FORMULATION PROCESS OF COMMUNITY DEVELOPMENT PLAN IN SEMI-ARID AREA

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ABSTRACT

This paper presents agricultural and rural development policy of the Government of Morocco in the arid region located at the southeast of the Atlas Mountains. The Japan International Cooperation Agency (JICA) has completed the Master plan study for irrigation and community development plan in the Tafilalet region, and the author, study team presents lessons of policy-makers how they have been coordinating rural development schemes in the region.

The region severely lacks rainfall, with only 50 to 200 mm per annum and agricultural activities are fully dependent on torrential water and groundwater through subsurface tunnel structures, which are called "the khettara" in Morocco. A recent inventory study indicates that the productive khettara has reduced to about 190 khettaras compared to about 570 khettaras in 1970s because of decrease of water discharge due to consecutive drought especially since 1997. Decrease of available water has accelerated desertification and depopulation in the region. Since the region has left behind development among several regions in Morocco, improvement of farm productivity is essential to secure living conditions in the rural area, especially for the communities scattered in the region.

In formulating regional development plan, the Government puts emphasis on community development through "capacity building" of beneficiaries. Experience, knowledge will be a strong base for future development. Interdependence system has been established on the basis of mutual reliance between the Government and communities. 1) Faithful response to beneficiaries' needs and 2) equal opportunity to access to the governmental support program, these policy directs farmer's motivation to self-reliance on irrigation management, consequently it mitigates devastation of social system and harnesses the solidarity of rural communities.

This paper presents of the Government of Morocco agricultural and rural development policy in the arid region located at the southeast of the Atlas Mountains. The Japan International Cooperation Agency (JICA) has completed the Master plan study in the Tafilalet region under the technical cooperation program, and the author, study team presents lessons of policy-makers on how they have been coordinating rural

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development schemes in arid region. On the regional level, there are 40 Provincial Agricultural Directrates (DPAs) and 9 Regional authorities of agricultural development (ORMVAs) under the Ministry of Agriculture, Rural Development and Sea Fisheries. The ORMVAs are called upon to promote and implement development schemes for the improvement of agricultural productivity, supporting service for farmers. The ORMVA/TF (Tafilalet) has its service area located in the Tafilalet region. The study area (Tafilalet region) is indicated in Figure 1.

1. INTRODUCTION

In arid regions, water is most essential factor influencing small-holder farming systems. The study area, Tafilalet region is located southeast of Atlas Mountains and has annual rainfall of 50 to 200 mm. Comparing to surface water use such as rainwater and perennial river flow in the west regions of the Atlas Mountains, torrential flow and subsurface water are solely available for irrigation and potable water use in the region. Subsurface water is utilized by pumpage or subsurface tunnel structure, which is called the "khettara", widely recognized as a qanat, karez and foggara in East Asia, Middle East and North Africa. Typical section of the khettara system is illustrated in Figure 2 The farmers have been maintaining water right for several hundreds years and established firm operation and maintenance system of the khettara, however it became difficult to maintain the system as well as the rural community life as such due to water shortage and depopulation in the region.

A khettara community has been established based on individual water user group. Recent inventory study by the JICA study team indicates that there are about 410 khettaras with total number of the 241 khettara villages, 17,100 households and 129,500 population in the study area. The ORMVA/TF has been implementing several support programs for the community development considering great account of giving an equal opportunity to access to the development scheme by the government, i.e., khettara rehabilitation, flood irrigation and communal pump station construction in the irrigation sector.

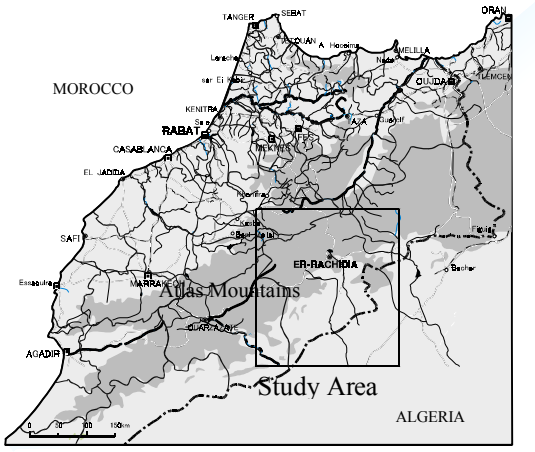

Figure 1. Location of the study area

2. HISTORY OF ACCESS TO WATER RESOURCES

There exist several water resources of surface and subsurface water origin. Surface water is utilized through dams and diversion weirs, and groundwater is exploited by pumps and gravity system of khettaras. More than 60 diversion weirs have been constructed in major streams since 1960s to divert flood water into farmland for irrigation, however its further development potential remains limited since few weir sites were proposed considering the overall water resources amount in the basins. It is often observed in surface water use, irrigation water is limitedly utilized in farmlands located along the rivers (wadi), and other areas far from the rivers have been deprived of

the water resources development as well as social investment. In addition, continuous drought resulted in decease of farm products for several years since 1970. To cope with these situation, groundwater use through pumping was accelerated to secure water supply for irrigation since 1980s, however rapid shifting to pump irrigation further caused continuous decline of groundwater table due to excessively large extraction. Drawdown of water table to more than 50 m deep from the ground surface caused high fuel consumption, consequently many farmers discontinued farming within a few years after pump irrigation was excessively developed in the beginning of 1990s.

Besides these problems, regional disparity of social investment left many khettara communities behind the development and severe drought accelerated depopulation and devastation of social system of the khettara communities. To preserve the social system as well as the natural environment, such as groundwater, the ORMVA/TF has launched the khettara rehabilitation program in region-wise. Table 1 shows water volume of various water sources in the area. It is noticeable point that water through khettaras provides about 38 percent of total water supply, and whole groundwater use including pump-up water is beyond dam storage water in recent years. Since surface water excessively depends on flood occurrence, unstable climate reduces farm production. This fact advocates for re-appreciated of khettara water use because of its stable flow condition through the year.

Table 1. Water volume in the study area

	Dam[1]	Diversion weir[2]	Pumpage[3]	Khettara[4]	Total
Water volume (MCM)	80	28	11	73	192
Percentage (%)	42	15	6	38	100

Source: 1 Hassan Addakhil dam (2003/04) Study report, ORMVA/TF

2 3 major diversion weirs (2003/04) Study report, ORMVA/TF

3 Yield of 360 pump stations (2000) Ministry of Equipment and Transports

4 Yield of 191 khettaras (2005), JICA study report

3. PROCESS TO PARTICIPATORY IRRIGATION MANAGEMENT

3.1 IRRIGATION BY KHETTARA WATER

Inventory survey indicates that the productive khettaras have decreased to about 190 khettaras at present compared to about 570 khettaras in 1970s because of decrease of discharge. The average discharge of 190 khettaras is only 5.9 lit/sec, and some communities have already migrated to urban area because so little water could not sustain their living.

In the meanwhile, farmers make efforts to effectively use water for irrigation, for example, the rotation irrigation corresponding to the traditional water right is applied to water distribution of khettara water for 24 hours. Although some farmers have water right of only one hour or less in two weeks, they distribute water to their farmlands

under kerosene lamps even in cold midnight in winter. For maintenance works, farmers periodically remove sediment and protect gallery and vertical shaft wall at their own expenses. Farmers abide by the local rule agreed on with adjoining khettara groups to equitably draw water. Local rule restricts extension of gallery, degradation of gallery bed and pump installation upstream of mother well so as to secure water flow of each khettara. A little financial support will increase irrigation water by reducing leakage loss, and lighten financial and laborious task of maintenance works for khettaras and irrigation canals.

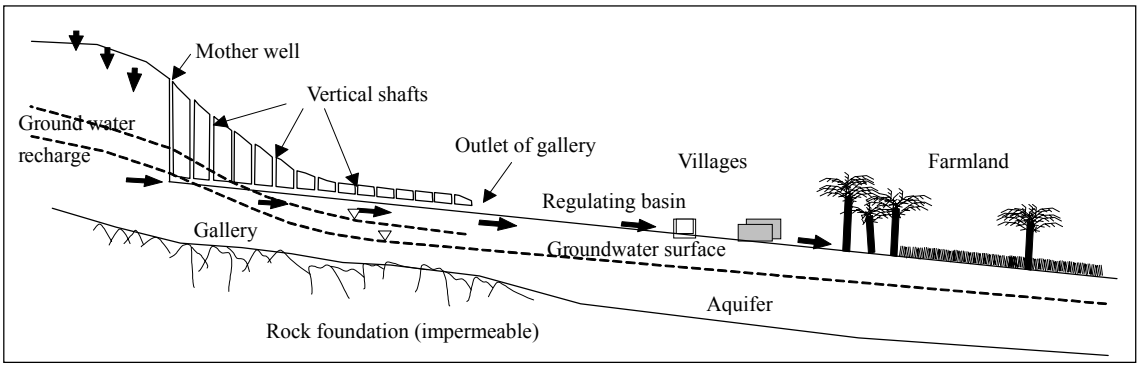

Figure 2. Schematic diagram of khettara system

3.2 IRRIGATION MANAGEMENT

In general, Government adopts participatory irrigation management to 1) reduce the dependence of farmers on government, 2) improve sustainability of irrigation systems, 3) improve efficiency and cost effectiveness of government expenditures, 4) improve agricultural productivity and so on, and for these purposes, Government would give higher priority to projects that are economically vital. On contrary to this, the ORMVA/TF has selected khettara communities without a clear distinction, e.g., water availability, number of beneficiaries and farm productivity during project implementation. Budget has been equally allocated for whole communities even though some khettaras have less water flow and locality have been severely depopulated.

For irrigation and community development, "mutual reliance" between the Governments and beneficiaries is essential to realize participatory management. The ORMVA/TF constructed diversion weirs and communal pump stations to equally distribute water to all beneficiaries, but not to individual beneficiaries. In addition, the ORMVA/TF has launched khettara rehabilitation works with close communication between farmers groups. Upon the request of the community, the ORMVA/TF willingly provides technical support including topographic survey, discharge measurement gratis. Beneficiaries steadily continue maintenance works so as to provide maximum benefit for their farmers groups. The emphasis must be on participation of government and beneficiaries, and a bottom up approach that harnesses the solidarity of rural communities. Rural development must be local and community- driven within a coherent framework. Table 2 indicates typical approach by the ORMVA/TF observed during the study:

Table 2. Activities of the ORMVA/TF and beneficiaries

by ORMVA/TF		by Farmers
1) Instruction of irrigation method to the farmers including water saving and rotation methods aiming at improving water use efficiency	↔	1) Preparation of water right paper to show present condition of water supply schedule to the engineers of the ORMVA/TF
2) Consultation of rehabilitation method of khettara and irrigation canal from technical and economical points of views	↔	2) Periodical maintenance works such as dredging of sediment and gallery protection by their own expenses
3) Rehabilitation works including material supply in emergency	↔	3) Investigation of the facilities and procurement of labor force for maintenance
4) Capacity building of farmers' groups and dissemination of farming skills	↔	4) Actual activities of income generation and extension of farm skills to neighbors through farmers' groups
5) Introduction of support programs by local and international donors	↔	5) Establishment and strengthening of farmers organizations (Associations)

3.3 FORMULATION PROCESS OF THE ORMVA/TF

The ORMVA/TF is composed of five (5) Departments and ten (10) Sub-Divisions, and closer to beneficiaries, 22 Local development centers that provide extension and support services to the farmers. In response to the information from Sub-Divisions and Local development centers, the Departments allocate annual budget for 1) planning and program service, 2) equipment procurement and management of irrigation and drainage network, 3) agricultural production service, 4) extension of institutional service, etc.

The ORMVA/TF emphasizes importance of participation of farmers to realize region-wise community development, thus irrigation and agro-industrial support programs are extended to all communities. In the small- medium irrigation program for surface irrigation canals, communal pump installation and khettara rehabilitation, capital amounts of half to one million US dollar has been equally distributed to the communities every year since 1990. As for khettara rehabilitation, the work has extended to most of the khettara systems even though rehabilitation length was limited to several hundreds meters against overall length of several thousand meters in each khettara. Almost the same budget was input for agro-industrial schemes such as date palm and vegetable cultivation, animal production, food processing, etc. Extension service by mobile team was offered to beneficiary secluded population in remote mountainous areas. Experience, knowledge of farmers' groups accumulated through their activities will be a strong base for future community development. 1) Response to beneficiaries' needs through dialogue between farmers and 2) distribution of benefit to all communities, this policy enhances farmer's motivation to self-reliance on irrigation management, consequently it mitigates devastation of social system and generates a communal society in regional level. Figure 3 indicates flow of formulation process for khettara rehabilitation scheme.

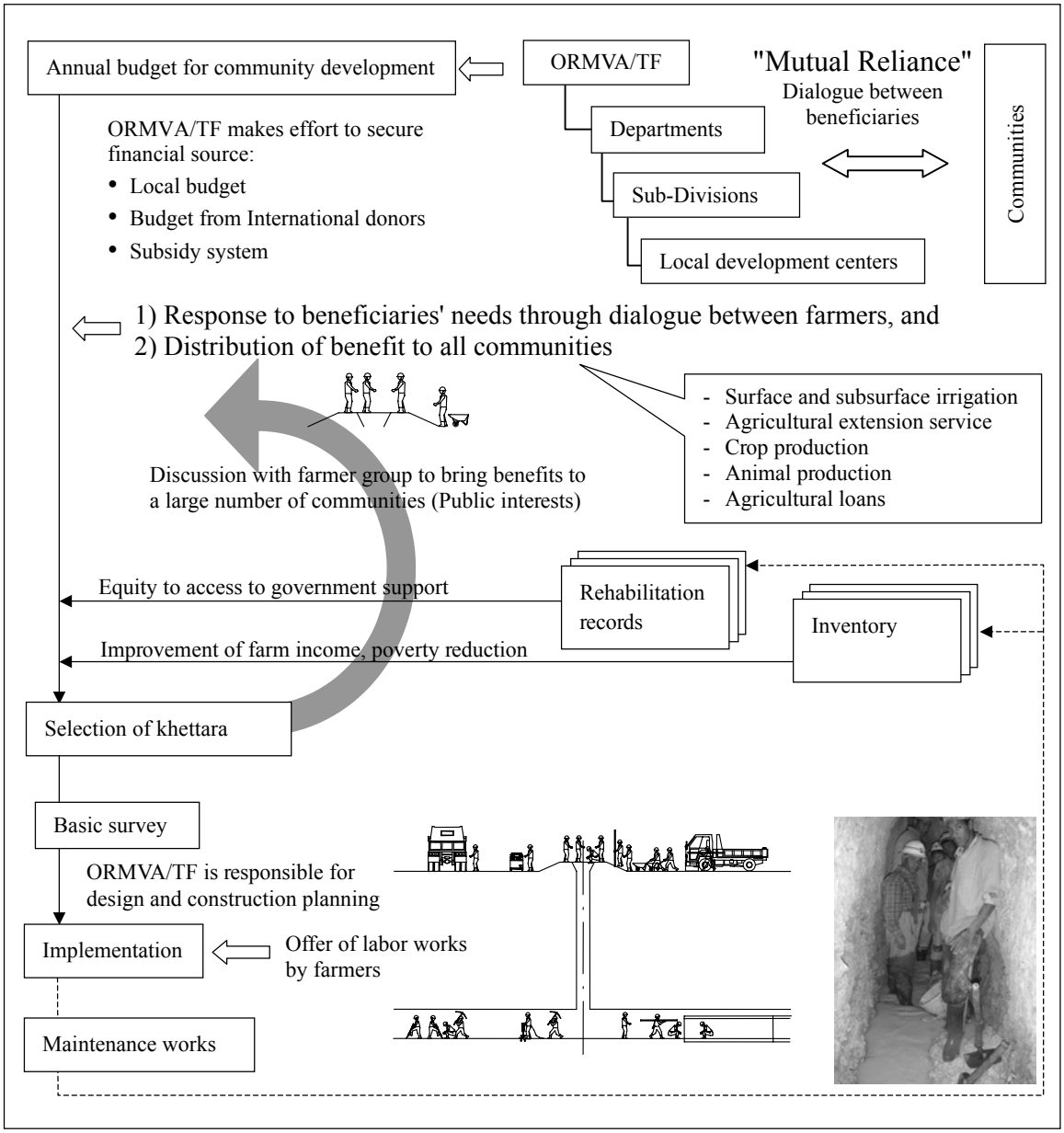

Figure 3. Formulation process of khettara rehabilitation scheme

4. ACTIVITIES OF JICA

In line with the development strategy of the ORMVA/TF, the Master plan on khettara rehabilitation and rural community development was formulated by the technical assistance program of the JICA. Following studies were conducted to verify relevance, effectiveness of the proposed components in the Master plan:

1) Technology transfer on khettara and canal rehabilitation method
2) Water saving irrigation (furrow, drip irrigation) to maximize irrigation efficiency
3) Improvement of farming skill to boost agricultural productivity (cultivation of cash crops, compost production, etc.)

4) Food processing and animal husbandry as income generation activities (date palm and vegetable processing and rabbit, pigeon breeding)
5) Improvement of rural life (improvement of water quality of khettara, public health and hygiene)
6) Capacity building of the ORMVA/TF and farmers' groups (Water Users Associations, women groups, etc.)

Before the study, the farmers scarcely accepted new farming skill and also did not put their income into irrigation and agricultural investment because benefit obtained from investment was uncertain. In the course of study, the farmers could directly see visible impacts, i.e., increase of khettara water, high crop production as well as market value, then they recognized new farming skill and positively joined to workshops and seminars. It is lesson learned that giving a trivial motive to farmers is most important to accelerate their activities, and the Government should prepare certain program that decrease financial risk on the farmer side, including subsidy scheme.

Through workshops and study tours held by the study team in the field level, farmers not only learned farming skills but had an opportunity to participate several governmental supporting programs, which had not been widely prevailed throughout the region previously. Both Governments and farmers have begun to put in serious efforts to cope with several constraints for development of oasis agriculture. With strong support by the ORMVA/TF, the farmers can have many opportunities to receive governmental assistance and their opinion shall be reflected to the Government's strategy.

Photo 1. Discussion with beneficiaries on khettara rehabilitation method

Photo 2. Exchange of opinions with beneficiaries on water distribution method

5. CONCLUSIONS

Khettara system resembles tertiary canal of a large irrigation system in end water distribution system. Poor operation and maintenance of the tertiary canal causes lower water use efficiency as commonly observed in a large irrigation system. Contrastively khettara system has been well operated for several hundreds years because community itself was established on the basis of khettara water. Khettara and irrigation canal are maintained periodically according to the water right. The Government respects their

self-reliance and provides technical and financial support within the extent of his autonomy. Since khettara flow is indispensable to maintain communities in arid region, it is desirable to improve present situation through efforts of local people with assistance of local governments considering the major significance of the khettara rehabilitation, i.e., 1) less cost and safer water sources, 2) sole water source for stable agricultural production, 3) source to preserve social system, and 4) heritage for the future.

Since each community is economically weak and vulnerable to climate change, community is expected to expand his activities to other communities based on their accumulated trust with local people and ability on managing and coordinating development works in the community. In the light of these facts, it is expected that the Government will continuously support communities and unify them into more large organization such as "communal society" to stabilize and increase farm income of the rural communities under their initiatives.