Renovation of Irrigation System to Ensure Drinking and Irrigation Water Supply in Shwebo Township, Sagaing Region

December 2018
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Background and Introduction</td>
<td>02</td>
</tr>
<tr>
<td>2. Objectives</td>
<td>06</td>
</tr>
<tr>
<td>3. Operation and Maintenance</td>
<td>07</td>
</tr>
<tr>
<td>3.1. Operational Services</td>
<td>07</td>
</tr>
<tr>
<td>3.2. Operational Activities</td>
<td>07</td>
</tr>
<tr>
<td>3.2.1. Intake and Escape Gate</td>
<td>07</td>
</tr>
<tr>
<td>3.2.2. Water Conveyance System</td>
<td>08</td>
</tr>
<tr>
<td>3.3. Maintenance Services:</td>
<td>08</td>
</tr>
<tr>
<td>3.3.1. Maintenance of the Intake, Sluice Gates and Escape Gate</td>
<td>09</td>
</tr>
<tr>
<td>3.3.2. Maintenance of Kin Tat Canal</td>
<td>09</td>
</tr>
<tr>
<td>3.3.3. Maintenance of Distribution Canals:</td>
<td>09</td>
</tr>
<tr>
<td>4. Operations and Maintenance Plan</td>
<td>10</td>
</tr>
<tr>
<td>5. Organizational Structure</td>
<td>11</td>
</tr>
<tr>
<td>5.1. Stakeholders and Functions</td>
<td>11</td>
</tr>
<tr>
<td>5.1.1. Scheme Level</td>
<td>11</td>
</tr>
<tr>
<td>5.1.2. Farm Level</td>
<td>12</td>
</tr>
<tr>
<td>6. Conflict Management</td>
<td>12</td>
</tr>
<tr>
<td>6.1. Methods of Managing Conflicts</td>
<td>12</td>
</tr>
<tr>
<td>7. Sustainability and Financing</td>
<td>13</td>
</tr>
<tr>
<td>8.</td>
<td>1</td>
</tr>
</tbody>
</table>
1. **Background and Introduction:**

UNDP Myanmar, with funding from Adaptation Fund is implementing a Climate Change Adaptation project - “Addressing Climate Change Risks on Water Resources and Food Security in the Dry Zone of Myanmar” since early 2015. The project aims to reduce the increasing impacts of climate change on agricultural and livestock production cycles in the dry zone of Myanmar - the impacts of increasing temperature and evaporation, declining water availability, and intensifying weather events especially flash floods and cyclones.

The Dry Zone is one of the most climate sensitive and natural resource poor regions in Myanmar and is vulnerable to growing food insecurity and severe environmental degradation. The objective of the project is to reduce the vulnerability of farmers in Myanmar’s Dry Zone to increasing drought and rainfall variability and enhance capacity of farmers to plan for and respond to future impacts of Climate Change on food security.

As part of the project, financial and technical support was provided to Shwebo Township for the renovation of Kin Tat Irrigation canal system, which was identified based on priorities/needs identified by the local administration. Objectives of providing the support were to reduce flooding in western part of Shwebo township (which as recurring phenomenon) and increase supply of irrigation water to eastern part of Shwebo, decrease flooding of fish ponds and improve access to adequate and good quality water for Shwebo city residents during the monsoon season.
Shwebo township is located in lower Sagaing Region and is one of the 5 beneficiary townships identified under the UNDP – Adaptation Fund Project. The Kin Tat Irrigation Canal (earlier known as Alaung-Pha-Ya creek) was built by King U Aung Zay Ya in 1864 during his 8-year rule to provide irrigation water for agriculture to Shwebo Township. He built a wooden dike across the Mu river to divert water for cultivation of rice fields in Shwebo. The Kin Tat canal flows through Khin Oo Township before draining into Maharnandar Lake (I) and (II) in Shwebo Township. Along the way, runoff from rice fields flows into Kin Tat canal. The Kin Tat canal was in 1994-95. Maharnandar Lake-(I) is the main source of drinking water for Shwebo City. Along Kin Tat canal, between Mu River and Maharnandar Lake, there are 3 side spill way gates which drains excess water whenever needed and it also controlled release of water into the rice fields located adjacent to the canal. Excess water from Maharnandar Lake drains into the Tet Kel Tan creek, which flows towards the eastern part of Shwebo and provides irrigation water for agriculture. Ultimately, the Tet Kel Tan creek drains into a big reservoir in Wetlet Township, under Sagaing region.

The renovation work for the irrigation was carried out by Aung Zay Ya Social Compassioners’ Association (a local CSO based in Shwebo), based on field observation and feasibility study conducted through engagement of stakeholders, including – the Chief Minister of Sagaing, District/Township Administrators, Township Development Management Committee and related technical line departments, and in particular the Irrigation and Water Utilization Management Department of Shwebo township. The contract with the CSO was signed on 3rd August 2016 and renovation works were carried out for six months – 2nd week of August 2016 to 2nd week of February 2017.
The infrastructure provided by the project benefits 488 households (direct and indirect beneficiaries) covering an agricultural command area of 2852.76 acres in 7 project villages and 3 non-project villages. These households (16% women-headed) are earning income mainly through rice cultivation for their livelihoods. The assistance provided through the project ensured better services for drinking and irrigation water by improving water flow and distribution through Kin Tat canal near Maharnandar Lake. As a result, the beneficiaries receive additional and reliable water supply to supplement agricultural production through motorized pumping from the Thet Kel Tan creek. Of the total beneficiaries above, 89 households (including from the 7 project villages and 3 non-project villages) are marginalized farmers with an agricultural command area of 128.89 acres.

Overview of Canal Renovation Works

- Renovation of the canal (3,700 feet)
- Clear aquatic weeds, 50 ft wide and 7 ft deep
- 6 sluice gates in the middle of the canal
- Sluice gates to control water distribution
- To Mu River
- Ko Pin Creek
- Htone Bo Creek
- Kantawmin Escape Gate
- Tet Kel Tan Creek
- Additional Water for 10 villages
- 488 Households with 2,852 acres
The renovation works included the construction of the following physical structures:

- Construction of new 6 sluice gates at the middle of old earth-canal which was used for diversion;
- Cleaning of aquatic weeds and removal of sediments and silts along 3700 feet length of that diversion earth-canal;
- Renovation of Kan Taw Min escape gate;
- Cleaning of side creek above 1000 feet of check gate;
- Minor repairs of Ka Phyu check gate; and
- Constructions of a commemorative slab and signage at renovation site.

The Irrigation Department (maintenance) provided substantive support through technical inputs, as well as through provision of workforce, including machinery and day-to-day supervision to ensure that renovation works are completed as per design specifications.

The above facilities were handed over to Shwebo Township (Irrigation Department, Irrigation Water Utilization and Management Department) on 12th January 2017. The opening ceremony of the Kin Tat Irrigation canal was held on 7 February 2017 and the event was graced by the District Administrator of Shwebo District. During the opening ceremony, water was released from the sluice gates by officials and dignitaries, including unveiling of the commemorative slab at the canal site.

The AF project, along with staff of Irrigation Department (Maintenance) organized a training involving communities from beneficiary villages (7 project villages and 3 non-project villages) with the objective of defining roles and responsibilities for the efficient use of irrigation water and for long-term sustainability and maintenance of the facilities.

1 (UNDP/AF Project villages: Min Ywar West, Ka Phyu, Ta Gon Taing, Pauk Tone, Nyaung Yin Kone, Thit Cho Pin, and Kone Gyi and 3 non-project villages: Min Ywar East, Sin Yone, and Chaung Sone)
2. Objectives:

An efficient management is critical for the functioning of this irrigation canal to ensure that the system serves more water access to the users in the long run. It is prudent for the management to plan, implement and monitor the maintenance activities. The most critical types of maintenance include; routine or the normal maintenance (preventive), special maintenance (corrective) and deferred maintenance (rehabilitation).

The objective of this scheme is to assist Shwebo Township, in particular the Irrigation Department - in monitoring, operation and maintenance of Kin Tat Irrigation canal, so that the irrigation system benefits farmers in Shwebo Township through efficient management and control of the irrigation system.

3. Operation and Maintenance:

3.1. Operational Services:

The operational service consists of two aspects, as follows:
• Operation of the physical system, staffing and management to ensure that the various components of the system from capture to application must be run as per design to ensure timely and adequate delivery of water to satisfy crop water requirements of beneficiaries.

• Controlling of sluice gates/check gates for proper regulation of water in and out of the canal irrigation system;

• Regular inspection of the system for silt accumulation, leakages, blockages, etc.;

• Check obstruction of flow to or near the sluice gates;

• Check the water level at the intake and escape gates; and

• Check and adjust the sluice gates to the recommended depth.

3.2. Operational Activities:

Operational activities are periodic or day-to-day activities that will enable the irrigation system to function properly. These relate to the technical, administrative and socio-economic components of the scheme. These are the services which the Irrigation Department provides on a regular basis.

3.2.1. Intake and Escape Gate:

The water intake and escape gate system of Kin Tat Irrigation System (portions of renovation) will require the following services:

• Controlling of sluice gates/check gates for proper regulation of water in and out of the canal irrigation system;

• Regular inspection of the system for silt accumulation, leakages, blockages, etc.;

• Check obstruction of flow to or near the sluice gates;

• Check the water level at the intake and escape gates; and

• Check and adjust the sluice gates to the recommended depth.
The water conveyance system of Kin Tat Irrigation canal is through an open earthen channel, which requires regular cleaning and maintenance. The following key activities are carried out in regular basis by Irrigation Department:

- Opening and closing of sluice gates to regulate water, as per requirement of irrigation water for farmers;
- Regular inspection of the canal to determine problems in water conveyance, such as breakage of canal banks and water spillage;
- Inspection of sediment level in canal and if necessary dredge the canal to ensure proper water conveyance to farmers; and
- Inspection of aquatic plants and weeds in the canals and removal of the same for proper conveyance of water.

### 3.3. Maintenance Services:

**3.3.1. Maintenance of the Intake, Sluice Gates and Escape Gate:**

- Flushing out accumulated silt regularly by opening the flush gate;
- Clean the sluice gates;
- Replace the damaged screens/gates;
- Grease the movable metal parts; and
- Repair concrete and steel parts with defects
- Irrigation water conveyed from Mu-river contained large amounts of suspended matter, causing sedimentation in the canal. The soil lost due to erosion along water ways and agriculture fields also enters the canal, resulting in sedimentation of the canal. Maintenance work for canal should be done at least once before the irrigation season starts. Maintenance works required for the canal are as follows:
  - Cleaning/removal of bushes and trees on the canal embankments to avoid obstruction of water flow and prevent blockage/leakages;
  - Weeding and de-silting of the canal to allow adequate water flow in the canal;
  - Damaged or eroded sections should be rebuilt to the original shape.

3.3.3. Maintenance of Distribution Canals:
Irrigation water from Mahanandar Lake is conveyed through the Kantawmin Escape Gate by way of a distribution canal (Tet Kel Tan). The maintenance of the main distribution canal is maintained under technical guidance and supervision of the Irrigation Department, whereas the canal (Lel Kyar Myaung) which feeds water into farmlands in respective villages will be the responsibility of the farmers. Farmers are also responsible for water application, and all in-field water management systems. The maintenance services for the distribution canal will be as follows:
  - Cleaning/removal of bushes, aquatic weeds and trees on the canal embankments to avoid obstruction of water flow and prevent blockage/leakages;
  - De-silting of the canal to allow adequate water flow in the canal;
- Damaged or eroded sections should be rebuilt to the original shape.

### 4. Operations and Maintenance Plan

<table>
<thead>
<tr>
<th>Activity</th>
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<tr>
<td>Regular Inspection/ Operation of the physical systems and management</td>
<td>Under management of Township Irrigation Department</td>
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<tr>
<td>Regulation/ Controlling of water level at sluice gates, flow rates,</td>
<td>Upon crop requirement and growing season</td>
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<tr>
<td>opening and closing of check gates</td>
<td></td>
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<tr>
<td>Clearing of aquatic weeds and debris in the conveyance system (In</td>
<td>Depend upon condition, budget allotment and availability of heavy</td>
</tr>
<tr>
<td>irrigation canal)</td>
<td>machineries</td>
</tr>
<tr>
<td>Check the water level at the intake gate (middle of the canal), escape</td>
<td>Staff assigned by the irrigation Department</td>
</tr>
<tr>
<td>gate (Kantawmin), check gate (Kha Hpyu)</td>
<td></td>
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<tr>
<td>Regular inspection of canal to determine in water flow –such as</td>
<td>Technical staff under irrigation department</td>
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<tr>
<td>breakage of canal banks and spillage water from irrigation structures</td>
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</tr>
<tr>
<td>Inspection of sediment level in canal and if necessary dredge the</td>
<td>Technical staff under irrigation department</td>
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<tr>
<td>canal to ensure proper irrigation water flow</td>
<td></td>
</tr>
<tr>
<td>Regular maintenance and repairing of damaged parts, parts with defects,</td>
<td>Depends on conditions, priority of works, availability of budget</td>
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<td>etc.</td>
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<tr>
<td>Cleaning/removal of bushes and trees on the canal embankments to</td>
<td>Farmers from irrigated command area under supervision of irrigation</td>
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<tr>
<td>avoid obstruction of water flow and prevent blockage</td>
<td>department</td>
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<tr>
<td>Maintenance of irrigation canal among parcels (Lei Kyar Myaung)</td>
<td>Farmers from irrigated command area under supervision of irrigation</td>
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</tbody>
</table>
5. Organizational Structure:

To ensure proper coordination and smooth functioning of the irrigation system and to avoid conflicts during operation and use, the following structure will be followed in the operation and maintenance of the Irrigation Canal:

5.1. Stakeholders and Functions:

The Kin Tat Irrigation system will have two levels of stakeholders – as follows:

5.1.1. Scheme Level

At the scheme level, the Irrigation Department will take responsibility of facilitating equitable sharing of water and for coordinated development. The Irrigation Department will be responsible for the operation from the intake, conveyance system and supervision of water user groups.

The irrigation Department will ensure that distribution is synchronized with the cropping season which is designed to correspond to weather, market forces, and agreement with water user groups/farmers as to their water demands, thus guiding when the intake should be opened. The irrigation cropping/ water distribution calendar and schedule will be adhered to in order to avoid over irrigation or under irrigation of crops. Proper planning of the operation is necessary in order to match the supply and demand as closely as possible. In case of water shortage, the Irrigation Department may introduce water rationing.

5.1.2. Farm Level:

The farm level operation and maintenance will be the responsibility of individual farmers. The farmers are responsible for water application, and all in-field water management systems.
6. Conflict Management:

In the event of conflicts resulting from individuals or groups that differ in attitudes, beliefs, values or needs, the affected parties will, at the first instance - try and resolve the issue mutually among themselves. However, if the conflict remains unresolved, the Water User Group will manage the conflict through canal-head (Myaung Gaung) or the Village Tact Administrator, based on facts and evidences available to them. If the Water User Group is still not able to resolve the conflict, the Irrigation Department will conduct an intensive search for facts in order to eliminate the problem or resolve it.

6.1. Methods of Managing Conflicts:

Conflict management will, at a minimum respect the following principles:

- Genuine involvement of members in decision-making process – to promote sense of ownership and belonging that motivates members to act and work for the good of all stakeholders
- Fairness in application of By-laws – are drawn in a participatory manner and be impartially implemented and enforced to ensure that the due process earns the allegiance of members.
- Mechanism for Water Allocation – in an equitable and timely manner to all members to minimize internal conflicts since access to water determines to a large extent harmony in a scheme.
- Establishment of a Conflict Management Committee – under the Water User Group to address disputes and conflicts in an impartial manner.
- Establishment of a procedure for resolving conflicts – which is available in writing and has a clear written procedure on how disputes will be handled if and when they occur.
7. Sustainability and Financing:

In order to maintain and ensure sustainability of the irrigation system, a fee to collect for water use is already established, based on prevailing norms and standards in the township. The villages here usually assign a member of the village who collect a fee equivalent to 6,000 MMK for one crop (i.e. during monsoon season) and an additional 3,000 MMK for additional use in the next season (example for winter crop). The villages in in western Shwebo are accessing water through distribution canals of Kin Tut canal system and those in eastern part by Ko Pin dam commend area.

The Township Administration and Irrigation Department manages the allocation of financial resources for proper maintenance of the system. The current practice is that the Irrigation Department allocates an approximate budget of MMK 10,000,000 for a period of six months and this budget is allocated for maintenance of all the irrigation systems under Shwebo Township. The Irrigation Department prioritizes the various schemes in the township and maintenance activities are done according to township level priorities and based on needs at the township level.