



IMPLEMENTED PROCESSES OF THE SMALL IRRIGATION DEVELOPMENT PROGRAMME IN BURKINA FASO

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ABSTRACT

The total irrigated area in Burkina faso is about 233,000 hectares, some over 70% of which are in the West South West and East Centre regions and about 4% in the Sahel region. The country is tropical and monsoonal with annual rainfall varying from 200 mm to 1000 mm depending on localities. Till now the principle irrigated crop has been paddy and irrigation has been needed in the wet season to provide water during dry spells.

Despite the good macroeconomic performance obtained through the adoption and the implementation of stabilizing programmes and structural reforms in order to improve the management of public finance and to liberalize the economy sector, living conditions of the population have not been significantly improved and Burkina faso is still facing the challenge of poverty with over 46% of the population living below the poverty line.

As population and food requirements are increasing, on the basis of the guidelines of the Poverty reduction Strategic Plan (PRSP), the government decided to significantly promote the development of the small-scale village irrigation as part of the strategic policy actions of the Rural Development Strategy. In this context, a small-scale village irrigation development pilot program which aims primarily at achieving self-sufficiency in food has been implemented.

Relying on farmer's participatory, on the whole, the small-scale irrigation has yielded benefits. They include use of irrigation in the dry season as well as in the wet season to provide water during dry spells for food crops (maize and beans) production, reduced immigration of young rural population during the dry season and increased agricultural activities. Yields per hectare have increased in areas where dependable water is available. There have been increases in cropping intensities, which have increased agricultural activities and stimulated a rise in local business activity. Finally the implementation of the small-scale irrigation pilot actions helped to attain self-sufficiency in cereals in Burkina faso for two years. While substantial benefits have been obtained from the small – scales village irrigation development pilot program,

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much remains to be realized: in most regions the benefits have not yet reached all the part of the population that lives under the threshold of extreme poverty estimated at 27.8%. Constraints include:

- Lack of water availability and formal land tenure system, which has delayed the motivation and restricted irrigation activities;
- Difficulties in implementing a cropping calendar that optimize water use, largely due to delays and uncertainties in the supply of agricultural inputs, and lack of commercialization possibilities and structures
- Lack of training of irrigation operational personnel and producers on irrigated areas choosing;
- Lack of communication between farmers and irrigation operational personnel and organization of producers.

Experience shows that farmer's participation is a key factor in the successful development of irrigation. However, methods, procedures and policies to motivate and train farmers for effective participation are still in an early phase of development. Pilot actions and measures to test appropriate concepts and methods are being conducted.

Early results point to the importance of strong government support for participatory approaches, training at all level, new attitudes of irrigation personnel, new procedures and methods to assist farmers in funding, commercialization of the produced cash crops and capacity building in promoting of the local industries and traders to respond to farmer's needs.

Key words: small-scale irrigation scheme, cropping calendar, farmers' participatory, self-sufficiency in food, rural development strategy, multi criteria analysis and responsabilisation.

I. BACKGROUND INFORMATION

1.1. CONCEPT OF THE SMALL-SCALE IRRIGATION DEVELOPMENT

The most commonly used irrigation method is surface irrigation. The schemes obtain water from rivers or reservoirs and use gravity-fed canal systems. Where gravity flow is not possible, water is lifted by pumps. Overhead irrigation (sprinkler and drip irrigation) is used for large-scale sugarcane production.

According to scheme size, degree of water control, level of technology or type of management, Africa's irrigation types and practices can be classified in various ways.

If the scheme size is taken as the basis for classification, four main categories can be distinguished:

- very large-scale schemes: typically over 10.000 ha with full water control and under government management. Examples are the gravity schemes in the large river basins in Sudan (Gezira), Morocco (Gharb) and Egypt;
- large-scale schemes: typically 1.000 to 10.000 ha with full water control. Generally under government or commercial management, the latter usually less

than 5.000 ha. Examples are found in Kenya (bura; Mwea), Tanzania (Mabarali), Somala (Shebelli);

- medium-scale schemes: typically 100 to 1.000 ha with full or partial water control. Government managed, government assisted cooperatives, or commercial estates;
- small-scale schemes: typically 1 to 100 ha, controlled by farmers' groups, or single farmers.

If the level of technology or the type of management is taken as the basis for classification, the terms "formal" and "traditional" (informal) irrigation could be used. Formal irrigation schemes are usually developed and managed by a government institution on behalf of the smallholders or labourers. Formal irrigation projects are typically medium, large or very large-scale developments. In contrast, traditional irrigation is usually small –scale. It refers primarily to schemes which are under local responsibility, controlled and operated by the community in response to their felt needs. The main traditional irrigation developments include the following:

- small –scale developments using manual or animal power or small pumps to obtain water from dug wells or ponds;
- small temporary river diversions or development of swamps;
- water spreading or harvesting: simple bundings collecting runoff water or flash floods discharging onto flat land.

Small- scale developments often have only partial water control and use traditional methods of water application and local materials. The works may be temporary and may need to be rebuilt annually. In some cases, natural flooding, if it implies some form of control of water, is grouped under the heading of traditional irrigation.

According to government policies on scheme operation and maintenance, irrigation systems varied widely from country to country. In Thailand, government efforts have transformed almost all the irrigation systems into government scheme (constructed and management by the government) which are usually large and medium scale projects built for increasing rice production to stabilize the domestic price of paddy and to enable this country to maintain its rice export position and people's scheme (constructed and managed by farmer with the assistance of the government) which are mostly small-scale and are rehabilitated or improved by the government to assist small farmers.

In Philippines, according to ownership, irrigation systems are classified into national, communal or private. National irrigation systems are owned, constructed and managed by the government. Communal irrigation systems are owned and managed by farmer's irrigation associations. Private systems are those constructed and managed by an individual to irrigate his land and sometimes that of a few neighbours. This kind of irrigation systems may be classified into small-scale scheme.

Irrigation systems in Indonesia may be classified into four general categories: technical, semi-technical, simple and village. The first three are constructed and managed by the government, while the fourth (village irrigation) is constructed and managed by farmer's groups. Simple are those that don't exceed 2,000 hectares selected by the

government according to standard criteria generally without an economic feasibility study. Designs are simple so they may be easily constructed using labour intensive methods. Technical and semi-technical systems are larger systems subjected to more rigorous feasibility studies and technical requirements. In all the systems constructed by the government the general policy is to construct only the main system and leave the farm level system as responsibility of the farmers.

Compared to the other three countries, small-scale irrigation development scheme in the new Rural Development Strategy in Burkina Faso has the smallest irrigated areas: typically about 0.1 to 20 hectares, controlled by farmers' groups, or single farmers, with only partial water control and use traditional methods of water application, new cropping techniques, and improved technologies and local materials. The works may be temporary and may need to be rebuilt annually. Examples are: Kenya, Zimbabwe, Tanzania, Madagascar for simple river diversions, Nigeria (fadama) for shallow groundwater, and Kenya, Tanzania for pumping from lakes. At present, the small-scale irrigation development scheme includes irrigated areas, which are over 50 hectares constructed with technical and economic feasibility studies.

1.2. FARMER'S PARTICIPATION APPROACH

1.2.1. Multi criteria analysis for determining the strategy

In order to take into account the diverse flaws, notably those related to passed experiences in the implementation of similar programmes, the execution of the pilot actions to test appropriate concepts and methods for farmer's participation relied on responsabilization of them and the reorganization of agricultural regions into three appropriate production areas.

The responsabilization of the producers include use, increase and creation of conditions favourable to the building of irrigation farmers' autonomy groups or agencies, which are able to respond to their needs, increase the responsibility of populations in the infrastructures management, develop economic market and improve women's economic status in rural area at farm level. The strategic main criteria, which are needed relied on leadership of heads of farmer's groups, their capacity for working together, the group's capacity to resolve internal conflict, the motivation of all the members and their creativity and dynamism.

The reorganization of agricultural regions into three appropriate produced areas relates to their classification into three regions according to specific characters relates to their physical potentialities (water and irrigated areas availability), increase of human resources (organisational and technical capacities of farmer's group or single farmers), Yields per hectare, the increase in cropping intensities and irrigated areas. This classification aims primarily at improving, conjointly with farmer's groups or single farmers, appropriate cropping and production systems and cropping calendar for optimizing water use and increasing the cropping intensity of the systems. The choose of crops is done together by farmers and government regional structures, which are charged to improve irrigation at farm level.

1.2.2. Implemented actions and measures

1.2.2.1. Identification and choice of the sites of production

For each proposed irrigation site, this process has taken three months including two weeks reserved for approval by the administration. The identification and choice of the sites relied on possibilities of precision of the physical and socio-economic framework of the site development, the elaboration of a site development plan and the working out of the technical basic data which can be used for the elaboration of the detailed development draft project.

For the final choice, in all the irrigation sites, one of the most important criteria used conjointly by farmers and irrigation operational personnel concerned the motivation of the beneficiaries groups in promoting the development of farmer organisations and co-operative structures responsible for the irrigated areas exploitation and engaged for the introduction and popularization of new cropping systems and techniques and approaches in order to increase their fully access to bank funding and supplies in inputs. In addition, farmers fully implication in appropriation of the realised actions and measures to allow the development of small-scale irrigation scheme is higher appreciate. Usually, employed methods for identification and choice of each proposed irrigation site relies on participatory approaches such as semi-structured interview and accelerated researches methods for participation.

1.2.2.2. Establishing of development scheme

The established development scheme has taken into account the findings of the particular studies formerly undertaken (topography, pedology, socio-economy, etc.). Because of its cost, in the whole, the established development scheme is implemented only for the irrigation sites, which are over 20 hectares and includes the presentation, description, calculation of the ideal dimensions, the execution method and the cost estimates of the irrigation works and of other needed infrastructures (social, communications) as well as the corresponding works. It also includes the land tenure system management and the description of the agricultural development actions, in terms of optimum choice of speculation and of organization, of maintenance actions and of needed means to this effect, as well as the supportive measures at the social and environmental level.

According to the conceivable development options, the development scheme is presented in a certain number of alternatives. For each of the alternatives, the phases of the execution is described in an argued manner and the costs and advantages is assessed at the economic, financial, social and environmental levels. The cost estimate is related to all the investments (hydro-agricultural and supportive infrastructures) and all the operation and production expenses. This kind of irrigation sites are constructed by the government the general policy is to construct only the main system and leave the farm level system as responsibility of the farmers.

Irrigation sites, which are less large than 20 hectares are constructed and managed by farmer's groups or individual farmers without a feasibility study. In some cases, those that exceed 10 hectares are constructed with simple designs and managed by the government.

1.2.2.3. Information, sensibilisation and organisation of producers

Because of the climatic hazards particularly in the East, North and Sahel regions and the repeated droughts over the latest decades in Burkina Faso, it is clear that the actions aiming at monitoring water through irrigation are still to play an essential role in the development of agricultural production and the strengthening of food security. All of information, sensibilisation of producers actions aimed at showing that the small-scale irrigation development is today an important alternative to solving the hunger and poverty issues in our country.

The actions which aimed at achieving farmers' groups and organisations building relies on the Law n° 014/96/ADP of 26th May 1996 relating to agrarian and land re-organisation. For their implementation, the following ministries which act through their decentralized structures and specialized organisations and institutions are concerned:

- the Ministry of Agriculture, Hydraulics and Fish Stock (MAHRH) which supervises the essential part of the activities relating to plant fish production,
- the Ministry of Animal Resources (MRA) which supervises the activities related to animal production
- the Ministry of Environment and Life Framework which covers all the activities related to environmental, forest and fauna issues
- the Ministry of Secondary, Higher Education and Scientific Research (MESSRS) in charge of agronomic and environmental research.

These ministries are represented in the country by regional and provincial directorates.

In order to fulfil their mission, the ministries rely on specialized organizations, namely:

- the National Institute of Environment and Agricultural Researches (INERA) in charge of agronomic research, including breeding
- the Water and Rural Equipment Fund (FEER), a public establishment oriented towards the management and coordination of the funds destined to development activities of land and water resources and equipment of rural world ;
- the Agricultural and Commercial Bank of Burkina (BACB) and the Union of Poplar's Banks of Burkina (URCP-B), which are limited companies in charge of granting agricultural credits,
- the National Office for Soils (BUNASOLS) in charge of soil analysis,
- the National Council for Environment Management (CONAGESE) in charge of the management of environment,
- the Professional Agricultural Organizations (OPA) for the organization and operation the rural environment,
- the Decentralized Financial Systems (SFD) that are the savings and credit institutions, etc.;

These different organizations and administrative services have enough qualifications, great experience as well as acknowledged and valued competence. They have implemented diverse approaches relating to village lands, water resources sustainable

management, improvement of the women's economic status in rural area, participation responsabilisation of beneficiary populations in the infrastructures management and the approach of local development at the farm level, which are undertaken in order to underscore the strengths and weaknesses of anterior experiences.

1.2.2.3. Definition of expected outcomes per year

The main results aimed at by the programme are:

- an increase in the maize and beans production by 3 400 tonnes per year
- modernization of agriculture through the adoption of simple, appropriate and low cost technologies,
- popularization of the research findings

The prevision of number and areas of developed irrigation sites relies on results of the selection of farmer's micro-projects and previous irrigation sites of production of each region.

1.2.2.4. Farmers and irrigation operational personnel training

Since several years, Burkina Faso's agriculture is subjected to more and more frequent and severe climatic hazards (difficult starting of rains, bad distribution in time and space, drought pockets, floods, rains early stop, ...). Face to this situation, water and irrigation techniques control reveals an essential condition to securing and diversification of agricultural production. From this diagnostic, it appeared opportune to implement, at the local and national level, strategic training programmes allowing to success. In this way, training programmes on soil water relationships, water requirements, water allocation and scheduling and maintenance procedures, irrigation sites identification and choice, micro-finance management, foot and motor pumps maintenance and reparation and soil's fertility management. Journeys of demonstrations of obtained results, commented visits and travel's studies are revealed necessary in some cases to increase farmer's technical and organisational capacities building.

1.2.2.5. Small-scale irrigation scheme funding

Irrigation development in Burkina Faso aims primarily at achieving food self sufficiency. To reach this objective, namely through the small-scale village irrigation development, the improvement of the women's economic status and the development of market economy in rural area, financing actions of irrigation construction are arranged through a mix of foreign loans and domestic funds. The implementation is undertaken together by the small-scale village irrigation development programme with its regional coordinating committees, the Agricultural and Commercial Bank of Burkina (BACB) and the Union of Poplar's Banks of Burkina (URCP-B), which are limited companies in charge of granting agricultural credits. NGOs and other government agencies with the participation of beneficiary populations provide assistance through coordinating committees.

All these funding institutions have been established at both national and local levels for the purpose of preparing production plans and targets and coordinating the supply of irrigation water, credit fertilizer, seeds, agro-chemicals and agricultural extension services. Through the elaboration and submission of their micro-projects to the required funding institutions, farms participate in the planning and implementing of irrigation projects.

1.2.2.6. Realisation of works relating to the sites

For the small – scale irrigation sites which are over 20 hectares, the execution of the works begun with the approval of the feasibility studies reports and the choice of the companies.

Monitoring of works is realized by a research consultancy recruited to this effect and different from the one conducting the execution studies. The works are realized in accordance with the companies' consultation file.

For the others, this phase relies on construction of simple bundings collecting runoff water or flash floods discharging into flat land by farmer's groups or individual farmers under the technical supervision of agricultural extension operational personnel. On the whole, it begins with the provision of agricultural inputs (credit fertilizer, seeds, agro-chemicals and irrigation materials).

1.2.2.7. Development and farmers' technical supervision in the sites

This phase includes:

- distribution of plots of land
- setting up of a producers organization
- producers training,
- exploitation of plots of land by producers,
- technical supervision of the producers during the production campaign.

II BENEFITS OF SMALL – SCALE IRRIGATION DEVELOPMENT PILOT ACTIONS

Through the small-scale village irrigation pilot actions, the main objectives relate to achieving food self sufficiency. After the implementation phase, many benefits have been obtained and additional activities have generated. They include:

- use of irrigation in the dry season as well as in the wet season to provide water during dry spells for food crops (maize and beans) production and increase of yields per hectare in areas where dependable water is available. Before implementing of small-scale irrigation pilot actions the maize and beans lands were productive only during the wet season, averaging only 1.0 tons to 1.5 tons per hectare in one year for maize and 0.6 tons to 0.8 tons per hectare in one year for beans. With the

introduction of dependable small-scale irrigation water supplies, the risks of agricultural production have been considerably reduced and farmers, with help of funding institutions, began to invest in fertilizers, high yielding seeds, agrochemicals and improved cultivation practices. Yields increased from 3.5 tons to 7.0 tons per hectare twice a year, especially in the systems served by storage reservoirs for maize and 0.9 tons to 1.5 tons per hectares twice a year for beans;

- reduced immigration of young rural population during the dry season through the increase of the agricultural activities. About over 0.4% young rural peoples which were previously immigrants, have been participated to the promotion of dry season production activities, namely through the adoption of simple, appropriate and low cost technologies for implementing of small-scale irrigation development activities;
- increase in cropping intensities especially in the systems served by storage reservoirs;
- stimulation of a rise in local business activity. Through the works, development and transformation and commercialisation phases, the implementation of small-scales irrigation actions which have not yet reached a stage of full maturity, and much remains to be achieved, their beneficial impact, on the whole, has yielded increased employment and business activity in the rural areas;
- increase in providing services to farmers. The high agricultural activity generated increased services to the farmers. Banks providing credit to the farmers expanded their operations. Both government and private agencies, dealing with fertilizers, agrochemicals and high yielding seeds had to handle more business and employ more people.
- additional incomes for many farmers through duck raising near irrigation canals and the commercialisation of production in the dry season;
- contribution to the self-sufficiency in cereals. The increased maize production, the principal staple, made Burkina faso self-sufficient in cereals or reduced the impacts of lack of food production during the drought and other risks of agricultural production, despite the yearly increases in population.

While substantial benefits have been obtained from the small – scales village irrigation development pilot program, much remains to be realized: in most regions the benefits have not yet reached all the part of the population that lives under the threshold of extreme poverty estimated at 27.8%.

Constraints include:

- Lack of water availability and formal land tenure system, which has delayed the motivation and restricted irrigation activities;
- Difficulties in implementing a cropping calendar that optimize water use, largely due to delays and uncertainties in the supply of agricultural inputs, and poor or lack of shops for the manufacture of small farm machinery and activities in the storage, milling, transportation and marketing of cereals;
- Lack of training of irrigation operational personnel and producers on irrigated areas choosing;

- Lack of communication between farmers and irrigation operational personnel and organization of producers.

III. EXPERIENCES GAINED

The Burkinabè economy rests mainly on the sectors of agriculture and rearing which provide in average 40%(25% agriculture, 12% rearing and 3% forestry, fishing) of the Gross Domestic Product and ensure 80% of the overall exports by themselves. The economically working part of the population is employed at 86% in agriculture and rearing, 5.8% in agricultural activities, 4% in industry and urban handicraft and 4.2% in services. Despite important economic progress, the rural population remains extremely poor. The proportion of poor represents 45.3% of the total population. The part of the population that lives under the threshold of extreme poverty is estimated at 27.8%. Irrigation practice being relatively recent in Burkina Faso, the irrigation systems have begun to develop but from 1960s. The total developed areas, all kinds merged, are estimated at 24,161ha.

The urge to improve the village small-scale irrigation development process yielded noticeable benefits which permitted the agricultural sector to fully play continuously its role of driving force of the economy. But more often there were obvious constraints to better small - scale irrigation performance, which may be broadly grouped into:

- Constraints in planning and construction of irrigation systems. They include difficulties in promoting the development of farmer organisations and co-operative structures responsible for the irrigated areas exploitation, introduction and popularization of new cropping systems and techniques and access to bank funding, supply in inputs and the relatively high cost of irrigated areas developments
- Constraints in improving performance of existing irrigation systems, which are related to degradation of natural resources namely the lowering of soil fertility, problems of selling of products on local and external markets, ownership security and socio-cultural heaviness tending to marginalize the young peoples, particularly women in the rural society and the level of farmers' instruction compared to the management of infrastructures, the management of water, the functioning of the co-operative.

From the assets found in small-scale irrigation with the pilot tests which have produced significant results these last years, improvement of performance of existing systems is considered judicious since many irrigation systems are performing well below their potential. In more often cases, it consists to increase cropping intensity in irrigated areas. However, limiting this measure to this activity only is unlikely to obtain a noticeable impact. It appeared opportune to define, at national level, institutional policies and management practices allowing to exploiting carefully the water resources.

3.1. ROLE OF GOVERNMENT

Irrigation development in Burkina faso aims primarily at achieving food self sufficiency. Initially there was a preference for large projects because of greater visibility, perceived economies of scale, and expected greater impact on production and

overall benefits. Lately, however, there has been a shift in programmes to small scale projects in order to use irrigation in the dry season as well as in the wet season to provide water during dry spells for food and cash crops, as these latter require less funding and can generate benefits in a shorter time.

Through its coordinating committees, government agencies provide with the participation of beneficiary populations financing assistance in construction, supply agricultural inputs and agricultural extension. The implementation is undertaken together by the small-scale village irrigation development programme with its regional coordinating committees, the Agricultural and Commercial Bank of Burkina (BACB) and the Union of Poplar's Banks of Burkina (URCP-B), which are limited companies in charge of granting agricultural credits, NGOs and other government agencies. More often, government irrigation agencies have programmes to organize water users groups by turnouts to enable farmers to carry out their responsibilities at the farmer level. But in more cases these programmes have not yielded benefits.

3.2. FARMERS' PARTICIPATION

Because it is a key factor in the successful development irrigation, during planning and construction, participation of the farmers is required in location of canals and structures or construction of simple bundings collecting runoff water or flash floods discharging into flat land under the supervision of agricultural extension. For each irrigated sites, implemented actions to obtain participation of the water users furthers is usually included their choice according to their requests of capability building of their irrigation associations. Consequently, their increased participation has limited wastage of water at the farm level, facilitated equitable water distribution, mobilization of labour or constitution of funds for the credit's counterparts or the maintenance of canals and pumps that cannot be undertaken by the government due to lack of funds, agricultural practise, agreed irrigation schedules, and a feedback of field problems to the agricultural extension agencies operating the system.

Where successful methods, practices and actions to maximize farmers' participation in information, sensibilisation, planning, construction and operation and maintenance of irrigation systems have not been implemented, motivating of farmers is delayed and training for their effective participation in irrigation development and management poses legitimacy problems to the irrigation agricultural extension agencies, which do not understand or consent the idea and concept of farmers' participation.

Improvement of farmers' participation does not need bureaucracy. It requires pluridisciplinary unrest working with farmers.

3.3. SMALL-SCALE IRRIGATION SCHEME FUNDING

The funding institutions of **small-scale irrigation scheme** are Kuwait Fund for Arab Economic Development and the government of Burkina Faso. As the majors irrigation projects which are funded by loans from foreign financing institutions and local counterpart funds, the main problem registered relate to lack of domestic funds for constructing or rehabilitation irrigation systems. The counterpart funds are voted only for the personnel expenses.

In addition, in more irrigation sites which are less than 20 hectares operated by farmers' groups, the lack of funds and resources for suitable operation and maintenance of the irrigation systems poses a basic constraint to better irrigation performance, because of its combination with other problems such as the poor mobilizing contribution in cash and labour from association members, their low capacity to manage the system effectively for equitable water distribution, conflict resolution and system maintenance. In those which are over 20 hectares, generally, this lack is combined namely to the low paying capacity of farmers due to the combination of the interference with water distribution by other farmers, poor maintenance and general deterioration of facilities, crop damage and low price of paddy compared to production costs, which discourage farmers' efforts to attain higher yields per hectare. The government has instituted operation and maintenance fees, but the farmers do not adhere to the schedule.

3.4. CROPPING CALENDAR

The reorganization of agricultural regions into three appropriate produced areas relates to their classification into three regions according to specific characters aims primarily at improving, conjointly with farmer's groups or single farmers, appropriate cropping and production systems and cropping calendar for optimizing water use and increasing the cropping intensity of these systems, through a prepared cropping calendar. The choice of crops is done together by farmers and government regional structures, which are charged to improve irrigation at farm level.

The cropping calendar is communicated to all water users who are informed that water releases will be in accordance with the calendar. In more irrigation sites with more over 20 hectares, farmers do not adhere to the schedules due to delays in acquisition of credit, seeds and fertilize, or to the lack of mobilization of labour or constitution of funds for the credit's counterparts or the maintenance of canals and pumps that cannot be undertaken by the government due to lack of funds. The delays in the agricultural inputs stem from the support agencies that make them available. Because of their higher cost, in more cases, feedbacks of selling problems to the farmers have not made. But where successful delays in cultivation and planting have been registered, the adoption of cropping calendar increased cropping intensity of the systems.

3.5. TRAINING

The urge to improve the village small-scale irrigation development process encouraged the establishment of consultancy agencies for the training of the farmers. But because of the lack of appropriate capacity building programme, poor incentives and appropriate training for irrigation systems operation and maintenance personnel is perceivable. The training programmes focused on soil and water relationships, water requirements, water allocation and scheduling and maintenance procedures, but there is a very need in trainings which are able to resolve institutional problems, such as successful methods and approaches for farmers' participation identification and implementing.

3.6. WATER MANAGEMENT

During the implementing phase of all the actions and measures to allow water management improvement in small-scale irrigation development scheme, many approaches which tend to organize farmers in each turnout more specifically with a view to facilitating the conflict resolving process and the coordination between the management of the main system and the farm level system have been considered. But in more cases, farmers do not adhere to these and perceived these programmes as serving the interest of the local authorities rather than theirs.

IV. RECOMMENDATIONS

In small-scale irrigation systems constructed and maintained by the government through its regional coordinating committees, efforts must be focussed on increase of irrigation fees collecting by framers themselves. In Burkina Faso, experience shows that governments are unable to allocate an adequate amount to cover the recurrent cost of the systems. In more cases, enforcement through group pressure and social sanctions by members of well organized irrigation associations is more effective than legal action by the government. Experience indicate too that collecting of established fees in order to pay irrigation systems' construction and maintenance should take into account the paying capacity of farmers. In addition, where farmers have sufficient paying capacity they often prefer to pay irrigation fees instead of contributing labour and materials directly.

Obtained experiences through the implementing of pilot actions and measures to test approaches for increasing farmers' participation showed that it should begin in all the stage of identification and choice of sites, planning processes and construction and development phases. In more cases, the use of recognized and catalysing farmers-water users and agricultural extension operational personnel should be indicate. In addition, it would be recommendable to have interdisciplinary groups, consisting of members skilled in engineering, agriculture management, sociology, economics and specialist of producers training and capacity building to assist the pilot project in planning interventions, analysing resultants, and designing improvements.

It is essential that the capacity building in the agricultural extension services charged to assist farmers should be interdisciplinary and should base on a learning process approach.