

UTILIZATION OF WATER RESOURCES OF MEKONG RIVER IN LAO PDR UNDER ADVERSE TOPOGRAPHICAL AND SOCIO-ECONOMIC CONDITIONS

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SYNOPSIS

Lao People's Democratic Republic (Lao PDR) is a land locked country. It is largely mountainous, with mean elevation being above 500 m above mean sea level and is characterized by steep terrain and deep narrow river valleys. Only about 4 per cent of the total land area is arable. About 85% of the country's territory is part of the Mekong river basin, whose water resources are Key to the development of the country's agriculture.

Some of the target areas of the Government of Lao PDR for accelerated development of irrigated agriculture are the fertile lands in the Champassack province where, due to lack of irrigation facilities, farmers are presently able to grow only one crop of rice in a year. Development of irrigation has been severely constrained due to adverse conditions of topography in which only lift irrigation is possible from Mekong river which requires large scale installation of pumpsets. This in turn requires easily accessible workshop facilities for maintenance of pumps and associated electrical/mechanical equipment. Another major constraint is the lack of financial resources of the Government for capital works and general lack of equipment and trained man power for the workshops.

As part of the mutually agreed implementation programme, WAPCOS Ltd. has prepared a Feasibility Report for the scheme which has the following four components.

- (i) Development of six irrigation schemes which could not be completed due to lack of funds (5462 ha)
- (ii) Installation and refurbishment of ten existing large pump sets
- (iii) Conversion of existing diesel driven pump sets to electric driven pump sets
- (iv) Improvement of three pump service centres at Vientiane, Savannakhet and Pakse.

These schemes, when completed, will enable the farmers to grow two rice crops and some cash crops in a year which will improve their socio-economic condition.

WAPCOS Ltd. is the Project Developer for this project.

1.0 BACKGROUND

Lao People's Democratic Republic (Lao PDR) is a land locked country. It is largely mountainous, with mean elevation being above 500 m above mean sea level and is characterized by steep terrain and deep narrow river valleys. Only about 4 per cent of the land area is arable. The total annual availability of fresh water is of the order of 330 Cubic Kilometer (Cu Km) including 38 cu km of ground water. Thus the per capita availability is 54,000 cum/annum which is the highest in Asia. However, due to adverse topography, most of the water requirement for various uses has to be met by pumping. At present ground water is being used mainly for water supply for rural areas, small towns and small scale industries located in low land areas where the depth of wells varies from 30 to 45 m with yields varying from 1 to 5 litres/sec. In plains and high land areas the yields are not adequate for irrigation of agricultural lands, as rice is the preferred crop of the farmers. Rice cultivation, therefore, is dependent on highly variable and uncertain rainfall. Thus for irrigation development, the only option is to pump water from the Mekong river and its tributaries.

The large level areas of Champassack province in the southern part of the country, are well suited for extensive rice cultivation and livestock raising. However, due to lack of irrigation facilities the farmers are able to grow only one crop of rice in a year. The existing irrigation infrastructure is in a highly dilapidated and neglected condition and requires urgent rehabilitation and commissioning.

With the above objective in view the Ministry of Agriculture and Forestry (MAF) of the LAO PDR approached the Government of India (GOI) for a soft loan of US\$ 17 million to rehabilitate and complete six irrigation schemes in Champassack Province.

After discussions between the Ministry of External Affairs of the Government of India and the Embassy of India in Vientiane it was decided to depute WAPCOS Ltd. to undertake a mission and submit a preliminary evaluation report on the proposed project and suggest a suitable approach for further consideration of the loan request by the Government of India. Based on the recommendations of WAPCOS, Government of India granted a Line of Credit of US\$ 17.34 million for development of the following four components of the scheme.



- (i) Development of 6 irrigation schemes to create an irrigation potential of 5120 ha.
- (ii) Installation of 10 large pump sets (187 KW to 400 KW capacity) on pontoons and Commissioning to pump river water to stilling basins of main canals of each scheme.
- (iii) Conversion of diesel driven pump sets into electric driven pump sets and their Commissioning.
- (iv) Improvement of Pump Service Stations at Pakse, Savannakhet and Vientiane.

As per the terms of the LOC, WAPCOS Ltd was appointed as Project Developer to implement the project in close cooperation with the Ministry of Agriculture and Forestry, Government of LAO PDR. After detailed field reconnaissance WAPCOS prepared a Detailed Project Report. This was followed by elaborate tendering process and the project work on EPC basis was awarded to an Indian contractor.

The component (iii) and (iv) have been completed and handed over to the client. The remaining two components are likely to be completed shortly.

In the following Paras the salient factures of the six schemes and the experience gained so far are briefly discussed.

2.0 IRRIGATION INFRASTRUCTURE IN CHAMPASSACK PROVINCE

In order to enhance agricultural productivity, following six irrigation schemes were planned in the Champassack province between 1992 and 1998:

- (a) Thaphosy Irrigation Scheme
- (b) Muang Sen Irrigation Scheme
- (c) Som Hong Irrigation Scheme
- (d) Ban Hea Irrigation Scheme
- (e) Savang Irrigation Scheme
- (f) Sak Muang Irrigation Scheme

These schemes were primarily based on pumping water from the river Mekong together with a network of canals, distributaries and field channels. The construction work started in 1998 and pumps were imported from India. However, due to paucity of funds, these schemes could not be completed and were discontinued in 2000 – 2001 after only partial commissioning of the planned works. This did not serve the desired purpose and the farmers had to revert back to the traditional rain fed cultivation, which enabled them to grow only one rice crop in a year.



2.0.1 Component-1

Thaphosy Irrigation Scheme is located about 17 km from Pakxe, in Champassack Province. This scheme was envisaged to benefit a command area of about 400 ha. The Main Canal, measuring about 1.72 km has already been constructed. Out of the total length of about 6.49 km of Secondary/Tertiary canals proposed for construction, only about 1.874 km has been constructed. About 80% of the families are farmers. Local varieties of paddy are cultivated by the famers, with an average yield of about 3-4 tons/ha during the wet and dry seasons. Vegetables are also cultivated, which is mostly used for domestic consumption, Banana, coconut and tamarind are also grown.

Muang Sen Irrigation Scheme is situated about 150 km from Pakxe. This scheme was envisaged to benefit a command area of about 900 ha. The Main Canal with a length of 3.388 Km has already been constructed. Secondary/Tertiary canals proposed for a total length of about 21.655 km are yet to be constructed. Paddy, beans, cucumber, carrot, mint, chillies, salad leaves and green vegetable are the main crops grown by the farmers. The average paddy yields are about 2.2 tons/ha and 4 tons/ha during the wet and dry seasons respectively. Coconut, tamarind, mango and oranges are also grown.

Som Hong Irrigation Scheme is located at a distance of about 60 km from Pakse. This project was envisaged to provide irrigation in a command area of about 1700 ha. The Main Canal measuring about 2.37 km has been constructed. The Secondary/Tertiary canals proposed for a length of 45.979 km is yet to be constructed. The main crops grown are rice, tobacco, corn, sugarcane, cucumber, beans and vegetables. The average yield of rice during the wet and dry seasons is about 3 ton/ha and 4.5ton/ha respectively. On an average 50% of the rice production is sold for sustenance @1500 Kips/kg (US\$ 1 = 8500 Kips) in the local market and @ 2000 Kips/kg to the beer manufacturing factories. Tobacco is mostly grown in small quantities for self consumption. Sugarcane, on the other

hand is mostly cultivated for sale, which fetches about 4 million Kips from a 40mX40m plot. Surplus vegetables are also sold for cash. Corn, beans and cucumber are mostly used for domestic consumption. Fruit trees like tamarind and coconuts are also grown by the residents. A Water Users Group (WUG) exists, which is further divided into 3 sub-groups consisting of about 10-15 persons/members. This WUG has about 3 million Kips, as reserve funds.

Ban Hea Irrigation Scheme was envisaged to provide irrigation to about 600 ha. This was to be implemented with the construction of a 2.86 km long main canal of which only about 0.935 km has been constructed. Similarly, about 10.388 km long Secondary/Tertiary canals were to be dug, which are yet to be constructed. The main crops grown are rice, peanuts, corn, cucumber and beans. The average yields of rice during the wet and dry seasons are about 3 tons/ha and 4 tons/ha respectively. About 60-70% of the yield is sold @ 2100 Kips/kg. Peanuts on the other hand yields about 1 ton/ha, which is also sold (about 25-30% of the total yield) @ about 10,000 Kips/kg. Fruits are also cultivated, but mostly for self consumption. A WUG with 6 members also exists.

Savang Irrigation Scheme was envisaged to irrigate an area of about 420 ha of command area. The proposed length of the main canal was about 2.169 km of which only 0.4 km has been constructed. Most of the villagers are cultivators and depend on their lands for sustenance. However, since returns are not adequate, most of the households have at least one person who has migrated to Thailand for livelihood. Farmers cultivate paddy, with yields of about 1 ton/ha. Beans, peanuts and cucumber are also grown, but mostly in their kitchen gardens for consumption. Fruits such as banana, guava, mango, tamarind are also grown. Since, cultivation in this area is only limited for sustenance for a few months, the villagers supplement their incomes by sale of bamboo handicraft items, which are sold in Thailand, Pakse and local markets.

Muang Irrigation Scheme is situated about 26 km from Pakse. This scheme was envisaged to irrigate a command area of about 1100 ha. For this purpose, about 3.18 km long main canal was envisaged and has been constructed. Secondary/Tertiary canals measuring 22.493 km was proposed, of which only about 3.76 km Secondary/Tertiary canals have been constructed so far. The farmers cultivate paddy, cucumber, beans, and vegetables. The average paddy yields during the wet and dry seasons are about 3 ton/ha and 4-4.5 ton/ha respectively. Tamarind, coconut, mango and banana are also grown, near their houses for consumption. A functional WUG exists in this area and whatever infrastructure that is in place, is managed by it.

2.0.2 Component - 2

In the year 2000, 18 large electrically operated pump sets (187 KW to 400 KW) were imported from India. Out of these, 8 pumps were installed on pontoons and the remaining 10 pumps could not be installed. These were to be installed after minor repairs and servicing.



2.0.3 Component – 3

After extensive search in the field 160 No. of diesel driven pumps out of 178 (65 BHP) could be located. However, 34 of these were required to be immediately converted into electric driven pumps after considerable repairs and servicing.

2.0.4 Component – 4

None of the three pump Service Stations, located at Vientiane, Savanakheth and Pakse were functional due to lack of

- Repairing equipment, tools and spare parts
- Instruments for checking electrical systems
- Trained technicians and support staff
- Transport vehicles to attend to service calls from the field.

3.0 INSTITUTIONAL ARRANGEMENTS

The Ministry of Agriculture and Forestry and the provincial authorities are jointly responsible for investigation and implementation of maintenance, repair and construction works for irrigation, land development, dikes and flood protection structures. The following departments are involved:

- The Department of Hydrology and Meteorology, which is responsible for collecting and analyzing climatic and hydrological data and for flood forecasting.
- The Department of Irrigation, which provides central planning and coordination of irrigation services. It consists of the country. It also offers advice to provincial administrations on matters concerning irrigation services. It consists of the following divisions: technical management; operation and maintenance; and planning and cooperation. The Study Survey and Design Centre, under this department, has the capacity to survey and design 10,000 ha/year, and supervise its realization in cooperation with provincial administrations. The function of the Irrigation Section of each province is to provide services in the survey, design and supervision of construction, while a construction enterprise undertakes the implementation of projects.

An initiative called the “Strengthening and Restructuring Irrigation Development Project” (SRIDP) is being implemented. It aims to develop and provide assistance in implementing strategies in the irrigation subsector. Another project called “Farmer Irrigated Agriculture Training” (FIAT) aims to train technicians and farmers in irrigation scheme design and management.

In 1991, a constitution was adopted which enshrined the principle that land belongs to the State, but individuals are guaranteed rights to use it. Land titles have not yet been distributed, but the principle has been accepted and a land market has been developing rapidly since 1992. A land registry survey is planned for the irrigated areas.

In the specific context of the irrigation development and management in Champassack Province it is obvious that many policies, strategies and programmes envisaged by the Government of Lao PDR can be successfully implemented only after the requisite institutional reforms are carried out especially at the grass root levels and linkages between different levels are strengthened to ensure accountability in O&M of the created irrigation infrastructure.

4.0 TRENDS IN IRRIGATION MANAGEMENT

Considerable investments have already been made in the last 20 years in irrigation development. Despite these efforts, only 13,500 ha are irrigated in the dry season. Although the returns on public investment in irrigation are low to negative, the irrigation sector still receives attention from donors. About 38 percent of all planned donor support in agriculture is for new irrigation projects.

The Government has recognized the problems facing the country and the strategy in the irrigation sector has been redefined. The new water law is based on:

- Improving the planning of new irrigation projects so that they are based on the needs of the farmers and are driven and managed by them. WUGs are being set up, and the new water law should provide a legal framework for these associations. The objectives of the Irrigation Department are now: (i) to develop irrigation for all lowland paddy fields in the wet season as long as farmers are interested and group themselves in WUGs; and (ii) to develop dry season irrigation.
- Making the existing schemes economically viable and self-sustaining, by: (i) helping farmers to establish WUGs; (ii) training farmers in irrigation management; (iii) encouraging farmers to introduce O&M cost recovery systems; and (iv) developing marketing infrastructures.

Under the New Economic Mechanism, policy on irrigated agriculture emphasizes the role of markets and prices as allocation mechanisms and a shift to cost recovery for services and facilities provided by government to farmers. Electricity and operating costs have been paid directly by farmers since 1992. Secondary and tertiary canals are the responsibility of farmers for all maintenance matters.

The Irrigation Department is responsible for the O&M of weirs, dams, pumps and primary canals. It is planned that these responsibilities will be handed over to WUGs or WUAs. However, in many cases, O&M are still carried out by the Irrigation Department or its provincial services.

A pragmatic approach has been adopted for a transitional period while the establishment of WUGs is encouraged and farmers are trained in irrigation management, irrigation scheduling, and O&M. It is expected that, eventually, each WUG will be able to define the water charge needed to sustain the irrigation scheme. In the specific context of the six irrigation schemes in Champassack Province the overall management is characterized by

- (a) Lack of investible resources to complete and commission the schemes
Apparently a realistic construction planning vis-à-vis the available resources was not done which resulted in thin spreading of resources on a larger number of schemes than could be easily completed to create utilizable irrigation potential.
- (b) Lack of operation and maintenance of the partially completed schemes. As a result, these got deteriorated over time and became almost defunct.
- (c) Out of 18 large pumps 10 pumps could not be installed and remained virtually unattended at various locations for several years.
- (d) A large number of small and medium diesel driven pumps imported from India remained unaccounted for as no systematic records were maintained. These had to be physically searched at various probable locations with the help of Government officials and farmers.

The farmers who were given these pumps refused to use them as they could not afford the expensive diesel to run them. Since Lao PDR has surplus and cheap electric energy, it is obvious that diesel driven pumps should not have been procured in the first place.

5.0 CONCLUSION

- (i) Lift irrigation schemes are techno-economically feasible even in conditions of adverse topography and socio-economic settings.
- (ii) For efficient O&M of irrigation schemes, strong institutional set up at grass-root level is required. Institutional linkages at various levels are required to ensure accountability in asset management.



- (iii) Indigenous capacity needs to be developed for manufacture of electrical /mechanical equipment required for sustainable irrigation development
- (iv) Capacity for manufacture of spare parts, equipment, tools etc needs to be developed in the vicinity of irrigation commands.
- (v) Rural development programmes should include setting up of Training Institutes for developing local man power of Electrical/Mechanical technicians
- (vi) Command area development programme should include, interalia, all weather rural roads to facilitate quick response to service calls from the field.