

REPUBLIC OF YEMEN
MINISTRY OF AGRICULTURE AND IRRIGATION

IRRIGATION IMPROVEMENT PROJECT

(IDA Credit No. 3412 – YEM)

Main Technical Assistance Package for IIP

WORKING PAPER 12

Issue Paper on Participatory Irrigation Management

February 2003

 **ARCADIS** EUROCONSULT

IN ASSOCIATION WITH





YEMENI ENGINEERING GROUP

CONTENTS

| | | |
|-----------|--|-----------|
| 1 | Introduction | 1 |
| 2 | Project Implementation Schedule | 2 |
| 2.1 | Overall implementation schedule _____ | 2 |
| 2.2 | Time Schedule for implementation of pim approach _____ | 2 |
| | Wadi Tuban _____ | 2 |
| | Wadi Zabid _____ | 3 |
| 2.3 | Early start of the rehabilitation of canal systems _____ | 4 |
| 3 | Registration of WUA | 5 |
| 4 | Rehabilitation and Maintenance Works | 7 |
| 5 | Farmers' Contributions towards Rehabilitation Costs | 8 |
| 5.1 | Level of Farmers' Contributions _____ | 8 |
| 5.2 | Modalities for Farmers' Contributions _____ | 8 |
| 6 | Operation and Maintenance of Headworks | 10 |
| 6.1 | Responsibility for O&M of Headworks | 10 |
| 6.2 | Financing the O&M of Headworks | 11 |
| 7 | Consequences of Non-Formation of WUA | 12 |
| 8 | Water Management Model | 13 |
| 9 | Formation of SWUF | 14 |
| 10 | Intensive Agriculture Demonstration Programme | 15 |
| 11 | Co-ordination and Communication | 16 |
| 11.1 | PIU Staff Meeting | 16 |
| 11.2 | PIU Management Meeting | 16 |
| 11.3 | Scheme Advisory Board | 17 |

APPENDICES:

Tentative Time Schedule for Implementation of PIM Approach – Wadi Tuban

Tentative Time Schedule for Implementation of PIM Approach – Wadi Zabid

Outline Design and Construction Schedule

ABBREVIATIONS AND ACRONYMS

| | |
|------|---------------------------------------|
| GDI | General Directorate of Irrigation |
| IDA | International Development Association |
| IIP | Irrigation Improvement Project |
| IMT | Irrigation management Transfer |
| ISF | Irrigation Service Fee |
| MAI | Ministry of Agriculture & Irrigation |
| NWRA | National Water Resources Authority |
| O&M | Operation and Maintenance |
| PAD | Project Appraisal Document |
| PIM | Participatory Irrigation Management |
| PIU | Project Implementation Unit |
| PMU | Project Management Unit |
| PPR | Project Preparation Report |
| RID | Regional Irrigation Department |
| SWUF | Scheme Water User Federation |
| TDA | Tihama Development Authority of MAI |
| WUA | Water User Association |
| WUG | Water User Group |

1 INTRODUCTION

This Working Paper raises a number of issues that need to be resolved by the IIP (PMU, PIU and Main Technical Assistance Team) as these issues are crucial for the smooth implementation of the project in general and the PIM approach in particular. A number of these issues touch on basic principles of the implementation of the project and would therefore require the approval of the IDA/World Bank. Other issues are more related to the timely implementation of project activities.

It is envisaged to discuss these issues in a small workshop in the last week of February 2003.

2 PROJECT IMPLEMENTATION SCHEDULE

2.1 OVERALL IMPLEMENTATION SCHEDULE

A number of project activities, such as: (i) the formation of PIM organisation, (ii) WUA formation and (iii) institutional assessment have started later than anticipated in the PAD. Consequently the original implementation schedule needs to be adjusted. Figure 1 shows a proposed implementation schedule for the project, based on the current status and resources.

The Main Technical Assistance Team suggests that PMU seeks agreement with IDA on a new (more realistic) project implementation schedule during the next supervision mission by the IDA.

2.2 TIME SCHEDULE FOR IMPLEMENTATION OF PIM APPROACH

WADI TUBAN

In Wadi Tuban, the implementation of the PIM approach has started in January 2003 with the preparation of detailed farmers' lists for all canal systems and Awareness Meetings (PIM Step 2) on the selected pilot spate irrigation systems.

Taking into account the availability of design capacity and satellite images, the Main Technical Assistance Team proposes that the Project should commence the rehabilitation on the following three spate irrigation systems in Wadi Tuban before the end of 2003:

| Name | Location on Wadi | River Bank | Area (ha) |
|--|------------------------|------------|--------------|
| Al-Arais (modernised system) | Upper (Wadi Tuban) | Right | 958 |
| Faleg Eiadh (diversion weir with traditional canals) | Middle (Wadi Kabir) | Left | 1,191 |
| Bert Salem Complex (traditional system with 8 <i>uqum</i>) ¹ | Lower (Wadi Saghir) | Left/Right | 1,290 |
| Total: | | | 3,439 |

¹ It is not required to cover all 8 *uqum*; focus will be on the first three or four traditional systems.

The proposed time schedule for the implementation of the PIM approach on these selected pilot spate irrigation systems in Wadi Tuban is presented in Appendix A.

WADI ZABID

In Wadi Zabid the implementation of the PIM approach has started at the end of January 2003 with conducting Preliminary Visits by the newly appointed PIM Specialist to a number of villages. It is envisaged that the Community Awareness Campaign (PIM Step 2) will start around 15 February 2003. The transfer of the motorcycles to the PIM Extensionists should be completed by then. This will facilitate the execution of the planned field activities.

It is anticipated that the identification of tertiary units and the preparation of Tertiary Unit Lists prior to the formation of WUGs (PIM Step 6) will require more time than in Wadi Tuban since the selected PIM Extensionists do not have any previous experience with spate irrigation. In addition they do not have sufficient knowledge about the layout and main characteristics of the spate irrigation systems.

Consequently, the formation of WUGs and WUAs (PIM Steps 6 and 8) as well as the participatory planning and design of rehabilitation works (PIM Step 7) on the first batch of pilot spate irrigation systems will start later and may require more time than in Wadi Tuban.

However, it is important to start rehabilitation works on a number of spate irrigation systems in Wadi Zabid before the end of 2003 for the following reasons:

- The time period between the formation of WUAs and the start of the rehabilitation works should not be too long in order to keep the WUAs motivated;
- The Project will gain experience with participatory design and rehabilitation works on a limited scale and with the preparation and supervision of rehabilitation works carried out by WUAs; and
- The Project will have two irrigation seasons to monitor the O&M of the primary and secondary canal systems by the WUAs as well as the administrative and financial management of the WUAs themselves following the signing of the IMT Agreement.

Therefore, it is proposed to initially concentrate all efforts for implementation of the PIM approach in the following spate irrigation systems:

| Name | Location on Wadi | River Bank | Area (ha) |
|---|------------------|-------------|--------------|
| Weir 4 (Gereb & Bira) | Middle | Centre-Left | 1,580 |
| Wadi Nassri (3 or 4 uqum in upstream section) | Middle | n.a. | ± 1,000 |
| Total: | | | 2,580 |

The proposed time schedule for the implementation of the PIM approach on these selected pilot spate irrigation systems in Wadi Zabid is presented in Appendix B.

To ensure the successful implementation of the tentative time schedule, the Main Technical Assistance Team proposes that:

- The Project aims to start the rehabilitation works in **Wadi Zabid** on Weir 4 and on 3 traditional spate irrigation systems on Wadi Nassri. The rehabilitation works should start before the end of 2003.
- The Project aims to start the rehabilitation works in **Wadi Tuban** on the modernised Al-Arais system, the hybrid Faleg Eiadh system and (part of) the traditional Bert Salem Complex. The rehabilitation works should start before the end of 2003.
- The motorcycles should be transferred to the PIM Extensionist shortly in order to facilitate their field activities.
- Sufficient staff should be available for the execution of the different steps of the PIM approach, in particular Design Engineers for the Participatory Planning and Design of Rehabilitation Works (PIM Step 7) and the preparation of the tender documents for the Main Works Contract (PIM Step 10).

2.3 EARLY START OF THE REHABILITATION OF CANAL SYSTEMS

The rehabilitation of canal systems will likely be concentrated in periods, which do not interfere with the crop seasons. We anticipate the following construction seasons:

| | | |
|-------|--|--|
| Tuban | Construction season October-March (6 months) | |
| Zabid | Group-I (upper) | Construction season August-October (3 months only) |
| | Group-II (middle) | Construction season October-July (10 months) |
| | Group-III (lower) | Construction season November-August (10 months) |

This would imply that for canal rehabilitation works only 2 constructions periods are available. In order to avoid a too heavy construction supervision workload in 2004-2005 it is crucial that rehabilitation of the canal systems starts in October 2003. Another reason is that WUA formation takes place mainly in 2003 and it will be difficult to keep WUAs motivated if they have to wait long for canal rehabilitation works.

In order to be able to start canal rehabilitation works by October 2003, the Main Technical Assistance Team proposes that:

- Design Engineers are fielded for participatory planning and design for 6 sub schemes in Tuban from March to July 2003 and for 2 sub schemes in Zabid from mid-April to August 2003.
- Procedure for registration of WUAs is simplified (see chapter 3).
- Suitable arrangements are formulated for farmer contributions (see 5.1).
- IDA approval is obtained for a simplified procedure for awarding small works contracts (<\$10,000) to WUAs (see 5.2).

3 REGISTRATION OF WUA

So far, it is (implicitly) assumed that WUA would be registered under the Law on Cooperative Associations and Societies (No.39, 27 December 1998). For this purpose, the Minister of Agriculture and Irrigation has issued a Resolution regarding (Model) Articles of Association of WUA in 2000, which is based on the Cooperative Law (No.39)

However, it is recommended that WUAs should not be established as cooperative associations on the basis of the Cooperative Law No.39 of 1998 for the following reasons:

- Cooperatives are economic and profit-oriented organisations, whereas WUAs do not seek profit as they only collect funds from their members for the purpose of financing the O&M of the spate irrigation systems and contributions to the rehabilitation costs (PPR, Volume F, 2000); and
- The condition that the WUA shall have a share capital of YR 1 million and that each member shall buy at least one share of YR 5,000 is not feasible for WUAs as many small farmers (i.e. owners-operators, sharecroppers and tenants) cannot afford and are not willing to purchase one share of YR 5,000 in order to become member of the WUA.

The new Water Law of 2002 stipulates in Article 10 that *“water users and beneficiaries associations, groups, committees, leagues or federations may be formed for the purpose of involving the public and the beneficiaries of water in regulating water resources or in operations and maintenance of water installations. The procedures for the implementation of the provisions of the Law shall set out the purposes and all the detailed rules related to such organisations accordingly”*.

According to Article 78 of the Water Law 2002, the *“GAWR shall prepare the Executive Procedures for this Law, with the participation of the relevant concerned entities cited in Articles 25 and 26 herein above, within six months from the date of issuance of the Law and such Executive Procedures shall be issued by a Decree of the Council of Ministers”*.

So far, the GAWR (i.e. NWRA) has not completed the relevant Executive Procedures concerning WUAs in collaboration with the relevant concerned entities, being the MEW as well as the MAI together with its affiliated authorities and institutions, such GDI.

In the Policy Statement on PIM by the MAI (July 2000), which is included in Annex 11 of the PAD (2000), it is stated

“MAI will register and recognise the water users organisations (i.e. WUGs at tertiary level, WUAs at secondary/primary level and SWUFs at scheme level) created under the IIP as representatives of users”.

Furthermore, the Policy Statement on MAI specifies the *“Minister of MAI will issue a Model Articles of Association for WUAs, which will be established temporarily under the Agricultural Cooperative Union Law No.39 of 1998. This will be a short-term interim solution until issuance of the irrigation law, whereby WUAs will be under its jurisdiction. Consequently, water users in spate irrigated areas could initiate the formation of WUAs, which will be registered in MAI and Ministry of Social Affairs”*.

Therefore, the Main Technical Assistance Team assumes that WUAs will be registered under the Water Law 2002 once the Executive Procedures regarding the formation and registration of WUAs have been issued as a Decree of the Council of Ministers.

Reportedly, one or more WUAs, which have been formed under a Netherlands-funded watershed management project, have been registered with the Ministry of Social Affairs under another law than the Cooperative Law No.39. It should be followed up whether this method can be used for IIP.

In order to avoid further delay in the implementation of the project, it is essential that the procedures for WUA registration are clarified as soon as possible; it is envisaged that the first WUAs will be established in Wadi Tuban from May 2003.

In order to facilitate the registration of WUAs, the Main Technical Assistance Team suggests that the following immediate actions are undertaken by the PMU with the assistance of the Main Technical Assistance Team before the end of April 2003:

- Conduct meeting with the Ministry of Social Affairs in Sana'a in order to discuss the possibilities to simplify the procedure for WUA registration under the Cooperative Law No.39, so that WUAs do not need a share capital of YR 1 million and each members must purchase at least one share of YR 5,000.
- Make assessment of the possibilities to register WUAs (temporarily) under any other existing law.
- Hold meetings with the concerned agencies (i.e. MAI and/or NWRA) that are in charge of preparing the Executive Procedures for the implementation of the provisions of the Water Law 2002 to discuss project views on the establishment and registration of WUAs.

4 REHABILITATION AND MAINTENANCE WORKS

Cost Ceiling for Canal Rehabilitation

During the participatory design process, farmers may come up with a long list of desired works. The available funds for scheme rehabilitation under the participatory approach are limited to be US\$ 6.3 M total, which corresponds to an average of US\$ 244/ha. The actual rehabilitation needs of the sub schemes may differ according to the condition of their individual schemes. The PPR gives the following indicative range of rehabilitation costs:

- Average cost estimates: Tuban \$ 342/ha and Zabid \$ 159/ha.
- Cost estimates for individual schemes in Tuban range from US\$ 70-800/ha

The Main Technical Assistance Team suggests that the Project sets an initial ceiling between US\$ 100-150/ha for canal rehabilitation or improvement works. Any works above this ceiling would be decided by the PMU after all designs are completed and the Project has an overview of required works, priorities and cost estimates.

Scope of Works

The list of rehabilitation works mentioned in the PPR provided an indicative cost estimate for project planning purpose.

The Main Technical Assistance Team recommends that the actual scope of rehabilitation and improvement works should be determined by the findings of the participatory planning and design process (PIM Step 7).

Routine maintenance works

The government has allocated O&M funds to the PIUs in Tuban and Zabid for 2002 and 2003. These funds are intended for routine O&M activities. Part of these funds is presently used for desilting canals. Although it is recognised that desilting of canals is badly needed, it should be realised that such works would generally classify as 'deferred maintenance' rather than 'routine maintenance'.

It would be prudent to restrict the amount of desilting work done under PIU's routine maintenance programme (without any farmer contributions), because the Project is likely to run into difficulty later on explaining that 10% farmers' contributions will be required for similar canal desilting works in other main and secondary canals.

The Main Technical Assistance Team proposes that:

- PIUs should focus the routine maintenance program on routine type of works, such as maintenance of gates (cleaning, lubrication, painting, repair) and on essential canal or embankment repairs.
- PIUs should focus routine maintenance works on the main Wadi, headgates and the upper part of the main canals.

5 FARMERS' CONTRIBUTIONS TOWARDS REHABILITATION COSTS

5.1 LEVEL OF FARMERS' CONTRIBUTIONS

According to the PAD (2000), farmers shall contribute 10% of the investment costs of earthworks, canal structures, roads and other civil works. However, some of these works, including part of the roads, will be included in the 'Priority Works', which follow a non-participatory approach and for which farmers do not have contribute to the rehabilitation costs.

During the current Community Awareness Campaign (PIM Step 2) farmers are informed that they have to contribute towards the capital costs of rehabilitation of canals and flood protection structures in the following way:

- 10% of total costs either in cash or labour during execution of rehabilitation works; and
- a cash repayment in yearly instalments totalling about 25% of the civil works expenditures. These payments will start 5 years after completion of the civil works and be stretched over a 20-year period.

In order to be able to communicate towards the farmers in a consistent and transparent way, the Main Technical Assistance Team proposes that:

- Farmers' contributions to the rehabilitation costs will only be required for the rehabilitation of the canal system, including desilting, profile reshaping, control structures, gates and associated structures, for which they will take over the O&M responsibility. No farmers' contribution will be required for roads, nor for emergency works.
- Farmers' contribution shall be fixed at 10% of the rehabilitation costs for all civil works on the canal system.
- Preferably before the end of May 2003, all concerned parties, including IDA, should mutually agree upon the proposed scope and level of farmers' contributions towards rehabilitation costs.

5.2 MODALITIES FOR FARMERS' CONTRIBUTIONS

It is envisaged that it will not always be easy to collect contributions in cash to the equivalent of 10% of the civil works costs from the farmers. Therefore other means to collect contribution should also be explored.

The Procurement and Disbursement Arrangements for the Irrigation Improvement Project are specified in Annex 6 of the Project Appraisal Document (August 2000). These arrangement specify "*subject to prior agreement with IDA in each case and practical considerations, works below an estimated value of US\$ 10,000 up to an aggregate amount of US\$ 1.0 million equivalent may occasionally be implemented, instead, by using direct contracting with the nearest available source*". (p.70)

It is also specified “*IDA Guidelines should be followed for all types of procurement, with some simplification of procedures and documents for small sub-projects, especially community involvement projects*”. (p.73)

It is clear that the Procurement and Disbursement Arrangements for IIP allow small works up to US\$ 10,000 to be executed through direct contracts with the nearest available source. This source should be the WUA. The execution of part of the rehabilitation works by the WUAs through direct contracting would have the following three main advantages:

- farmers will have the opportunity to contribute to the rehabilitation costs by undertaking part of the rehabilitation works (i.e. earthworks) for a lower contract price than the engineer's estimates;
- WUA will acquire the necessary technical and organisational skills to plan, execute and supervise civil works, which are needed for the implementation of O&M works following the formal transfer of the O&M responsibility; and
- farmers will develop a greater sense of ownership as they have directly implemented a part of the rehabilitation works on their spate irrigation system.

To facilitate the contribution of 10% of the rehabilitation costs for civil works on the canal system by the farmers, the Main Technical Assistance Team suggests that:

- Farmers shall have the option to contribute their 10% towards the rehabilitation costs for civil works on the canal system through the execution of one or more small works contracts (less than US\$ 10,000), whereby the contract price shall be 30% lower than the engineers' estimates.
- As the total amount available for direct contracting is limited to US\$ 1 million, direct contracting shall be exclusively used for small works to be carried out by the WUAs.
- Preferably before the end of March 2003, simplified procedures and documents for awarding small works contracts to WUAs should be obtained or prepared by the Main Technical Assistance Team.
- Preferably before the end of May 2003, IDA approval should be obtained for a simplified procedures and documents for awarding small works contracts to WUAs.
- Before the end of May 2003, the Main Technical Assistance Team should prepare an appropriate financing schedule, if farmers have to make cash contributions to the rehabilitation costs during the execution of the rehabilitation works.

Although the total scope of rehabilitation works on the canal systems will depend on the findings of the participatory planning and design process (PIM Step 7), it is estimated that the total costs will be in the order of US\$ 6 million. As farmers have to contribute 10% of the rehabilitation costs, their total contribution will be about US\$ 600,000. If farmers would make their total contribution to the rehabilitation costs only by undertaking small works contracts against a contract price of 30% lower than the engineer's estimates, the WUAs should carry out direct contracts with a total value of about US\$ 2 million. This would mean that at least 200 direct contract packages have to be prepared and supervised.

To facilitate the farmers' contributions to the rehabilitation works by undertaking small works contracts, the Main Technical Assistance Team suggests that:

- MAI and IDA should explore the possibility and the need to increase the maximum amount available for direct contracting to US\$ 2 million if farmers prefer to make their 10% contributions to the rehabilitation costs through the execution of small works contracts only.

6 OPERATION AND MAINTENANCE OF HEADWORKS

6.1 RESPONSIBILITY FOR O&M OF HEADWORKS

In order to support the Government's policy of institutional reforms in the irrigation sector, the PAD (2000, p8) specifies that the Project would support a programme of decentralisation and user participation in accordance with the following institutional model:

- at the level of the canal system, including primary canals, WUAs, which are based on existing informal WUGs, would take responsibility for O&M;
- at the scheme level, the WUAs would be federated into a SWUF that would ultimately take responsibility for O&M of the entire scheme, except the headworks; and
- at the scheme level, an Irrigation Council (IC) would act as a joint farmer/Government forum for ensuring public interest aspects of water management and for setting water charges.

The Policy Statement on PIM issued by MAI in July 2000 states in paragraph 2 (c)

“irrigation management and systems O&M responsibilities and powers should be progressively transferred from government agencies to self-reliant user organisations” and in paragraph 3 (e)

“transfer O&M functions to user organisations at local and later at scheme level will be backed by recognition of authority of user organisations commensurate with their responsibility, appropriate training and technical assistance”.

However, it is not clear if the water users through their WUAs and/or SWUFs shall take over the O&M responsibility for the modernised headworks (i.e. concrete diversion weirs).

During an Orientation Workshop in October 2002, which was attended by staff of the PMU and both PIUs as well as representatives from the Main Technical Assistance Team, participants agreed that the Government should remain responsible for the O&M of the diversion weirs for reasons of equitable/agreed distribution of water along the wadi and between two primary canals sharing the same diversion weir. Also the Government should remain responsible for flood warning and surface water monitoring.

The Main Technical Assistance Team supports the opinion that O&M responsibility for the diversion weirs should not immediately be transferred to the water users for the following reasons:

- the newly formed WUAs may not have the organisational and technical skills and capacity to undertake the O&M of the diversion weirs; and
- the small owner-operators, sharecroppers and tenants may not have the financial ability to pay the full O&M costs of the diversion weirs.

In principle, the headworks could be managed by one of the following institutions:

- a) Government, through one of its existing institutions or departments, such as TDA or RID;
- b) autonomous Public Utility, such as Water Boards; or
- c) private sector under a lease or concession contract.

To ensure the effective O&M of the diversion weirs, including the equitable distribution of base and spate flows between all primary canal systems along the Wadi, the Main Technical Assistance Team proposes that:

- Preferably before the end of May 2003, MAI and IDA should agree that at least during the project implementation period the O&M of the head-works along the wadi remains under the responsibility of the Government. At a later stage the O&M might be transferred to the WUA/SWUF.
- Preferably before the end of October 2003, PMU with the assistance of the Main Technical Assistance Team should prepare a proposal, in which the recommended institutional framework for the O&M of the headworks as well as the role of the Irrigation Council are presented.
- Preferably before the end of December 2003, all concerned parties should mutually agree upon the proposed institutional framework for the O&M costs of the diversion weirs.

6.2 FINANCING THE O&M OF HEADWORKS

The PAD (2000, p16) states that *“the suggested general principle for O&M cost sharing is that the WUAs should cover all O&M costs corresponding to those portions of the system that would be fully under their jurisdiction, while the Government pay the balance of the O&M costs. The target would be 90% financing of the scheme O&M by the WUAs by PY7”*.

This would mean that the WUAs are responsible for paying the full O&M costs of the primary and secondary canals, including all control structures, whereas the Government remains responsible for paying the full O&M costs of the headworks. However, the PPR (Volume E, p22) estimated that about one-third of the O&M requirements are at main canal level and about two-third at Wadi level, including the maintenance of the low flow channels in the Wadi bed to the main canal head gates. In other words, the 10% as balance of the O&M costs to be financed by the Government may not be sufficient to cover the O&M costs of the diversion weirs.

To ensure the financing of the O&M of the diversion weirs, the Main Technical Assistance Team is of the opinion that the following two options shall be considered:

- the Government finances the full O&M costs of the diversion weirs; or
- the Government recovers a part of the O&M costs of the diversion weirs from the farmers, whereby the following two options could be applied:
 1. farmers contribute in cash through their WUAs; and/or
 2. farmers contribute in labour by farmers would be responsible for the annual construction of the spurs in the Wadi bed to ensure the diversion of base and spate flow into the intake structures.

To ensure the sustainable financing of the full O&M costs of the diversion weirs, the Main Technical Assistance Team suggests that:

- Preferably before the end of October 2003, PMU with the assistance of the Main Technical Assistance Team should prepare a proposal concerning an appropriate financing mechanism for the O&M of the headworks.
- Preferably before the end of December 2003, all concerned parties should mutually agree upon the proposed financing mechanism for the O&M costs of the diversion weirs.

7 CONSEQUENCES OF NON-FORMATION OF WUA

The formation of WUAs as well as the transfer of O&M responsibility from the Government to the WUAs can only be on a voluntary basis. However, there is a possibility that farmers cannot or refuse to form a WUA. None of the relevant documents related to the Project specify what the consequences should be for the project implementation and for the future O&M in case farmers decide not to form WUAs. The main issue then is that the O&M responsibility for the primary and secondary canals cannot be transferred from the Government to the WUAs.

During a meeting attended by PMU staff and the Main Technical Assistance Team on 18 January 2003, the following two options were discussed:

- The Government will not rehabilitate the distributive network and will stop to operate and maintain the distribution system, allowing it to deteriorate. In this case the Government could allow the farmers to operate and maintain the system by themselves, without any further Government support; or
- The Government will rehabilitate the distributive network and will continue to operate and maintain the distribution system, but the farmers have to pay ISFs that are sufficient to cover all O&M costs carried out by the Government and the supply of water will be stopped if the farmers do not pay their due ISFs.

In order to create the conditions that encourages farmers to organise themselves in WUAs for the purpose of taking up the O&M responsibilities a formal Project policy is required. In order to have such policy, which can be communicated to all stakeholders, including the farmers, the Main Technical Assistance Team proposes that:

- PMU should issue a clear statement to all stakeholders that the formal policy of IIP is that rehabilitation works on spate irrigation systems will only be carried out if WUAs have been formed (PIM Step 8) and farmers have expressed their interest to take over the O&M responsibility for the canal system by signing the Works and Support Agreement (PIM Step 9).
- Only when it becomes clear that WUAs cannot be established on a significant number of primary canal systems, PMU with the assistance of the Main Technical Assistance Team should assess if the Government should remain responsible for the O&M of these primary canal systems and if the IIP shall undertake rehabilitation works on these primary canal systems.

8 WATER MANAGEMENT MODEL

Irrigation in Wadi Zabid and Wadi Tuban is generally well developed. A number of farmers make conjunctive use of spate and groundwater to grow high value crops such as fruits (i.e. banana and mango) and vegetables. Without pumping of groundwater, farmers would not be able to grow such crops, because the spate flows are highly unreliable and unpredictable. Therefore, groundwater cannot be ignored in the water management models for Wadi Tuban and Wadi Zabid.

The Main Technical Assistance Team proposes that the Project should not just look at improving the utilisation of spate water, but should take a broader view and aim at improving the conjunctive use of (i) spate water, (ii) base flow and (iii) groundwater.

Interviews and hydrological data for Zabid indicate that:

- Spates have become shorter in duration. In the past a spate would last 3 days, at present approximately 12 hours. As spates become shorter in duration, farmers downstream will likely get less water.
- Base flow may constitute 70% of the total annual flow at the Kolah weir upstream of Zabid. Part of the base flow may disappear in the Wadi bed. The remainder goes to 3 canals (Roda, Buny and Barry).
- Groundwater has perhaps become the most important source of irrigation in the middle and lower parts of the Wadi.
- Wells in the middle section of Zabid (Weirs 3 and 4) fall dry part of the year (farmers here reportedly cut their banana plantations).

The Main Technical Assistance Team proposes that the Project should promote more **equitable access** not only to spate water, but also to groundwater.

9 FORMATION OF SWUF

The PAD (2000, p8) states that “at the scheme level, the WUAs would be federated into a SWUF that would ultimately take responsibility for the O&M of the entire scheme, except the headworks”. However, the PAD does not specify what the specific responsibility for the SWUF will be with regard to the O&M of the entire scheme. One of the conclusions of the Orientation Workshop was that the SWUF would not be responsible for the O&M of any irrigation structure. Its tasks would be limited:

- monitoring of water distribution between WUAs at Wadi level;
- resolution of conflicts between WUAs;
- coordination between WUAs as managers of the primary canals and the operator of the diversion weirs; and
- representation of WUAs in the Irrigation Council.

The Inception Report also envisaged that the SWUF might also have the following additional tasks:

- provision of support services to WUAs with regard to training and/or procurement of equipment; and
- exploration, development and implementation of additional activities that are not directly related to O&M and water management.

The Main Technical Assistance Team is of the opinion that the above-mentioned tasks as the reasons for the establishment of SWUFs are not sufficient. Instead of forming SWUFs as an additional administrative layer, without direct O&M responsibilities, the above-mentioned tasks could also be implemented by the Irrigation Council/Water Zone Committee.

With regard to the institutional framework for the O&M of spate irrigation systems, the Main Technical Assistance Team suggests that:

The PMU with the assistance of the Main Technical Assistance Team should assess the need and feasibility to establish SWUFs at scheme level as part of the preparation of proposals regarding the institutional framework for O&M of the headworks.

10 INTENSIVE AGRICULTURE DEMONSTRATION PROGRAMME

According to the PAD (2000, p35), the objective of the proposed agriculture development component is to increase agricultural production in Wadi Tuban and Wadi Zabid through the implementation of an intensive on-farm demonstration programme aimed at increasing crop yields. The demonstration programme would not only target farmers that irrigate with spate water but also farmers, within the wadi command area, that use ground water exclusively or in conjunction with spate water.

Under the intensive agriculture demonstration programme, proven technologies would be transferred from the research stations to the farmers' fields, including:

- introduction of superior varieties for cotton, sorghum, sesame and other crops;
- usage of quality seeds;
- improved levelling of fields;
- improved on-farm water management;
- improved crop husbandry techniques, including optimal seeding dates, improved weeding and crop protection from pests and diseases;
- introduction of inter-cropping of compatible crops; and
- introduction of new crops.

In addition to these above-mentioned demonstration activities, the Main Technical Assistance Team proposes that the intensive agriculture demonstration programme should consider to include activities focused on:

- less-water consuming varieties/crops;
- improved fodder crops;
- improved processing and storage techniques;
- organic farming and integrated pest management;
- plantation of trees for fuel wood, fruit production and as wind breakers; and
- women-specific activities.

It is important that the Intensive Agriculture Demonstration Programme is carried out in co-ordination with:

- the PIM Programme, whereby the PIM Extensionists can facilitate the planning and execution of field activities to be carried out under the Intensive Agriculture Demonstration Programme;
- the Ground Water and Soil Conservation Project, in particular with regard to the introduction and demonstration of water-saving technologies (i.e. sprinkler and drip systems); and
- ongoing Government programmes, such as the sand dune stabilisation activities carried out by TDA.

11 CO-ORDINATION AND COMMUNICATION

11.1 PIU STAFF MEETING

To facilitate the planning and coordination of (field) activities between the different PIU sections as well as progress monitoring, PIU Staff Meetings should be held two-weekly and should be attended by all PIU staff, including consultants of the Main Technical Assistance Team Consultants stationed in the project area and the PIM Extensionists. The main purposes of these two-weekly/monthly staff meetings would be:

- review activities of the last two weeks;
- discuss problems encountered during the field activities with a focus on suitable solutions; and
- discuss the planned activities for the next two weeks and co-ordinate joint activities.

To facilitate the planning and coordination of (field) activities and progress monitoring in both Project areas, the Main Technical Assistance Team proposes that PIU Staff Meetings should be held every two weeks on a fixed day and time.

11.2 PIU MANAGEMENT MEETING

To ensure the effective planning, co-ordination, supervision and progress monitoring of the implementation of all IIP activities in both Project areas, a PIU Management Meeting should be held in the PIU Office on a monthly basis with the participation of:

- one or more representatives from PMU in Sana'a;
- PIU Director and all heads of the PIU sections;
- representatives from the concerned departments in the Lahej RAO and TDA;
- consultants of the Main Technical Assistance Team Consultants stationed in the project area; and
- one or more representatives from the Main Technical Assistance Team in Sana'a.

The main purposes of these monthly PIU Management Meetings are as follows:

- review activities of the former month on the basis of the Progress Reports prepared by the heads of the PIU sections;
- discuss problems and/or issues encountered during the execution of activities and formulate appropriate solutions and/or guidelines;
- review and discuss the planned activities for the next month on the basis of the Work Plans prepared by the PIU Director;
- planning of training activities; and
- planning of visits by PMU staff and Main Technical Assistance Team staff.

To ensure the coordination, supervision and progress monitoring of the implementation all IIP activities in both Project areas, the Main Technical Assistance Team proposes that PIU Management Meetings should be held at least once a month on a fixed day and time.

11.3 SCHEME ADVISORY BOARD

Although farmers are at the centre of the participatory process, the consultation of other key stakeholders should also be facilitated by creating an appropriate mechanism, such as an advisory board at Wadi level.

The following institutions and persons may be invited to become members of such a Scheme Advisory Board:

- Governorate;
- Local Councils;
- District Magistrate;
- Social and political leaders; and
- Canal Masters.

In addition to inform the members of the Scheme Advisory Board regularly about the progress of Project implementation and planned activities, the main responsibility of the Scheme Advisory Board is to support the IIP by:

- providing information and advice to the IIP on issues related to allocation and distribution of base and spate flows at Wadi and primary canal levels; and
- facilitating the implementation of the steps of the PIM approach, especially the formation of WUGs and WUAs by encouraging farmers to participate actively in the group formation process.

As long as the Irrigation Council has not been established, the Scheme Advisory Board may also undertake the following tasks:

- resolution of water-related conflicts between upstream and downstream users at Wadi and primary canal levels;
- enforcement of penalties against any party for violating agreed rules related to the allocation and distribution of water at Wadi and primary canal levels.

To facilitate the consultation of key stakeholders in both Project areas, the Main Technical Assistance Team proposes that a Scheme Advisory Board should be formed in Wadi Tuban and Wadi Zabid respectively.

APPENDICES

- **Tentative Time Schedule for Implementation of PIM Approach - Wadi Tuban**
- **Tentative Time Schedule for Implementation of PIM Approach - Wadi Zabid**
- **Outline Design and Construction Schedule**

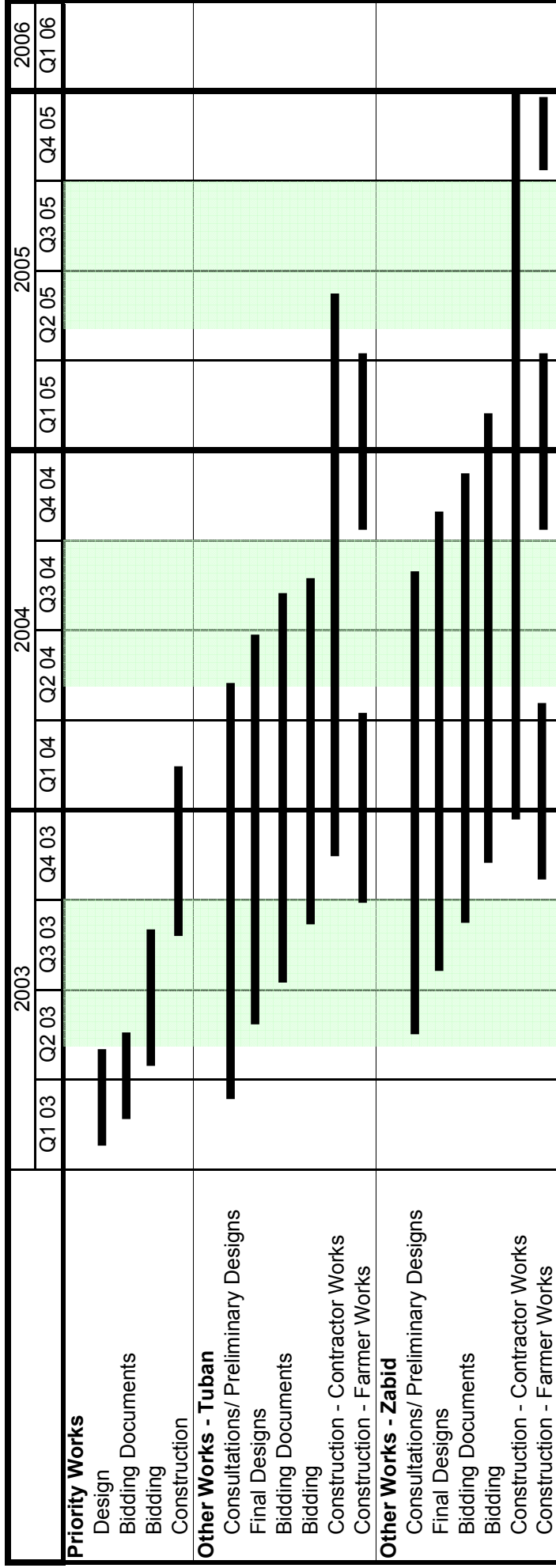
TENTATIVE TIME SCHEDULE FOR IMPLEMENTATION OF PIM APPROACH

WADI ZABID

| Step | Batch | Duration (months) | 2003 | | | | | | | | | | | | 2004 | | | | | | | | | | | | 2005 | | | | | | | | | | | |
|------|-------|-------------------|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|
| | | | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| 2 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 1 | 4.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1 | 3.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 1 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 1 | 7 (7) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 1 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 17.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 23.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 1 | 16 (5.5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 5.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 1 | 16 (5.5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 5.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- No difference in timing if first batch starts in 2003 or 2004
 - Timing of activity when the first batch starts in 2004
 - Timing of activity when the first batch starts in 2003

Irrigation Improvement Project - Outline Design and Construction Schedule



Legend Main hot/flood season when construction activities will be reduced.