associations</td>
</tr>
<tr>
<td>HJRBDAD</td>
<td>Hadejia-Jama'are River Basin Development Authority</td>
</tr>
<tr>
<td>HVP</td>
<td>Hadjia Valley Project</td>
</tr>
<tr>
<td>ICID</td>
<td>International Commission on Irrigation and Drainage</td>
</tr>
<tr>
<td>IIMI</td>
<td>International Irrigation Management Institute</td>
</tr>
<tr>
<td>KASCO</td>
<td>Kano Agriculture Supply Company</td>
</tr>
<tr>
<td>KRIP</td>
<td>Kano River Irrigation Project</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>RBDA</td>
<td>River Basin Development Authority</td>
</tr>
<tr>
<td>SAP</td>
<td>Structural Adjustment Program</td>
</tr>
<tr>
<td>TCPC</td>
<td>Technical Committee on Privatization and Commercialization</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
</tr>
<tr>
<td>WUA</td>
<td>Water Users' Association</td>
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CHAPTER 1

Introduction

The International Irrigation Management Institute (IIMI) had collaboration with the Hadejia Jama'are River Basin Development Authority (HJRBDA) on the invitation of the Federal Ministry of Water Resources of Nigeria to undertake a Collaborative Action-Research Program for irrigation management improvement through the promotion of participatory irrigation management in Nigeria. Phase I of the IIMI-HJRBDA Collaborative Action-Research Project was completed in February 1993. The Ford Foundation provided funding support to the Phase II IIMI-Nigeria Program. On the basis of encouraging results in the promotion of participatory irrigation management in the Kano River Irrigation Project through the Action-Research Project in Northern Nigeria, the Ford Foundation provided funding for the continuation of IIMI activities through Phase II IIMI-Nigeria Program.

Nigeria presents interesting challenges in the irrigation sector management. She has both small-scale traditional irrigation systems and large-scale public-sector irrigation systems. The history of the traditional irrigation systems dates back to the ninth century although public-sector large-scale irrigation development commenced only about two decades ago. The economic implications of the nation's dependence on food imports led to the adoption of new policies by the Government of Nigeria, aimed at attaining self-sufficiency in food. Consequently, a substantial investment in irrigation infrastructure development was made by the government during 1970-1980. The Government of Nigeria invested about US$3 billion (this amount does not include the money expended on irrigation development through Agriculture Development projects) in irrigation development over a period of two decades, through the River Basin Development Authorities (RBDAs) which are parastatal agencies of the Federal Ministry of Agriculture, Water Resources and Rural Development. Under this program, dams and major structures of many systems have been constructed although the irrigation distribution network remains to be completed. As of 1991, the total irrigated area under large-scale irrigation was only 70,000 hectares (ha). Only 16 percent of potential irrigation facilities was utilized (Soribe 1993). There are public-sector irrigation developments by the State Ministry of Agriculture as well. However, the area under public-sector irrigation is expected to increase considerably by the end of 1992. The low performance of the large-scale irrigation systems is reflected in the shortfall between the achievement and the target set out in the National Development Plan of Nigeria (Adams 1991).

In 1987, the Government of Nigeria adopted a policy of commercialization and privatization aimed at handing over the management of public-sector enterprises to the private sector as part of an overall Structural Adjustment Package (SAP). In the irrigated-agriculture sector, this has resulted in a shift from agency management towards joint management of irrigation systems with both agency staff and farmers sharing the responsibility for management and resource mobilization.

The new policy also calls for the transfer of increased responsibilities for operation and maintenance of irrigation systems from the agency to the users. The eleven River Basin Development Authorities (RBDAs), parastatal agencies of the government in charge of irrigation- and water-related development and management, have been partly commercialized. As a result, the cost of their services will no longer be subsidized but passed on to the users. Thus, the recurrent cost of operation and maintenance of systems must now be mobilized within the systems themselves. In future, the government will only provide funds for the construction of irrigation infrastructure. The new policy also requires to bring substantial changes
in the institutional and legal arrangements pertaining to the management of irrigation systems, the roles of water users' organizations, and the collection of water charges.

Outcomes of IIMI-HJRBD AJoint-Research Program of Phase I

IIMI-Nigeria Program

In August 1991, the International Irrigation Management Institute (IIMI) established a field program to study the Kano River Irrigation Project (KRIP) in Northern Nigeria. Since then IIMI has been working in collaboration with the Hadejia-Jama'are River Basin Development Authority (HJRBD A) to promote agency-farmer joint management in public-sector irrigation systems.

Brief Description of the Kano River Irrigation Project

The HJRBD A is responsible for the construction and management of the KRIP which is being developed in two phases. Under Phase I, 15,000 ha of a total planned area of 22,000 ha of irrigation have already been developed. The second phase will develop a further 40,001 ha. With farmers in the KRIP adopting irrigated agriculture as a viable alternative to rain-fed agriculture, cropping intensity, productivity and crop coverage have increased over time. During the wet season, about 50 percent of the area is under rice. Farmers also grow non-rice crops such as sorghum, millet, maize, cowpea and vegetables during this period. Large areas of KRIP are under maize and other crops in the dry season as well (Figure 1).

Initiation of IIMI-HJRBD A Collaborative Action-Research Program

IIMI's Collaborative Action-Research Program with the HJRBD A is aimed at supporting the turnover of a certain level of system management to users in three pilot sites of the KRIP. The research program is made up of four major components: 1) Institutions; 2) Mode of Management; 3) O&M Procedures; and 4) Resource Mobilization.

Results of Phase I Program

Phase I program has shown encouraging results. The HJRBD A management has begun to introduce innovative measures to make KRIP an economically viable and environmentally sustainable irrigation system. For instance, the HJRBD A has established a separate unit to support farmers' cooperatives and Water Users' Associations (WUAs). Other outcomes include the following:
Figure 1. Map of Nigeria
Formation of Water Users’ Associations

Three Water Users’ Associations (WUAs) have been formed at the distributary channel level. Each distributary channel (DC) covers about 150-300 ha of land with about 18-28 field channels (FCs). The number of farmers within a DC is about 300 on average. All farmers are members of the association with a committee being formed to handle irrigation-management activities. These associations are in the process of being registered and an agreement will be signed between the associations and the KRIP specifying the roles and responsibilities of both parties. Such arrangements will give recognition to the farmer groups and assist them to become joint partners with the agency in managing the system.

Activities undertaken by the farmers’ associations to date include clearing the DC and FCs. Such activities show that farmers are capable of organizing themselves and carrying out activities at a much lower cost than the KRIP for the same amount of work. The KRIP maintenance costs based on contract rate are estimated to be some 260 percent higher than the actual cost when the farmers undertake such channel cleaning operations.

Water Charge Collection

A survey in the pilot sites indicated the need to improve crop coverage within the command area if water charges are to be collected effectively. About 30 percent of the command area was not cultivated during the 1991-92 dry season due to physical and socio-institutional problems. The collection efficiency also seemed low. The HJBDA management has approved an experimental program in the pilot sites where water charges can be collected by the Water Users’ Associations on behalf of the KRIP. The associations will retain 15 percent of the collection for their own use.

A recent study commissioned by IIIM showed that, to break even on O&M work, it would be necessary to collect 70 percent of the potential water charges. Efforts are also being made to identify the sharing of responsibilities for O&M between the farmer groups and the agency (Bagadion 1991).

Integrating Production Activities through Water Users’ Associations

The scope of activity of the associations is being expanded to include input acquisition and several production-related activities such as the procurement of fertilizer in bulk, hiring of tractors for land preparation and marketing of produce. However, the WUA activities start first with water-related activities. Gradually, other agriculture-production-related activities would be taken by the WUAs.

Phase II IIIM’s Program in Nigeria

As mentioned earlier, the Ford Foundation provided funds to continue the ongoing program and supported further complementary activities. The complementary activities were identified on the basis of the report of the IIIM-Nigeria mission which was commissioned in May, 1998.
Current Issues in Nigeria’s Irrigation Development

Within the overall context of irrigation development and management in Nigeria, the mission identified a number of issues or problems affecting the development of Nigerian irrigation, which have either arisen already or seem likely to deserve attention in the near future by the policymakers and research institutions to make irrigation a viable and sustainable sector of the national economy. The prominent issues are as follows:

**Issues Concerning the Performance of Irrigation Systems**

*Monitoring of System Performance*

At present it seems that there are not enough data about the performance of the existing irrigation systems, to guide managers’ decision making. Monitoring and evaluation of such parameters as cropping intensity, crop output, water input and various others would probably improve the quality of management decisions and actions.

*Underutilization of Irrigation Facilities*

In several cases, formal irrigation facilities which the government has created are not being used by farmers to their full potential capacity. The reasons for this seem to be complex. They include questions of farmers’ attitudes and motivation, as well as institutional and technical causes such as insufficient performance of maintenance. The reasons for underutilization, and remedies for it, need to be understood urgently because of their impact on revenue collection by the RBDAs.

*Development of Usable Indicators and Methodology by the System Managers*

The managers of irrigation systems need to have usable indicators and methodology to access the performance of irrigation systems. Hence, it is important to develop a feasible methodology and indicators that can be used by them.

*Socioeconomic Impact*

It is necessary to understand the impact of irrigation on equity, profitability, poverty alleviation, property relationship on land and gender relations so that irrigation development does not either create a big gap between the rich and the poor or cause an inequitable resource distribution.

**Issues Concerning Management of Water**

*Integrated Management of Water Resources*

It appears that in the northern States, and perhaps in States in the middle belt as well, the most rapid growth of irrigation is occurring through small-scale pump-based activities by individual farmers, abstracting water from streams or shallow aquifers. It is sometimes claimed that the areas served by these are increasing up to ten times as fast as formal irrigation. There are risks of water-table decline, environmental
change, and deprivation of other water users, unless there are regulatory processes to govern the use of the total water resources. This question is critically relevant in the three northern-most river basins.

**Productivity of Water**

The three northern river basins (Sokoto-Rima, Hadejia-Jama'are and Chad) are extremely deficient in surface water. These three basins contain about 35 percent of the area, and 27 percent of the people of Nigeria. The available surface water resources of 478 m³ per person per year are, by international standards, very small (for example, Egypt has about twice as much), and the average annual rainfall received is now about 65 percent of that received 30 years ago. In these circumstances, it is essential to ensure that policies are adopted which maximize the benefit obtained from each use of this very scarce resource.

Prevention of “Irrigation Water Loss”

Irrigation water is a valuable commodity. Irrigation water is lost in several ways: through seepage and percolation from canals and fields, through the release of more than the required amount of water, poor maintenance causing wastage of irrigation, delivery of water at the wrong time and through leaks and breaches in the conveyance system. The issue of water loss is related to understanding the technical aspect of the field situation of water use and institutional arrangement for prevention of “water loss.”

**Issues Concerning the Management of the Irrigated Agriculture Sector**

Economics of Different Scales of Irrigation Development

Irrigation is being undertaken in various modes, ranging from individual activities based on shallow-well pumps to formal systems backed by very large dams. To guide policy decisions about the thrust of future irrigation investments, there appears to be a need for an economic analysis of the cost-benefit performances of different types of irrigation. Such an economic analysis would need to take account of the economic perspective of the individual farmer and of farmers' groups or users' associations, of the managing agency and of the national economy.

Introduction of Irrigation to New Regions

There are specific management problems associated with the introduction of formal irrigation systems in areas where irrigation has not previously been practiced much. The agency staff and the farming community may both need to develop new attitudes and skills. Training and information campaigns are needed, and better understanding of the constraints affecting both groups of people is also desirable. This issue is most likely to arise in States of the middle belt where rain-fed production is a strong competitor for the available labor resources.

Farmers' Participation in the Management Process

Changing the relationship between the managing agencies and the farming community seems to be a necessary step in the solution of some of the other issues. Formation of Water Users' Associations is one element of this, but there are numerous other matters that may need attention if participatory policy is to
be put into operation. These include better definition of the legal framework, water rights and land rights; and the adoption of planning processes so as to guarantee to farmers some formalized opportunities to understand and influence the evolution of projects that will affect them. The farmers’ participation is also important for implementation of the privatization and commercialization policy of the government.

**Issues Concerning the Management of Public irrigation Organizations**

**Cost** Recovery

The current policy of the Federal Government requires that operational costs be borne by the users (of formal irrigation) rather than by the federal budget. The present level of cost recovery from users is however low. Means have therefore to be devised, which whilst enhancing cost recovery will not aggravate the other problems by, for example, reducing further the levels of system utilization.

**Improving the Existing Public Irrigation Organizations**

There is a need to improve existing public-irrigation organizations. These improvements take place by institutionalizing the management training program and the strategic planning exercise. It also can be done through an internal structural change and adoption and the introduction of new techniques in management. Hence, the improvement and reforms of existing organizations are to be considered from the standpoint of alternative strategies for an effective improvement program to achieve the efficiency and productivity of these organizations.

Management Training

There are already several universities, polytechnics and other types of institutes which provide training in irrigation technology as part of agricultural or civil engineering courses. There seems to be a need to supplement these kinds of technical training, by developing curricula in the organization and management of irrigation.

Management of Maintenance

Maintaining the irrigation facilities in good functioning condition is a normal duty of management. Its importance increases where the agency is endeavoring to induce farmers to pay fees at a level they are not accustomed to. The agencies are also trying to reduce their own costs, so there must be close attention to developing efficient and cost-effective management of maintenance. Farmers’ associations may be persuaded to take on lower-level maintenance tasks. However, if they do so, they are likely to demand that the agencies improve the maintenance of the larger facilities.

Financial Autonomy

The question of irrigation organization status is important. It is relevant to look into the effect of financial autonomy of irrigation systems on effectiveness, profitability and sustainability of the system.
**Issues Concerning Community Irrigation Organizations**

Formation of Irrigators' Associations

The formation of sustainable organizations of farmers and strengthening these so that they can become valid partners of the government agencies are generally perceived as desirable. Movement in this direction has however been slow, because replicable organizational models in the country are yet to be developed. Among the issues here is the problem of identifying factors that will motivate the farmers to want to support such organizations and bind them together.

Organizations for Small-Scale Irrigation Development

Although small-scale irrigation has flourished in recent years, it has not yet been accompanied by much institutional development among the farmers. This seems to be needed if these systems are to remain sustainable in the longer term. Such organizations would not be the same as those in the medium or large formal systems, and should probably be designed on the basis of studies of traditional modes of cooperation in fadama agriculture. Apart from the institutional questions, the rapid spread of small-scale pump-based irrigation may present issues of zoning of development areas, and integration with other users of water and land.

Intervention Strategy in Fadama Development

There is fast development of small-scale, farmer-based privatized irrigation systems. There is a need to understand alternative intervention strategies in order to provide assistance to these systems when they stand for assistance. The important issues to be taken into consideration in small-Scale irrigation is the process developed by the agencies like the ADPs and Departments of Irrigation of States to assist farmers develop their systems.

Strengthening the Local Organizations for Irrigation Management

There has not been any deliberate effort to strengthen local organizations for irrigation organization. The government policies announced on different occasions indicate the participation of the farmers and their responsibility to share the cost of maintenance and management of the irrigation systems. Issues relating to strengthening local organizations for irrigation management are to be investigated.

Legal Basis of Self-Management and Farmer Participation

Irrigation management is not only a technical proposition, but comprises socio-institutional and technical aspects. There is a need to investigate the legal framework required for self-management of irrigation systems by the farmers and farmers' participation through the Water Users' Associations.
Other Issues

Public Health Impacts of Irrigation

Schistosomiasis has a definite linkage to irrigation in several formal systems in Nigeria. The association of other diseases such as malaria, onchocerciasis, guinea worm and diarrhoeal diseases with irrigation is possible but less clear. It is not known whether small-scale irrigation development has more or less impact on schistosomiasis than formal irrigation has. Reduction of the impact of schistosomiasis requires attention to features of the design of new systems, and also of operation and maintenance of existing systems.

The Components of Phase II IIMI-Nigeria Program

Among several issues identified for irrigation management improvement in Nigeria, the four following issues were taken up for further investigation through the IIMI-HJRBDAs Collaborative Action-Research Activities for the Phase II Ford Foundation funding:

1. Strengthening Agency-Farmer Joint Management

The activities being carried out with the HJRBDAs on agency-farmer joint management will be continued under the Phase II Program. The experiences learned from the HJRBDAs activity will be transferred to some other River Basin Development Authorities. The process for the formation of sustainable farmer organizations will be institutionalized in HJRBDAs. The WUAs which have been formed will be strengthened so that they can become viable partners of State agencies. Factors that will motivate farmers to support such organizations will also be identified. The processes and procedures of joint management in public-sector irrigation systems will be documented and made available to other RBDAs and State agencies involved in irrigation management.

2. Understanding the Dynamics of Fadama Social Organization

Fadama cultivation, which is considered informal irrigation, occupies about 90 percent share of the total irrigated area in Nigeria as opposed to what is termed formal irrigation. Fadamas are of different types with different technologies applied for cultivation. These include shallow tube well, washbore, petrol or diesel small pumps, shaduf and lift irrigation systems. The government’s Agricultural Development Program (ADP) has promoted small pumps to irrigate fadama areas. At present, pumps are owned and used by individual farmers except in a few instances where farmers have organized groups to better utilize water resources. In the general vicinity of Kano, there are extensive fadama lands which, by definition, are able to offer dry season irrigation through shallow wells or surface pumping. In fact, it is possible to find examples of intensively cropped irrigated farms in the fadama areas. The large increase in small-scale irrigation has not yet been accompanied by much development of farmer organizations except the World Bank Project for Fadama development through Fadama Users’ Associations. Such institutions would differ from those in the medium or large formal irrigation systems. For instance, in fadama areas, farmer organizations should probably be designed on the basis of studies of traditional modes of cooperation such as Gandu (social production unit), Gaiya (work patty system) and Kungiya Gaya (traditional association).
As there is little information available on the organizational aspects of fadama cultivation, an exploratory study of fadama areas will be undertaken to help understand the present organizational status of owners of fadamans, and the prospects and potential problems of organizing farmers into a federation which will enable them to take collective action on fertilizer procurement, marketing of produce and securing credit facilities. The study, which will lay the groundwork for a more extensive socio-institutional study of fadama irrigation, is aimed at exploring the possibility of exchanging experiences between public-sector and fadama irrigation systems. The proposed research on collective action in fadama areas will complement IIMI’s current efforts in the HJRBDA to assist with organizing farmers for water distribution, canal maintenance and collection of fees.

**Assistance to a River Basin Development Authority in Developing Its Strategic Planning**

With the new national policy agenda, there is a need for strategic planning by RBDAs coupled with technical advice and assistance for improving system performance, physically and financially. If strategic planning is to be useful and effective, it must be carried out as a participatory exercise by those responsible for implementing the program. Otherwise, the chances of bringing about organizational change and improvement would be slim.

It is proposed that a strategic planning activity be carried out with the HJRBDA which would provide the foundation for a set of activities designed to achieve the larger institutional objectives (such as financial autonomy) identified in the course of the planning exercise. These include formulating the purpose and objectives of the organization and establishing the means of implementing plans to achieve these strategic objectives.

**Collaboration with Other Institutions**

In carrying out research studies related to these activity areas, IIMI will seek collaboration with Nigerian research institutions. IIMI-Nigeria has already developed collaborative ties with the following institutions.

* Department of Agricultural Engineering, Ilorin University,
* Department of Public Administration, Obafemi Awolowo University, Ile-Ife,
* Department of Geography, Bayero University, Kano,
* Department of Agricultural Engineering, IAR, ABU, Zaria, and
* National Water Resources Institute, Kaduna.

Institutional linkages between IIMI and these national organizations will be strengthened through research collaboration in the future.
CHAPTER 2

Activities Undertaken in Phase II Program

STRENGTHENING WATER USERS ASSOCIATIONS FOR THE PROMOTION OF JOINT MANAGEMENT

The application of the farmers’ increased role in irrigation management requires skilful preparation of the farmers and the agency personnel for their new roles in the joint management of the irrigation system. In the process of institutionalization of agency-farmer joint management and sharing of responsibility by the farmers and the agency, the farmers are to be organized into “Water Users' Associations.” It is already proved from the experiences of many countries that the agency alone will not be able to maintain and operate the system so that partnership with the users is to be institutionalized through organized groups. The effort is made in Phase II Program to continue the activity to strengthen WUAs. Strengthening WUA activities encompasses activities at HJRBD and KRIP, and legal and institutional changes.

In Phase I report, it is mentioned clearly that one of the activities undertaken during that period was the effort to develop processes for the formation of Water Users' Associations in the Kano River Irrigation Project (KAIP). In order to promote the participatory approach in KRIP, the undermentioned processes were followed.

Experimental Pilot Sites

In order to test the WUA institutionalization process, three experimental sites were selected in consultation with the management of KRIP in three locations of the KRIP. These three pilot sites are located in the head, middle and tail sections of the system. They are Bangaza in the head section, Agolas in the middle section and Karfi in the tail section (Figure 2).

<table>
<thead>
<tr>
<th>Name of pilot site</th>
<th>No. of farmers</th>
<th>Area in ha</th>
<th>Average landholding</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangaza</td>
<td>145</td>
<td>271</td>
<td>1.86</td>
<td>Head</td>
</tr>
<tr>
<td>Agolas</td>
<td>325</td>
<td>139</td>
<td>0.42</td>
<td>Middle</td>
</tr>
<tr>
<td>Karfi</td>
<td>423</td>
<td>126</td>
<td>0.29</td>
<td>Tail</td>
</tr>
</tbody>
</table>
Figure 2. Location of three pilot projects within KRIP.
Characteristics of Water Users’ Associations for Participatory Management at KRIP

**Boundary of the Association**

The present command area of KRIP is estimated to be 15,000 ha. In order to establish a viable unit of functioning Water Users’ Associations in KRIP, the boundary for the primary Water Users’ Association is demarcated at the distributary channel level as far as possible. Wherever water is supplied directly from the secondary to the field channels, several contiguous field channels are grouped together for the formation of Water Users’ Associations. Bangaza is supplied by a distributary channel and it commands a larger area among the experimental sites. Agolas is supplied by a distributary channel and it has a command area of about 140 ha. The Karfi WUA is formed by bringing the farmers of a group of contiguous field channels together. There is no distributary channel delivering water to field channels at Karfi.

Hence, Water Users’ Associations are formed on the basis of hydrological boundary, not on administrative or village boundaries as was the case previously in the formation of the units of the cooperatives. It is also considered that water is the binding forces which will bring farmers together when the association is formed on the basis of membership on hydrological boundary. The landowners within the command area of a distributary channel are made the members of the association. The membership will be well-defined based on the hydrological boundary and landownership.

**Defined Membership**

The situation of KRIP is different from other irrigation projects. The land within the KRIP areas belongs to the individual farmers and not to the State. The land was taken by the government to be developed for irrigation. After development, farmers were given back the land for cultivation. Hence, the farmers are the owners of the land. They are made responsible for making the decisions on agricultural activities in their farms. The landowners are made responsible for paying water charges and they are thus made members of the Water Users’ Associations.

**Organization**

The primary tier to the Water Users’ Association in KRIP is at distributary level. The average size of the command area is 200 ha with about the same number of farmers. Each distributary channel command has about 15-25 field channels. The lessons learnt during Phase I activities indicate that the distributary channel Water Users’ Association can be a cohesive and active organization of the farmers. It can perform a number of useful functions like maintenance of field channels and distributary channels, regulating the norms for the distribution of water among the farmers; it can equally help in the effort to collect a higher percentage of water charges.

At the initial stage, it is visualized that the distributary channel will be the primary unit. The higher unit of WUA will be at lateral and branch levels. Finally, the central-level Water Users’ Associations will be formed out of the representatives of the branch-level Water Users’ Association (Figure 3).

The central-level Water Users’ Association will liaise with the agency management of KRIP. It will interact with the management for scheduling the main canal maintenance, choice of cropping pattern, water availability and water distribution. It can also play an important role in resource mobilization for the better management of the irrigation system.
Figure 3. Units and levels in the irrigation system.
Committee

The executive committee at the distributary level is composed of elected representatives of the farmers. However, effort is made to have representatives from each field channel as far as possible. All the landowners within the command area are the general members of the distributary Water Users' Association. Out of the members of the general body an Executive Committee is formed. This Executive Committee undertakes day-to-day activities in the command area. The Executive Committee is composed of the Chairman, the Vice-chairman, the Secretary and representatives of the field channels.

Meetings

The Executive Committee meets twice a month. The general body meeting is scheduled to be held twice a year. This general body is composed of all landowners within the hydrological boundary of the distributary channel. The meeting will be held before the agricultural activities during the dry and wet seasons. The experiences in KRIP show that farmers are eager to maintain distributary canals and field channels for dry-season agricultural activities.

The minutes of the meeting are entered in the minute book. All transactions of the association are recorded in this minute book which is open to all members. This process has helped introduce the concept of transparency in the activities of the Executive Committee.

Nature of Water Users' Association

The existence of functional organizations able to shoulder full responsibility for the O&M of distributary level will enable KRIP to:

- reduce the cost of operating KRIP, and
- improve the operation and management of the main system.

The process and procedures developed over a period of time in KRIP help create effective Water Users' Associations. Hence, each WUA should have the following features:

Self-Supporting. Generating sufficient income internally to finance its O&M responsibilities

Self-Regulating. Formulating its own rules and regulations to reflect the local characteristics and requirements (within the provision of general rules and regulations).

Self-Governing. Able to organize and execute the decisions of the Executive Committee without the need of input from the government agency.
Process of Formation of Water Users’ Associations in KRIP

Adoption of the Learning Approach

In consultation with the officials of HJRBDA and KRIP, it was agreed that WUA formation in KRIP will not follow the blue print approach—fixing the rigid procedures and the numbers of WUAs to be formed in a given period of time. The target-oriented time-bound WUA formation method has proved to be ineffective. Under such circumstances, WUAs could not take root effectively to share the responsibility of management at the assigned level of the irrigation system.

The KRIP is fortunate in the sense that it is not bound by the number of projects targeted to form the Water Users’ Associations. The exercise for the formation of Water Users’ Associations in KRIP is undertaken with the objective of strengthening and improving the management of KRIP. Hence, HJRBDA and KRIP looked for an opportunity to establish a proper process for the formation of Water Users’ Associations in KRIP. This approach adopted in KRIP is better known as the “Learning Approach.” On the basis of new information received from the field, new programs are prepared by the agency to strengthen WUA activities. This approach helps intensify two-way communication between the farmers’ organized groups and the agency. The effort of the agency would be to form a functioning Water Users’ Association which can contribute to the better management of the irrigation system. In the project-based target-oriented WUA formation, targeted number of WUAs are formed but they would remain only in paper or remain inactive. In order to avoid the possibility of such recurrence in the WUA formation of the “Learning Approach” is followed. The associations have to grow on the basis of the farmers’ needs, not on the basis of the official target and therefore it is important that the farmers have to take time.

Facilitator Role in the WUA Promotion in KRIP

Except for the formation of Farmers Cooperatives in KRIP, the agriculture extension staff who are to take the responsibility for the WUA formation did not have experience in such formation. There are different experiences in different projects. In some projects, facilitators are brought from outside the system for a given period of time to complete the assigned job. In other projects, the staff from within are mobilized for the WUA formation. The KRIP and the HJRBDA decided to assign a group of field-level extension staff from within KRIP to take the responsibility for the WUA formation at the field level. IIMI employed a Social Scientist with a background in cooperatives, community organization and social-welfare activities to work with the field-level extension staff of KRIP who are in charge of WUA formation. The person in charge of the WUA in HJRBDA and the Head of the Services Department of KRIP worked closely with IIMI staff in promoting the participatory irrigation management through the WUA formation in KRIP.

Since the extension staff are assigned to facilitate the WUA formation in KRIP, they need orientation on the job they have to undertake. The new job requires skills on group dynamics and interpersonal relations. The top-down approach in dealing with the farmers is to be avoided. The field staff need to understand the method of group formation, holding of the meeting and recording the minutes of the meeting. Later on, these skills are to be transferred to the WUA members.

Three levels of orientation programs were organized. It is not only the field-level staff who need to understand the functioning of WUA but also the zonal and regional officials of KRIP. They are to be aware of the role, process and procedure of WUA formation in KRIP. Officials of different levels along with the Project Manager of KRIP participated in the first orientation program on WUA.

The second training program was organized basically for field workers along with their immediate supervisors. The contents of this training program included; (a) Objectives of WUA (b) Physical and
Administrative Organization of KRIP (c) Basis of WUA Formation (d) Field Data Collection (e) Conducting the Farmers’ Meeting (f) Maintaining the Records of the Associations (g) Maintenance of the Channels by the Association, and (h) Resource Mobilization.

Besides these specific training-cum-orientation program to the staff of KRIP and HJRBDA, a monthly review-cum-training program to the field staff is conducted by the Chief of the KRIP WUA. The objective of this monthly meeting is to review what has happened during the previous month. The report will be presented by the individual field staff to the group. Thus, the groups of field staff responsible for WUA formation learn from each other's experience. Problems will be identified and necessary action will be suggested. During the time of IIMI-HJRBDA Collaborative Research Activity, the monthly review-cum-training program of the field staff was a regular phenomenon.

**Preliminary Data Collection**

The general feeling among the field-level staff who have been assigned to the task of WUA formation in KRIP is that they have been in the field for long periods of time so that they know everything and, therefore, there is no need for information collection from the particular hydrological boundary. It required lots of effort from the higher-level official to make them understand the importance of field-data collection by them. Several purposes would be fulfilled by the process of field-data collection by the field staff. The first purpose of this preliminary activity is to have intense interaction between the farmers of that particular hydrological boundary and the field staff of KRIP. The trust between the farmers and agency staff can be promoted only through proper interaction and mutual respect to each other. Second, more information will be collected which was not known to these field staff.

The preliminary information collection from a given hydrological boundary includes (a) number of the farmers, (b) area within the hydrological boundary, (c) types of crops grown in different seasons, (d) types of infrastructures within the command area, (e) social organizations, (f) ethnic groups, and (g) economic activities.

The information thus collected is to be properly recorded. It is to be stored in the office of the Chief of WUA in KRIP. The information will be useful to compare the situation before and after the WUA formation. The information will be necessary later on at the time of the WUA registration.

**Initial Contact with the Farmers for WUA Formation**

After understanding the socio-agricultural situation of the hydrological boundary of the assigned area, the field staff are to contact the farmers to motivate them for the WUA formation within that hydrological boundary. Within the experience of KRIP, the first reaction of the farmers would be "can the association give us fertilizers and seeds"? The preoccupation of KRIP farmers is how to get fertilizers at the government rate. These inputs are not easily available in the market. The distribution of fertilizers from the Kano Agriculture Supply Company (KASCO) is not systematic either. At the initial stage, the farmers talk more on the basis of individual need. The farmers have not been given to understand that they have to take responsibility for maintaining the system at a given hydrological boundary. The promoter of WUA has to play an effective role in making them understand the importance of collective effort in irrigation management. Until recently, the operation and maintenance works were done by the agency staff. Hence, they do not see the importance of the role of the farmers in O&M at distributary channel level.

The effort at this stage is to make the farmers convinced of the importance of users' organizations to mange water-related activities within a given boundary. The water-related activities include water
acquisition, water allocation and distribution, resource mobilization for operation and maintenance and conflict resolution. In order to convince the farmers of the importance of Water Users' Associations, it requires continuous effort and regular contact with the farmers.

The experiences of Agolas, Kerfi and Bangaza are different. The activity of collecting information and establishing initial contact with the farmers started in Agolas. The Social Scientist of IIIM along with the field staff of KRIP contacted individual farmers in their field. Several visits were made. After sometime, they agreed to come together to discuss irrigation management within the hydrological boundary. The first meeting was organized by the farmers under a tree within the command area. Only 20 farmers out of 250 attended this meeting. They deliberated on different problems including the question of distribution of fertilizers. In the course of the discussion, they agreed that if they could work together, they would be able to resolve the problems of water and fertilizers. They decided that they would work first for the water management within that hydrological boundary. Tall and dense grass infested the channels at distributary and field channels. They went through the process of holding farmers' meetings several times before the formation of ad hoc Water Users' Associations. They discussed the rules and regulations and later agreed to them among themselves. They recorded detailed WUA activities in the minute books. This demonstrates that one short visit by the officials is not enough for the WUA formation but that it requires continuous support and visits to the site.

Kerfi farmers were convinced of the need of the Water Users' Association. Kerfi is located at the tail-end section of the main system. They formed two Water Users' Associations. However, one can observe that the process followed in Agolas was adopted in Kerfi in the exercise of the WUA formation.

Bangaza is located in the head-end section of the system. The farmers did not take interest in the formation of Water Users' Associations despite several efforts made by the IIIM Social Scientist along with the KRIP extension staff. They said that different people have come and told them to do this and that. Their reaction was, "do we have to do so?" They were watching and observing the activities of the field staff. A meeting was organized between the Managing Director, senior staff of HJRBDA and farmers from Bangaza. The Managing Director of HJRBDA told them that from now onwards HJRBDA would share management responsibility between the organized farmers' group and the KRIP staff in managing the Bangaza sector. The Water Users' Associations will be given responsibility to collect water charges on behalf of KRIP. The statement of the Managing Director motivated the Bangaza farmers to come together and work together and generated a deep sense of trust among them. This meeting helped bring a tremendous impact on the thinking of these farmers. They were convinced that KRIP was serious about the Water Users' Association. They felt that KRIP was going to give them the serious responsibility of water charge collection. Previously, farmers would be taken to courts for their failure to pay water charges. Now, KRIP is willing to give this responsibility to the farmers through the Water Users' Association. The examples of Agolas, Kerfi and Bangaza indicate that continuous effort and different strategies are to be employed in promoting Water Users' Associations in the management of the irrigation system.

**Farmers' Meeting**

The extension staff assist the farmers' groups to organize the meeting. Usually, the meeting takes place in the workplace of the farmers. The venue is important. This gives them the sense of belonging to a common place. Holding a meeting of the WUA in the Project Office or outside the hydrological boundary was deliberately avoided.

The role of the extension staff is to facilitate the organization of the meeting. The meeting is to be conducted by the farmers themselves. In course of time, the farmers will have organized meetings by themselves. They will fix the date of the meeting. The agenda of the meeting would be prepared by
themselves. Information about the meeting will be circulated also by themselves. If the farmers see the benefit of some activities, they can learn fast. This is what one can see from the experiences of the KRIP farmers' organization.

**Broad-Based Water Users' Organization**

An effort was made in KRIP to create a broad-based water users' organization. Project-based water users' organizations depended more on the so-called "farmer leaders" who happened to be the known persons to the extension officers. They would not have much of the wider support of the larger group of farmers. After the conclusion of the project, the associations becomes ineffective. In order to avoid such a tragic situation, a deliberate effort is made to form an association which has a broad base and whose value is shared by the larger number of the farmers within that given hydrological boundary. In such a situation, the process of WUA formation takes a longer period of time than the anticipated period of 4-6 months. A WUA formed through such a process would be a dedicated and functional one.

**Collective Effort of the Farmers to Share the Responsibility**

It is necessary to encourage the collective effort of the farmers as in the maintenance of the channel, in the collective land preparation through the hiring of tractors on behalf of the Water Users' Associations, in the group marketing of agriculture produce or in the procurement of fertilizers in bulk. Such activities require support from different agencies. These agencies should help them undertake such collective activities.

The most urgent and important collective activity would be the maintenance and cleaning of the channel within the distributary boundary. The Water Users' Associations have made efforts to clean channels in Bangaza, Agolas and Kerfi as they can do proper maintenance. However, the priority for maintenance time is different with the farmers. The farmers put more effort in maintenance of the channels for the dry-season agriculture activities.

Both the agency and the farmers have seen the benefit of such timely maintenance by the farmers' group. The benefit to the farmers is recognized from the better hydraulic performance after the removal of the grass and weeds in the channel. The tail-end farmers derive more benefit from such collective effort through the WUA.

The collective contribution of the farmers in the maintenance of the channel saves KRIP's maintenance money. The unit cost of such maintenance is comparatively low. Hence, the scarce resource which is available with KRIP can be better utilized elsewhere in the proper maintenance of the system.

**Single Function WUAs**

The WUAs at KRIP were formed basically to carry on water-related functions like water allocation, distribution, maintenance of the channel and resource mobilization. It is visualized that water can bring the farmers together and make them work together for its better utilization.

In course of time, the WUAs are expected to add on more activities on marketing, fertilizer procurement and credit mobilization. The important consideration is that these activities should not be imposed upon them. The associations should be able to gradually incorporate these activities in the WUA functioning. With this approach, some WUAs within KRIP will have multifunctions and others a single function. Such
flexibility should be provided by KRIP as well as by HJRBDA. This flexibility will help grow the Water Users' Association for their collective need for agricultural development.

**Farmer-to-Farmer Training**

Farmers also need orientation on the types of activities to be undertaken by them through the Water Users' Association.

Farmers are to be exposed to new challenges not through a top-down traditional training program. KRIP farmers are provided a training opportunity through the "Farmer-to-farmer" training program. This peer group training program has been quite effective in raising inquisitiveness among the farmers in innovative agricultural activities. "farmer-to-farmer" training programs were organized for the farmers of Agolas, Bangaza and Kerfi in the Kano River Irrigation Project.

The visiting farmers were keen to learn the new techniques applied by fellow farmers' fields or in the system and were willing to apply them to their system. Through the field visit and observations, they could identify what was relevant to them and what was not. This method helped the farmers to learn from their fellow farmers and adopt new techniques and innovations in a way which was both faster and more effective than the formal extension approach.

The effectiveness of the "farmer-to-farmer" training approach is conditional upon five important factors:

The Same Wavelength

Both groups of farmers can communicate with each other without any difficulty because both of them have similar work experiences, backgrounds and problems. Hence, learning through this method is swifter than other methods. Even those farmers who do not speak the same language can learn from this method by observing the fields and agricultural practices of fellow farmers.

Seeing Is Believing

When the farmers observe improved practices in other farmers' fields with their own eyes, they were more convinced and ready to adopt them. On government-owned farms, by contrast, they have a hard time adopting new techniques.

Peer Group Learning

Peer group learning is faster than a vertical training method. "If they can do it, why can't we?" This thinking challenges the ego and propels farmers to learn and adopt new techniques. A group of Wurno farmers visited Kerfi of KRIP. They observed many features which happened to be of interest to them. They were amazed to see the utility of the syphon pipe used by Kerfi farmers.

Farmers Are Innovative

Farmers have been experimental for centuries and appear to be especially so when they see other farmers succeed. This approach is effective in learning from each other's experiences.
Farmer-to-Farmer Training Is Effective

While the cost for such a training program is very low compared to other programs, its effectiveness and adoption potential are high. This method has also been used in Asia. The reactions and responses of farmers in Nigeria are not very different from those in Asia. The experimental tendencies of farmers worldwide seem to be similar. Farmers are open to innovations but are cautious investors and try to avert risk as far as possible. They will not, as a group, adopt new approaches unless they are convinced of their efficacy by personally observing the fields of fellow farmers.

Support of HJRBDA to Promote Participatory Irrigation Management

Adoption of the Program

HJRBDA internalized the policy of farmer participation in irrigation management after the reorganization of RBDAs as a result of the Structural Adjustment Program (SAP) in Nigeria. The government policy stated that it would no longer provide O&M costs to the already completed irrigation projects. Hence, many RBDAs including HJRBDA had to adopt the policy of farmers’ participation in the management of the Kano River Irrigation Project.

Establishment of a WUA Unit at Authority and Project Levels

The next important step taken by RBDA is the establishment of a specific unit to look after the Water Users’ Association unit both at authority and at KRIP level. This unit is established under the Directorate of Services to be directly supervised by Assistant General Manager of Services. This unit is to take care of policy issues on the promotion of participatory irrigation management (Figure 4).

In KRIP, the WUA unit is kept under the Head, Department of Services to be directly supervised by the Chief of WUA specifically appointed for the purpose. At both levels, the specific unit is made responsible for the promotion of participatory irrigation management.

Staff Assignment

In the WUA unit of authority, the Extension Officer was in charge of Water Users’ Associations. He worked closely with IIIMI staff in programming the training program to the staff of the WUA unit, in arranging field visits to observe the activities of WUA, in liaising the activities between KRIP and the authority and in the promotion of such programs in other irrigation projects besides KRIP.

In KRIP, 12 extension field staff were deputed to take the responsibility for the formation of Water Users’ Associations in KRIP. Besides, one extension officer was made responsible for the supervision and coordination activities of WUAs in KRIP.

The administrative support necessary for the promotion of Water Users’ Associations is provided by HJRBDA.
Figure 4. *HJRDBDA* organization chart.
**HJRBD A Board for WUA**

The Board of Management of HJRBD A is the highest policymaking body for river basins. The Board has approved the proposal to undertake a program to authorize the farmers' Water Users' Associations to collect water charges on behalf of KRIP. Further, if the water charge collection from the area of the WUA exceeds 90 percent of the total water charge collection, the WUAs are authorized to retain 15 percent of it in their account. This decision of the Board shows how serious the HJRBD A is, in institutionalizing and activating WUAs in the Kano River Irrigation Project. The decision shows the confidence the HJRBD A has placed on farmer partnership in collecting water charges, which used to be the responsibility of KRIP's revenue collectors. Previously, water charge collection had caused many conflicts between KRIP and the farmers. The farmers have, in the pilot sites, taken responsibility for cleaning and maintaining the field and distributary channels.

**Review Committee for WUA**

(b) hydraulic performance.

management first-hand information on WUAs. Hence, management will have an intimate knowledge of the issues in promoting participatory irrigation management in KRIP and in other projects.

**Strengthening Staff Capability in WUA Activities**

The development of skills among the HJRBD A and KRIP staff in promoting participatory irrigation management through the formation of Water Users' Associations is crucial for fulfilling the objectives of joint management. IMI made the effort to work in collaboration with the host institution and its staff. IMI followed different strategies to familiarize the HJRBD A and KRIP staff in WUA activities. In the familiarization of WUAs and in the process of educating about WUAs to the agency staff, all levels of HJRBD A staff were involved at different points of time.
On-the-Job Training

HJRBDAs staff and KRIP staff were working closely with IMI staff on the questions of WUA activities. Regular meetings were organized to discuss the issues on the WUA formation. These staff participated in the preparation of a curriculum for training to extension field staff of KRIP and of the Hadejia Valley Project (HVP).

Half a dozen staff of HJRBDAs have been exposed to the issues of participatory irrigation management. Two of them are in management positions at present. One of them, Mr. Yahaya Kazaure, is the Project Manager of KRIP. The other officer, Mr. Mohammad Kura, is now the Project Manager of the Hadejia Valley Project. Both KRIP and HVP have now a few good field staff who have a good knowledge of and skills in the WUA formation.

Orientation Program on WUAs to KRIP Staff

Several orientation programs on WUAs were organized to familiarize the staff on different aspects of Water Users' Associations. These programs are aimed at supervisors and field-level staff who have to deal with farmers directly.

Seminars

Seminars are organized to exchange experiences of Water Users' Associations. In May 1993, a seminar was organized by HJRBDAs on "Water Users' Associations in KRIP" under the chairmanship of the HJRBDAs Managing Director. All the Executive Directors and Project Managers from all the HJRBDAs projects were invited to participate in the seminar. This seminar gave an opportunity to exchange experiences among different HJRBDAs projects.

In April 1994, a seminar was organized for HJRBDAs staff by IMI to share the experiences of participatory management in other countries.

Visit to the Sites

One way to expose the members of the management on the problems of the field is by making them visit the field and interact with the people there. The Executive Director of Services of HJRBDAs and Project Managers made several visits to the pilot sites to gather first-hand information on the issues the farmers and the field staff are confronted with.

The members of the Bangaza Water Users' Association organized a visit for the Managing Director to Bangaza to make him see how the Water Users' Associations are functioning in maintenance of the channels and in resource mobilization. Before visiting the field site, the Managing Director invited all the Projects Managers from all the projects of HJRBDAs. These Project Managers had the opportunity to observe for themselves what the farmers could do if they were organized with some purpose. The Managing Director had direct interaction with the office bearers of the WUAs. He had the opportunity to observe the WUA activities by himself. His comment was, "When I first heard about farmers' participation, I was not convinced that the farmers would cooperate because they have been given everything by the Project. After observation of WUA activities in Bangaza, I am convinced that farmers are interested in participating in and are willing to contribute for better management of the irrigation system through their "Water Users' Associations."
Dialogue between HJRBDA Management and WUA Farmers

One of the preconditions of the participatory irrigation management is to establish a mechanism where farmers and agency staff can engage in a meaningful dialogue for the better management of irrigation systems. This approach was followed to promote participatory irrigation management in HJRBDA.

The farmers from Kerfi, Bangaza and Agolas were invited to engage in dialogue with the Managing Director and other senior staff of HJRBDA. The farmers had a chance to ventilate their grievances. The management took the opportunity to clarify its position on different issues raised by the farmers. At the end, both parties were satisfied. Mutual trust and respect were generated by means of open dialogue between the farmers and the agency.

Efforts to Institutionalize the Participatory Approach in HJRBDA

In order to make WUA activities an ongoing exercise, legal and institutional aspects are to be in place. The following section attempts to highlight the efforts undertaken to provide a legal basis to WUA, defining the legitimate role to be played by WUA, financial support to WUA and recognition of WUA as the partner unit in the management of irrigation for the implementation of joint management of the public-sector irrigation systems.

Registration of Water Users' Associations

The WUAs formed at distributary-channel level are to be registered in the agency. It is recognized that there is a need to register WUAs and to provide them with certification. They will be recognized as legitimate farmers' groups that will be entitled to receive services from the government agencies such as the Kano Agriculture Supply Corporation (KASCO).

The following information needs to be supplied to the registering unit for WUA registration:

(a) Name of WUA,

(b) Size of the command area,

(c) Number of farmers in the command area,

(e) Cropping pattern,

(f) Constitution of the association agreed to by the members, and

(g) Names of the Executive members

This information will be the basis for monitoring and evaluation of WUAs within a given system. The WUAs are to be registered within the authority of HJRBDA. Until other arrangements are made, they should be recognized and registered by HJRBDA. Of course, questions are raised as to whether
these associations secure legal status by being registered in WJRBDA. This issue deserves further attention of the researchers and policymakers. However, registration of WUAs in the Cooperative Department will not help fulfill the irrigation-related activities. There is a need to have a new legal and institutional arrangement to provide due recognition to WUAs in KRIP and HJRBDA.

Agreement between WUAs and the Agency

There should be mutual agreement in sharing the responsibility for operation and maintenance of the system. The agreement will bring both the agency and the farmers' group together as partners who will be able to understand their respective roles and will be accountable to each other. HJRBDA has prepared an "agreement" document to be signed by Water Users' Associations and the agency. This document is given in Appendix 1.

Financial Autonomy

In order to provide financial autonomy, the HJRBDA Board approved the provision of collecting water charges within that given command area and retaining a certain percentage for further improvement and development activities of the command area within the WUA jurisdiction. The association can mobilize both cash and labor from among the members for maintenance and operation of the distributary channel.

Legal Recognition of Water Users' Association

Effort is being exerted to legally recognize Water Users' Association within the existing legal system of the country. Legal experts are of the opinion that WUAs are to be registered under the Cooperative Act of the country. The WUAs are different from Cooperatives in their basis of organization and objectives to be fulfilled. The WUAs are primarily the association to carry on water-related activities. Input-related activities come only in the second stage. The WUAs have to work in partnership with the authority in sharing some of the responsibilities of the operation and maintenance of the irrigation system. Hence, an appropriate legal basis for Water Users' Associations requires further serious consideration.

Lessons to Be Derived from HJRBDA on Participatory Irrigation Management

The experience with water users' organizations at HJRBDA should be viewed as a valuable insight in the process of forming WUAs and of institutionalizing farmer-agency joint management. A number of valuable lessons can be gained from the activities at KRIP. In the pilot sites of the experiences of HJRBDA, the following recommendations are proposed:

Establish a National Policy for Participatory management

A number of development projects within the Ministry of Water Resources include the formation of groups for public participation in the O&M of the scheme. But, at present, there is no clear government policy
as to how public participation should be motivated, organized or regulated. Each project has developed its own procedures, policies and rules.

A well-defined national policy must be established to guide the future development and activities of the RBDA schemes if participatory management is to become institutionalized.

Formalize Legal Basis for Organizations

The Ministry of Water Resources should take the lead in promoting the need of a legal basis for water users’ organizations.

Public Participation Support Organization

Motivating farmers to participate in water users’ organizations is a difficult task requiring particular skills. To ensure that the appropriate skills can be mobilized, to form and support water users’ organizations, the Ministry of Water Resources and RBDA should establish a cadre of staff to be responsible for participation activities.

Recognition of WUA Value

The value of WUAs must be recognized by all cadres of staff in projects. At KRIP, the extension group has been directly involved with the formation and support of the water user organizations. Involvement of the engineering O&M group, the revenue group and the administrative group has been slight which has, to some extent, weakened the organizations.

Observation Period

It is unrealistic to expect that WUAs can be formed quickly and then left to become fully effective. Experience at KRIP (and elsewhere) shows that support for the organization is required for some time after its formation. Support should be provided through training and advice. But, it is important that the groups are encouraged to internalize the objectives so that the organization has a clear rationale for its existence.

Identified Responsibilities

To avoid confusion, both on the part of the agency staff and the farmers, the role and responsibilities of the agency and the water user organization must be clearly defined.

A National Policy will establish the general objectives; however local needs and conditions will require the identification of the jurisdiction of the agency and the farmer organization, and the tasks and responsibilities of each.

Ideally, an agreement setting out the tasks and responsibilities should be made between the agency and the water user organization.
FADAMA SOCIAL ORGANIZATION

**Introduction**

Fadama cultivation occupies a larger share of the total irrigated area in Nigeria than what is termed formal public-sector irrigation. Existing data show that about 3.5 million ha of Nigeria's land mass are fadama lands out of which some 2 million ha can be put under small-scale irrigation (Table 2).

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<th>State</th>
<th>Available fadama land</th>
<th>Potential (irrigable) fadama</th>
<th>Area by washbore and tubewell</th>
<th>Area by direct pumping</th>
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</tr>
<tr>
<td>Sokoto/Kebsii</td>
<td>400,000</td>
<td>164,000</td>
<td>140,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Bauchi</td>
<td>235,000</td>
<td>181,000</td>
<td>71,000</td>
<td>110,000</td>
</tr>
<tr>
<td>Katsina</td>
<td>46,000</td>
<td>40,000</td>
<td>12,150</td>
<td>27,850</td>
</tr>
<tr>
<td>Niger</td>
<td>110,000</td>
<td>Studies are underway to classify these statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adamawa/Taraba</td>
<td>995,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benue</td>
<td>298,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3,520,000</td>
<td>1,782,000</td>
<td>1,020,762</td>
<td>761,238</td>
</tr>
</tbody>
</table>
Fadamas are low-lying flood plains composed of fluvial deposits with extensive groundwater potentiality. Along the river, they vary in width from a few hundred meters to as much as 15-20 km. They include land and water resources which could be developed for irrigated agriculture. Farmers have traditionally worked in these flood plains where they raise water to irrigate small parcels of vegetables and rice. In areas where water can be easily extracted from shallow groundwater or surface water, traditional irrigation technologies such as Shaduf and Calabash are used to irrigate the land. Agriculture Development Projects (ADPs) have now introduced washbore or low-lifting Pumps which have larger capacities than those of traditional technologies.

The literature review on the fadama agricultural development shows that there is no reliable information on the organizational aspects of fadama agricultural activities. There are literature reviews on soil, crops, groundwater potentials and conflicts among different interest groups. Agriculture development projects on fadama development of many States have introduced Fadama Users' Associations (FUAs).

The rationale of IIMI for selecting to study social organizations of fadama agriculture is to find out whether there are traditional water users' associations based on fadama agricultural activities. It is also hoped that some of the findings of this study will be applicable both for the improvement of water users' associations in the public irrigation systems and in the fadama development activities.

The Department of Geography, Bayero University and Hadejia-Nguru Wetlands Project were given responsibility to undertake a study on social organizational aspects of fadama development. The Bayero University selected sites from the Kano fadama area (Figure 5). The Nguru-Hadejia Wetland Project selected its study sites within the Nguru area where there are several fadama irrigation systems.

To enable comparability of the findings of these two research sites, a common checklist for information collection was given (see checklist in Appendix II).

The general characteristics of the social organization of fadama in Kano and Nguru area under study and the list of the systems are given in Table 3.

A two-level study was undertaken for the social organization of fadama. The two groups of researchers undertook the reconnaissance of around 20 systems in the Kano and Nguru wetland areas (Figures 5 and 6). Of the 20 systems, 5 in the Kano area and 4 in the Nguru area were selected for detailed study.

**Source of Water**

The source of water of 5 out of the 9 systems is a river. The source of water of 2 out of 9 organizations is groundwater and that of 2 others out of the 9 is a lake.

**Type of the System**

All those 5 systems in Kano used lift or pump for irrigation. Water is lifted from the nearby river in three systems. Two systems used pumps to draw groundwater. The lifts or pumps are individually owned. There is not much interaction in sharing water in the 5 systems in Kano.

In Nguru, all the 4 systems are gravity irrigation systems with extensive lengths of the canal. Since all of them have surface irrigation, community effort is reported in water acquisition and water sharing.
Figure 5. Location of wafer user groups
Figure 6. Location of Study Area.

1. Karfi in Karfi Section
2. Danhassan in Karfi Section
3. Yansama in Chalawa Section
4. Gama Kwari in Jakara Section
5. Warawa in Garin Warawa Section
Table 3. Features of the social organization of *fadamas* under study.

<table>
<thead>
<tr>
<th>Name of the system organization</th>
<th>State (of water)</th>
<th>Type of the system</th>
<th>Year established</th>
<th>Members</th>
<th>Types of organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerfi, Kerfi Sector</td>
<td>Kano Kano River</td>
<td>Lift irrigation</td>
<td>1980</td>
<td>1,000</td>
<td>Reg.</td>
</tr>
<tr>
<td>Gama Kwari, Jakara Sector</td>
<td>Kano Jakari River</td>
<td>Lift</td>
<td>1974</td>
<td>70</td>
<td>Inact.</td>
</tr>
<tr>
<td>Warawa, Garin Warawa Sector</td>
<td>Kano Groundwater</td>
<td>Lift</td>
<td>1986</td>
<td>100</td>
<td>Inact.</td>
</tr>
<tr>
<td>Garmakywan Yamma</td>
<td>Yobe Hadejia River</td>
<td>Surface irrigation</td>
<td>1987</td>
<td>717</td>
<td>Reg.</td>
</tr>
<tr>
<td>Nguru</td>
<td>Yobe Nguru Lake</td>
<td>Surface irrigation</td>
<td>1985</td>
<td>50</td>
<td>Reg.</td>
</tr>
<tr>
<td>Tagali</td>
<td>Yobe Barum Gana</td>
<td>Surface irrigation</td>
<td>1986</td>
<td>76</td>
<td>Reg.</td>
</tr>
<tr>
<td>Usur</td>
<td>Yobe Kumbag -dem Lake</td>
<td>Surface irrigation</td>
<td>1984</td>
<td>50</td>
<td>Reg.</td>
</tr>
</tbody>
</table>


**Area under Irrigation**

It is difficult to determine the size of the command area. In other words, it is difficult to determine the fixed command area. Some of the fadama is owned by the community. They are given for cultivation on an annual basis. Others are owned by individuals and shared with other members of the community. There are permanent as well as temporary cultivators.
History of the Fadama Organization

Many of these organizations were formed in the mid-1980s. The report shows that the oldest one was established in 1974. The new one was formed only in 1994. Some of them were motivated to be organized to secure credit and agriculture inputs and others to undertake collective effort to bring irrigation water to their farms.

Membership in the Fadama Organization

Except for 2 of the organizations under study, the rest of the (9) systems have less than 100 members. The fadama organizations with multiple functions like irrigation and input distribution have larger members. The membership is not determined by the ownership of the land. Anybody within the village is a member and is entitled to get agricultural inputs. The fadama organizations which were initially formed for the purpose of irrigation water management have defined membership, rules and roles. Basically, they are organized for irrigation purpose. Later on, their activities are expanded for securing agricultural inputs as well.

Types of the Organization

Out of 9 organizations 7 are registered in Agriculture Development Projects (ADPs) of the respective States. The other two organizations became defunct and are not registered.

It is interesting to note that many of these fadama organizations are registered. It shows that ADPs under the Fadama Users' Associations have become effective. This World Bank-supported project initiated large-scale programs in several States in Northern Nigeria. Fadama Users' Associations are basically formed for the purpose of securing credit and agricultural inputs. It was difficult for individual farmers to purchase agricultural inputs from the market and to make it easy many of these members were motivated to be members of fadama associations. They are also to be registered in the Agriculture Development Projects to be entitled to get agricultural inputs and other credits. Hence, many of these fadama organizations are "registered."

Unifying Factors in the Fadama Organizations

In Kano and Nguru, the factors motivating the farmers to come together are different. In Kano, the fadamas are private properly. Individual farmers were responsible for production activities in their fadama farms. There have been two external factors which influenced the fadama farmers to come together in the Kano area. The inception of large-scale irrigation (KRIP) brought with it a package of incentives such as the provision of farming inputs at subsidized cost and the granting of agriculture loans and establishment of extension services from the government and its agencies. The government also made it clear that it was interested in groups of peasants rather than in individuals. The main motivation for establishing these associations was the necessity to acquire appropriate resources.

In the Nguru area, the farmers' groups came together for the reason of water issues in agriculture. The groups in Garwaywan Yamma and Tagali stated that their main concern was the availability of water for dry-season irrigation. The group in Nguru tried to stop their flood-rice farms from being flooded before the...
rice was strong enough to withstand high water levels. The group in Usur is trying to keep flood water in the fadama as long as possible.

In order to tackle these problems, they have to undertake different activities. Some of them had to dig an 18 km long canal to bring water. Others had to maintain the dike to keep the flood water out for a certain period of time. The other group had to work to augment water in the system with the help of large pumps to be borrowed from the agency. The water-related problems of these different groups are, thus, tackled in different ways.

Initiative

Both in Kano and Nguru, one notices the role played by an individual farmer to bring the farmers together for the purpose of collective and group activity. However, the effort revolved around securing the agriculture inputs including pumps in Kano.

In the Nguru area, the individual farmer has taken the initiative to bring the group of farmers together. The background of the extension services among these farmers helped benefit the farmers in motivating them to work together. It is not clear what role was played by the association organizer or institution organizer in these systems. In most of the cases, the individual farmer of the community took the initiative to organize the farmers to undertake collective effort.

Objective of the Fadama Organization

In Kano, fadama organizations seem to have only the objective of securing agricultural inputs. There has not been much concern about the collective use and sharing of water.

In the Nguru area, various groups were formed with different but quite relevant objectives. The Nguru group had defined its problems and objectives most clearly, i.e., to build a dike to protect their farms from early flooding. The Tagali and Usur group considered irrigation as the primary objective. The initial objective of the group in Garmakywan Yamma was agriculture in general but later on it was made specific to secure water for irrigation. Initially, the objective of the Garmakywan and Usur group was agricultural inputs.

Activity of the Fadama Organization

In the Kano area, the study indicates that the fadama organizations have only one function. Its responsibility is to secure inputs from the government agency and distribute them to the members. One does not notice much of the other activities undertaken by these associations like water acquisition and water distribution.

In the case of fadama organizations in the Nguru area all of them have multifunctions to perform. They undertake activities through their collective effort. They also undertake activities to secure agricultural inputs and to distribute them to the members of the fadama association. It is said that groups do not limit their activities to irrigation only. All groups also aim to obtain a quota of fertilizer allocations and join forces to obtain other inputs from government agencies. Activities like digging of wells for domestic water supply are also undertaken jointly. Plows, which can be hired by members, are obtained on a communal basis. Contributions are used to provide food to needy people or to cover medical treatment of fellow members.
Leadership in the Fadama Organization

In Kano, the traditional leader or village head has played an important role in the management of the fadama organization. The selection of other officers in the organization is through a process which considers the popularity and position of the person in the society. Members usually come to a consensus in their selection process.

Out of 5 systems studied in Kano, two have already collapsed. It is noted that the reason for this collapse is embezzlement and the resulting failure of the leadership of the association. The individual members do not feel the need to revive the fadama organization.

It is very important to underline here that the farmers' organizations should have proper leadership. To ensure proper leadership the recruitment process should also be proper. Members of the association should play an important role in this regard. The election process ensures instilling the responsibility among the elected representatives. In the meantime, the process of accountability and transparency are to be maintained. The failure of the two fadama organizations in Kano points out the importance of the leadership role in an organization.

In Nguru, it is reported that in all cases, the leaders are elected by the members. However, there was ADP influence so that each fadama organization has a few common office bearers who are elected by the members of the association like the Chairman, Vice-chairman, Secretary and Treasurer. Criteria used for the election of the members are their competence and active participation in community activities. They are to be respected members of the community.

The traditional leader has an important role to play in the rural life of Northern Nigeria. The fadama organizations seek advice from the traditional leaders and elders of the village. In most cases, the traditional village head acts as an adviser to the group. Although the traditional village head is not in a position to make final decisions, the members always act on advice. Such a mechanism contributes to keeping the group together in the larger society.

Usually, the leaders keep their positions as long as the members are satisfied with their performance. It shows that most groups are stable in this respect. The leaders of all groups join the members when they perform communal work. This is also the case with the traditional rulers. The leaders can thus advise the group in the field.

Rules and Sanctions

In Kano, the fadama organizations do not have rules and provision of punishment for not complying with the rules of the organization. However, the Nguru study shows that there are certain rules and regulations to be followed by the members of the association. They relate to fee payment of membership, participation in the meeting, labor contribution in the maintenance of the irrigation channels, etc. The defaulters are imposed fines.

Thus, systems mobilize labor and cash contribution from among the members of the association.

These members have to cooperate in communal work, follow the water distribution schedule and help each other in agricultural activities.

Binding Factors to Keep the Fadama Association Together

In Nguru, the study identified the following binding factors to keep the fadama association together.
Well-defined problem: The well-defined problem helps keep the farmers together.

Influential leadership: The influential leadership in the association contributes to keep the group together.

Participation of the members in decision making: The members should have the sense of satisfaction by participation in the meetings when important decisions are made. Such publications make them part of the decision-making process.

Integration of traditional leaders in the organization activities: The traditional leaders play an important role in keeping the group together. Hence, it is necessary to find out ways and means to involve them in the activities of the association.

Communal work: Communal work brings the group together so that it can share the difficulties and benefits together.

Conflicts in the Fadama Organization

The study of Nguru also points to the fact that there a few points of conflict which need to be thoroughly resolved.

Lack of Sanctioning Power

In order to keep the group together, there is a need to have rules and regulations. If any members do not follow the rules and regulations, they should be punished, failing which the organization may start disintegrating.

Multi-Function Organization

When an organization undertakes several functions at a time, the members might not be bound together by a common function. It may lead to the disintegration of the association. One has to see whether the multifunctions of the organization have relevance to all members or not.

Larger Membership without Defined Objectives

Larger membership, undefined boundary and ill-defined objectives contribute to the disintegration of the fadama association.
Members with Temporary Activity

Membership of the outside village farmers cultivating the hired land would not contribute to the long-term objectives of the fadama association. Such factors can contribute to the disintegration of the fadama association.

Conflict with Other Competitive Groups

Conflicts among the cultivators and Fulanis are to be carefully settled. These conflicts can lead to serious long-term consequences which will be unhealthy for the growth of the fadama association.

Drying up of the Water Sources

The drying up of water which would be the binding force would lead to the disintegration of the group. Water is a very important source to keep the group together in an irrigation system. The study shows that the decrease of the amount of flood in 1993 resulted in the instability of the fadama water users’ association.

Lesson from the Fadama Organizations to Water Users’ Association in Public-Sector Irrigation Systems

There are several important lessons that can be learnt from the experiences of the fadama users’ organizations.

(a) The users’ organizations formed are strong and effective in surface irrigation systems where members have to contribute their labor for the maintenance of the channel. The farmers have proved that they can undertake the responsibility of the management of the system.

(b) Leadership is very important to keep the users’ organizations functioning. The Kano fadama organizations indicated that the organizations collapsed because of the irresponsibility of the leadership of the organizations. Nguru Progressive Fadama Organization has demonstrated the importance of the leadership role in making the organizations strong.

(c) The extensive background among the members of the association has helped contribute to strengthen the organization.

(d) The defined objective and defined membership help organize the fadama users’ organizations to be effective. Ill-defined membership often tends to distort the functioning of the users’ organizations.

(e) The example from the Nguru wetlands area demonstrates that many of the users’ organizations have multiple functions. They undertake irrigation management as well as agricultural-input distribution activities. Hence, the adoption of the multiple functions by the users’ organizations should be gradual.
(f) The decision-making process should be broad based. The members of a users' organization should feel that they have participated in its decision making.

(g) There has been a balance between the traditional village leaders and the elected members of the users' organizations. This can be a good lesson in the context of Nigeria.

(h) The rules of a users' organization are to be followed by all members. When there is noncompliance of the rules of the organization, the defaulters should be punished. The fadama users' organizations of Nguru area have demonstrated the value of the implementation of a reward and punishment system within the organization.

(i) Labor as well as cash contributions have been the basis for the resource mobilization of the organizational activities.

Some of the lessons learnt from the experiences of fadama users' organizations are quite relevant to WUAs of the agency-managed systems. It has been shown that the registration system has provided extra incentive to fadama farmers to come together. Hence, legal recognition of the organizations is important.

ASSISTANCE TO RIVER BASIN DEVELOPMENT AUTHORITY IN DEVELOPING ITS STRATEGIC PLANNING

The strategic planning exercise aimed at HJRDBDA has two components. One is to make changes in the organization efficiency through the participation of the staff in the exercise of strategic planning and the other is to devise a mechanism in KRiP and in such other already completed projects to achieve financial autonomy.

Strategic Planning for Strengthening the Organization

The government of Nigeria has provided an opportunity to RBDAs to readjust the operation and management of irrigation systems under their jurisdiction over a period of time depending on the status of the RBDAs. They are at the crossroads of change. These changes are required to promote the relation between the farmers and the agency for joint management and participatory irrigation management in Nigeria.

Among those RBDAs, HJRDBDA, which is the collaborating institution of IIMI in Nigeria, is the candidate for institutional reforms. HJRDBDA has indicated its interest in participating in the process. IIMI was in a good position to work on the theme of Management of Public Irrigation Organizations in Nigeria.

Because of the changes which have occurred in national policies as a result of Nigeria's Structural Adjustment Program, HJRDBDA is now faced with a radically different environment in which it must operate. Many services which it formally provided to cultivators, such as plowing services, fertilizer distribution and extension advice are now to be provided through the private sector. In addition, these policy changes have mandated parastatal organizations such as HJRDBDA to achieve financial autonomy in their operations. This has led to a compelling need for the authority to reexamine its basic purpose, values, structure, and mode of operation in the light of these new situations in a comprehensive strategic planning process.
In introducing reforms in the agency, the following three important elements should be taken into consideration: (a) Incremental reforms, (b) acceptance of change by the agency, and (c) external assistance to smoothen the process of change.

**Incremental Reform**

Incremental reform will be introduced by the agency through the process of mutual consultation, deliberation and planning. The exercise of mutual consultation, deliberation and planning takes place at least for a series of meetings over a certain period.

The strategic planning process is to be carried out with the active participation of the members of the organization. Hence, the strategic planning exercise becomes the participatory planning initiated from within the system.

The mode of deliberations and consultations takes place combining the Organizational Development (OD) technique, T-Group exercise and Goal Oriented Project Planning (GOPP). The T-Group exercise is also known as the Sensitivity Type of training program which helps not only understand each other but the members of the organization to be creative. Such an exercise will bring change both in the nature of the organization and the capacity of the people who are going to manage the change in the organization. The GOPP is used in many projects to redefine the goals and objectives, and to assess the inputs and outputs to achieve such goals and objectives.

**Accepting Reforms**

In order to introduce reforms in an organization, it is necessary to be careful about the possibility of rejection of reforms. Hence, the strategic planning exercise has to take place in collaboration with the groups of staff of different levels of the Organization. The process thus followed for reform would encourage the agency to own the change within the organization. Efforts will be made by them to institutionalize the reforms.

**External Assistance to Smoothen the Reforms**

External technical experts help design the strategic planning by

- redefining the goals and objectives of the organization in the changing context,
- establishing a long-term direction to achieve the strategic objectives, and
- formulating the plan to achieve the implementation of the strategic objectives.

In the process of the introduction of reform measures, fundamental values and objectives are to be reexamined and reconsidered. Such effort needs external specialized skills to assist in the process. The specialized skilled people bring with them the skill of the strategic planning process as well as the technical issues experienced from similar situations in other organizations.

Research institutes like IIMI will assist in providing research input to introduce reforms and changes in the organization.
Hence, external assistance, including the activities of IIMI, play the role of the midwife to transform the organizational values, objectives and operational styles.

A series of meetings were held with the Managing Director and Other senior staff of HJRBDAs in relation to the strategic planning for the performance improvement of HJRBDAs and a program was developed. HJRBDAs has agreed to bear the local cost for holding workshops and meetings for the strategic planning. IIMI could not mobilize enough resources to bring external expertise to carry on the exercise of strategic planning. Instead, a series of seminars were organized to orient RBDAs to the new challenges they have to face within the socioeconomic and institutional changes.

Viable Financial Resources to Projects

Another important component is to secure financial autonomy and self-sufficiency of the completed projects. In consultation with the staff of HJRBDAs, the following strategy is proposed for implementation by HJRBDAs in order to achieve financial autonomy of KRIP:

(a) Sharing of responsibility with farmers in maintenance, operation and water charge collection.

(b) Increasing the revenue generation in the system by raising the role of water charge, improving water charge collection efficiency, expanding the potentiality of water charge collection and generating secondary income.

(c) Reducing the operating cost by means of transferring some of the activities only to the necessary number of staff for the management of the system.

(d) Institutionalization of performance incentives by granting collection incentives and points in staff promotion.

The discussion paper submitted for the consideration of HJRBDAs is given in Appendix III.

RELATION WITH OTHER NATIONAL INSTITUTIONS IN NIGERIA

in accordance with the mandate of the international Irrigation Management Institute (IIMI), collaborative activities were undertaken with the national institutions in order to strengthen national capacity. The objectives of the collaborative activities in Nigeria are as follows:

* strengthening national capacity to undertake research in irrigation management.
* performing IIMI activities in a collaborative mode.
* facilitating the exchange of information.

IIMI established working relations with several national institutes in Nigeria. They are:

* Department of Agriculture Engineering, Amadu Bello University, Zaria.
* Department of Agriculture Engineering, Ilorin University, Ilorin.

* Department of Geography, Bayero University, Kano.

* National Water Resource Institute, Kaduna.

There are many institutions which are engaged in research in relation to water, crops and soil. Most of the research undertaken by these institutions is directed toward the issues of crop-water requirement. There was no orientation among the research institutes to undertake research in irrigation management issues as identified in the IIIMI mission to Nigeria to develop a medium-term plan for collaboration between IIIMI and Nigerian organizations. A number of collaborative activities were undertaken.

Research Grant to a Student of the Department of Agriculture Engineering, ABU, Zaria

A research grant was awarded to a student of the Department of Agriculture Engineering, ABU, Zaria through the Department to follow a master's degree. A Memorandum of Understanding was signed between the Department of Agriculture Engineering and IIIMI in this respect. The Department takes responsibility for supervising the thesis of the student who undertakes the study to compare the design flow of water with the actual flow of water in the Kadawa sector of KRIP. The grant provision helps fulfill three objectives:

* it forces the student to go to the field and get practical experience from the field.

* the faculty member is made aware of the issues of irrigation management through his supervision responsibility.

* it helps create a new type of manpower required to undertake research on irrigation management issues in Nigeria.

During the time of the field work, both the Department of Agriculture Engineering and IIIMI provided inputs for data collection and data analysis.

Setting of Irrigation Research Priorities for Nigeria: Collaboration with the Department of Agriculture Engineering, Ilorin University

Collaborative work was undertaken with the Department of Agriculture Engineering, Ilorin University, specially through Prof. E. U. Nwa. The objective of this collaboration is to reorient the research community and policymakers of Nigeria toward research on irrigation management issues in Nigeria. Professor Nwa did a quick survey of the research status and role of different research institutions in Nigeria (Nwa 1993). A survey was conducted to ascertain the research need for improved irrigation management of River Basin Development Authority Projects in Nigeria (Pradhan and Nwa 1993).

It was felt necessary to bring policymakers, researchers and practitioners together to determine the irrigation research priorities for Nigeria. In order to achieve the goal of bringing these groups together, a national seminar was organized in collaboration with the Department of Agriculture Engineering, University of Ilorin. Fifty participants representing policymakers, practitioners and researchers participated in the
national seminar on "Irrigation Research Priorities for Nigeria" organized in Ilorin from 20-23 April, 1993. Twelve papers were discussed. At the conclusion of the seminar, a set of recommendations was suggested for future consideration (see the recommendations of the Seminar in Appendix W). A paper on the seminar proceedings with the title "Irrigation Research Priorities for Nigeria" was published jointly by IIIMI and the University of Ilorin.

Department of Geography, Bayero University

The responsibility for investigating the dynamics of social organization of fadama in Northern Nigeria was assigned to the Department of Geography of the Bayero University, Kano and the Hadejia-Nguru Wetland Conservation Project of Nguru. The Department of Geography of the Bayero University had a great deal of experience on the study of fadama but there was hardly any study undertaken to look into the issues of social organization of fadama. Hence, an agreement was concluded with the Dean of Social Sciences of the Bayero University to undertake a study on social organization of fadama around the Kano State. The study was concluded successfully in June, 1994. A report on "Social Organizations among Fadama Farmers in the Kano State" was submitted to IIIMI in June, 1994.

Hadejia-Nguru Wetland Conservation Project

An agreement was concluded between IIIMI-Nigeria and Hadejia-Nguru Wetland Conservation Project to undertake a study on social organization of fadama around the Hadejia-Nguru area. The goal of the Hadejia-Nguru Wetland Conservation Project is the maintenance of ecological values and functions of the Hadejia-Jama'are ecosystem through regular flooding of the flood plain. The three main objectives of the project are:

(a) to investigate and promote the sustainable use of the wetland resources in the Hadejia-Jama'are Basin for the benefit of both human and wildlife communities,

(b) to explore resource exploitation alternatives aimed at optimizing traditional land use practices, in particular through the development of experimental demonstration projects, with the active collaboration of local communities, and

(c) to work with both the Nigerian administrations and international agencies to ensure that planned developments in the project areas represent a sustainable use of available resources.

The objectives of the Hadejia-Nguru Project match the objective of the study on the social organization of fadama in Northern Nigeria. The Hadejia-Nguru Project has undertaken field investigation of the social organization of fadama within the Hadejia-Nguru area. The report of the study is made available to IIIMI in July, 1994.
National Water Resources Institute (NWRI), Kaduna

IIIMI established contacts with the National Water Resources Institute (NWRI), Kaduna, an institute under the Federal Ministry of Water Resources, through visits and participation in the seminars and workshops organized by the National Water Resources Institute. The Institute has a number of laboratories for experimentation and conducts a training program specially to the technicians engaged in the drinking-water program. Over a period of time, the Institute was attempting to reorient itself towards irrigation management in Nigeria.

A "Participatory Irrigation Management" seminar was jointly organized by the International Irrigation Management Institute (IIIMI) and the National Water Resources Institute, Kaduna, with the objective of presenting the state of the art of participatory irrigation management in public-sector irrigation systems in Nigeria. The other objective is to share the experiences on participatory irrigation management of the Kano River Irrigation Project with the policymakers and researchers. Fifteen papers were discussed in the seminar and they deal with the various aspects of the participatory irrigation management. The role of the government was discussed for the promotion of participatory irrigation management. This involves the legal provision, institutional arrangement and land-property relationship with the cultivators. Attempts were made to identify the role of nongovernmental agencies for the promotion of the participatory irrigation management. These aspects are considered issues beyond the government because it alone cannot take the responsibility for providing services to the needs of the citizens. Citizens have to organize themselves in order to improve the delivery of services. Participatory irrigation management is also directed toward that objective.

The paper on the proceedings of the national seminar on "Participatory Irrigation Management in Nigeria" was published jointly by NWRI and IIIMI-Nigeria.

The recommendations made in the national seminar are given in Appendix V.
CHAPTER 3

Impact of the IIMI-Nigeria Program

Institution Strengthening Activity

Establishment of Water Users' Associations (WUAs)

WUAs have been functioning in three pilot sites. On the basis of experiences from the pilot sites, the Kano River irrigation Project (KRIP) has extended the formation of WUAs in ten other distributaries.

To Establish Functioning WUAs, There Is a Need to Have Institutional and Organizational Support

HJRDBA established a unit under the Directorate of Services to take care of WUA activities. Similarly, KRIP has created a unit to take charge of WUA in KRIP. It has at present 12 field staff.

HJRDBA Board Provided Support to WUA, Empowering Them with the Authority to Collect Water Charge on Behalf of KRIP

Establishment of a Review Committee at HJRDBA Indicates the Support of HJRDBA to Make WUAs a Useful Partner in the Management of Irrigation Systems

Design of WUA Program in the Hjadejia Valley Project (HVP)

The first stage of the first phase of HVP covers a command area of 6,500 ha. HJRDBA decided to introduce participatory irrigation management in HVP from the beginning of the project implementation. Hence, the process of WUA formation started with the Gamsaka area of HVP. Field staff were given training in the process of WUA formation. The KRIP features of WUA like hydrological boundary, organizational basis, committees and types of meetings are borrowed by HVP.

Wurno Irrigation Project, Sokoto

This is one of the oldest projects. The EC provided funding under the environmental protection program to rehabilitate the irrigation system. It was agreed at the time of project implementation that, in future, the rehabilitation and O&M of the project will be through the participation of farmers. The Team Leader of the consultancy and consultant on Institution Development visited IIMI and KRIP before the preparation of a detailed plan for the implementation of participatory irrigation management in the Wurno Irrigation Project. KRIP experiences had an impact on the organizational basis of WUA, on the training of the field staff, and on the orientation of officials (Ward 1993).

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Saga Irrigation Project at Niamey

The farmers and officials from the Saga irrigation Project of Niamey, Niger Republic visited KRIP to learn lessons from the Water Users’ Association. The farmers and officials of both agencies exchanged experiences of the role and functions of the farmers in the management of the irrigation system. In the same way, officials from KRIP and IIMI visited the Saga System to learn about the functioning of the Saga Cooperative Organization.

Farmer-to-Farmer Training Program within KRIP

The farmer-to-farmer training program is adopted to arouse awareness among the farmers. The HVP as well as the Wurno Irrigation Project also followed this training method to make their farmers aware of Water Users' Associations.

Comment of IIMI External Review Panel

"The performance and output of existing irrigation systems are very low. There is little cooperation among agency personnel and the farmers or among the farmers themselves. Establishing WUAs and getting them to take responsibility for O&M are a major challenge. In this regard, IIMI has made evident progress in the Hadejia-Jama'are pilot project and has assisted in the creation of WUAs for better irrigation management. Whether this can be sustained and expanded is uncertain, and will entirely depend on future funding opportunities" (TAC 1994).

Adoption of the Recommendation of the National Seminar

In the meeting of the Nigerian National Commission on Irrigation and Drainage held in the Lower-Niger River Basin Development Authority on 28-29 March 1994, Engineer I.K. Musa, Director of Irrigation and Drainage of the Ministry of Water Resources and Rural Development called the attention of the members to consider and adopt the proposal of the framework for implementing the various action programs contained in the Hague Declaration. The first proposal calls for the initiation of an Action-Research Program for improvement and increased productivity of water through the adoption of the recommendations agreed at the national seminar on "Irrigation Research Priorities for Nigeria," organized jointly by IIMI and the University of Ilorin, Ilorin.

As part of the recommendation of the national seminar held in Ilorin, a National Irrigation Research Network will be established. It will be coordinated from the University of Ilorin for the time being. The Network will be able to bring together researchers, practitioners and policymakers. The information gap in the field of research activities will be filled in by this national irrigation research network. This is an exercise to strengthen the national capacity of Nigeria to undertake research on irrigation issues in Nigeria.
Adoption of IIMI-Nigeria Research Findings by the World Bank for Further Strengthening of Participatory Irrigation Management in Nigeria

In 1993, a World Bank mission did a reconnaissance of five potential public-sector irrigation systems in Nigeria for World Bank investment. One of the components looked into by the mission was the role of the farmers in sharing the responsibility of operation and management of the system. They identified that out of the five systems, only two (the Kano River Irrigation Project and the Lower-Anambra Irrigation Project with the Japanese International Cooperation Agency) had visible efforts put in for the promotion of the participatory irrigation management. The serious exercise on participatory irrigation management is identified only in the Kano River Irrigation Project of Hadejia-Jama'are River Basin Development Authority.

The World Bank mission proposes the expansion of IIMI-HJRBDA collaborative research results in KRIP and the Lower-Anambera Irrigation Project.

Information Dissemination Activities

Two national seminars were organized in collaboration with national institutes of Nigeria.

Irrigation Research Priorities for Nigeria

A national seminar in collaboration with the University of Ilorin was organized in April, 1993. Fifty participants representing the Ministry of Water Resources, RBDAs, ADPs, university researchers and donors participated in the national seminar. Twelve papers dealing with issues on irrigation research priorities for Nigeria were discussed.

Participatory Irrigation Management in Nigeria

This seminar was organized in collaboration with the National Water Resource Institute, Kaduna with the objective of sharing experiences on participatory irrigation management among a number of projects undertaken by different agencies in Nigeria. Fifteen papers were presented for discussion. Thirty participants including Directors of the Department of Irrigation and Drainage and Planning, and Research and Statistics of the Ministry of Water Resources and Rural Development, officials of ADPs, research scholars and NGOs participated in the two-day national seminar held at the National Water Resources Institute.

Publications

Two seminar proceedings were published during the project period.


Both these publications were widely circulated within and outside Nigeria. Besides the printed publications, there were several other reports which were prepared during this period of time.


References


APPENDIX I

Contract Agreement between HJRBDA and Water Users' Associations at KRIP

This Agreement made this day ......................... between the **HADEJIA JAMA'ARE RIVER BASIN DEVELOPMENT AUTHORITY** whose address is P.M.B. 3168, HOTORO, **WUDIL ROAD, KANO** [hereinafter called the Authority] on the one part and ......................................... whose address is ......................................... [hereinafter called the user] on the other.

WHEREAS the AUTHORITY and the USER are desirous to share irrigation management responsibilities in the areas of WATER USE ACTIVITIES, PHYSICAL SYSTEM MAINTENANCE, ORGANIZATIONAL ACTIVITIES, and RESOURCE MOBILIZATION as contained in this agreement.

1. WATER USE ACTIVITIES

1.1 The AUTHORITY shall ensure that an adequate quantity of irrigation water is acquired for crop production in both wet and dry seasons.

1.2 The Authority shall allocate an adequate quantity of water for crop production in both wet and dry seasons to Water Users' Associations.

1.3 The Authority shall be responsible for the equitable and reliable delivery of water from the main irrigation system up to the Distributary Channel [DC] level.

1.4 The Water Users' Associations (WUAs) shall be responsible for the equitable distribution of irrigation water within the DC command area.

1.5 In the event of a water shortage, the WUA shall arrange scheduling of irrigation water within the DC command area.

1.6 The WUA shall be responsible for equitable distribution of irrigation water at the Field-Channel (FC) level.

1.7 The Authority shall in conjunction with the USER ensure that the irrigation water supplied to the individual farm plots is effectively utilized for crop production.

2. PHYSICAL SYSTEM MAINTENANCE

2.1 The Authority shall take the responsibility of operating the irrigation system from the main canal up to the laterals.

2.2 The USER shall take the responsibility for operating the distributary channels [DCs] and the field channels [FCs]. This will include full control of the operation of field turnouts gates [FTOs] and distributary turnouts [DTOs] in collaboration with the Authority's staff.
2.3 The USER shall abstract water from the field channels for irrigating his crop using syphon tubes and check boards. Under no circumstance shall the USER cut bunds to abstract water from the system.

2.4 The AUTHORITY shall take the responsibility of maintaining the irrigation system from the main canal [MC] up to the lateral canals [LCs] and night storage reservoirs [NSRs].

2.5 The AUTHORITY shall be responsible for the proper maintenance of the Main and Collector drains.

2.6 The AUTHORITY shall be responsible for the proper maintenance of access roads.

2.7 The USER shall be responsible for the proper maintenance of distributary channel[s], field channels and field drains. This shall include desalting, cutting of grass, repairs of broken and/or eroded embankments, repair of DC lining and drop structures and replacement of FTO plates.

2.8 The USER shall be fully responsible for the proper maintenance of field tracks.

2.9 All maintenance activities to be carried out by the USER shall be under the technical guidance of the AUTHORITY.

3. ORGANIZATIONAL ACTIVITIES

3.1 The AUTHORITY shall agree with the decision taken by the USER on the operation and maintenance of the system [DC level] provided they are in conformity with the approved user's guidelines.

3.2 The USER shall make decisions on the operation and maintenance of the system [DC level] as laid down in guidelines on the rules and regulations of the user.

3.3 The AUTHORITY shall communicate to the USER about all operation and maintenance activities about DC level that may affect water delivery to the USER.

3.4 The USER shall communicate to the AUTHORITY about all decisions taken [by the USER] on operation and maintenance activities of the irrigation system.

3.5 When necessary, the AUTHORITY shall mediate all water-related conflicts between the USER and pastoralists [Fulani herdsmen] through the Fulani Association and/or appropriate Authorities.

4. RESOURCE MOBILIZATION

4.1 The AUTHORITY shall in conjunction with the USER undertake a comprehensive crop coverage survey of the DC command area at least once in a season at the appropriate time[s].

4.2 The AUTHORITY has by this agreement authorized the USER to collect Seasonal irrigation water charges from individual members [of the Users' Association] on its behalf for onward payment to the AUTHORITY.
4.3 The USER shall deposit all water charges so collected [at least twice a week] directly to the accounts of the AUTHORITY at .................................. project through the Services Department of the Project.

4.4 The AUTHORITY shall provide to the USER a rebate of 15 percent of the total water charges collected and paid to it by the USER provided 100 percent collection [and payment] of the due water charges is made every cropping season.

4.5 The AUTHORITY shall provide a rebate of 10 percent to the USER on collection [and payment] of not less than 80 percent of the due water charges every cropping season.

4.6 The AUTHORITY shall not pay and rebate to the USER on collection of less than 80 percent of the due water charges in any season.

5. VALIDITY OF AGREEMENT

This agreement is valid for the period ................. unless otherwise terminated by both parties [AUTHORITY and/or USER].

Signed on behalf of the AUTHORITY [HJRBDMA] Signed on behalf of .......... Water Users’ Associations

Date ................. Date .................

Witness ................. Witness .................

Date ................. Date .................

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APPENDIX II

Checklist for information Collection on the Social Organization of the Fadama

1. INTRODUCTION
   A. Area Overview
      * Location: district, village.
      Access to the system.
      Access to support services and markets.
      * Physical information of the surrounding area.
   B. Settlement Pattern of the Surrounding Area
      * History of settlement.
      * Population.
      Milestones in agricultural development (establishment of support services, introduction of new crops, and irrigation facilities, etc.).
      Ethnic composition.
   C. History of the Surrounding Area's irrigation Development
      * Type of Irrigation: groundwater utilization or gravity system.
      * Technologies used.

II. HISTORY OF THE SYSTEM
   A. Original Construction
      * When?
      Who initiated and directed?
      * Amount and source of resources invested: cash, labor, materials.
      * Basis for internal resource mobilization: household, landholding.
External resources.

B. Improvements/Rehabilitation

* Other than routine maintenance, when have major inputs and improvements been made?
* Who initiated? When? What was done?
* Amount and source of resources invested: cash, labor, materials.
* Basis for internal resource mobilization: household, landholding.
* External resources.

C. System Expansion

* How have boundaries of system changed over time?
* Have new settlers (authorized or unauthorized) been allowed to join?
* Have segments of the system been left?

III. DESCRIPTION OF THE SYSTEM

A. The Physical System

1. Hydrology

* Source(s) of water.
* Catchment area.
* Rights to water in source: upstream and downstream systems.
* Seasonal variation of water supply at extraction point.
* Discharge in canal at extraction: maximum and minimum for each crop.
* Flood frequency.
* Drought frequency.
* Water quality: salt, lime, etc.
* Other uses of water: power, fire protection, animals, etc.
* Water constraints to expansion/intensification of irrigation or groundwater utilization.
2. **Canals: Main and Branch**

   - Type of construction, materials, quality, and condition.
   
   Seasonal and long-term changes.
   
   - Distance from source to first fields.
   
   Length of main canal in command area.
   
   Design capacity of main and branch canals.
   
   - Density: including field canals (m/ha).
   
   - Condition of rock and soil along alignment.
   
   Condition (specify in which season).

3. **Structures**

   - Type of construction, materials, quality, and condition.
   
   Seasonal and long-term changes.
   
   - Intake/diversion.
   
   Regulators: gates, fixed.
   
   Cross drains.
   
   Aqueducts, siphons, drop structures.
   
   Measuring devices.
   
   Main turnouts: type, number.
   
   In case of tubewells, other descriptions are to be given like size of the pump, delivery system, etc.

4. **Boundaries of the Irrigated Area**

   - Irrigated area for each crop.
   
   - Changes in system over time: amalgamation, expansion, or loss.
   
   Limitation of expansion for each crop: physical, water rights.
5. **Drainage**
   - In command area.
   - Escapes from **canals**.

6. **Soils**
   Type: head, middle, tail.
   Fertility and suitability for irrigated agriculture.

**IV. OPERATION AND MAINTENANCE**

**A. Activity/Problems**
   - Related to water acquisition: water rights, paucity of supply, damage from floods, etc.
   - Related to water delivery: canal cleaning, landslide repair, **flood** damage, crabs, animals, seepage.
   - Related to water distribution and drainage.
   - Priority tasks in **O&M**: maintenance of diversion and canal or water distribution. In case of pump, describe the maintenance **procedure**.

**B. Water Distribution Tasks (Frequency and Magnitude of Effort)**
   - Method of water distribution for each crop and variation during each crop: rotation (who and how initiated, frequency of turn); continuous flow: contract; turns (head to tail).
   - Distribution during water-short period: rotation among **outlets**, among field neighbors within outlet.
   - Match between water distribution and allocation: method of matching, proportioning weir, timed rotation.
   - Relationship of water distribution to physical infrastructure.
   Who is responsible for water distribution activities?

**C. Routine Maintenance**
   - What work is done.
   - Frequency.
   Purpose: improve performance, preventive.
I. How long does it take?

D. **Emergency Maintenance**

- Reasons.
  - Frequency.
  - How long does it take?
  - Who determines it is an emergency?
  - Who organizes and leads the work?

E. **Extent of Agency Involvement in System**

  What agency is involved?

  - Management input of agency.
  - Agency organization for water delivery and O&M.

V. **INSTITUTIONS AND SOCIAL ENVIRONMENT**

A. **Social Structure**

  - Landholding pattern.
  - Nature of tenancy (criteria: owner, tenant, sharecropper).
    
    Ethnic composition in the command.

  - Villages.

  - Settlement pattern and irrigation labor availability.

  - Power structure (related to land and local government affiliations).
    
    Religion.

  - Kinship pattern.

  - Leadership: formal, informal.

  - Migrants: wherefrom, previous irrigation experience.
Nonagriculture employment.

Seasonal migration for employment.

B. Organization for Irrigation Operation and Maintenance

1. Membership

- Criteria: land, water share, crop, tenancy, official position, contractual, ethnic (exclusions), gender, age, labor, investment input.

Membership in other systems.

- Absentee members

2. Roles and Positions

- For each position include: method of nomination, appointment, tenure, remuneration (cash, in-kind, labor exemption).

- Appointed functionaries.
  - Chairman.
  - Vice-chairman.
  - Secretary.
  - Treasurer, etc.
  - Water supply and/or system damage monitor
  - Crier.
  - External communications.
  - Moderator of meetings.
  - Tool keeper.

Committees: regular and ex-officio.

Informal leaders.

- Relationship of panchayat and political leadership to system.

3. Tiers of Organization

- Federation/unitary.

- Central.

- Regional/distributary.

- Village/farm channel
4. **Meetings**
   - Regular: time, place, who calls.
   - Extra.
   - Purpose: resource mobilization, accounts, maintenance, conflict.
   Attendance: landlords, tenants, women
   Penalty for not attending
   - Leadership: moderator, minute keeper, how selected.
   - **How** are resolutions passed? vote, consensus.
   - Records of meeting.

5. **Conflict and Conflict Management**
   Cause, nature, frequency of conflict.
   Specific to cropping season?
   - Internal or external to the system.
   - Among systems.
   - Non-water issues.
   - To whom is first appeal for conflict resolution made and what is the step-by-step procedure for difficult cases?
   - What is handled within the organization and what is taken outside?
   Police cases.
   Court cases.
   - Rules and sanctions.
   - Records of conflict resolution.

6. **Water Rights at System Level**
   - Sharing with other system.
Permit, rent, prior appropriation, riparian.

Customary rights.

Evidence of conflict among systems.

7. Water Allocation (Water Rights of Members within System)
   Bases for allocation principle: land area, soil, investment, purchased, traded.
   * How does water allocation change with crop, and level of water supply?
   * Outside influence due to assistance.
   * Dominance of one social group.

8. Internal Resource Mobilization
   * Purposes for resource mobilization.
   * Basis: same as water allocation, household.
   * Type of resource: cash, labor, in-kind (remuneration, etc.), animal, bullock cart, local knowledge.
   * Organization to manage.
   * Accounts of resources due and contributed.
     Annual quantity of each type of resource.
   * Sanctions for not contributing.
     Annual amount realized from fines, how collected and used?
   * What is the consequence of not paying fines?
   * Where are funds and in-kind resources held? Is there intermediate (short-term loans) use?
   * Discrimination against contribution: caste, sex, age.
   * What if family does not have a male member?
   * Contractual arrangements for maintenance: method, reason.
9. **External Resources**

   * Purpose.
   * Source: connections, contacts.
   * Who (person) initiated contact with outside agency, incumbent or previous experience in government position?
   * Frequency.
   * Type: cash, food-for-work, cement, gabion wire, technical advice.
   * Equipment: bulldozer, jackhammer.

C. **Organizational Development**

   * Changes over time in: roles, resource mobilization, processes for electing functionaries, etc.
   * Changes in decision-making process.
   * Process of allowing new outlets from the main canal.
   * Terms and conditions of external agency for providing aid and resolving conflict.
   * Changes in relationships with other systems: water sharing when temporary damage in canal, sharing resources for maintenance.

VI. **DESCRIPTION OF THE AGRICULTURAL SYSTEM AND SERVICES**

A. **Agricultural System**

1. **General**

   * Main crops.
   * General condition of crops.
   * Cropping pattern (provide a rough sketch map indicating the crops grown in different locations)
   * Crop calendar.
   * Cropping intensity.
   * Estimated yield.
   * Change in agricultural practices during the past 25 years: new crops, varieties, technology.
• Mechanization versus labor-intensive system.

2. **Production Inputs**

   Use of improved seed.

   • Use of fertilizer.

   Extension services (types, training, production campaign).

   • Price of inputs.

3. **Agricultural Practices**

   • Land preparation methods.

   Use of manure, fertilizer.

   • Broadcasting or transplantation.

   • Yield per crop.

   • Total yield per year.

   • Prices and marketing.
Responsive Management Development in Irrigation Systems
Through Water Charge Collection

Example from Kano River Irrigation System, Kano

Because the agency depends on the collection of water charges from the farmers, there has been a change in its orientation. The change has occurred from an authority-orientated to a farmer-orientated or client-oriented system. Hence, the livelihood of the staff of the system is dependent on the income from the system. This factor forced the agency to change its role to responsive client-oriented management with the sharing of responsibility between the farmers and the agency staff. On the other hand, farmers have to be responsible for maintaining and managing the system within their competence. Water charge collection alone will not help maintain and operate the whole system. So the responsiveness of both the agency and the farmers' group is important. The new policy of the Government of Nigeria has pushed RBDA towards this direction.

In addition, these policy changes have mandated parastatal agencies to achieve financial autonomy in their operations. These new changes have led to a compelling need for the authority to reexamine its basic purpose, objectives, values, structures and mode of operation.

The Kano River Irrigation System of HJRDBA is taken here as an example to understand whether KRIP can economically survive on its own resources. There are several questions to be answered: Does KRIP have resources that can be mobilized? Where do the resources come from? How can KRIP be managed as a viable and sustainable irrigation system?

The potentiality of water charge collection in KRIP indicates the viability of the system. The present cropping intensity in KRIP of 164 percent indicates the possibility of mobilizing over Naira 12 million as water charge collection from KRIP. The 164 percent cropping intensity includes those non-water-chargeable crops like sorghum and maize in the wet season.

The important aspect here is the role to be played by the beneficiary farmers. There has been misunderstanding between the farmers and the agency personnel. There is a general tendency among the farmers to evade paying water charges. On the other hand, there has been a low efficiency in the water charge collection. Hence, there is a need to revamp the management style of KRIP focusing more on internal resource mobilization for the operation and maintenance of the system.

The relationship of water charge collection with the overall management improvement is analyzed from the experiences of the Kano River Irrigation System. This also makes the agency more responsive to the clients—the farmers of the system. Without better irrigation management and improvements in the system of water delivery, the water charge collection rate will be discouraging. A high rate of water charge collection and an assured delivery of water supply to the farmers are the two sides of the same coin. Besides water delivery, there are other factors as well which are within the domain of irrigation systems. It is proposed here to highlight the transition of the Kano River Irrigation System from the subsidized operation and maintenance system to the process of internal resource mobilization through the water charge collection for operation and maintenance. Subsequently, this system has to, through the management change process, match with the objectives of commercialization and privatization. The application of a partial commercialization policy is reviewed from the experience of system management of the Kano River Irrigation System.
I. IMPACT OF WATER CHARGE COLLECTION ON MANAGEMENT

Under the commercialization program, the system maintenance and management depend on the water charge collection. Hence, it has a greater implication on management improvement. It influences the behavior of the agency personnel to be responsive to the farmers’ needs. The farmers are to be cooperative in helping to mobilize internal resources for the operation and maintenance of the system.

Responsiveness to the Farmers’ Need

When the system’s operation and maintenance are subsidized by the federal government, the irrigation agency is more or less responsive to the auditors once a year in relation to bookkeeping. Once the auditor’s report is supportive to the expenditure, the irrigation agency’s job is done. There is hardly any need to interact with the farmers. With the change in the approach of resource mobilization from within the system through water charge collection, the irrigation agency is made responsible for the needs of the farmers. The agency has to work in the interest of the farmers and win their confidence. The water charge collection from the farmers has brought a change in the role of the agency, the perception of the staff and the role to be played by the farmers in an organized way.

To Motivate Farmers to Crop in a Larger Area

The income of the irrigation system is dependent on the water charge collection. In the Kano River Irrigation System, the water charge is collected on the basis of the area under crop coverage. The water charge rate is N.500.00/ha/crop. In the dry season, the water charge is collected for all crops grown within the command area. In the wet season, water charge is collected only for the rice crop. The amount of water charge collection will depend on the area of crop coverage in the command area. The water charge will be collected only in the area where there is crop coverage with irrigation water. If the crop coverage reduces in the command area, the potential water charge collection will also go down. This will result in the improper maintenance of the system, insufficient salary to the staff and poor operation which will be a vicious circle. Hence, the farmers are to be encouraged to have crop coverage in all the command area. The agency officials are to make sure that water is available for the total command area.

Assured Delivery of Water

The assured delivery of water encourages the farmers to enlarge the area by crop coverage. The salary of the agency staff is dependent on the income collected from the water charge collection. It is the responsibility of the agency to make the farmers confident that they will get the required quantity of water when necessary. In order to have an assured supply of water, proper maintenance of the system is a precondition.

Improvement of Land Development

Along with the motivation of the farmers to cultivate and the confidence to have an assured supply of water, there is a need for the appropriate improvement of land which includes the quality of land, proper drainage, no waterlogging and appropriate land development for irrigation. If such conditions are not present within the command area, the water charge collection will go down drastically affecting the sustenance of the system.
Alternative for Low-Cost Maintenance

The cost of maintenance will go up if the structures are destroyed or neglected by the farmers and this will be an increased burden to them. They have to find out ways of reducing the cost by becoming vigilant and not allowing the structure to be damaged by internal or external forces. There is a need to inculcate a sense of belonging of the system among the beneficiary farmers and the farmers should own the system. This is possible through the organization of the water users' group which will make them take the responsibility for maintenance up to a certain level of the system so that the ever-increasing water charge can be reduced.

Communication with the Farmers of KRIP

Farmers as partners are to be recognized. There is a need to have regular communication with the farmers in order to meet the objective of making them aware of KRIP activities. This exercise will help introduce transparency on the types of activities undertaken by KRIP. Such communication will help reinforce the trust and accountability among the farmers and the agency personnel. There is a need to have organized groups of farmers. This will be possible only through the formation of Water Users' Associations. Through WUAs, it becomes easy to communicate to a larger section of the farmers. Further, they would be bound by common bonds of the association.

Decisions to Be Implemented

KRIP is a viable irrigation system. It falls within the scale of economy size. It can stand on its own. It has a reliable source of water which is sufficient for both dry and wet seasons. However, management has to take several hard decisions in order to make this an economically viable system.

In order to introduce the responsive management improvement in KRIP, the following strategy is to be carefully implemented by HJRIBDA

(a) Sharing of responsibility with farmers in maintenance, operation and water charge collection.

(b) Increase the revenue generation in the system by raising the rate of the water charge, improving the water charge collection efficiency, expanding the potentiality of the water charge collection and generating a secondary income.

(c) Reduce the operating cost by means of transferring some of the activities to other agencies and retaining only the necessary number of staff for the management of the system.

(d) Institutionalization of performance incentives by granting collection incentives and points in staff promotion.

Resource mobilization is central to all the KRIP activities. Reform measures to introduce the financial autonomy in the system are to be implemented (Small and Carruthers 1991). According to them, the improvement in performance is remarkably achieved after institutional reorganization to establish financial autonomy of the system. The Kano River Irrigation System is in the process of implementing some of these reform measures, in general, and in the pilot sites of IIIMI-HJRIBDA Action-Research Project, in particular.
Sharing of Responsibility

The IIMI-HJRDA Action-Research Project aims at institutionalization of agency-farmer joint management. It aims at sharing of responsibility between the agency and the farmers. The farmers are organized into Water Users' Associations. The agency alone will not be able to maintain and operate the system and, therefore, partnership with the users is to be institutionalized.

The Kano River Irrigation System has 2 dams, a 19 km main canal, a 47 km lateral canal, a 320 km distributary channel, 1,120 km of field channels, 8 functioning night storage tanks, 1,486 km of drainage and 16,000 units of hydraulic structures (Ben Musa 1992). These infrastructures are to be maintained jointly. During project implementation, it was decided that maintenance of the field channels was the responsibility of the farmers. However, the farmers were not organized to take this responsibility. The distributary channels are not regularly maintained. This has caused inconveniences to the farmers. In some distributaries, farmers have got together to clean canals and to cut the Bahama grass once a year.

The IIMI-HJRDA Action-Research Project attempted to investigate the possibility of institutionalizing the formation of Water Users' Association on the basis of hydrological boundary within the distributary channel (Pradhan 1992). The experimental WUAs in Agolas and Karfi indicate that they can take the responsibility of maintenance within the command area of the distributary canal.

The involvement of farmers' organizations in maintaining the canal resulted in saving of cost and assured delivery of water supply. An example from Agolas IV of KRIP during the 1992 dry season maintenance shows the cost difference between the involvement of the farmers' in O&M and that of the contractors at the present market contract rate. The farmers of Agolas IV organized themselves to desilt and cut the Bahama grass in the distributary canal. They cleaned 2.3 km of the canal by mobilizing 108 farmers. The cost is computed on two bases:

(a) on the basis of labor employment at N.35.00/day, and

(b) on the basis of contract rate at N.4.40/meter.

On the basis of N.35.00/day/person for 108 farmers the cost will be N.3,780.00. On the basis of contract rate employed by KRIP in 1991, the cost at N.4.40/meter for 23 km will be N.10,120.00. This figure shows that when KRIP undertakes the cleaning and desilting on the market contract rate, it would be 268 percent higher than the market labor rate. The farmers, through their organization, will be able to do this even at less cost.

However, the WUAs are to be carefully organized. Time and resources are to be invested in order to create strong, viable and functional Water Users' Associations.

Once such WUAs at distributary canal level are formed, it will be able to take the responsibility of maintenance as well as of operation within the distributary canal level. The agency has to enter into an agreement specifying responsibilities of the agency above the distributary canal and specific responsibilities of the Water Users' Association at distributary level.

It is feasible to share the responsibility between KRIP and the farmers' group. The farmers' organization is to be given responsibility for O&M up to the distributary canal. Above the distributary canal, O&M would be KRIP's responsibility. Proper maintenance of the main canal is equally important for promotion of farmer participation at different levels of the irrigation system.

It is estimated that the 1991 rate of 72 percent of the water charge collection can be the break even point between O&M cost and internal revenue generation. As an exercise to increase the water charge collection, HJRDA management has approved the pilot testing of a program to authorize the Farmers'
Water Users' Associations to collect the water charges on behalf of KRIP and retain 15 percent of the collection in the account of the Water Users' Association.

Efforts to Increase Revenue Generation in this System

One of the features of the Structural Adjustment Program (SAP) in partial commercialization of RBDAs is to make RBDAs self-sufficient in the management and operation of the ongoing irrigation systems. In response to the need to increase revenue generation, RBDAs have introduced several measures some of which are given below:

Raising the Rate of Water Charge

RBDAs including HJRBDA have raised the rate of water charge from N.100.00/acre/crop to N.200.00/acre/crop. This raise of rate of water charge was immediately made applicable to the Kano River Irrigation System. The analysis of the potentiality of further raising of the rate of water charge shows that there is no more scope immediately to raise the water charge in the Kano River Irrigation System. The present rate of increase is quite high. For the next several years, there cannot be any reasonable justification for raising the rate of water charge (Svendsen 1992). The notification of HJRBDA of 7 October, 1992 suggests the revision of the rate of water charge on an equity basis. The private landholding up to 30 acres will be charged only N.200.00/crop. Commercial landholding from 31 acres to 100 acres will be charged at N.300.00/acre/crop. Industrial farm holdings above 100 acres are to pay N.400.00/acre. It seems that there will not be much net gain in the amount of water charge collection because the majority of the landholdings are smaller than 30 acres. In Bangaza, the average landholding is about 4 acres and in Agolas and Kerfi, the average landholdings are smaller than 1 acre.

Improving Water Charge Collection Efficiency

Since there is not much scope in raising the rate of water charge, it is necessary to consider to improve the water charge collection efficiency. It is not enough to say that there is no more supply of funds from the federal government and that, therefore, the systems cannot function. The system is productive and so the system must be able to pay for its operation and maintenance.

The analysis shows that the present water charge collection efficiency is only about 30 percent. There is scope to improve the collection efficiency. Proper assessment of the cropped area, motivating the farmers to pay the water charge, information to the farmers to pay the water charge, procedure to collect water charge at the field level, monitoring of the water charge collection by sector and by zone on a weekly basis, involvement of Water Users’ Association in helping to collect the water charge, group pressure to the individual farmers to pay the water charge and plugging the leakage of the water charge collection during the time of collection would contribute to the collection of a higher percentage of water charge.

The HJRBDA notice of 29 September, 1992 informs the decision of the Board of Directors of HJRBDA that 90 percent of the water charge will be collected for the dry season of 1991-92, for the wet season of 1992 and for the dry season of 1993. It also notifies that where 90 percent of the water charge collection has not been realized, irrigation water will not be released to those blocks. In a way, it attempts to bring group pressure in the collection of the water charge. The Project Manager of KRIP has put this activity as his priority activity in the management of KRIP. One revenue collector is made to be in charge of collecting the water charge in 500 acres.

A note about the 90 percent water charge collection is to be added here. It is not clear whether 90 percent is for the potential water charge collection or for the cropped area. They are two different aspects.
with deep management implications. If the target is for 90 percent of the potential area, the responsibility of KRIP tremendously increases making sure that the farmers' crop in the whole command area. The management of KRIP is to make sure that there is no physical problem in the conveyance, drainage and in the land development so that the cropped area is over 90 percent. If it is 90 percent of the cropped area, it is more a matter of strengthening the mechanism of the water charge collection. The collection effort will be only for survival. This will not influence to bring responsive management in the irrigation system. As a matter of fact, the target should be for 90 percent of the potential area.

It is estimated that 72 percent of the potential water charge collection is the break-even point for the O&M of the system. Hence, it is safe to assume that resources for the O&M of the system can be mobilized from within through the improvement of the management system.

On the other hand, the O&M cost as estimated at N.8.5 million is only 3.20 percent of the value of the crop yield in 1990. The value of yield is estimated at N.265,472,980 (Ben Musa 1992. Production Table of 1990). One has to be cautious about the yield figures and value computation of yields. There has not been consistency of data of yield and crop coverage between 1985 and 1990. However, rice coverage has tremendously increased but wheat cultivation has not picked up as the data suggest. It is estimated that the wheat cultivation in the dry season of 1991-92 is between 6,000 and 7,000 ha whereas the 1990 data show 12,000 ha of wheat cultivation. Yield data need to be improved (Adams 1990). Systematic information collection is very important for management and better decision making.

The yield data show that the water charge to be paid for O&M is not a high cost to the farmers. The water charge rate is within their capacity. Attention is to be given to this aspect in the appropriate procedure for collection.

Expanding the Potentiality of Water Charge Collection

The 1992 dry-season crop survey in three pilot sites shows that the crop coverage is only 73 percent of the potential command area. Physical and institutional reasons are attributed for the shortfall in the crop coverage. The improvement in physical conditions and the institutional arrangement within the command area help increase the collection of the water charge. In order to do so, there is a need to have proper monitoring and evaluation of the physical condition, water flow and delivery of water in the command area and motivating the farmers not to let the field fallow. Increasing the crop coverage even in 20 percent of the command area of KRIP will bring N. 1.4 million more revenue per season. Hence, it is not enough to say that there is a shortage of resources for O&M of the system but one has to explore the possibility of mobilizing resources from within. There is a tremendous unexplored potentiality for resource mobilization in KRIP. This is the new thrust of management brought by partial commercialization. It opens the opportunity to mobilize the dormant resources from within the system.

Generating Secondary Income for the System

The system can look for a number of alternative sources of income. The important one is fishery, if properly managed. The resources from the Tiga Dam are untapped. The resources could be generated from night storage tanks as well. The Tiga Dam alone supplies an average of about 500 kg of fish each day. They are sold in different markets. Middlemen are taking the maximum advantage of the fish catch in the Tiga Dam. The market price of fish per kg is N.35.00. About 182 tons of fish would be harvested from the Tiga Dam alone in a year. The price of the fish caught per year is about N.6.3 million. If 20 percent of this amount is collected for KRIP, it comes to about N.1.2 million. This resource is not yet tapped. Besides, there are 8 night storage tanks which can bring revenue from fishing.
**Reduction of Operation Cost**

One of the objectives of responsive management is to reduce unnecessary expenses in an organization. In doing so, the organization has to retain only those activities which genuinely fall within the activities of the organization. KRIP has several hundred kilometers of rural road to be maintained by KRIP. The rural road serves irrigation purposes as well as the rural marketing and rural mobility. The rural road is also used for other purposes. Such activity is also the responsibility of the local government and maintenance of the rural road should be transferred to the local government. Here, one can decide which portion of the road is to be maintained by KRIP for irrigation purposes and which portion should be transferred to the local government.

The other important area where a substantial cost reduction can take place is the appropriate number of staff employed in the irrigation system. In order to have a better return out of investment in staff, one has to come out with some acceptable ratio between the hectarage and the number of staff. This does not mean to lay off the staff. HJRBDA can transfer staff to several other projects. However, KRIP can afford to have only a reasonable number of staff.

The Annual Report of HJRBDA, 1990, shows that KRIP has 435 staff. Employment of new staff after the introduction of commercialization policy has been stopped.

The ratio of staff in relation to the area (ha) to be served is different in different systems. The ratio is 1:30 in KRIP whereas in Pakistan, it is 1:165, in Punjab, 1:215 in Sind, 1:88 in NWFP and 1:123 in Baluchistan (Bandaragoda and Firdousi 1992). In Malaysia, the ratio is 1:97. The system has an area of 24,000 ha (Valera and Mohd. Desa 1991). Keeping in view the trend in different systems, the management has to make a decision to determine the ratio of staff to the area to be served. Such a decision will help reduce the cost of maintenance of the system.

**Institutionalization of Improved Performance Incentives and Points in Staff Improvement**

The improvement of the system needs to bring change in the assessment of the performance of staff, in the incentive mechanism as well as in the establishment of relations between the contribution of the staff in meeting the objectives of the improvement of management and the promotion of the staff. The contribution of the staff to increase the collection of water charge, promotion of farmer participation in irrigation management and WUA formation should be contributing points toward the promotion of the staff.

The staff who perform the job, toward the management improvement brought by the introduction of partial commercialization of RBDA in Nigeria, should be immediately rewarded.

**Conclusion**

In order to establish economically viable self-sufficient irrigation system management, the authority has to bring change in the relationship between the farmers and the agency to make them partners to share the responsibility of operation, maintenance and resource mobilization. Alternatives to increase revenue generation, expansion of the potentiality of water charge collection and improvement in the water charge collection efficiency are to be investigated and implemented. Such improvements are to be introduced by the authority. It is very important to make a system productive. Alternative sources of revenue generation are to be looked into. The present practice has been to be dependent on the Federal Government subsidy so that there has been negligence in looking for alternative resource mobilization. There are resources which are yet to be mobilized. The client-oriented management system is to be introduced.
Effort is to be exerted in reducing the unnecessary cost and boost the morale of the staff through immediate reward for better performance in their career development and performance. The performance should be judged in line with the changes required in the management of the system.

With the signing of Performance Agreement, the RBDAs shall now operate as a purely commercial enterprise but may be subject to the general regulatory powers of the Federal Government. The supervision of the RBDAs by the government will be changed from ex-ante control of operation to ex-post monitoring of results. The purpose of this, according to the Chairman of TCPC, is to enhance managerial autonomy at the enterprise level and ensure accountability for result. The agreement shall also clarify objectives and reconcile priorities, ex-ante, so that public enterprise managers could be held unambiguously accountable, ex-post, for achieving those objectives, uninhibited by rigid bureaucratic controls and ad hoc intervention by Ministry officials.

Under the agreement, the RBDAs now have the powers to fix their own rates, prices and charges for goods and services; capitalize assets, borrow money; issue debenture stock; and sue or be sued in their corporate names (Niger Basin News, Jan-June, 1992).

The signing of the performance agreement between the RBDA and the Federal Government has given an opportunity to RBDAs to find out ways of improving management for the healthy survival of RBDAs. HJRBDA has to introduce innovations for the survival of the irrigation systems. The analysis of KRIP shows that KRIP is an economically viable and sustainable irrigation systems. However, continuous management improvements have to take place.
APPENDIX IV

Recommendations of the Seminar on "Irrigation Research Priorities for Nigeria"

The seminar highlighted the serious problems facing irrigation development in Nigeria. After a thorough and in-depth discussion of these problems and on research priorities needed to solve them and to develop sustainable irrigation for the country, the seminar unanimously adopted the following recommendations and action programs.

IRRIGATION RESEARCH PRIORITIES

Six major areas which require priority research attention were recommended. These are:

1. Irrigation Performance Assessment
   1.1 Develop usable indicators and a methodology to assess various types of irrigation systems (large, medium and small, etc.).
   1.2 Develop the mechanism for and actually undertake continuous project monitoring and evaluation.
   1.3 Study the irrigation efficiencies and water use efficiencies of the system in all their ramifications.
   1.4 Collect routine data on the irrigation system. Although this is implied in 1.1 to 1.3 above, 1.4 is repeated for emphasis. Some of the routine data to be collected include:
      a) crop area survey data,
      b) groundwater levels,
      c) surface water and groundwater quality data,
      d) salinity and alkalinity,
      e) canal water loss,
      f) soil fertility data, and
      g) climatological, hydrological and hydrogeological data.
   1.5 Study the interrelationship between the design and operation and management of irrigation systems.
   1.6 Carry out rigorous appraisal of project feasibility studies.
   1.7 Study the degree of capacity utilization of the existing schemes.
   1.8 Study the productivity of water and labor in irrigation systems.
   1.9 Investigate the effectiveness of the input and extension delivery systems.
1.10 Develop the procedure for rehabilitation and modernization of irrigation systems.

2. Economic Issues

2.1 Study the comparative cost advantage of small-scale and large-scale irrigation projects.

2.2 Study the impact of the Structural Adjustment Program (SAP) on the performance of the various types (large or small) of irrigation systems.

2.3 Investigate the problems of cost recovery and undertake studies that would lead to the determination of the appropriate water charges in irrigation systems.

2.4 Study the cost-effectiveness of the various irrigation systems and how to increase the productivity of capital.

3. Technological Issues

3.1 Study and develop appropriate and sustainable irrigation technologies for Nigeria.

3.2 Develop local raw materials for use in irrigation and drainage.

3.3 Develop alternative water lifting devices for fadama irrigation.

3.4 Design and fabricate hydrometric and soil and water measuring instruments.

3.5 Develop alternative sources of energy for pumping water, alternative to the conventional fossil fuel.

3.6 Study and improve water application methods.

3.7 Study crop water requirement and irrigation scheduling to include:

a) Evaluation of ET models in different ecological zones of Nigeria, and

b) Crop yield response to irrigation water management.

3.8 Study the control of salinity and groundwater problems.

3.9 Investigate the reduction of irrigation water losses.

3.10 Study the management of the maintenance of irrigation systems.

3.11 Investigate the Integrated management of water resources on catchment bases.

3.12 Undertake the computer simulation of irrigation systems.

3.13 Undertake studies to determine the best methods of recharge of various aquifers particularly for the National Fadama Development Project (NFDP).
4. Institutional Framework for Irrigation Management

4.1 Investigate the institutional framework and legal basis for effective farmer participation in irrigation development and management.

4.2 Study the establishment of farmer organizations such as Water Users' Associations, Fadama Users' Association, Farmers Cooperatives, etc.

4.3 Investigate land property relationship issues, e.g., ownership of land in public irrigation systems; and impact of land subdivision on irrigation management.

4.4 Study the alternative approaches to involve the private sector in irrigation development.

5. Environmental Issues

5.1 Undertake environmental impact assessment of the irrigation systems in relation to hazards of health, salinity, alkalinity, rising water table, etc.

5.2 Study the impact of dams and reservoirs on the environment.

5.3 Investigate downstream compensation releases, i.e., how much water is to be released downstream of dams to enhance downstream environmental quality.

5.4 Undertake groundwater and surface water studies to ascertain the sustainability of the washbores and tubewells in the National Fadama Development Project.

6. Sociological Issues

6.1 Studies to overcome the sociological problems that make it difficult to obtain accurate and up-to-date data on irrigation development and management.

6.2 Studies of the sociocultural attitude of the beneficiaries and potential beneficiaries of irrigation projects.

6.3 Studies of issues such as displacement, resettlement and adjustment

6.4 Women in irrigation

6.5 Studies of the sociology and methodology of introducing irrigation into new regions that have not been familiar with irrigation.

6.6 Studies of the methods of reducing conflicts between crop farmers and pastoralists and those of reintegrating the activities of crop farmers and pastoralists for mutual benefit.
FRAMEWORK FOR IRRIGATION RESEARCH AND PILOT PROJECT

1. The seminar adopted and recommended a proposal by Nwa as a framework for irrigation research in Nigeria.

2. The seminar recommended that a pilot project using Anambra-Imo and Hadejia-Jama'are catchments be instituted to test the framework recommended above.

IRRIGATION RESEARCH NETWORK

1. The seminar recommended that an "Irrigation Research Network be set up for the purpose of disseminating research results and other irrigation information among its members that would be both institutional and individual."
Recommendations of the National Seminar on
"Participatory Irrigation Management in Nigeria"

- The government should intensify efforts to involve local communities and farmers in the study and design stage of the construction stage, so as to enhance their participation in operation and management of irrigation systems.
- The Department of Irrigation and Drainage should make an inventory of efforts towards achieving active participation of beneficiaries in irrigation development programs.
- The Federal Ministry of Water Resources and Rural Development should establish a WUA unit to monitor participatory irrigation management efforts in the country.
- The government should soon have an irrigation policy in place, providing for legal and institutional support for WUAs.
- Effective training on participatory irrigation management should be provided to agency staff.

The recommendations of the seminar were jointly agreed to by NWRI and IIIMI and were presented to the Ministry of Water Resources and Rural Development.