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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

**DEPARTMENT OF IRRIGATION
MINISTRY OF WATER RESOURCES
HIS MAJESTY'S GOVERNMENT OF NEPAL**

**THE STUDY ON
THE REHABILITATION OF GOVERNMENT DEVELOPED
IRRIGATION SCHEMES
IN
THE KATHMANDU VALLEY**

**FINAL REPORT
OPERATION AND MAINTENANCE MANUAL**

FEBRUARY, 1995

**NIPPON KOEI CO., LTD.
CHUO KAIHATSU CORPORATION**

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LIST OF ABBREVIATIONS

Organizations and Others

| | |
|-------|---|
| ADB | Asian Development Bank |
| ADB/N | Agricultural Development Bank of Nepal |
| AO | Association Organizer |
| CRID | Central Regional Irrigation Directorate |
| DIO | District Irrigation Office |
| DOI | Department of Irrigation |
| FIG | Farmer-Irrigators' Group |
| HMGN | His Majesty's Government of Nepal |
| HYV | High Yielding Varieties |
| ISP | Irrigation Sector Program (ADB) |
| LIDs | Land Improvement Districts |
| MET | Monitoring and Evaluation Team |
| MIT | Mobile Irrigation Team |
| NRs | Nepalese Puppies |
| O&M | Operation and Maintenance |
| Rp. | Nepalese Rupee |
| TL | Turnout Leader |
| UNDP | United Nations Development Program |
| VDC | Village Development Committee |
| WUA | Water Users' Association |

Measurement

Length

| | |
|----|------------|
| mm | millimeter |
| cm | centimeter |
| m | meter |
| km | kilometer |

Time

| | |
|------|--------|
| sec | second |
| mini | minute |
| hr | hour |

Area

| | |
|-----------------|----------------------------------|
| cm ² | square centimeter |
| m ² | square meter |
| km ² | square kilometer |
| ha | hectare (10,000 m ²) |

Derived Measures

| | |
|---------------------|------------------------------|
| lit/sec | liter per second |
| lit/s/ha | liter per second per hectare |
| m ³ /sec | cubic meter per second |

Volume

| | |
|-----------------|------------------|
| cm ³ | cubic centimeter |
| m ³ | cubic meter |

Others

| | |
|-----|-----------|
| El. | Elevation |
|-----|-----------|

Weight

| | |
|-----|-------------------------|
| kg | kilogram |
| ton | metric ton (1,000 kg) |

CHAPTER-I INTRODUCTION

All the rural development projects need active participation of the people who will be benefited through implementation of the projects. People's participation in the rural development projects means people's involvement in the process of decision-making for administrative affairs, policy and formulation of the development plan. Out of these, irrigation is one of the means to promote rural development. " The Irrigation Policy " announced and published in 1992 by the Government of Nepal has been playing an important role to develop small to middle scale irrigation schemes as well as to rehabilitate existing old irrigation schemes in the country and it stresses farmers' more participation in operation and maintenance activities in the rehabilitated irrigation facilities after they are handed over to the farmers according to the regulations and practices specified in the policy. The irrigation policy also emphasizes participation of the farmers in selection, design and construction of the irrigation facilities, especially construction of tertiary canals. In addition, the irrigation policy states that all the government-developed irrigation projects which cover up to 500 ha. in hilly region and 2,000 ha. in Terai plane region and, if it is found feasible, even bigger projects should be turned-over to the farmers. The policy also states that once irrigation projects are turned-over to the farmers(beneficiaries), and all the activities regarding operation and maintenance of the irrigation schemes should be carried out by the concerned Water Users' Associations (WUAs) to be established under each scheme.

The policy introduced above also states general concepts for development of the irrigation schemes as well as concepts for operation and maintenance of the irrigation schemes which are to be managed by the farmers, and following the policy, a large number of existing irrigation schemes, specially small irrigation schemes are being rehabilitated by Department of Irrigation (DOI) and District Irrigation Offices (DIO) with monetary assistance from the foreign aid agencies, like Asian Development Bank (ADB) etc. and some of them have already been turned-over to the farmers. However, it has been found during the field survey for the existing irrigation schemes of different sizes, that most of the existing irrigation schemes in Katmandu valley do not have WUAs. Even some irrigation schemes which have WUAs, their functions are very limited only to such activities as cleaning the canals 2 to 3 times a year. And it has been also observed that even the established WUAs, they do not have any specific objective, targets and functions for running the irrigation systems properly. Also, farmers' participation in operation and maintenance of the irrigation systems is not at all satisfactory and water charge has never been collected from the farmers. These facts observed during the field survey have revealed that WUAs are not managed in organized way and they need to be drastically changed into more active organizations under which farmers' participation in operation and maintenance (O&M) of the irrigation facilities can be activated. With this background, this O&M manual has been prepared especially for use by the engineers of DIO and the farmers who are expected to manage their own irrigation schemes by themselves. And this operation and maintenance manual intends to realize the following:

- (1) To maintain the irrigation systems to be rehabilitated, which will be handed over to the farmers from the Government of Nepal, by the farmers themselves and achieve high graded performance in water management in the irrigation systems by the farmers themselves with the help of this manual.
- (2) To deliver the irrigation water efficiently and distribute it equally to the water users under each irrigation scheme, realizing to reduce the loss of water in the canal systems, timely and equal distribution of irrigation water and fair share of the irrigation water among the water users.
- (3) To maintain the facilities of the irrigation systems effectively and economically so that the irrigation systems can have reliability and productivity.

To help adequately mobilize the necessary human and other resources required for managing the irrigation systems.

- (4) To provide basic ideas for establishing the water users' associations responsible for operation and maintenance of the irrigation facilities including management of the water users' associations by farmers themselves.
- (5) To provide measures to settle the conflicts among the groups of the farmers also to provide measures to prevent adverse environmental effect that may arise while operating the irrigation systems.

It may be mentioned here that the rehabilitated irrigation canal systems are lined with concrete and equipped with such structures as intake facilities, diversion structures with gates on the canals, spillways, cross-drains etc. which need periodical maintenance and systematic operation by the farmers. Accordingly, all the farmers under the rehabilitated irrigation schemes are strongly requested to participate more frequently in O&M and water management than before with the understanding that the facilities once handed over to the farmers must be maintained by themselves including minor repairs of the canal systems for which costs should be borne from the water charge to be collected. This situation calls for drastic change in the way of thinking by the farmers, i.e., to make decision by themselves and to do what has been decided by themselves in a cooperative manner.

CHAPTER-II OBJECTIVES, BACKGROUND AND BASIC CONCEPTS

2.1 Objectives

Reflecting the statements given in Chapter-I and paying full attention to the prevailing performance by the farmers in O&M of the irrigation facilities as well as in water management under the existing irrigation schemes which was observed by JICA study team during April to June and August to September 1993, as well as during April to May, 1994, this O&M manual has been prepared to guide and help the farmers who are expected to operate and maintain the rehabilitated irrigation systems as well as to participate in water management in the systems effectively. Also this O&M manual has been prepared as reference materials which may be needed from time to time by the officials especially attached to DIOs who are expected to play very important roles in guiding the farmers at various stages of implementation of the project.

2.2 Basic Policy and Strategy Highlighted in the O&M Manual

This O&M manual has been prepared especially for use by the engineers of DOI and the farmers under the rehabilitated irrigation schemes aiming at more effective O&M of the irrigation facilities and water management through active participation by the farmers. Accordingly, attention has been paid to the contents of the O&M manual so that the contents include more concrete and clear descriptions on the activities needed in O&M of the rehabilitated irrigation facilities which are to be managed by the farmers themselves and suggestions for proper water management among the farmers under the scheme, avoiding abstract conceptions as much as possible. It may be stressed here that the basis on which this O&M manual stands is cooperation among the farmers and more active participation by the farmers in O&M activities and water management, which calls for mutual understanding among the farmers and initiative by the farmers themselves with proper guidance by the concerned governmental agencies like DOI, DIO and other organizations. In light of the fore-goings, it may be noted here that the success in O&M and water management largely depends upon the strong will and efforts of the farmers to perform their duties described in this manual.

Irrigation policy emphasizes more participation by the farmers in O&M and water management. This policy is considered reasonable and acceptable by the concerned government officials. However, the most important thing is that the policy should be understood well among the farmers who really participate in O&M and water management. In this sense, continuous efforts by the concerned government officials to make the farmers understand that success of the project largely depends on their performance. Accordingly, the concerned government officials are requested to have discussions and meeting with the farmers beneficiaries as much as possible at the initial stage of the project taking every opportunity prior to O&M and water management by the farmer beneficiaries in the rehabilitated irrigation systems. Also, it is very important to let the farmers understand that expected farmers' performance in O&M and water management under the rehabilitated irrigation is far different from the present one, which means all the farmers under the rehabilitated irrigation schemes are strongly requested to fitful their duties in O&M and water management, which needs drastic change in way of traditional understanding by the farmers in performing O&M and water management. This will call for more heavy duties to be performed by the farmers in O&M and water management and more active performance in related fields by the will of farmers themselves. Without this understanding, it seems very difficult that the project would achieve its successful goal. It may be mentioned here that it takes time to change present farmers' way of thinking in O&M and water management. Accordingly, this O&M

manual has been prepared hoping that farmers' way of thinking can be gradually changed into more active way in every aspect hopefully within considerable years with the guidance of the concerned government officials and this O&M manual, since nosuccessful examples have been shown in the other irrigation projects which are considered to have the same nature. Also it may be stated here that since this O&M manual has been prepared on the limited basis of observations during the study in Nepal and information obtained by the study team or provided by DOI and DIO, the suggestions and proposals given in this manual may be considered as general guidance to O&M and water management to be performed in the rehabilitated irrigation schemes. Accordingly, some part of this manual may be modified and improved in better way through the discussions between the farmers and the officials of DOI and DIO reflecting the actual requirements in each irrigation scheme to be rehabilitated through the project.

CHAPTER-III OPERATION AND MAINTENANCE MANUAL

3.1 General

This O&M manual includes the following which covers necessary and expected activities by the farmers and the concerned agencies at different stages of the project for successful O&M and water management in the rehabilitated irrigation schemes.

- (1) Information Dissemination for the Project
- (2) Organization and Training of Water Users Associations (WUAs)
 - (i) Formation of WUAs
 - (ii) Unit Organizations (Farmer-Irrigators' Group)
 - (iii) Formation of Unit Organizations
 - (iv) Function of the Unit Organizations (Irrigators' Groups)
 - (v) Appointment of the Turnout Leaders
 - (vi) Committees to be Established on the Basis of the Unit Organizations
 - (vii) Function of the Committees
- (3) Strengthening of District Irrigation Offices
 - (i) Roles and Function of AOs
- (4) Strengthening of Regional Irrigation Directorates
- (5) Improvement of Programming and Budgetary Procedures
- (6) Orientations to the Farmers
 - (i) Initial Orientations to the Farmers
 - (ii) Intermediate Orientations to the Farmers
 - (iii) Final Orientations to the Farmers
- (7) Kinds of the Facilities to be Operated/Maintained and Extent of the O&M Under the Manual
- (8) General Mode of O&M of the Facilities
- (9) General Task of Each Member of the Organizations
- (10) Weekly and Monthly Basis Task of Each Member of the Organization (WUA)
- (11) Special Task of Each Member of the Organizations
- (12) Recommended Formalities for Record Keeping
- (13) Participation by Farmers in Technical Training

- (14) Water Management
 - (15) Collection of Water Charge
 - (16) Deposit and Release of the Water Charge
 - (17) Anticipated Common Problems with Water Charge
 - (18) Water Rights
 - (19) Monitoring and Evaluation of O&M and Water Management Activities Under the Rehabilitated Irrigation Schemes
 - (20) Others
-

** In addition to the above, supporting materials have been attached to this O&M manual as Annexes-1 to 8, which include " Suggested Rules and Regulations for Water Users' Association ", " Recommended Constitution of Water Users' Association ", and " Technical and Sociological Data to be Filled Prior to Project Operation " etc.

3.2 Information Dissemination for the Project

- (1) For use by the farmers, simple pamphlets written in brief language (preferably in Nepalese) should be prepared by the engineers of DOI explaining the nature and objectives of the project, the role and obligations of the farmer beneficiaries, and the general policies and procedures on the selection of priority project, appraisal, sharing of the costs between the Government of Nepal and farmers, formation of WUAs, farmers loans with ADBN, construction agreement, WUA training, and turnover of the irrigation facilities to the farmers etc.
- (2) Each district irrigation office should identify the project area clearly and prioritize the project area for information dissemination program considering availability of the staff at DIO, accessibility to the project area, and other locally relevant factors.

3.3 Organization and Training of Water Users' Associations (WUAs)

As the operation and maintenance of the irrigation systems under the project is to be undertaken by WUAs to be newly established, their organization and training are crucial to the success of the project. Therefore, basic to proper implementation of the project is the methodology for organizing and strengthening of the WUAs. One of the recommended approaches to this is through farmers' participation in planning and construction of the facilities of the irrigation systems. It is through this that they learn how to work together in organized and harmonized manners, select their leaders, decide on their organizational structure, agree on their rules and regulations, and organize a viable WUA. The WUA can be further strengthened by training in O&M of the irrigation systems. The successful organization and strengthening of the WUAs depends in turn on the strengthening of the District, Regional and Central level offices of the Department of Irrigation, especially strengthening of DOI with respect to the manpower and equipment. Concrete strengthening plan of DIO is given in section 2.3 of Chapter 2 of Annex in Volume II of the main report.

3.3.1 Formation of WUAs

The foundation stone of the new policies on irrigation development is that the new policies on irrigation development is that the participation and consent of the beneficiaries

shall be compulsory for project identification, selection, design, construction, operation and maintenance. This requires that farmer beneficiaries are properly organized to enable effective group decision making and implementation of tasks of water distribution, system maintenance, conflict management, resource mobilization and increasing production.

Experience has shown that these tasks are best done when the WUA is organized with a base consisting of small groups of farmers who draw water from the same turnout on a tertiary canal of the designated irrigation systems. This base has to be strong in order that the WUA can also be strong. Each of the small groups should have adequate representation at the highest decision making body. It is very important that farmers are fully involved in all preliminary activities prior to implementation of the project to ensure that problems can be minimized in and when the project is approved.

3.3.2 Unit Organizations (Farmer-Irrigators' Groups)

In this O&M manual, the unit organizations to be established for O&M of the rehabilitated irrigation facilities have been planned paying attention to the tertiary irrigation block which covers the area of about 20 ha in average. Under the project, however, the unit organizations shall be established on the basis of the farmer-irrigators' groups consisting of 20 to 30 farmers who have an average agricultural land of about 0.24 ha totaling to about 5.0 ha in average. This unit organization shall be the minimum unit of a WUA to be established under the project. Accordingly, the number of the unit organizations to be established under the project will be as follows.

Table 3.3.1 Number of Unit Organizations

| <u>Name of Schemes</u> | <u>Net command Area(ha.)</u> | <u>Nos. of Unit Organizations</u> |
|---------------------------|------------------------------|-----------------------------------|
| <u>Kathmandu District</u> | | |
| Biswambhara (AK-04) | 92.0 | 18 |
| Boshan (AK-05) | 122.0 | 24 |
| Dakshinkali (AK-07) | 67.0 | 14 |
| Indrayani (AK-14) | 101.0 | 20 |
| Shali Nadi (AK-25) | 157.0 | 30 |
| Sub-total | 539.0 | 106 |
| <u>Bhaktapur District</u> | | |
| Bidol (AB-02) | 32.0 | 6 |
| Katunje (AB-10) | 40.0 | 8 |
| Kutdhal (AB-12) | 43.0 | 8 |
| Mahadev Khola (AB-14) | 112.0 | 22 |
| Sub-total | 227.0 | 44 |
| <u>Lalitpur District</u> | | |
| Kotkhu (AL-10) | 246.0 | 49 |
| Lubhu (AL-13) | 130.0 | 26 |
| Thika Bhairaw-I (AL-19) | 497.0 | 99 |
| Thika Bhairaw-II (AL-20) | 88.0 | 18 |
| Sub-total | 961.0 | 192 |
| Grand Total | 1,727.0 | 342 |

According to the farm survey conducted by JICA study team, the farm population and family size in 13 irrigation schemes are summarized as below.

Table 3.3 2 Farm Population and Family Size in 13 Irrigation Schemes

| Name of Scheme | Total Household | Total Population | Farm Household Resident Farmers | Outside Farmers | Total Farmers | Total Population |
|---------------------------|-----------------|------------------|---------------------------------|-----------------|---------------|------------------|
| Kathmandu District | | | | | | |
| Biswambhara (AK-04) | 229 | 1,260 | 224 | 0 | 224 | 1,232 |
| Boshan (AK-05) | 498 | 2,790 | 436 | 0 | 436 | 2,440 |
| Dakshinkali (AK-07) | 58 | 411 | 58 | 181 | 239 | 1,412 |
| Indrayani (AK-14) | 314 | 1,854 | 273 | 0 | 273 | 1,611 |
| Shali Nadi (AK-25) | 700 | 4,550 | 581 | 0 | 581 | 3,780 |
| Sub-total | 1,799 | 10,865 | 1,572 | 181 | 1,753 | 10,475 |
| Bhaktapur District | | | | | | |
| Bidol (AB-02) | 43 | 256 | 42 | 126 | 168 | 1,011 |
| Katunje (AB-10) | 177 | 1,024 | 167 | 0 | 167 | 967 |
| Kutudhal (AB-12) | 97 | 542 | 82 | 61 | 143 | 803 |
| Mahadev Khola | 490 | 2,942 | 431 | 0 | 431 | 2,585 |
| Sub-total | 807 | 4,765 | 722 | 187 | 909 | 5,366 |
| Lalitpur District | | | | | | |
| Kotkhu ((AL-10) | 1,509 | 10,113 | 1,295 | 0 | 1,295 | 6,862 |
| Lubhu (AL-13) | 634 | 3,868 | 565 | 0 | 565 | 3,448 |
| Thika Bhairaw-I (AL-19) | 2,249 | 13,043 | 1,988 | 0 | 1,988 | 11,530 |
| Thika Bhairaw-II (AL-20) | 1,635 | 8,830 | 677 | 0 | 677 | 3,655 |
| Sub-total | 6,028 | 35,853 | 4,525 | 0 | 4,525 | 25,495 |
| Total | 8,633 | 51,484 | 6,819 | 368 | 7,187 | 41,336 |

Also, the land tenure in 13 schemes is given as follows.

Table 3.3.3 Land Tenure in 13 Irrigation Schemes

| Name of Scheme | Owner Cultivator | Tenant Cultivator | Owner cum Tenant | Total Farmer |
|---------------------------|------------------|-------------------|------------------|--------------|
| Kathmandu District | | | | |
| Biswambhara (AK-04) | 4 | 25 | 195 | 224 |
| Boshan (AK-05) | 196 | 109 | 131 | 436 |
| Dakshinkali (AK-07) | 151 | 5 | 84 | 239 |
| Indrayani (AK-14) | 44 | 161 | 68 | 273 |
| Shali Nadi (AK-25) | 139 | 122 | 320 | 581 |
| Sub-total | 534 | 422 | 797 | 1,753 |
| Bhaktapur District | | | | |
| Bidol (AB-02) | 45 | 55 | 67 | 168 |
| Katunje (AB-10) | 42 | 42 | 84 | 167 |
| Kutudhal (AB-12) | 43 | 29 | 72 | 143 |
| Mahadev Khola (AB-14) | 22 | 345 | 65 | 431 |
| Sub-total | 152 | 471 | 287 | 909 |
| Lalitpur District | | | | |
| Kotkhu (AL-10) | 259 | 660 | 376 | 1,295 |
| Lubhu (AL-13) | 305 | 209 | 51 | 565 |
| Thika Bhairaw-I (AL-19) | 1,074 | 99 | 815 | 1,988 |
| Thika Bhairaw-II (AL-20) | 406 | 0 | 271 | 677 |
| Sub-total | 2,044 | 969 | 1,512 | 4,525 |
| Total | 2,730 | 1,861 | 2,596 | 7,187 |

The said survey also gives the landholding in 13 irrigation schemes as follows.

Table 3.3.4 Landholding in 13 Irrigation Schemes

| Name of Scheme | Marginal >0.2ha | Small (0.2 - 0.5 ha) | Medium (0.5-1.0 ha) | Large 1.0 ha< | Total Farmers | Average Farm Size |
|---------------------------|--------------------|-------------------------|------------------------|------------------|---------------|----------------------|
| Kathmandu District | | | | | | |
| Biswambhara (Ak-04) | 99 | 103 | 20 | 2 | 224 | 0.41 |
| Boshan (Ak-05) | 262 | 131 | 44 | 0 | 436 | 0.28 |
| Dakshinkali (AK-07) | 81 | 120 | 36 | 2 | 239 | 0.28 |
| Indrayani (Ak-14) | 177 | 55 | 35 | 5 | 273 | 0.37 |
| Shali Nadi (Ak-25) | 267 | 215 | 81 | 17 | 581 | 0.27 |
| Sub-total | 886 | 623 | 216 | 28 | 1,753 | 0.32 |
| Bhaktapur District | | | | | | |
| Bidol (AB-02) | 50 | 66 | 48 | 3 | 168 | 0.19 |
| Katunje (AB-10) | 82 | 60 | 22 | 3 | 167 | 0.24 |
| Kutudhal (AB-12) | 46 | 40 | 56 | 1 | 143 | 0.30 |
| Mahadev Khola (Ab-14) | 272 | 108 | 43 | 9 | 431 | 0.26 |
| Sub-total | 450 | 273 | 169 | 17 | 909 | 0.25 |
| Lalitpur District | | | | | | |
| Kotkhu (AL-10) | 570 | 259 | 401 | 65 | 1,295 | 0.19 |
| Lubhu (AL-13) | 215 | 333 | 17 | 0 | 565 | 0.23 |
| Thika Bhairaw-I (AL-19) | 1,173 | 517 | 258 | 40 | 1,988 | 0.25 |
| Thika Bhairaw-II (Al-20) | 508 | 102 | 54 | 14 | 677 | 0.13 |
| Sub-total | 2,465 | 1,211 | 731 | 118 | 4,525 | 0.20 |
| Total | 3,801 | 2,107 | 1,117 | 162 | 7,187 | 0.24 |

3.3.3 Formation of Unit Organizations

Formation of unit organizations should be started with formation of small farmers groups (usually it is called "Toli" in Nepalese term, however, in this manual it is referred to as "irrigator group"). All the farmers who receive irrigation water from a particular turnout of the specified irrigation system should belong to one group headed by active leaders. Identification of such leaders should be done by farmers themselves or by assistance of Association Organizer(s) and concerned overseers who are employed by District Irrigation Office(DOI). After identifying active leaders of small farmers groups, the Association Organizers (AOs) should first train them on how to discuss in the meetings with the members of other groups in a cooperative manner. Generally, one leader per one turnout shall be selected and appointed. And he (she) will be responsible for managing the irrigated area under a specified turnout.

3.3.4 Function of the Unit Organizations (Irrigators' Groups)

The unit organization consists of the farmers who belong to the irrigated area under a specified turnout located at the head of a tertiary canal (hereinafter the area is referred to as "turnout area"). The membership to the unit organization is to be the farmers who actually engage themselves in farming under the turnout area. Basically, each member under the same turnout area is entitled to receive the irrigation water depending on the size of the farmlands which they own and availability of irrigation water. On the other hand, each member of the organization is requested to fulfill the following duties.

- (1) To faithfully participate in O&M activities which are specified in sections 3.10 to 3.12 of chapter 3 of this O&M manual.

- (2) To pay water charge regularly which is essential to maintain the irrigation systems in good condition as well as to run the organization properly with respect to its administrative matters including savings for unexpected expenditures as specified in sections 1 and 8 of Annex-1 of this O&M manual.
- (3) To attend the meeting(s) at unit organization for decision-making among the members and settling the problems if any as specified in section 1 of Annex-1 of this O&M manual.
- (4) To attend the technical training course (orientations to the farmers) for O&M and water management etc. to be arranged by DIO to acquire and improve the technique for O&M and water management.
- (5) In the case of emergencies caused by natural hazards, all the members are requested to cooperate each other immediately to minimize the hazards and damages to the irrigation facilities as specified in section 3.12 of chapter 3 of this O&M manual.
- (6) To maintain records of O&M activities and water management as well as to maintain tools for O&M in good condition as specified in Annex-6 of this O&M manual.

3.3.5 Appointment of the Turnout Leaders

As already discussed in section 3.3.3, to represent the unit organization, each unit organization must appoint a representative person, hereinafter referred to as "turnout leader". The turnout leader is entitled to express his (her) opinions, to act as a leader of the unit organization and to order the members to carry out their duties specified in this manual as well as tasks specified in the meeting(s). The turnout leader is also entitled to call together the members whenever necessary to settle the problems if any. The turnout leader is also requested to participate in O&M activities and water management as well as in collecting the water charge from each member of the unit organization. The assignment period of the turnout leader will be two years in general and in the case he (she) can not fulfill his (her) duties because of illness and unavoidable accidents, he (she) will be immediately replaced by the another person who is elected by the members of the unit organization and the elected person will succeed the remaining assignment without delay.

3.3.6 Committees to be Established on the Basis of the Unit Organizations

Under the specified irrigation scheme, one committee will be organized on the basis of the representative of each unit organization. And the committee thus organized is considered to be the top organization for decision-making for action plan for various activities needed for O&M of the irrigation facilities, administrative affairs, water management, especially, planned distribution of water to each turnout, conflict management and other problems to be settled. With this background, the committee under each scheme consists of the following members. And actually these committees are considered as WUAs to be newly established under each irrigation scheme to be rehabilitated.

Table 3.3.5 Number of Committees to be Established

| <u>Name of scheme</u> | <u>Number of the committee</u> | <u>Total Members of the committee</u> |
|-----------------------|--------------------------------|---------------------------------------|
| Biswambhara (AK-04) | 1 | 224 |
| Boshan (AK-05) | -do- | 436 |

| | | |
|----------------------------------|------|-------|
| Dakshinkali (AK-07) | -do- | 239 |
| Indrayani (AK-14) | -do- | 273 |
| Shali Nadi (Ak-25) | -do- | 581 |
| <hr/> | | |
| Sub-total (Kathmandu district) | 5 | 1,753 |
| Bidol (AB-02) | 1 | 168 |
| Katunje (AB-10) | -do- | 167 |
| Kutdhal (AB-12) | -do- | 143 |
| Mahadev Khola (AB-14) | -do- | 431 |
| <hr/> | | |
| Sub-total (Bhaktapur district) | 4 | 909 |
| Kotkhu (AL-10) | 1 | 1,295 |
| Lubhu (AL-13) | -do- | 565 |
| Thika Bhairaw-I (AL-19) | -do- | 1,988 |
| Thika Bhairaw-II (AL-20) | -do- | 677 |
| <hr/> | | |
| Sub-total (Lalitpur district) | 4 | 4,525 |
| <hr/> | | |
| Grand Total | 13 | 7,187 |

As a result, 13 committees (WUAs) consisting of 7,187 farmers should be newly established. These committees should be established at least one year ahead the implementation of the project. It may be mentioned here that we must consider how to organize the farmers into a WUA, because it is considered as one of the most difficult problems to be faced in establishing a new organization. One of the important solution to the above problem will be to give the confidence to the farmers that the irrigation water is assured to the terminal irrigation facilities in each scheme to be rehabilitated through the project. The confidence may be obtained by the explanation by the engineers of DOI to the farmers of the difference between this project and other irrigation projects including irrigation projects by ISP. This explanation is considered very important because, in the past, many government-developed irrigation projects failed to assure the distribution of irrigation water to the terminal irrigation facilities, especially to the tertiary irrigation canals and to the on-farm level canals where the irrigation water is actually needed by the farmers.

3.3.7 Function of the Committees (WUAs)

It is recommended that the committees should have the following functions:

- (1) The committees (WUAs) will act as the top organizations for decision-making for every affair concerning O&M of the irrigation facilities, water management including water distribution, water charge collection, including its deposit at the bank and proper running of the deposited funds, decision on the working schedule for O&M activities under each scheme, conflict management, and settlement of the problems which may arise in the course of daily activities for O&M of the irrigation facilities.
- (2) The committees will appoint one chairman who represents the general assembly of the WUAs, 13 representatives who represent 13 WUAs, and at least 2

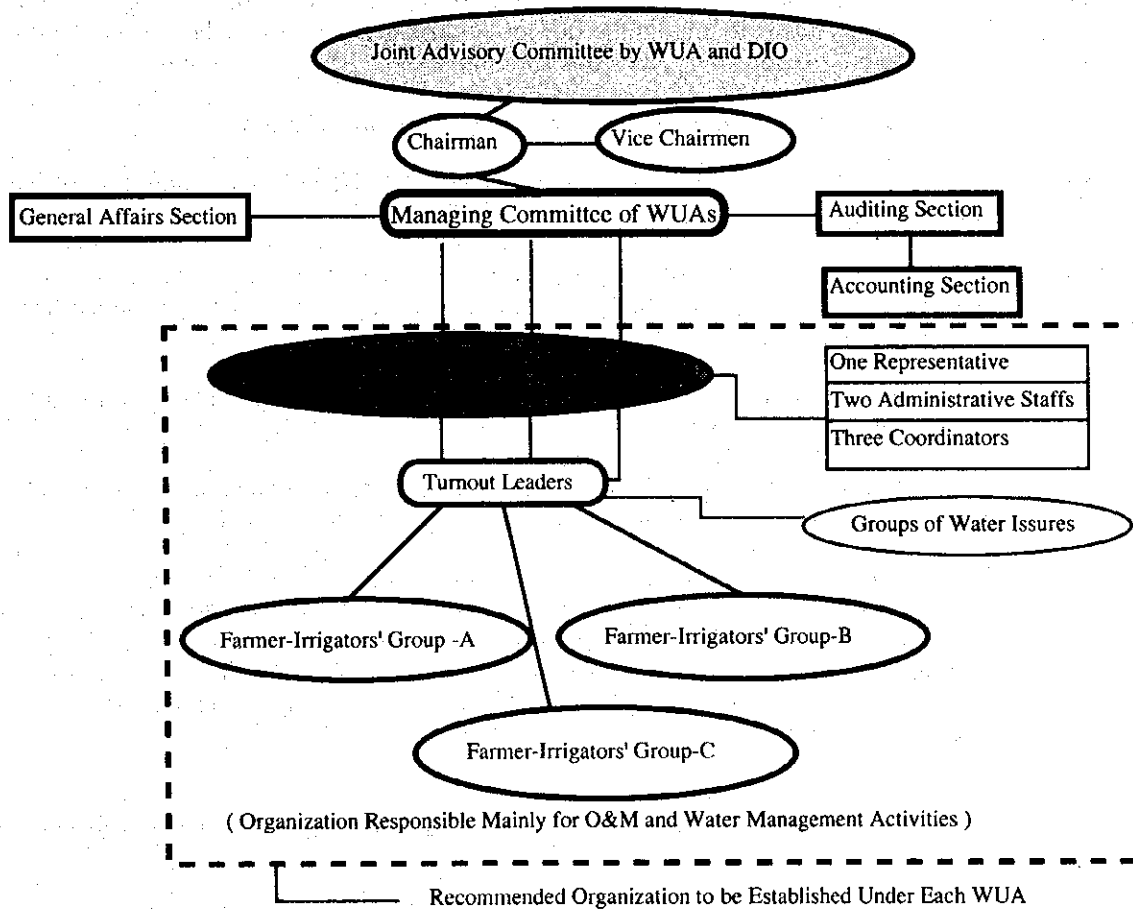
- administrative staffs and 3 coordinators for each WUA who help run the organizations smoothly.
- (3) The committees (WUAs) will hold its general assembly once in a year and its regular meetings once in two months. In case of need, the chairman is entitled to convene the committees and ask the members to attend the general assembly.
 - (4) The committees are requested to invite concerned official(s) of DOI to attend the committee as observer(s) to receive guidance if necessary.
 - (5) The committees are responsible for preparing an annual report to show their activities for the year and the report must include the following:
 - (i) General activities in O&M of the irrigation facilities for the year under each scheme and problems to be settled in the future.
 - (ii) Accounting report on the water charge collected from the members, with respect to total amount collected, its disbursement during the year (including detailed items for which the disbursement has been made) remaining amount to be carried over next year and anticipated budget required for next year etc.
 - (iii) The committees are entitled to convene all the turnout leaders to attend the general assembly and to hear about their performance in O&M activities and water management for the year. The committees are requested to give proper advises and guidance to each turnout leader so that they can achieve higher performance in O&M activities.
 - (iv) The report should be prepared by the end of December of every year at latest and it should be presented to the general assembly for approval.
 - (6) The turnout leaders are responsible for informing all the members of the decisions taken by respective committee and what were discussed in the committee without delay.
 - (7) The assignment period of the committee members will be 2 years in general. New committee members will be appointed through the election to be held among the committee members. Unless otherwise specified, re-assignment of the previous committee members through the election is guaranteed. However, the total assignment period of each committee member shall not exceed 4 years to avoid oligopoly of the positions by the same persons.
 - (8) The committees are responsible for arranging the meetings. Generally, the meetings will be held 7 times a year including a general assembly. The decisions and rules which have been made in the meetings are considered to be the total will of the all members and all the members are requested to observe and follow them strictly.

These functions give general rules and duties to be observed and carried out by all the members of the organizations and even the chairman is requested to participate in the above. However, in many countries, a lot of experiences in the established organizations for O&M and water management have shown that they have tendency to become rigid and passive in actual O&M activities. Also, the organizations have tendency to become an organization with top-to-down decision-making characteristics which may not be accepted in this manual, resulting in failure in active O&M of irrigation facilities and effective water management in the irrigation systems. These tendencies must be avoided by all means. Thus , the main issue to be discussed in formation of organizations for O&M should be "

how to maintain the organizations in good condition under farmers participation " that means to always keep the farmers' willingness to participate in O&M and water management in active and cooperative condition. Evidently, these problems seem to be very difficult to handle and they can not be solved within short period. It needs some time as well as drastic change of way of thinking of the farmers who are usually considered to be very conservative.

With this understanding mentioned in sections 3.3.1 to 3.3.7 of chapter 3 of this O&M manual, it is recommended to establish the following organization for O&M activities by WUAs as shown below.

Figure 3.3.1 Recommended Organization to be Established



Note: Number of the Members of Committee of a WUA should be limited to 6 (for Bidol Irrigation Schemem, the smallest irrigation scheme) to maximum 20 (for Thika Bhairaw-I irrigation scheme, the largest irrigation scheme.

3.4 Strengthening of District Irrigation Offices

It is necessary to introduce a new task to be borne by each district irrigation office under this project which includes formation, training and monitoring of WUAs. DIO should be strengthened so that it can develop technical skills to attain this purpose. As the nature of the project is very similar to on-going ISP, existing Association Organizers (

AOs) should also be added to the present staff of engineers and overseers. Initially, one AO should at least be recruited to each DIO to begin with the strengthening program. Additional AOs should be recruited as needed when the program expands. Engineers, assistant engineers and AOs should be trained to work together as a team.

3.4.1 Roles and Function of AOs

Association Organizers (AOs) will play crucial roles in guiding the farmers who are expected to fully participate in O&M of the rehabilitated irrigation facilities and water management in the rehabilitated irrigation schemes. The major role of AOs is to serve as a catalyzer of various activities, helping the farmers in their decision making. The main function of AOs is to guide and assist the farmers to organize viable WUAs, enabling them to sustain the operation and management of their irrigation scheme towards achieving collective irrigated agricultural productivity improvement. The primordial responsibility of the AOs is to enable the farmer beneficiaries organize themselves into a cohesive association. Accordingly, the AOs should have the following assignment:

- (1) To facilitate assessment of needs of irrigation community and resources.
- (2) To assist the farmers in identifying their leaders and to develop the capability of the farmer-leaders in effective handling of the affairs of the association.
- (3) In consultation with relevant DIO staff, to facilitate capability of the association to make plans for activities by the farmers and to manage human resources necessary for the activities etc.
- (4) To coordinate with the technical staff of DIO to facilitate farmers' participation in all the stages of the project.
- (5) To develop work plans for the farmers in line with necessary technical activities to ensure maximum farmers' participation in every phase of the project.
- (6) To prepare and submit brief reports on a monthly-basis to the chief engineer of DOI. And the reports should include activities by the AOs, its performance, observation and evaluation by the AOs on the farmers' activities and recommendations for further activities by the AOs and farmers. This activity by the AOs should be continued until the WUAs have been fully established as independent organizations.

With the above-mentioned guidance, the AOs will participate especially in the following roles:

- (1) To help an irrigation community (the word for " an irrigation committee " used here may be considered as a temporary working organization required for establishing a new WUA for each rehabilitated irrigation scheme under the project, and the working committee should consist of at least one AO and 5 leading farmers from a designated irrigation scheme to be selected and appointed by the AO.) establish appropriate means and procedures to achieve its goal highlighted in this O&M manual.
- (2) To guide the community for establishing an organization (new WUA) with such desirable functions as described in this O&M manual and to guide the committee not to use the community for his (her) own ends; neither manipulate people or coerce action, rather encourage every local initiative especially by the farmers to be organized into a new WUA.

3.5 Strengthening of Regional Irrigation Directorate

As in the DIOs, Regional Irrigation Directorate (RID) has also to be strengthened to be able to handle additional tasks under the project. The additional tasks will include the overall monitoring of the progress of the project, especially, monitoring of various activities at the initial stage of the project where organizing the concerned farmers into a designated WUA will take place. This task should be carried out under the leadership by the Mobile Irrigation Team (MIT) which is responsible for providing assistance that may be needed by DIOs especially at the preparatory stage of the project.

3.6 Improvement of Programming and Budgetary Procedures

For satisfactory implementation of the project in accordance with the new policies (irrigation policy in 1992 and other related policies) on participatory irrigation development, there should be sufficient leading time for information dissemination, technical preparations and institutional activities before the construction of the physical facilities of the project. The leading time for this will be about six months for a project with average difficulty and 12 months for that with greater difficulty. Accordingly, the project should be generally programmed for implementation not in one fiscal year but at least in two fiscal years. Thus in any fiscal year budgetary support for the program should be provided for two general activities and another for the project construction. During the said leading time, orientations at different stages to the farmers shall be given to the farmers mainly by the engineers of each DIO, i.e., Kathmandu, Bhaktapur and Lalitpur districts.

3.7 Orientations to the Farmers

3.7.1 Initial Orientations to the Farmers

(1) Target for the Initial Orientations

Considering the above-mentioned situation as well as the importance of organizing the farmers into a new WUA at an early stage of the project (prior to implementation stage) all the farmers who belong to any rehabilitated irrigation scheme under the project can be the targets of the orientations and they are requested to receive the orientations as one of their most fundamental duties prior to formation of the organizations (WUAs). The orientations may be headed by Association Organizers(AOs) from each District Irrigation Office. In the orientations the following should be clearly transmitted to the farmers. Also it is recommended that at least selected 10 farmers from each irrigation scheme to be rehabilitated should attend the orientations and the orientations should be held at each DIO office.

(2) Main Issues to be Oriented to the Farmers

To obtain general understanding for need of O&M and water management by the farmers for the irrigation schemes to be rehabilitated, it is recommended to first give the initial orientations by the engineers and AOs of DIO to the selected farmers, which include the purpose and necessity of O&M and water management by the farmers and general concepts to be taken into account for better performance of O&M and water management by the farmers etc. as follows.

- (a) It should be stressed at the initial stage of the orientations that maintenance of the irrigation systems by the farmers themselves does not mean that it gives an advantage only to the other farmers, rather, it gives in turn a great advantage to the individual farmers attached to each irrigation scheme. That is why participation in

O&M activities in a cooperative manner is strongly requested. And it must be stressed that organizations (WUAs) to be established will never last long without this understanding and cooperation among the farmers.

- (b) It should be also stressed in the orientations that water resources have become a common asset to be equally shared among the people not only among the farmers but also among the people who belong to the other sectors. Also it is very important to let the farmers know that to make water resources available for irrigation needs cost for water development which is usually very high as is the case in drinking water. This background calls for need of collection of reasonable amount of water charge from the farmers who receive benefits from the project. However, it is anticipated that it will take time for the farmers to understand this clearly because they have been accustomed for a long time to take the irrigation water as granted free of charge. Therefore, Association Organizers (AOs) are requested to patiently guide the farmers to make them understand this, utilizing every possible opportunity and make them sure that the collected water charge will be properly used only for the purpose of O&M of the irrigation facilities which are their own assets. This kind of guidance to the farmers should also be given at the initial stage of the orientations.
- (c) It should be stressed that all the members(farmers) under the organizations have equal rights and at the same time they are requested to fulfill their duties equally to maintain the organizations for the farmers themselves as much as possible. To make this policy very sure, all the members including even the chairmen of the organization should take part in O&M activities for which mutual decisions are to be made in the meetings. It means that prevailing O&M activities which are being carried out by the very limited number of hired manpower (in most cases 2 to 3 farmers with payment) should be changed into all farmers-participating type activities as early as possible, thus enabling to expand life span of the irrigation facilities as long as possible.
- (d) Water management by the farmers in the designated irrigation systems will play a vital role in the organizations. Evidently, success of water management largely depends on how the farmers participate in it in a friendly and cooperative manner with the understanding that effective water management will contribute to increase agricultural products as well as to other sectors which also need water badly.
- (e) Another important issue of the orientations is that after completion of the project farmers have to maintain their irrigation systems including the related facilities by themselves without expecting any budgetary support (except some special cases as specified in this O&M manual) as well as manpower from the Government. This situation will force the farmers to contribute more in terms of expenditure and labor compared to previous situation under which the farmers have been put. However, this situation must be overcome by the combined efforts between the farmers and the concerned governmental officials, otherwise it will be very difficult to establish the farmers-managed organizations for O&M of the facilities, which is one of the most important targets of the project.

As the first step towards successful establishment of the organizations, these basic understandings required for O&M of the irrigation facilities and water management in the designated irrigation systems are to be fully understood by all the farmers prior to establishment of the organizations. Therefore, as stated earlier, at least 10 farmers including turnout leaders from each irrigation scheme should receive the initial orientations which will be held with the assistance from each District Irrigation Office and the orientations will take place for 7 days including free discussions between the farmers. And the participants must bear the duties to transfer what have been discussed, learnt and decided in the orientations to each farmer who belongs to the designated organization

without delay. Transfer of the results obtained in the orientations to the farmers of each irrigation scheme shall be made by the respective turnout leaders in the village-level meetings with the assistance of AOs of each DIO.

(3) Timing of the Initial Orientations

Considering that it will take considerable time for the farmers to change their way of thinking in O&M of the irrigation facilities as well as in water management, and paying attention to importance of the issues to be given in the orientations, it is desirable that these orientations should start as early as possible, preferably, they should start at least 1.5 years ahead the formal implementation of the project.

(4) Place Where the Initial Orientations Are Given

Each District Irrigation Office (DIO) is responsible for arranging a suitable place or room which can accommodate about 15 persons including lecturers to perform the orientations. Each DIO is also requested to arrange audio visual equipment which can clearly show actual performance by the farmers in O&M activities as well as in water management activities in different countries in Asian regions to clearly show what is wanted in O&M activities and water management to the farmers. And it is considered that this will largely contribute to change the traditional manner of O&M and water management by the farmers in the valley.

(5) Notice for Attending the Initial Orientations

Each DIO is also responsible for issuing the notice to the designated farmers at least 2 weeks ahead the orientations so that maximum number of the farmers can receive the orientations. The notice should be prepared in a written form and it should be delivered to each designated farmer without delay. Each DIO and concerned Association Organizers(AOs) are responsible for delivery of the notice.

(6) Papers to be Prepared for the Initial Orientations

For effective initial orientations, brief papers (consisting of about 10 pages) as a text will be prepared by each DIO in collaboration with concerned AOs. The papers will include the following:

- (a) Objective and purpose of the orientations.
- (b) Government's intention for the project.
- (c) General obligation and expected contribution by the farmers.
- (d) Expected functions of the organizations to be established.
- (e) Need of regular payment for water charge and collection method.
- (f) Necessity and importance of O&M and water management by the farmers in a cooperative manner.
- (g) Clear explanation by the engineers and AOs of DIO of the difference between this project and other irrigation projects in the valley.

As stated earlier, the leading farmers (turnout leaders) who have received initial orientations shall bear the obligation to convey the contents of the orientations to all the farmers of the designated organizations (WUAs) clearly and without delay. Transfer of the said contents should be made in the village-level meetings as suggested earlier. Since

the contents of the orientations include what are not so concrete, it is recommended that at least 3 days should be assigned for explanation of the contents and during which free discussions among the farmers should be held to deepen the understanding of the subject each other. It is very important that the farmers are gradually guided to have an understanding of the importance of cooperation in O&M and water management as well as to have a clear understanding of need of payment of water charge for irrigation water.

3.7.2 Intermediate Orientations to the Farmers

(1) Target Farmers for the Intermediate Orientations

Selection of the target farmers for the intermediate orientations is considered very important since the contents of the intermediate orientations include mainly practical technique needed for daily O&M activities as well as water management. Therefore, it is recommended that 10 farmers including the turnout leaders from each designated organization should receive the intermediate orientations. The age of the attendants to the orientations should range from young to old, preferably from 18 to 50 to achieve better performance in O&M and water management which need cooperation from different generation.

(2) Main Issues to be Oriented to the Farmers

As mentioned above, the lecture given in the intermediate orientations includes mainly practical technique required for daily O&M activities and water management. They will include the following:

- (a) Explanation by the lecturers (engineers and AOs of DIO)of the purpose of the intermediate orientations.
- (b) Kinds and extent of the work to be carried out in O&M and water management activities by the farmers.
- (c) Timing of each work mentioned above.
- (d) Procedures of each work.
- (e) Method and timing for opening and closing the gates and how to measure the discharge through the gates etc.
- (f) How to keep records for O&M and water management activities.
- (g) Usage of tools and maintenance of tools.
- (h) Necessity of group work in organized way, especially in water management.
- (i) Utilization of the records obtained during O&M and water management activities.
- (j) Method of reporting of the important findings (problems and troubles with the irrigation facilities) during O&M and water management activities to the responsible persons (preferably to the designated turnout leaders.).
- (k) Arrangement of meetings and method of debates among the members.
- (l) Overall responsibilities of the members of the organizations (WUAs).

3.7.3 Final Orientations to the Farmers

(1) Target Farmers for the Final Orientations

Target farmers for the final orientations will be the participants to the intermediate orientations considering that the farmers who are expected to be key personnel in O&M and water management activities can receive a series of orientations. In the case the same participants to the intermediate orientations can not attend the final orientations, then another members are requested to attend the orientations by proxy without failure.

(2) Main Issues to be Oriented to the Farmers

Since the final orientations are considered to be the finish of the formal orientations to the farmers, the contents of the orientations will include comprehensive training in O&M of the facilities and water management including actual O&M activities by the farmers guided by several association organizers. The final orientations will include the following:

- (a) Confirmation of the importance of the of continuous O&M activities as well as water management and appeal to the need of change of way of thinking in O&M and water management activities.
- (b) General guidance to the farmers on the comprehensive activities required for O&M and water management.
- (c) How to establish the organizations (WUAs) and necessary activities to be taken by the farmers prior to establishing the organizations (WUAs).
- (d) Expected participation by the farmers at the implementation stage of the project in collaboration with respective contractors. In this project, it is intended that the farmers should mainly participate in improvement of on-farm level irrigation systems after the tertiary canals, decision of the locations of the turnouts on the tertiary canals and improvement of his (her) farmland conditions etc.
- (e) Preparedness for payment of partial project cost to be shared by the farmers according to the Government's regulations.
- (f) Advises and discussions for the preparation of draft constitution and regulations to be established in the organizations (WUAs).
- (g) Advises and discussions for the preparation of detailed regulations to be observed by the farmers during O&M and water management activities.
- (h) Distribution of handy O&M manual (in Nepalese version) to the participants, which is specially designed for use of the farmers and with explanation of its utilization.

** The handy manual should be prepared by DOI and its contents should be simple, however, the manual should provide at least the following.

- (1) Method of patrolling the irrigation canals by the farmers.
- (2) Operation method of gates in consideration of irrigation water distribution with the assistance and advises of the turnout leaders.
- (3) Monthly obligation in O&M of the irrigation facilities by the farmers.

- (i) The period of the orientation will be one week and for each day 5 hours' orientation will be given on different subjects.

Copies of the handy manual will also be distributed to all the farmers who belong to the designated organizations (WUAs). The farmers must bear the printing cost of the handy manual. A written certificate will be given by the organizer of the orientations to each participant who continuously and successfully attended and received orientations of all the stages. The participants to the orientations must pay a leading role for O&M activities and water management also they are also requested to bear the duty to transfer the knowledge and technique to the remaining farmer-members which they have obtained during the orientations.

(3) Timing of the Final Orientations

The final orientations will be given at least 6 months ahead the inauguration of the rehabilitated irrigation schemes under the project so that the farmers can fully prepare themselves for O&M and water management activities with the understanding that the rehabilitated irrigation systems including its minor facilities belong to the farmers themselves and not to the Government.

(4) Place Where the Final Orientations Are Given and Notice for the Participants

Each DIO is responsible for arranging a suitable place or room which can accommodate about 15 persons including lecturers to receive the orientations. The notice to the orientations should be given to the farmers at least 2 weeks ahead the orientations so that maximum number of the participants can be attend the orientations. Each DIO is also responsible for arranging the audio visual which will help the participants understand the orientations clearly.

(5) Papers to be Prepared for the Final Orientations

DIO is requested to prepare papers for lecture which include the following:

- (a) Overall guidance for necessary activities to be taken by the farmers in O&M and water management. The overall guidance should include the items specified in (2) of section 3.7.3 of this O&M manual.
- (b) Recommendable water management by the farmers especially water management under turnouts on the tertiary canals.

*** As a part of water management, rotation irrigation method may be partly needed for distribution of irrigation water in the rehabilitated irrigation systems, especially, this method shall be applied during land soaking and land preparation in which much water is required within a limited time. Accordingly, during this period, there should be systematic water management in consideration of rotation irrigation. However, this can not be easily achieved without cooperation between the farmers. Accordingly, in this manual, it is recommended that water management together with the rotation irrigation should be carried out on the basis of the farmer-irrigators' groups which will consist of 20 to 30 farmers with total areas of about 5 ha to be irrigated. To carry out the rotation irrigation smoothly among the farmer-irrigators' groups, it is recommended that all the farmers under the same irrigation scheme should strongly assist the designated turnout leaders so that the turnout leaders can prepare a rational year-round irrigation water distribution plan. Also it may be mentioned here that in making the final adjustment in water distribution by rotational irrigation method for a designated irrigation scheme, it is recommended that such adjustment should be made through several village-level meetings and a series of discussions with

the attendance of all turnout leaders to avoid unnecessary conflicts among the farmers. Also, since this matter is deeply related to water management in the main, secondary, tertiary and on-farm level canals, it is recommended that the lectures on such water management should at least include the following.

- (1) As the first step, the turnout leaders of each irrigation scheme shall collect from the farmers or shall order the farmers to bring the year-round information on crop cultivation schedule, irrigation schedule especially for land soaking and land preparation, areas to be irrigated etc. Based upon this, the turnout leaders shall, in collaboration with the assistant engineers of DOI and AOs, decide the approximate amount of irrigation water to be diverted from respective turnouts, timing of diversion of irrigation water, recommended operation method of the gates and its procedures etc. And the turnout leaders shall be responsible to convey above information to all the farmers who belong to the same turnout(s) without delay so that the rotation plan can be kept by the farmers in a cooperative manner. The turnout leaders may ask the concerned farmers to follow the irrigation schedule recommended and prepared by the turnout leaders.
 - (2) Based on the planned water distribution schedule, the turnout leaders shall, in collaboration with the assistant engineers of DIO and AOs, estimate the required manpower (farmers) and service period to perform the irrigation water distribution plan and shall ask the farmers for cooperation equally.
 - (3) Basically, on-farm level water management shall be carried out on farmers' own initiative. However, at the initial stage of the on-farm level water management, such initiative should be taken by the farmers who have received the training for water management under the project. The on-farm level water management will include, for example, operation of small gates (timely opening and closing of gates) and maintenance of each on-farm level canals (to keep the original shape of the canals, to undertake desilting and weeding etc.) by the farmers themselves.
- (c) Request to the farmers for submission of his (her) year-round crop cultivation schedule to the turnout leaders and concerned officials of DOIs so that the turnout leaders and concerned officials can establish a preliminary irrigation water distribution plan for the year based on their crop cultivation schedule.

3.8 Kind of the Facilities to be Operated/Maintained and Extent of the O&M Under the Manual

Following irrigation facilities shall be regularly operated and maintained by the farmers under the guidance of this manual and the irrigation facilities to be maintained by the farmers are to be constructed by the aid of the Government of Nepal and after that the irrigation facilities would be handed over to the farmers according to the programs to be established and prevailing irrigation policies in Nepal.

- (1) Head works (Diversion works) with gates;
- (2) Irrigation canals including main, secondary, tertiary and on-farm level canals;
- (3) O&M oads along the main, secondary and tertiary canals;
- (4) Gates at the diversion points on the main, secondary and tertiary canals;
- (5) Structures such as cross-drains, culverts, spillways attached to the irrigation systems etc.;
- (6) Gauging devices along the main, secondary and tertiary canals; and
- (7) Equipment (to be specified) necessary for O&M activities.

The manner and frequency of O&M for the said facilities are given in sections 3.11, 3.12, 3.13, 3.14 and 3.15 of chapter 3 of this O&M manual.

3.9 General Mode of O&M of the Facilities

Unless otherwise specified, O&M of the rehabilitated irrigation facilities shall be carried out by the farmers themselves without payment. All the members of the WUAs must equally bear their duties which are specified in sections 3.11, 3.12, 3.13, 3.14 and 3.15 of chapter 3 of this manual. As stated earlier, one of the problems with the existing organizations for O&M is that very few farmers are taking part in O&M activities and in most cases existing organizations hire 2 to 3 men as watchmen with payment and they work for the purpose of O&M of the facilities, however, they are not well-trained for the said purpose and they only participate in simple O&M activities such as weeding and desilting in the canals 2 to 3 times a year, which is not at all sufficient to maintain the facilities in good conditions. This situation is commonly observed in almost all the existing irrigation schemes in Kathumandu valley, causing much trouble in maintaining the irrigation systems in good condition. Evidently, this kind of prevailing O&M activities will not satisfy the requirement in the newly rehabilitated irrigation schemes. It is clear that the only way to improve this situation is to change the existing mode of O&M into farmers-managed O&M of the irrigation facilities, in which farmers are asked to faithfully participate in O&M activities equally with serious understanding that the irrigation facilities once handed over to the farmers neither belong to the Government nor to the other people, instead, they belong to the farmers themselves and nobody will take care of them except the farmers who belong to the designated irrigation schemes. This understanding calls for drastic change in traditional way of thinking in O&M of the facilities by the farmers to the direction that farmers should consider that the irrigation facilities are their own properties which are to be managed with proper investment and strong will to take care of them through mutual cooperation and sharing the duties each other. Totally speaking, since each net command area of the irrigation schemes (13 schemes in total) to be maintained by the farmers is less than 500 ha (ranging from 497 ha of Thika Bhairaw-I scheme to 32 ha of Bidol irrigation scheme, 133 ha/scheme in average), all the irrigation facilities including head works should be operated and maintained by the farmers themselves unless otherwise specified.

(1) General Mode of O&M of Main Gate(s)

The main gate(s) at the intake facilities and on the main canals shall be operated in the following manner.

- (a) In general, the main gate(s) at each intake facility shall be kept open for 24 hours during the initial stage of rice cultivation of about 1.5 months and 12 hours for remaining period. However, if an independent rainfall of more than 10 mm/day is observed, then the gate(s) shall be closed on the following days and if continuous rainfall or independent rainfall which exceeds 30 mm/day in total is observed, then the gate(s) shall be closed for a week. And, if the rain continues for a long period (more than 3 days), then the gate(s) shall also be kept closed to avoid intrusion of excessive discharge into the canals until the rain has completely stopped. Opening and closing the gates shall be carried out by the farmers in charge by the instructions of the turnout leaders.
- (b) Records of O&M of the main gate(s) shall be kept by the farmers on duty, filling the necessary formalities given in Annex- 6 of this O&M manual. And if it is found something wrong with the main gate(s), it should be reported to the responsible turnout leaders without delay. And farmers are requested to repair it as early as possible in collaboration with each other. And all the costs for such minor repair should be borne by WUA (the farmers). In the case that the

damages to the gates are found out of farmers' control, they should consult with DIO immediately. In this case, DIO should help the farmers undertake the repairs in connection with method of repair, supervision of repair work by the farmers. Also, DIO should share the partial costs required for the repair with the WUA. It may be proposed here that 30 % of total repairing cost should be borne by DIO, i.e., by the Government.

- (c) In addition to the above, the condition of main gates shall be regularly checked by the farmers or by the turnout leaders and the observation results should also be recorded regularly. Painting the main gates shall be made at least once in five years. The painting shall be done by the farmers under the supervision by the engineers of DIO and cost for painting shall be borne by the WUA.

(2) General Mode of Operation of the Gates at Turnouts

- (a) Unless otherwise specified, the gates at the turnouts on the main canal shall be opened and closed according to the water allocation plan approved in the meetings of each WUA. Actual work for opening and closing the gates shall be carried out by the farmers according to the instructions by the turnout leaders.
- (b) Opening and closing time of the gates and condition of the gates must be recorded by the farmers on duty according to the instructions to be given by the respective turnout leaders.

(3) General Mode of Regular Maintenance of Other Irrigation Facilities

Irrigation facilities other than gates shall be regularly maintained by the farmers. Regular maintenance of the irrigation facilities of each irrigation scheme shall be carried out as a group work by the farmers, i.e., once a month, the turnout leaders of each irrigation scheme shall organize 2 patrolling parties. And each party shall consist of 5 farmers and one turnout leader. These parties will walk along the canals and check the conditions of the facilities along the canals and the results of the observation by the parties shall be kept in record following the formalities given in Annex-6 of this O&M manual. The turnout leaders, utilizing the observation results, shall give the necessary instructions to the farmers who participate in maintenance of the irrigation facilities.

3.10 General Task of Each Member of the Organizations

- (1) All the farmers who belong to the rehabilitated irrigation schemes under the project should be the member of the respective farmer-irrigators' groups (FIGs).
- (2) All the farmers are requested to faithfully undertake their duties specified in this O&M manual. The duties include participation in operation and maintenance of the irrigation facilities, water management under the guidance of turnout leaders (TLs), attendance to the meetings and technical training to be conducted by DOI, payment of water charge as a member of WUA within the designated period, cooperation especially in water distribution, and in case of need, participation in special tasks which are also specified in this O&M manual. Also, all the farmers are requested to cooperate with the AOs whenever necessary and all the farmers are also requested to participate in the elections which will be held from time to time.
- (3) Since a FIG will be generally organized on the basis of about 5.0 hectares of farmlands consisting of an average farmland holding of 0.2 to 0.3 hectare, possessed by 20 to 30 farmers, which is considered to be a considerable number

of farmer families, cooperation among the farmers especially cooperation in water distribution under the designated turn-out is essential. Because it has been observed in many rice-producing countries that there is a big difference between the water amount distributed and received depending on the locations of the farmlands, i.e., there is a tendency that farmers whose farmlands are located at the upstream portion of an irrigation system are apt to take excessive water and as a result, sometimes water does not reach the downstream areas where the water is also equally needed. This situation sometimes causes tensions among the farmers and in the worst case it causes conflicts among the farmers, which lead the farmers to disharmony.

3.11 Weekly and Monthly Basis Task of Each Member of the Organization (WUA)

(1) Weekly Basis Task of Each Member

Each member of the organization (farmer) is requested to fulfill the following task equally on the weekly basis.

- (a) Once a week , a group consisting of 3 farmers should patrol along the main and secondary canals and observe the condition of the canals and the related facilities. Organizing such patrolling party should be subject to the order or instructions by the turnout leaders.
- (b) During the patrol, observation should be made on the condition of the intake facility, upstream and downstream condition of the intake facility, operating condition of the gates in the intake facility as well as in the main and secondary canals, flow condition in the canals, silting condition in the canals, existence of foreign matters in the canals and around the gates, surrounding slopes where the canals pass through etc.. And if foreign matters in the canals which can be removed easily are found, they should be removed while patrolling along the canals.
- (c) The observation results should be maintained by the patrollers and kept in records following the formalities given in Annex-6 of this O&M manual for use of periodical operation and maintenance of the irrigation systems.
- (d) At the time of finishing the patrol, the responsible farmer of the party should briefly report the results of the observation to the turnout leader without delay.
- (e) Upon receiving the records, the turn-out leader should go through them and he must give necessary instructions for next patrollers. The instructions for next patrollers shall be given through the previous patrollers. Like this, all the farmers who belong to the respective irrigation scheme should take part in patrolling along the canals by turns. Payment for such patrolling by the farmers shall not be made in any manner because this duty is considered as minimum duty to be borne by each farmer to maintain the WUA and the irrigation systems.

(2) Monthly Basis Task of Each Member

Each member of the organization shall faithfully take part in the following activities on the monthly basis specified below. Any member who neglects his (her) duties without acceptable reasons for negligence by the committee of the WUA shall pay a fine of 20 Rp. per negligence of duties and continuous negligence exceeding more than three times shall be the matter of the discussion in the committee of the WUA and decision for that shall be made by the committee and in the worst case, the committee may hold the right to stop water distribution to such member(s) with prior notice to him

(her) or them. The task mentioned above shall be carried out without any payment to the members of WUA as this task is also considered to be the fundamental duties of the members who receive the irrigation water from each irrigation scheme.

- (a) In addition to the monthly duties specified in (3) of section 3.9 of this O&M manual, each irrigation scheme should be cleaned by the members of the WUA at least once in two months. For this purpose, 50 to 150 members depending on the scale of beneficiary areas should work together for the designated day fully.
- (b) The work will include cutting grass along and in the canals, desilting in the canals as well as desilting both at the upstream/downstream portion of the intake facility including transportation of the desilted materials to the designated dumps, overall checking of the canals and gates along the canals, slopes around the canals, leakage from the canals and from the gates etc. Any minor damages to the irrigation system which are found during the work should be repaired on the spot by the members in collaboration with each other to avoid further expansion of the damages. And the costs required for repair of such minor damages shall be borne by all the WUAs. In the case that big damages to the irrigation systems, which are out of control by the members (farmers), are found during the work, it should be reported to DIO by the responsible person (turnout leader) without delay and measures should be taken between DIO and the responsible members of the WUA including the method of repair, costs for repair and sharing the costs between DIO and the WUA.
- (c) After finishing this work, records on the work should be kept by the responsible members according to the formalities given in Annex-6 of this O&M manual. And the records should be fully utilized for the work to be conducted next month.

3.12 Special Task of Each Member of the Organizations

In addition to the above, all the members of the organization (WUA) may be requested to fulfill the task specified below when emergency happens. The emergency means natural hazards like floods, droughts, landslides due to floods and earthquakes, fires etc.

- (1) When emergency happens, the turn-out leaders should immediately call a emergency meeting and the meeting should consist of at least 5 representative members of the WUA. And it is recommended to invite the officials of DIO to the meeting to obtain proper advises for finding out the measures against the hazards. The meeting should immediately work out a rehabilitation plan for the damaged irrigation systems including the related facilities with the help of technical assistance from DIO and if necessary from DOI also. And the rehabilitation plan should be concrete one which includes method of rehabilitation, materials to be used, working method, period required for rehabilitation, required manpower and costs for rehabilitation, method of farmers participation in the rehabilitation work etc.
- (2) All the members (farmers) of the WUA must participate in the rehabilitation work. In the rehabilitation work, members' contribution shall be done by contribution in labor and no payment shall be done for labor contribution by the members as this task is also considered to be one of the fundamental duties to be fulfilled by the members of the WUAs.
- (3) In this case, the costs required for the rehabilitation work should be borne by the Government as it is anticipated that such costs would exceed the limit of payment by the members of the WUAs.

3.13 Recommended Formalities for Record Keeping

(1) General

Keeping precious and long-term records for every activities in O&M and for the condition of the irrigation systems including condition of its related structures, as well as keeping record for monetary flow in O&M activities are considered to be essential to effective management of a WUA. For many years, these works have been carried out mainly by the technical and administrative officials of the government. Accordingly, the members of a WUA, who are farmers, are usually not trained well to carry out such task effectively. However, this situation must be changed gradually. In O&M of the rehabilitated irrigation systems under the project, these record-keeping works should be carried out by the responsible members who are selected from the farmers. To achieve this, "technical training on record keeping" should be given to the selected farmers in the orientations specified in this O&M manual prior to their actual assignment to these tasks.

(2) Records to be Kept by the Committee of a WUA

Following records should be kept by the committee of a WUA.

- (a) Brief description of the condition of the structures of the irrigation systems after finishing monthly patrol by the members of the WUA. The description should be made on the condition of the intake facility, main and secondary canals including the related structures, gates on these canals, as well as natural condition along these canals, silting condition in these canals according to the formalities given in Annex-6 of this O&M manual. This record keeping should be done by 3 responsible members (coordinators) of the WUA to be selected in the meeting of the WUA.
- (b) Attendance records of the members of a WUA to the patrol of canals and checking of the irrigation canal systems including its structures, which are the duties of each member of a WUA, giving full name of the attendant and his (her) working hours. This record keeping should also be done by the said 3 members.
- (c) Record keeping for collection of monthly water charge from each member of the WUA according to the formalities given in Annex-6 of this O&M manual. This record should be kept by 2 members who are responsible for accounting affairs of the WUA (the accountants).
- (d) The accountants are responsible for depositing the collected water charges at the designated bank approved by the general meeting of the WUA and responsible for monitoring the balance sheets of the deposited money at the bank.
- (e) The accountants are also responsible for reporting the condition of cash flow of the deposited money to the general meeting for approval. And upon request by any members of the WUA, the accountants should clearly state the condition of the cash flow to them. And at the end of the fiscal year, the accountants should prepare financial statements which summarize the balance sheets of the water charges for the year and must obtain approval for them by the general meeting.
- (f) The accountants shall also distribute the financial documents to all the turn-out leaders.
- (g) Imbalance found in the balance sheets should be discussed in the meeting of the WUA and measures should be taken against it immediately.

- (h) The account of a WUA shall be audited from time to time by the responsible persons appointed by the WUA to keep the statement of the account correct and clear.
- (i) Other than these, the said 3 coordinators are also responsible for preparing the documents which include the contents of the discussions at the meetings and matters decided in the meetings. And the documents thus prepared shall be distributed to all the turnout leaders immediately. These 3 coordinators are also responsible for preparing and printing the brief paper(s) on a monthly basis as specified in Annex-6 of this O&M manual. And the paper(s) thus printed shall be distributed to all the members of each WUA immediately.

3.14 Participation by Farmers in Technical Training

The selected members of the WUA must participate in the technical training (orientations to the farmers) specified in section 3.7 of chapter 3 of this O&M manual. In addition, to increase number of members who have skill in operation of gates and reading the gauges of the gates, it is recommended that more members of the WUA should participate in the additional technical training taking every possible opportunities. The additional technical training for operation of gates and reading gauges of the gates shall be done on the job training basis with the help of assistant irrigation engineers attached to DIO. The training period for this will be 1 day and 10 members selected from each irrigation scheme shall receive this training at a time. This additional training shall be carried out on a monthly basis and shall be continued at least for one year.

Further, to make the technical training more effective it is also recommended that the selected members of the WUA should make a group visit to a successful irrigation system rehabilitated under the project managed by another WUA. This visit should be planned at the end of the end of final orientations to the farmers. The requirements for this visit are as follows:

- (1) Availability of one or two successful irrigation systems that may be visited.
- (2) Cooperation and willingness of the host WUAs in furnishing information and answering questions from the members of the visiting WUA.
- (3) A properly designed program of lectures and field visit for the visiting WUA and provide guidance during the field interviews and discussions and during the sessions for summarizing what has been learned.
- (4) Necessary logistics for conducting the field visit.

This visit may take 3 days. The first day is devoted to lectures and discussions on the things to be done during the field visit, the listening of questions to be asked and data to be gathered and how these are to be undertaken. The group may be subdivided into small groups. The second day may be devoted to visiting the irrigation system. And the final day is for concluding discussions, assessment of learning and preparation of action plans which the visiting group will discuss in the meeting of the WUA as well as explain to other members of the WUA who belong to the same turnout group.

3.15 Water Management

Note: This part (especially (1) General, in this section) has been prepared for the irrigation engineers attached to DIO. And it presents need of flexibility in irrigation scheduling, and description of efficiency of water use and water conservation and common problems observed in water

management etc. And the discussion does not directly concern the project, however, it will give technical suggestions to the irrigation engineers of DIO who are expected to bear an important role in water management for the project. With this background, "necessity of meetings for water management and its general mode under the project are proposed.

(1) General

Flexibility in irrigation scheduling is essential for efficient irrigation management. In some places, water is available most of the time but may become unavailable part of the time, often unpredictably. In such cases, a safety or buffer of several days is needed to protect the crops. This can be done by lowering the "refill" criterion, i.e. by increasing the range of allowable depletion during periods of restricted water supply.

The whole issue of irrigation scheduling becomes moot, however, if water is never available on demand or if it is provided on arbitrary, rigid schedule which is not subject to control and to adjustment in accordance with varying crop needs. Such is the case in some (perhaps too many) of the older irrigation districts, where water is diverted from a canal to each farmer for a limited number of hours on specified dates during the growing season. In such a regime, the only choice left to the irrigators is to "take it or leave it," so most irrigators obviously "take it," and as an insurance against possible future disruptions of delivery they tend to take as much as they can, even much beyond reasonable needs. This tendency, as we have already pointed out, may do more harm than good and can indeed be self-defeating.

Often, an irrigator needs to manage not just one crop but a mix or array of crops in a centrally managed farm. The irrigator's concern is then to develop an overall irrigation schedule which optimizes the allocation of water throughout the season and ensures an adequate supply during the peak water use periods. This may mean that one or another of the crops will not receive water on its own optimal schedule. In view of the fact that some crops require more water than others at certain critical periods and less at other periods, it is necessary to plan the crop mix on the farm so as to balance the demand and supply. This involves not only the selection of complementary crops but also the allocation of the appropriate fractional land areas, and water application schedules, among them. A crucial task is to determine how much land can be irrigated with a given amount of water and a given schedule of water delivery. Two approaches can be taken: (1) plant only the area for which water is available to meet peak demand, or (2) plant a calculated excessive area and store water in the root zone for a planned deficit irrigation during the period of peak demand.

There are, of course, numerous other considerations which might warrant a modification of the irrigation schedule. It is vital, in any case, that irrigators (in this case "irrigators" rather mean irrigation engineers.) be fully aware of the major factors involved as given below.

Efficiency of Water Use and Water Conservation

The term efficiency is generally understood to be a measure of the output obtainable from a given input. Irrigation and water-use efficiency can be defined in various ways, depending on the nature of the inputs and outputs considered. For example, one may attempt to define as an economic criterion of efficiency the financial return in relation to the investment in the water supply. One problem is that costs and prices fluctuate from year to year and vary widely from place to place. Another problem is that some of the costs of irrigation, and certainly some of the benefits, cannot easily be quantified in tangible economic or financial terms, especially in places where a market economy is not yet fully developed. Often, only the short-term costs and

immediate benefits are discernible, whereas the long-term advantages or disadvantages are unknown a priori. How can we assign monetary value, for instance, to the possibility that an irrigation project might save the population of a region from the dire effects of a drought if the frequency or probability of droughts of varying degrees of severity cannot be determined ?

Quite different from the strictly economic criterion of efficiency is the physiological one, i.e. the plant water-use efficiency. the criterion here is the amount of dry matter produced per unit volume of water taken up by the plant from the soil. As most of the water taken up by plants in the field is transpired while generally only a small fraction is retained, the plant water-use efficiency is in effect the reciprocal of what has long been known as the " transpiration ratio " defined as the ratio of the amount of water transpired to the amount of dry matter produced. That ratio can run as high as 500 or even 1,000 in regions and seasons of high evaporability.

What we shall refer to as the technical efficiency is what irrigation engineers call " irrigation efficiency " It is generally defined as the net amount of water added to the root zone divided by the amount of water taken from some source. As such, this criterion of efficiency can be applied to complex regional projects, or to individual farms, or to specific fields. In each case, the difference between the net amount of water added to the root zone and the amount withdrawn from the source represents the seepage and evaporative losses incurred in conveyance to the crop, as well as the losses due to deep percolation below the root zone within the field and to runoff from the field.

From the point of view of water use, some large-scale irrigation projects operate in an inherently inefficient way. In many of the surface irrigation schemes, one or a few farmers may be allocated large flows representing the entire discharge of a lateral canal for a specified period of time.

Where water is delivered to the consumer on a fixed schedule and charges are imposed per delivery regardless of the actual amount used, customers tend to take as much as they can. This often results in over irrigation, which not only wastes but also causes project-wide problems connected with the disposal of return flow, water-logging of soils, leaching of nutrients, and elevation of the water-table requiring expensive drainage. Although it is difficult to arrive at reliable statistics, it has been estimated that the average irrigation efficiency in such schemes is probably well below 50 % (and may be as low as 30 %). Since it is a proven fact that, with proper management, it is possible to achieve irrigation efficiencies as high as 85 % or even 90 %, there is obviously much room for improvement.

Particularly difficult to change is management practices which lead to deliberate waste not necessarily because of insurmountable technical problems or lack of knowledge but simply because it appears more convenient, or even more economical in the short run, to waste rather than to apply proper management practices of strict water conservation. Such situations typically occur when the price of irrigation water is lower than the cost of labor or of the equipment needed to avoid over irrigation. Very often the price of water does not reflect its true cost but is kept deliberately low by direct government subsidy, which can be self-defeating.

Incidentally, the cost of water may be distorted even without government subsidy. For example, consider the case of an operator drawing water from an aquifer in excess of the rate of natural recharge: the cost of pumping may be only a small fraction of the cost of replenishing the aquifer after it has been depleted. So the ultimate cost of using " cheap " water may be high.

Where open and unlined distribution ditches are used, uncontrolled seepage and evaporation, as well as transpiration by riparian phreatophytes, can cause major losses of water. Even pipeline distribution systems do not always prevent loss. Leaky joints

resulting from poor workmanship, corrosion, ill-maintained valves, or mechanical damage by farm machinery may cause large losses. Sometimes the damage is not immediately apparent, as when a buried pipe under pressure fails at night, with no one in attendance.

Surface runoff resulting from the excessive application of water ideally should not occur. In the case of gravity irrigation systems, however, it is often virtually impossible to achieve uniform water distribution over the field without incurring some runoff (" tail water "). Only when provision is made to collect irrigation and rainwater surpluses at the lower end of the field and to guide them as controlled return flow (i.e., reuse for irrigation) can this runoff water be considered anything but a loss.

It appears at present that the greatest promise for increasing water use efficiency lies in allowing the crop to transpire freely by alleviating any water shortage while at the same time controlling all other processes of water loss and obviating the other environmental constraints to attainment of the full productive potential of the crop. This is particularly important in the case of the new and superior varieties which can attain their full potential yields only if water stress is eliminated and such other factors as soil fertility, aeration, salinity, and soil tilth are optimized. Plant diseases and pests may depress yields without a proportionate decrease in transpiration and water use. All management practices can thus influence the efficiency of water use in irrigation, so the practice of irrigation should not be regarded merely as the provision of water to thirsty crops, but more comprehensively as an integrated production system designed to maximize the efficiency of land, water, manpower, machinery, and energy utilization.

In many parts of the world, far greater returns can be obtained from intensification of production in existing irrigation systems, i.e. by improving methods of water, soil, and crop management, than by building ever new irrigation projects on the basis of the same antiquated and inflexible design. Since it is difficult to convert traditional systems to modern irrigation scheduling, it is important to make decisions affecting irrigation frequencies and quantities in the early stage of planning new projects, before the distribution system is designed and installed and all future irrigators are thereby locked into an inefficient pattern.

With these concepts and understanding, under this project it is recommended that the irrigation engineers attached to DIO should play an important role in the following meetings in which water management for the rehabilitated irrigation systems is to be planned, carried out and managed in strong collaboration with the farmers.

(2) Meetings for Water Management Under the Project

The meetings which handle the water management in the designated irrigation systems shall be held in the following way.

- (a) In the meeting of each WUA, required number of responsible persons (turnout leaders) shall be selected and they shall assess the required amount of irrigation water at the respective turnouts and shall make recommendations to the representative of the WUA whether irrigation water will be delivered to the members simultaneously or by rotation. The representative shall decide on the matter based on the discussions with the turnout leaders. Actual implementation of the decision by the representative of the WUA shall be made by the water issuers (to be appointed by the turnout leaders) under supervision of the turnout leaders.
- (b) Every member is entitled to water in proportion to the area of their farmland under the designated irrigation system. And when water is delivered by rotation, each member's water allocation shall be diminished in the same proportion to the decrease in water supply and the measurement of water deliveries shall be in terms

of time or number of hours and minutes during which the irrigation water is delivered.

- (c) The committee of each WUA shall be responsible for grouping the members on turnout-basis (FIGs).
- (d) Distribution of water may be temporarily suspended for regular maintenance and construction/repair works during the off season, and also in cases where members fail to pay water charges, taking water without authorization, misuse of the water, intentional damage to the irrigation facilities, or in case of committing of any other act in violation of the constitution of the association, rules and regulations.

3.16 Collection of Water Charge

For many years farmers have developed by themselves many irrigation schemes of different scale utilizing available water resources to maximum extent as pioneers of water resources development. As a result, it seems that it has become a common understanding among people that water rights belong only to the people who took initiative in the past development projects like first comer first prize basis. However, prevailing serious surrounding natural conditions including environmental aspect to be taken into consideration for various development projects do not allow this no more. That means water resources has become a valuable as well as common asset to be shared among many people and it should not be monopolized. This understanding may justify to periodically collect reasonable amount of water charge from the farmers who receive direct benefits by utilizing limited water resources. Detailed discussions on water charge including its amount, timing, method of collection, purpose of its usage, record keeping, preparation of balance sheets etc. under this project are given in section 8 of Annex-1 of this O&M manual. Historically speaking, in many O&M programs in different countries, collecting water charge periodically from the farmers has not at all been successful. And for many years, water charge was /has been calculated mainly on the basis of the following 3 methods introduced below.

- (1) Depending on the amount of water used (Method-A),
- (2) Depending on the area irrigated (Method-B) ; and
- (3) Depending on the amount of crops harvested (Method-C).

However, each method introduced above has both merit and demerit as briefly discussed below.

Method-A is considered to be one of the most recommendable method for calculation of water charge since it has a merit of rational use of irrigation water as correlation between water consumption and water charge is usually expected. To make this method more effective, it is necessary that each farm house should be equipped with a water-gauging meter to measure the amount of water consumed. Although this method is considered to be most rational one, people sometimes encounter the difficulty in introducing this method to each farm house because some of the farmers don't like to have it with them and sometimes they are suspicious of its function and in the worst case, they even try to stop movement of the meter, which is sometimes observed in open canal systems. However, this method is still considered to be the most recommendable one provided that cheap labor force required for measuring the device is available.

Against this, in Method-B, water charge is calculated on a basis of irrigated cropped area. And this method is considered to be rational only when each farmer consumes irrigation water according to the designed water requirements.

However, observations in many countries have shown that there is much fluctuation in irrigation water consumption by each farmer house although they hold almost the same acreage of farm land to be irrigated. This means that it is difficult to distribute irrigation water to each farm land equally resulting in less contribution to effective use of irrigation water. In spite of such defect with the method, it is still popular in many countries because of its easy accounting system to settle the water charge.

Method-C is usually adopted for the irrigated farm land where mono-culture is prevailing. This method offers two ways to decide water charge to be paid by each farm house. The one is to pay water charge in kind by fixed weight ratio of cultivated crop per unit acreage and it does not concern yearly production. The other is to pay water charge in kind according to total production of the cultivated crop, thus water charge varies according to production of the crops.

Namely, if farmers have less production, then, the water charge to be paid will be less and the same can be said in adverse case. To practice this method smoothly, it is necessary that proper evaluation on the production by each farm house should be made, however, it sometimes happens that farmers do not agree to the evaluated value, which causes conflicts between the farmers and evaluators. At present, these methods introduced above are most common methods for calculation of water charge. Other than these, there are several indirect methods to pay water charge by paying back O&M fee and initial investment costs.

Through the discussions, it is understood that there exist many difficulties in deciding the proper method of water charge collection, however, since one of the most important targets to be achieved through the project is to strengthen the O&M activities under the rehabilitated irrigation schemes, and through which much improvement in irrigation water distribution is expected. Accordingly, it is recommended that, under this project, the water charge should be collected in proportion to the area of farmlands to be irrigated i.e., according to Method-B.

3.17 Deposit and Release of the Water Charge

The accountants of each WUA are finally responsible for collection of the water charge from all the members of each WUA on the monthly basis. However, the water charge should be basically collected through the respective turnout leaders on the basis of each FIG. Thus, each WUA should open an account at the authorized bank. And the water charge thus collected should be deposited in the account of the authorized bank. And the deposited water charge should be released from time to time for payment of O&M work after getting approval by the committee of the WUA. The accountants are also responsible for keeping balance sheets of the deposited water charge and the balance sheets should be open to every members. And the chief accountant of each WUA shall have to report the balance to the committee of the WUA for approval. At the end of every fiscal year, the chief accountant of each WUA shall prepare statements containing overall balance sheets of the water charge for the year for approval by the general assembly. And all the statements from each irrigation scheme shall be compiled into a report (brief report) and distributed it to the responsible members of the each WUA and if requested to show the report by any members of the WUAs, the responsible members must respond to the request immediately.

3.18 Anticipated Common Problems with Water Charge

For successful O&M of the rehabilitated irrigation facilities by the water users' associations (WUAs), consideration for water charge, especially, with respect to its unit

rate is one of the most dominant parameters to be taken into account. However, a lot of experiences have proved that O&M activities which are not fully supported by sound budget allocation always result in failure. Also prevailing insufficient O&M activities for the completed irrigation facilities in many countries can be largely attributed to poor budget allocation for O&M. This problem seems to be very serious as performance of O&M activities largely depend on availability of the budget. In the case that less amount of budget is allocated for O&M activities, the problems with them become more difficult to solve, because a lot of social, political and economic functions always accompany the O&M activities, which make the activities more difficult. Since these functions influence each other, it is difficult to identify the origin and extent of the problems properly.

Theoretically speaking, all the costs necessary for maintaining O&M activities at acceptable level should be borne by water charge to be collected from the members of the water users' associations (WUAs). This acceptance will be fully credited by the members only when the balance sheets (income and expenditure) for water charge are found acceptable. In most cases, however, there exists a big imbalance between the income and expenditure, causing much deficiencies. In the case that O&M activities are maintained by water users' associations (WUAs), the budget to support the O&M activities is borne from each farm house in the benefited area under the project. Accordingly, there is a tendency to minimize the O&M activities to save the water charge as much as possible. As a result, in most cases, water charge collected from the farmers is not sufficient to fully support the O&M activities. Thus, we can easily observe poor O&M activities almost everywhere, and we can't expect that the initial investment cost is fully recovered from the benefited farmers. Thus, it is considered necessary that present water charge applied for the existing irrigation schemes should be raised, otherwise, budget allocation for O&M of the irrigation facilities from the Government's public sector to private sector will not last long. However, when we discuss to raise the existing water charge to meet the minimum requirement in view of O&M activities, we must consider the following in addition to farmers' opinions.

- (1) To check administrative efficiency of the concerned government's irrigation offices with respect to labors, facilities as well as existing administrative procedures;
- (2) Is the collected water charge properly used for the purpose of O&M of the irrigation facilities ?

This question is considered important because in the past, the water charge collected from the farmers was sent to the Government and it was put into the governmental budget and it was re-distributed to each existing irrigation scheme by the arrangement of the Government. However, this arrangement did not necessarily reflect the actual budget needed by each existing scheme and as a result, farmers were not satisfied with the monetary arrangement thus made by the Government, because the arrangement never justified the relationship between the administrative service by the Government and the water charge paid by the farmers. Apparently, this situation discourages many farmers.

- (3) Are the farmers fully informed of the purpose of payment of water charge ?

This question is also considered important because ,in the past, the farmers were not well-informed of the purpose of paying water charge as well as in which way it was used. Accordingly, it is considered that there has been a big gap between the Government and the farmers, which led to misunderstanding each other.

- (4) How much part of income from the farmers' productive activities is occupied by the water charge to be paid ?

To analyze this problem properly is a must. Because, in the case that the water charge to be paid by the farmers occupies a relatively large part of the income of the farmers, then the farmers will not pay the water charge willingly. Accordingly, in the case that if it is necessary to raise the water charge, the said problem must be analyzed properly with a top priority.

- (5) How much is the amount of money to be borne by the farmers for irrigation development projects from the view of indirect tax ?

In most cases, the value-added tax imposed on the farm lands is considered very important. If the value-added tax is already imposed on the farm lands, then, it is considered that some part of the project costs is already covered by the farmers (beneficiaries) and is difficult to ask the farmers to pay additional charge in any form.

- (6) Is the water charge rightly collected from the farmers and used properly ?

In collection of the water charge, corruption is sometimes observed unfortunately. Especially, in the case that water charge is collected according to consumption, such corruption is likely to occur frequently. In fact, investigation on this matter in many countries has some times revealed that the water charge collected from the farmers is not fully received by the Government and project offices.

Considering the above-mentioned situation and problems, it is important that we should see whether concerned data and information for each problem are available and well-arranged, otherwise, we will face difficulty in handling this kind of problems and difficulty in finding the reason for raising the water charge. We can find in many countries that some WUAs are permitted to collect water charge from the users of water for small-scale industries, that for washing the minerals, small scale power generation, parks etc. Generally speaking, the number of water users for the said purpose is less, however, water charge for the said purpose is relatively high compared to that for irrigation purpose. Accordingly, we cant neglect income from those sectors. Collecting the water charge from those sectors contributes to help increase the running funds of WUAs, however, high priority in using water by those sectors should also be taken into consideration. However, this problem, that is whether it is permitted to collect the water charge from those sectors should be discussed more carefully referring to existing water laws and its related judicial regulations in the countries.

It is commonly observed that the total water charge collected is not sufficient to cover the costs which are actually required to maintain the irrigation facilities and WUAs. However, to raise the water charge is not always a sole answer to solve this problem. Because a careful study on the costs being spent for WUAs and its activities sometimes reveal that we can reduce unnecessary activities for O&M of the facilities and we can also reduce the costs required for the activities. To raise the water charge sometimes hinders agricultural productivity and as a result it brings about rise in production costs. Accordingly, prior to finalization of the O&M plan, it is always recommended that a comparative study for the costs of O&M should be made , considering both cases that O&M is manually and mechanically conducted. This study will offer a good suggestion for improvement of productivity. The same can be said for the cost analysis for required staff, infrastructures as well as monetary assistance for O&M programs.

3.19 Water Rights

Generally speaking, pattern of holding the water rights can be divided into following two patterns.

- (1) Taking the water from the rivers in accordance with historical age of the organizations, that means older organizations have priority in taking the water under normal condition.
- (2) Taking water from the rivers according to the permission by the Government or governmental administrative offices.

At present, in many countries, water mainly for irrigation purpose is being taken following either pattern (1) or pattern (2). In case that the WUAs are under jurisdiction by laws, regulations for water rights specify the maximum water amount taken. In case of this project, the water rights have been assured in accordance with the minutes of meetings confirmed by Department of Irrigation (DOI), Ministry of Water Resources and JICA study team in October, 1993, DOI. Accordingly it may be considered that all the rehabilitated irrigation schemes under this project have equal rights to use the water for irrigation of command area under each scheme. This means that the Government has given priority to draw water from the rivers for irrigation. Accordingly, further discussions on this matter may be avoided here.

3.20 Monitoring and Evaluation of O&M and Water Management Activities Under the Rehabilitated Irrigation Schemes

(1) Necessity of Monitoring and Evaluation

Monitoring the performance of O&M and water management activities under the rehabilitated irrigation schemes is considered very important to properly evaluate the project as well as to grasp the problems accompanied by the O&M and water management in the rehabilitated irrigation systems and to find out solutions for the problems. Accordingly, it is recommended that DIO should monitor and evaluate the performance of the O&M and water management. Such monitoring and evaluation by DIO should be first made for the O&M and water management activities by the farmers during one year after the rehabilitated irrigation facilities have been handed over to the farmers of each irrigation scheme. After that this monitoring and evaluation should be carried out continuously by DIO, preferably once in two years and the results of monitoring and evaluation should be reported to each WUA and based on the results, DIO may give timely suggestions to each WUA for necessary improvement of various activities in O&M and water management.

(2) Recommended Organization for Monitoring and Evaluation

For monitoring and evaluation of the said O&M and water management activities, it is recommended to establish a monitoring and evaluation team (MET) in each DIO. The team should consist of two assistant engineer and one AO attached to each DIO. The assignment period for the monitoring and evaluation for each WUA shall be one week including preparation of brief report for the monitoring and evaluation. To perform the monitoring and evaluation quickly and effectively, it is recommended that each DIO should prepare simple monitoring evaluation sheets which cover the following. And the formalities of such sheets should be common to each DIO.

(3) Items to be Monitored and Evaluated

The monitoring and evaluation should be made on the following items:

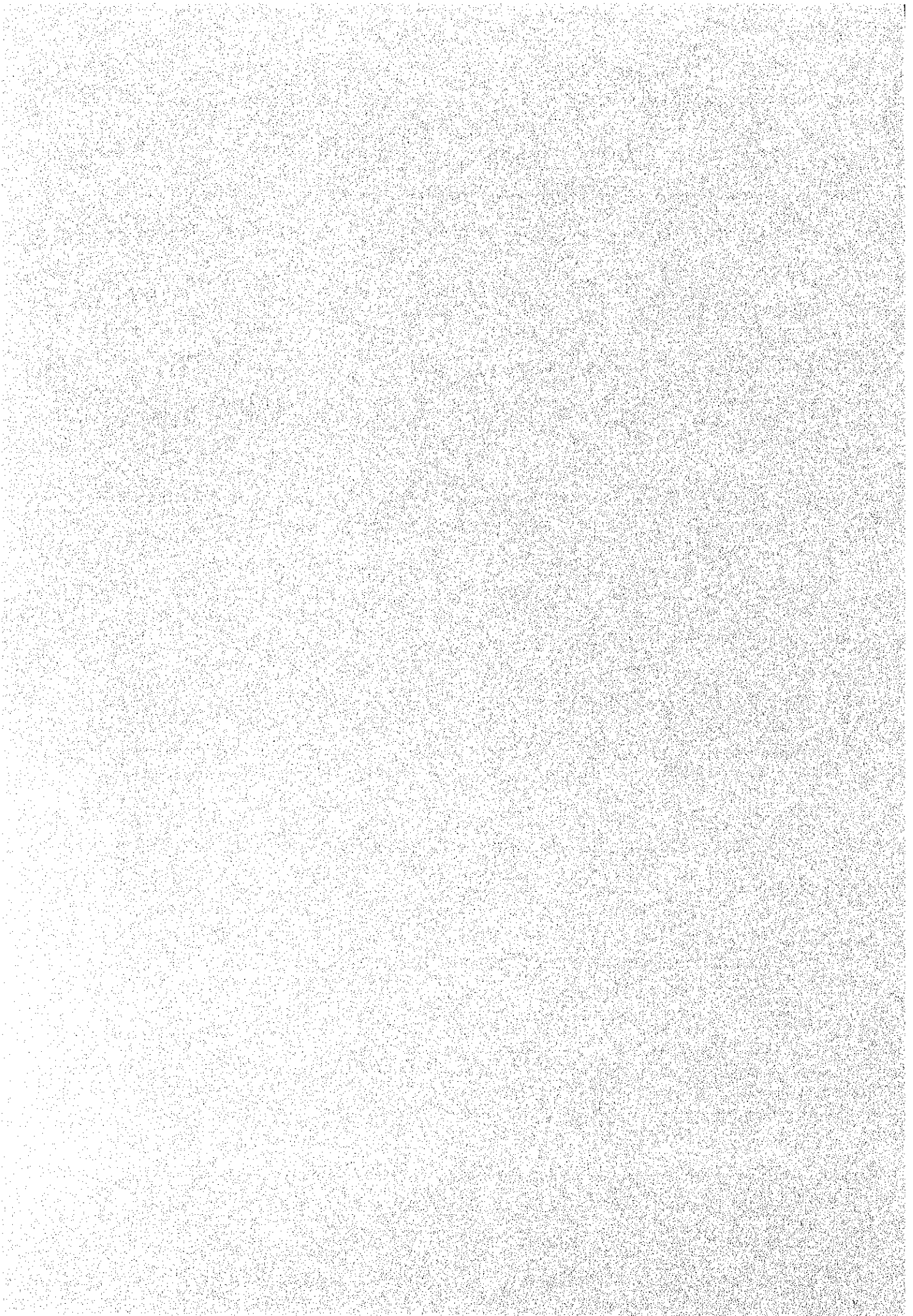
- (i) Evaluation of the farmers' participation in O&M activities specified in this O&M manual utilizing attendance records for O&M activities and hearing from the farmers.

- (ii) Evaluation of physical conditions of irrigation facilities of each irrigation scheme, such as intake facilities, canals, related structures, gates, protection works along the canals etc.
- (iii) Evaluation of farmers' participation in water management, especially in rotation irrigation practice under each irrigation scheme specified in this O&M manual.
- (iv) Evaluation of collection water charge from the farmers specified in this O&M manual and identification of the problems accompanied by collecting the water charge.
- (v) Identification of commonly observed problems and conflicts among the farmers.
- (vi) Evaluation of performance in record keeping by the farmers specified in this O&M manual.

3.21 Others

As mentioned in chapter 2 of this O&M manual, the basis on which this O&M manual stands is cooperation among the farmers (members of the WUA) and more active participation by the farmers in O&M activities and water management, which calls for mutual understanding among the farmers and initiative by the farmers themselves, all of which largely depend on the willingness of the farmers to perform O&M activities with the understanding that the rehabilitated irrigation systems under the project should be protected and maintained well as long as possible. Therefore, the ultimate purpose of this O&M manual may be to gradually change the traditional way of thinking by the farmers and to gradually raise the technical skill of all the farmers in O&M of the irrigation systems. This means that farmers who have engaged themselves in traditional agriculture in Katmandu valley for many years are now requested to change themselves to be more self-reliant and thereby farmers should consider the agriculture as their-own problems. And it should be understood well by the farmers themselves that neither the government nor the engineers but only the farmers themselves can change the agriculture through their positive initiatives. Accordingly, it is requested that any farmer-leaders or irrigation engineers who may use this O&M manual as a guide for the farmers should understand the above-mentioned basis on which this O&M manual stands and it is also requested that the leaders should always try to convey this message to the farmers utilizing every possible opportunities.

ANNEXES



ANNEX-1. SUGGESTED RULES AND REGULATIONS FOR WATER USERS' ASSOCIATIONS

The suggested Rules and Regulations provided here may be used as the guides of the engineers and the AOs of each DIO in promoting the discussions by small farmers groups. Depending on the situation and taking into account the existing practices and experiences of the farmers, some of the suggested rules and regulations may be adopted, modified or rejected.

RULES AND REGULATIONS OF

WATER USERS ASSOCIATION

For the information and, guidance and compliance of its Office Bearers and Members, the _____ has adopted the following Rules and Regulations at a General Meeting held on _____ at _____.

Section 1. Duties of Members

- (1) Every member shall be individually and jointly responsible with other members for:
 - (a) The operation, maintenance and improvement of the Association's diversion, distribution and drainage structures and its related facilities.
 - (b) Proper and beneficial use of water allocated and distributed to the members.
 - (c) Complying with the rules and regulations and carrying out the objectives of the Association and the provision of its constitution.
- (2) Every member shall pay a membership fee in the amount of Rs. _____. The membership fee shall be payable upon filling of membership application while the annual fee shall be paid before the first general meeting for the year. In assessment or other fees levied by the association for carrying out the objectives of the association.
- (3) It is the duty of every member to attend the meetings of the association and actively participate in its deliberations.

Section 2. Special Meetings

The committee of each WUA may convene special meetings of the members when determined to be necessary for carrying out the activities of the association with notice to be disseminated to the members at least five days before the date of the said meetings.

Section 3. Voting

- (1) The order of business in general meetings held by a WUA shall be:
 - (a) Call to order and determination of quorum.
 - (b) Approval of agenda.
 - (c) Approval of the minutes of the previous general meeting and special meeting, if any.
 - (d) Matters arising from the minutes of the previous general meeting and special meeting, if any.

Each member shall be entitled to one vote at general meetings and special meetings held by a WUA.

Section 4. Order of Business in General Meetings and Special Meetings

- (e) Report of the Representative of the committee of a WUA on the financial status, indicating the income and expense of the preceding irrigation season, the cash on hand, the cash deposited in the bank, and the current assets, liabilities and net worth of the association.
 - (f) Presentation, discussion and approval of the program and budget for the next irrigation season.
 - (g) Discussions on the matters raised by the general membership or by the committee.
 - (h) Date and place of next meeting.
- (2) The order of business in special meetings shall be such as to cover only the matters for which the special meeting was convened.

Section 5 Record Keeping

- (1) Coordinators (3 persons in total) of each WUA shall keep the following records of the association:
 - (a) Membership list with individual land holdings.
 - (b) Minutes of the meetings,
 - (c) Constitution, by-laws, rules and regulations and registration documents of the WUA.
 - (d) Labor mobilization records and individual labor contributions.
 - (e) Bills and letters of correspondence.
 - (f) Crop yield records.
 - (g) Other records assigned by the committee.

- (2) The accountants (2 persons in total) of each WUA shall keep the following records:
 - (a) Collection of membership fee.
 - (b) Cash contribution by the members if any.
 - (c) Member's payment of irrigation fee (water charge) and other fees.
 - (d) Record of income and expenses by the WUA.
 - (e) All other financial records of the WUA.

Section 6. Irrigation and Water Distribution

- (1) The committee of each WUA shall appoint persons (Turnout Leaders) who shall properly assess the amount of irrigation water required in the main canals etc. and recommend to the representative the WUA whether water can be delivered to each turnout simultaneously or by rotation. The representative shall decide on the matter. The implementation of the decision of the representative shall be by the water issuers under the supervision of the turnout leaders.
- (2) Basically, every member of each WUA is entitled to water in proportion to the area of his (her) farmland. When water is delivered by rotation, each member's allocation shall be diminished in the same proportion to the decrease in water supply and the measurement of water deliveries shall be in terms of time or number of hours and minutes that water is delivered.
- (3) The committee of each WUA shall group the members in terms of turnouts delivering water to farmers' fields so that each turnout shall have farmer-irrigators' groups (FIGs). The farmers of each FIG shall select a leader who shall take charge of the water distribution among the members under the supervision of the turnout leaders.
- (4) Distribution of water may be temporarily suspended for regular maintenance and construction or improvement work during the off season, and also in cases where members fail to pay water charge, take water without authorization , misuse the water, intentionally damage the irrigation facilities, or commit any other acts in violation of the association's constitution, rules and regulations.
- (5) No member shall be allowed to sell his (her) share of water on an individual basis.
- (6) No one is allowed to adversely affect other people's land and crops while irrigating his (her) own field.

Section 7. Maintenance of Irrigation System and Related Rules

(1) Monthly-Basis Maintenance

Monthly-basis maintenance of the irrigation system shall be carried out by the farmers of each WUA according to the suggestions given in (3) of section 3.9 and in (2) of section 3.11 of this O&M manual. The committee of each WUA shall set the dates and number of the days for which the work will be undertaken and inform all members concerned at least one week before start of the activity. Records of labor mobilization shall be kept by the secretary. At the end of the monthly-basis maintenance of the irrigation system, the conditions of main, secondary, and tertiary canals as well as its related structures should be clearly grasped and each conditions observed should be described by the responsible person (s) according to the formalities given in Annex-6 of this O&M manual.

(2) Weekly-Basis Maintenance

Weekly-basis maintenance of the irrigation system shall be carried out by the farmers of each WUA according to the suggestions given in (1) of section 3.11 of this O&M manual.

(3) Emergency Maintenance

Emergency maintenance shall be carried out by the farmers of each WUA according to the suggestions given in section 3.12 of this O&M manual. The representative of each WUA shall mobilize the labor of members by groups according to their residential locations in accordance with the estimated requirements, taking care that over a period time the labor contribution of each group and each member would be equal. For this purpose, records of labor mobilization shall be kept by coordinators of the WUA.

(4) Related rules

- (i) Minors under the age of 18 years shall not be allowed to work in the canals or in any part of the irrigation systems during the repair works.
- (ii) Members who cannot contribute as labor shall contribute cash equivalent or hire labors and the number of which shall be in accordance with the requirements.
- (iii) The work shall be carried out in accordance with the instructions by the supervisor(s) appointed by the managing committee or its members. Anyone who does not work according to the instructions or who is found to be negligent shall be marked absent.
- (iv) One man working for the whole day will be considered as a contribution of one laborer.
- (v) Excepts in cases of emergency, maintenance work shall be carried out from 9 A.M. to 4 P.M.
- (vi) People working on the system maintenance will be excused from the work if there is an emergency or death in the family provided that they inform the secretary of the matter within a reasonable period.

Section 8 Water Charge

- (1) Every water user (members of each WUA) of the irrigation system shall pay on a monthly basis to the association (WUA) the amount of Rs. 100 per 0.3 ha of the farmland irrigated by the system to meet the operation and maintenance expenses of the system.
- (2) The association shall issue a receipt in a form prescribed by the managing committee to the water user who paid the water charge.
- (3) Unpaid water charge shall bear an interest rate of _____ percent per month. If payment of a water charge is not made within _____ year after the end of the irrigation season, the water user may be deprived of water unless the committee of the WUA finds a valid reason such as crop failure, for failure to pay etc.

Section 9 Conflict Management

- (1) Conflicts on water distribution, use, and drainage within a Unit Organization's area of coverage shall be settled within the groups through the intervention and decision of the leaders of the groups. The decision of the leaders may be appealed to the chairman of the WUA whose decision shall be final unless otherwise contrary to the existing laws.
- (2) Conflicts on water distribution, use and drainage between water users or between farmers from different groups shall be investigated and decided by the members of the committee designated by the representative whose decision shall be final unless otherwise contrary to the existing laws.
- (3) Conflicts between the members or groups which pertain to the matters not directly concerned with the operation and maintenance of the irrigation systems are not to be settled by the association (WUA).

Section 10 Financial Management

- (1) All collections and other income of the association (WUA) shall be deposited by the treasurer in a bank chosen by the general meeting.
- (2) Withdrawals from the association's deposited money shall be made only through the signatures of the responsible accountant and the representative of the WUA after a resolution of the committee standing the purpose of the withdrawal and the amount to be withdrawn.
- (3) The accountants may establish a petty cash fund not exceeding Rs. _____ at any one time for the purpose of urgent cash payments.
- (4) The accounts of the association shall be audited every _____ months by the auditor appointed by the general meeting of the association. The relevant audit report shall be presented at every general meeting of each WUA.
- (5) The committee shall prepare the budget of the association for each irrigation season showing the expected income and estimate of expenses and present it to the general meeting for approval.
- (6) The committee shall establish a simple financial accounting system that will enable compliance with the regulations of the local government authority.

- (7) The representative and other office bearers and members of the committee and the association shall be reimbursed for actual expenses incurred in the conduct of business of the association.

Section 11 Penalties

- (1) The following acts are considered as offenses and are subject to fines in the corresponding amounts as indicated below:
- (a) Non-attendance in the meetings for three consecutive times.
 - (b) Non-participation in maintenance work as required.
 - (c) Stealing irrigation water.
 - (d) Damaging irrigation canals or structures.
 - (e) Misuse of irrigation water.
- (2) Other offenses as determined by the managing committee are subject to a fine of Rs. _____ for every offense.

Section 12 Miscellaneous

- (1) Matters not covered by the constitution and these rules and regulations of the _____ water users association (WUA) shall be executed according to the prevailing laws of His Majesty's Government.
- (2) These rules and regulations may be supplemented or amended by a resolution of the association in a general meeting and recorded in the minutes of the meeting. Such resolutions shall be appended to these rules and regulations.

**ANNEX-2. RECOMMENDED CONSTITUTION OF WATER
USERS ASSOCIATION (WUA)**

PREAMBLE

Being convinced that the use of water resources of _____ river located in ward No. _____ of _____ Village, District of _____, of the Kingdom of Nepal in the irrigated agricultural sector could lead to be the convenience for local farmers in the field of agriculture and thereby lead to the improvement in the efficiency of the present irrigation system and,

Being mindful that the introduction of such a system would facilitate the increment of production of food stuff and that such a system could support the agricultural development of the country,

Now, therefore, we the local users of Ward No. _____ of _____ Village of _____ District of _____ Zone, with the mutual consultation and cooperation, have promulgated this constitution to establish the _____ Water Users Association with a view to using the water of the above resources in the spirit of mutual cooperation.

Chapter 1. Preliminary

1. Short Title and Commencement

- (1) This constitution may be called " The Constitution of _____ Water Users Association, _____.
- (2) This constitution shall come into force on the date of registration of _____ Water Users Association under the Association Registration Act, 2034 (1978).

2. Definition

In this constitution, unless the subject or the context otherwise requires:

- (1) " Association " means the _____ Water Users' Association.
- (2) " Irrigation Area " means the area of _____ ha within the boundary of _____.
- (3) " General Meeting " means the general meeting of the Association.
- (4) " Representative " means the Representative of the Association.
- (5) " Member " means the Member of the Association.

3. Seal of the Association

The Association shall have a seal of its own for the purpose of its functions. The shape of this seal shall be _____ in which the words

_____ Water Users Association _____ (19__) shall be written.

4. Office of the Association

The office of the Association shall be in Ward No. _____ of _____ Village, _____ District, _____ Zone.

Chapter 2. Objectives

1. Objectives of the Association

The objectives of the Association are as follows:

- (1) To utilize the water of the _____ river situated in the Ward No. _____, _____ Village for irrigated agriculture.
- (2) To establish, operate, repair and maintain and develop a suitable as well as dependable irrigation system for the irrigation area through proper O&M and water management by the member of the Association.

Chapter 3. Membership of the Association

1. Qualification of the Membership

- (1) Among the lands within the irrigation area, the tenant of the land where there is a tenant and land owner where there is no tenant shall be automatically a Member of the Association. Such Member shall be the Member of the Association.
- (2) In the case of land owner or tenant who has not attained the age of ____ years, his quadron shall be the Member of the Association.

Chapter 4. General Meeting and Managing Committee of the Association

1. General Meeting

- (1) There shall be General Meetings composed of the Managing Committee of the Associations.
- (2) The date, time and place of General Meetings shall be as determined by the Managing Committee of the Associations.
- (3) The Chairman of the Managing Committee of the Associations shall preside over the General Meetings and in his absence, the Vice-Chairman shall preside over the General Meetings. In case the Vice-Chairman also remains absent, a member appointed from among the Members of the Managing Committee will preside over the General Meetings.
- (4) A notice shall be given publicly to all the Members of the Managing Committee by clearly mentioning the date, time, venue and the agenda of the General Meeting in advance of seven days.
- (5) The quorum of the General Meeting shall not be deemed to have been met if 50 % of the total number of the Members the Managing Committee are not present.

- (6) In case the quorum is not attained in the General Meeting called by the first notice, second General Meeting shall be called by a notice for date three days later.
- (7) In such General Meeting subject to second notice, the quorum shall be deemed to have been attained if at least 25 % of the total number of the Members the Managing Committee are present in the General Meeting.
- (8) The decision made by a majority of the votes shall be valid in the General Meeting.
- (9) The other procedures relating to the General Meeting shall be as decided by the General Meeting itself.

2. Functions, Duties, and Rights of the General Meeting of the Managing Committee

The functions, duties and rights of the General Meeting of the Managing Committee shall be as follows.

- (1) To frame and promulgate regulation necessary for the construction, operation and repair and maintenance of the irrigation system.
- (2) To approve the audit report of the Association.
- (3) To prepare the annual programs of the Association.
- (4) To approve the annual budget estimate submitted by the Committee of the Association after preparing it on the basis of the final resources of each Association.
- (5) To handle all the matters and conflicts related to O&M and water management which can not be settled in the Committee of each Association

3. Constitution of the Managing Committee

- (1) The Managing Committee shall consist of the executive members elected from among the members of the Associations.
- (2) There shall be 10 executive members in the Managing Committee of the Associations. They are a Chairman, a Vice-Chairman, three in General Affairs Section, two in Auditing Section and three in Accounting Section.

4. Meeting of the Managing Committee

- (1) Meeting of the Managing Committee shall be held at least four times a year.
- (2) The Chairman may order to call the emergency meeting of the Managing Committee if it is required. Such emergency meeting may also convene in case more than 50 % of the Executive Members submit written request to the Chairman.
- (3) The Secretary shall call the meeting of the Managing Committee on the date, time and place prescribed by the Chairman.
- (4) The Chairman shall preside over the meeting of the Managing Committee and in his absence the Vice-Chairman shall preside over the meeting. In case the Vice-Chairman also remains absent, a Member appointed from among the Executive Members present in the meetings shall preside over the meeting.
- (5) The quorum of the meeting of the Managing Committee shall be deemed to have been attained if 50 % of the members are present.
- (6) All the Executive Members shall have to be notified about the meeting of the Managing Committee at least three days in advance.
- (7) In case the quorum is not attained in the meeting of the Managing Committee called by first notice, a second notice shall be issued.
- (8) Upon the second notice, if 25 % of the members of the Managing Committee are present, the meeting may be held.
- (9) The decision made by a majority of the votes shall be valid in the meeting of the Managing Committee.
- (10) The other procedures relating to the meeting shall be decided by the Managing committee.

5. Functions, Duties and Rights of the Managig Committee

The functions, duties and rights of the Managing Committee shall be as follows:

- (1) To work according to the plan and programs approved by the General Meeting.
- (2) To expend necessary expenses for the work subject to the plan and program to be specified according to the situation.
- (3) To submit annual budget and program of the Association to the General Meeting.
- (4) To perform or cause to perform all the functions in the name of the Association which have to be performed by each Association.
- (5) To delegate all or some power among the powers conferred upon the Managing Committee to nay the Executive Members.

Chapter 5. Functions, Duties and Rights of the Executive Members

The functions, duties and rights of the executive members shall be as follows:

(1) **Chairman**

- (a) To preside over the General Meeting and the meeting of the Managing Committee and to conduct the meeting.
- (b) To specify the date, time, place and agenda for the meeting of the Managing Committee.
- (c) To cast the deciding vote, in the case of even division of votes in the meeting of the Managing Committee.
- (d) To represent on behalf of the Associations or to appoint any Executive Members for the representation of the Association.
- (e) To give order to call Emergency Meeting of the Managing Committee.

(2) **Vice-Chairman**

- (a) To assist the Chairman to discharge the functions of the Association.
- (b) To exercise all powers and perform all functions of the Chairman in his absence.

(3) **Executive Members of the General Affairs Section**

- (a) To call the General Meeting in accordance with the decision of the Managing Committee.
- (b) To call the meeting of the Managing Committee in accordance with the order of the Chairman.
- (c) To maintain records of the discussions and decisions of the Managing Committee.
- (d) To submit annual report of the Association in the General Meeting.
- (e) To certify the decision of the Managing Committee.
- (f) To do necessary correspondences on behalf of the Managing Committee according to the constitution, policy and decision of the Association.
- (g) To discharge other necessary functions as prescribed by the Chairman or taking his permission, keeping in view the interest of the Association.

(4) **Executive Members of the Auditing Section and Accounting Section**

- (a) To prepare the annual budget of the Association and to submit it to the Managing Committee.
- (b) To keep the particulars of the income and expenditures of the Association.
- (c) To manage for realizing the fees, subscriptions, fines and such other amounts to be realized from its Members by the Association.

- (d) To supervise and control all the financial matters of the Association.

Chapter 6 Financial Management

(1) Financial Resources

The financial resources of the Association shall be as follows:

- (a) Fees, fines etc. realized from the Members of the Associations.
- (b) Subscriptions, prizes, financial supports, grants, etc. received by the Associations from any sources.
- (c) Loan amounts received by the Associations.

(2) Particulars of the Immovable Property

The particulars of the immovable property of the Association shall be kept as prescribed by the Managing Committee.

(3) Fund

- (a) There shall be a fund for the operation of the functions of the Associations in which all the amounts received for the Associations shall be deposited.
- (b) All the expenses to be done on behalf of the Associations shall be born from the fund pursuant to subsection (1).
- (c) The operation of the fund shall be as directed by the Managing Committee.

(4) Audit

- (a) The audit of the Associations shall be done by the Auditor appointed by the General Meeting in each year.
- (b) The particulars of the accounts of the Associations along with the auditor's report shall be submitted to the local authorities (DIOs) each year.

Chapter 7. Miscellaneous

(1) Provision Relating to the Election

The election of the Executive Members shall be performed from among the Members in the General Meeting.

(2) Disqualification of the Candidate

A member who is not in a position to understand his (her) action due to mental or physical unsoundness shall not be entitled to stand as a candidate for the post of an Executive Member in the election of the Managing Committee.

(3) Vote of Non-Confidence

- (a) In case a resolution of vote of non-confidence is submitted in the General Meeting against any Executive Members by the consent of 50 % of the Members on the ground that he (she) has not fulfilled the responsibilities honestly and if the resolution is passed by a majority of two thirds of the Members in the General Meeting, such Executive Member can not hold his (her) post.
- (b) An opportunity shall be given to submit his (her) clarification to the Executive Members against whom the resolution of vote of non-confidence has been submitted.
- (c) In case a resolution of vote of non-confidence is not approved once it is submitted, again a resolution of vote of non-confidence upon the same Executive Members can not be submitted without passing one year.

(4) Resignation

Any Executive Members desirous to quit his (her) post may resign from his (her) post provided that such resignation is judged to be reasonable by the General Meeting.

(5) Condition for Automatic Termination from the Membership

In case any Executive Member without any notice and without a reasonable cause becomes continuously absent for two times in the General Meeting or four times in the meetings of the Managing Committee, such Executive Members shall be deemed to be automatically terminated from his (her) post.

ANNEX-3. TECHNICAL AND SOCIOLOGICAL DATA TO BE FILLED PRIOR TO PROJECT OPERATION

Note: This formality should be filled by the responsible person(s) who represent(s) the designated irrigation scheme and should be submitted to DIO without delay.

I. PROJECT DESCRIPTION

- 1.1 Name of the Scheme: _____
- 1.2 Category: Rehabilitation.
- 1.3 Location: _____ District, _____ Ward No., _____
Village.
- 1.4 Estimated irrigated area and number of farmers per village.

| <u>Name of Village</u> | <u>Irrigated Area (ha)</u> | | <u>No. of Farmers</u> | <u>No. of Households</u> |
|------------------------|----------------------------|-----|-----------------------|--------------------------|
| | Wet | Dry | | |
| _____ | | | | |
| _____ | | | | |
| _____ | | | | |
| _____ | | | | |
| _____ | | | | |
| _____ | | | | |
| _____ | | | | |

1.5 Physical Description of the System

1.5.1 Present use of the river (Are there within approximately 1 km upstream or 1 km downstream of the rehabilitated intake any irrigation scheme or water mills or the uses of water that will influence or be influenced by the project ?)

1.5.2 Are there any water rights problems ? (If there are water rights problems, acquire a " Letter of No Objection " from the users of these facilities or negotiate an agreement to share the water).

1.5.3 Structures

(1) Describe the intake structure or diversion in the system.

(2) Describe the main canal with respect to its type, width, depth, length, slope, discharge, quality and condition.

(3) Describe other structures in the canal system with respect to its kind and number.

1.6 Agricultural System in the Command Area.

(1) Irrigated lowland _____ ha.

| <u>Kind of Crops</u> | <u>Spring Crop</u> (ha) | <u>Summer Crop</u> (ha) | <u>Winter Crop</u> (ha) |
|----------------------|----------------------------|----------------------------|----------------------------|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

(2) Rainfed lowland _____ ha.

| <u>Kind of Crops</u> | <u>Spring Crop</u> (ha) | <u>Summer Crop</u> (ha) | <u>Winter Crop</u> (ha) |
|----------------------|----------------------------|----------------------------|----------------------------|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

(3) For each main crop obtain the following information:

- Average yield (kg/ha) _____.
- Farm gate price during harvest (NRs/kg) _____.
- Period of highest farm gate price (NRs/kg) _____.
- Cost and type of seed used (NRs/kg/local/HYV) _____.
- Cost and type of fertilizer used (NRs/kg/manure/fertilizer) _____.

(4) Is there a cropping calendar plan followed collectively by the farmers?
Yes or No

(5) If yes, describe the cropping calendar plan.

(6) Also, indicate who formulated the cropping calendar and the following information.

Position in
Farmer's Organization

Period of holding
the position

Remuneration**

** If the individual concerned is not remunerated what other benefits does he enjoy for preparing the cropping calendar plan.

II. PROJECT AREA DESCRIPTION

2.1 Access to the Project Area.

2.1.1 Name of the Nearest Roadhead _____.

2.1.2 Distance to the Project Command Area from the Roadhead _____ km.

2.1.3 Ordinary Route to Reach the Project Area.

2.2 Access to Support Service and Market.

2.2.1 Distance to the Nearest Market _____ km.

2.2.2 What kind of agricultural products are traded?

2.2.3 Distance to the Nearest Cooperative _____ km.

2.2.4 Distance to the Nearest Service Center _____ km.

2.3 Availability of Food: / / Surplus / / Deficit.

2.3.1 Surplus Volume _____ mt.ton.

Deficit Volume _____ mt.ton.

2.4 Availability of Labor

2.4.1 Availability of labor for reconstruction (rehabilitation) of the scheme and maintenance according to labor category and wage rate.

| Labor Category | <u>Availability</u> | | Wage Rate (NRs/day) |
|----------------|---------------------|----------------|---------------------|
| | Locally Available | To be Imported | |
| Skilled | _____ | _____ | _____ |
| Semi-skilled | _____ | _____ | _____ |
| (Male) | _____ | _____ | _____ |
| (Female) | _____ | _____ | _____ |
| Unskilled | _____ | _____ | _____ |
| (Male) | _____ | _____ | _____ |
| (Female) | _____ | _____ | _____ |

2.4.2 Availability of Voluntary Labor:

_____ man-days/year for reconstruction (rehabilitation)
_____ man-days/year for repair and maintenance.

III. SOCIAL STRUCTURES AND SETTLEMENT PATTERN IN THE PROJECT AREA

3.1 Brief History of Settlement

3.2 Population:

3.2.1 Age/sex distribution

3.2.2 Literacy Status

3.2.3 Ethnic/Caste/Composition

3.2.4 In/Out/Migration/Seasonally/Permanently

3.3 Land holding Pattern:

3.3.1 Land holdings:

| Holding Category | No. of Households | Percentage of Total Land Holding Household | Percentage of Irrigated Land to Total Land |
|-----------------------|-------------------|--|--|
| Small (< 0.5 ha) | _____ | _____ | _____ |
| Medium (0.5-1.0 ha) | _____ | _____ | _____ |
| Large (1.0-1.5 ha) | _____ | _____ | _____ |
| Very Large (> 1.5 ha) | _____ | _____ | _____ |

3.3.2 Land Tenure:

| Tenure Category | No. of Households |
|-----------------------------|-------------------|
| Land owner | _____ |
| Tenant | _____ |
| (1) Pure tenant | _____ |
| (2) Small holder cum tenant | _____ |
| Landless/sharecropper | _____ |

3.3.3 Number of Absentee Landholders _____.

And Area Held by Them. _____ha.

3.3.4 Land Prices:

Irrigated Land _____ (NRs/ha)

Unirrigated Land _____ (NRs/ha)

IV. BRIEF HISTORY OF THE PROJECT AND ASSISTANCE RECEIVED

4.1 Describe briefly the history of irrigation development in the area surrounding the project area, mentioning type of scheme, management pattern, location, diversion points and name of the command area.

4.2 Project History and Assistance Received

4.2.1 (1) When was the project first constructed ?

_____.

(2) Who financed, initiated, and directed the initial construction ?

_____.

(3) Who provided labor in the initial construction ?

_____.

(4) Who provided technical assistance ?

_____.

(5) What kind of contribution did the farmers give ?

// Cash // Labor // Materials (NRs)

(6) Estimated farmers' contribution:

Cash _____ (NRs)

Labor _____ (Man-days)

Materials. _____.(NRs)

(7) What was the basis of mobilizing internal resources ?

// Household // Landholding // Others if any, please explain.

_____.

4.2.2 Previous Works Done

(1) Have the canals and other structures in the system undergone major repair?

// Yes // No

(2) When ? _____.

(3) What was done ?

_____.

(4) Who initiated and financed the repair ?

(5) Farmers' contribution:

Cash _____ (NRs)

Labor _____.(Man-days)

Materials _____ (NRs)

4.3 Project Extension/Contraction

4.3.1 Have the new settlers been allowed to join ?

// Yes // No

4.3.2 Has there been amalgamation, incorporation of other systems ?

// Yes // No

V. Farmers' Involvement in Implementation of the Project

5.1 Would the framers like to be involved in determination of the location and types of irrigation facilities to be constructed ?

// Yes // No

5.1.1 If yes, how ?/ If no, why ?

5.2 Would the farmers like to be involved in construction of diversion structures, main, secondary and tertiary canals including the related facilities ?

// Yes // No

5.2.1 If yes, how ?/If no, why ?

5.3 What percentage of the farmers would be willing to share cost of construction ?

Willing to share _____ %.

Not willing to share _____ %.

5.3.1 Those who are willing to share in :

Labor contribution _____ %.

Cash contribution _____ %.

Right-of-way/land contribution _____ %.

Contribution by other materials _____.

VI. ORGANIZATION OF WATER USERS' ASSOCIATION

6.1 Organization:

6.1.1 Are the farmers in the project area organized into a Water Users' Association ?

// Yes // No

6.1.2 If yes, furnish the following information.

(1) Name of the association _____.

(2) Year of the establishment _____.

(3) Names and address of the founders or initiators. _____.

(4) Present status of the office with respect to its address, staff and its function.

6.1.3 Membership in the association.

(1) Present membership _____.

(2) Membership during past 5 years _____.

6.1.4 Procedures of becoming a member of the association.

6.1.5 If there are different categories of memberships, probe what differentiates one category from another and what are the duties, rights, and obligations of different kinds of members ?

6.1.6 Has any member been expelled ?

// Yes // No

If expelled, why ?

6.1.7 Have some members of the association been permanently absent ?

// Yes // No

If yes, how many _____ (Nos.) and for how long _____ (years/months)

6.1.8 Association Meetings

(1) How many times did the association officials meet and how many times did the general assembly meet in the past five years ?

| Years | Official Meeting (Nos.) | Agenda | General Assembly (Nos.) | Agenda |
|-------|-------------------------|--------|-------------------------|--------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

6.1.9 How many times were the extraordinary meetings held in the past five years and what was the purpose ?

6.1.10 Prove what actions are taken against those who do not attend the meeting (in both official as well as general assembly meeting)

6.1.11 How are the resolutions passed in the meetings (by vote or consensus or others ?)

6.1.12 Does the association have written constitution and/or by-laws ?
If yes, who wrote it and what are its major provisions ?

6.1.13 What records does the association keep ?

/ / Income and expenditure accounts

/ / List of members

Others (Please specify)

6.1.14 For what years are these records available ?

6.1.15 Name the non-members who influence the management of the association, if any.

Name

Address

| <u>Name</u> | <u>Address</u> |
|-------------|----------------|
| <hr/> | <hr/> |
| <hr/> | <hr/> |
| <hr/> | <hr/> |
| <hr/> | <hr/> |
| <hr/> | <hr/> |

6.1.16 What relationships exist between local political leadership and the association ?

6.2 If the farmers in the project area are not organized into a water users' association, whom do the farmers recognize as leaders or managers of the association ?

6.2.1 Are the farmers in the project area interested in forming an association ?

// Yes // No

If no, why ? (Also estimate percentage of the farmers who are not willing to organize into an association)

If yes, who would be interested in taking a leader role ? (Identify leaders from head, middle reach and tail-end of the project. Also, identify leaders from different socio-economic groups who live in the command area of the scheme.)

| Name | Address | Socio-economic stratification (Category/land holding) | Location of Irrigated Plot |
|------|---------|---|----------------------------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

VII. PRESENT WATER MANAGEMENT IN THE PROJECT AREA

7.1 Water Allocation and Distribution

7.1.1 What are the bases for water allocation (water rights of the members within the project) ?

// Land area

// Investment

// Purchasing water share.

// Others (Please specify)

7.1.2 Who attends to the allocation and distribution of water ?

Name

Address

7.1.3 How is the water distributed ? [Find out how the distribution is done at different levels (sectional level/scheme level) of the project, who determined these rules, who alters the rules ? when ? and how ? And what penalties are imposed on those who violate the rules ?]

7.1.4 How does the water allocation change with crops (paddy/wheat, wet/dry seasons) ?

7.1.5 In there any outside influence (due to assistance) or dominance of on individual or social group in water distribution ?

7.1.6 How are the priorities for water distribution determined ? What factors determine who should receive water at a particular time ?

7.2 Conflict and Conflict Management

7.2.1 Collect information on causes, nature and frequency of conflict.

7.2.2 What actions related to water use are considered offense or illegal ?

7.2.3 Do the farmers frequently quarrel over water ?

// Yes // No

If yes, what are the usual causes of the quarrel ?

7.2.4 To whom is the first appeal for quarrel resolution made and what are the step-by-step procedures for difficult cases ?

7.2.5 What conflict is handled within the organization (or farmers) and what is taken outside ?e,g to police, court, etc.

7.2.6 What actions have taken against the offenders ?

| <u>Offenders</u> | <u>Actions/sanctions</u> | <u>Year</u> |
|------------------|--------------------------|-------------|
| <hr/> | <hr/> | <hr/> |
| <hr/> | <hr/> | <hr/> |
| <hr/> | <hr/> | <hr/> |
| <hr/> | <hr/> | <hr/> |
| <hr/> | <hr/> | <hr/> |

7.2.7 Describe conflicts that have occurred among the systems.

7.3 Resource Mobilization and Maintenance

7.3.1 What are the bases of mobilizing resources from maintenance ?

/ / Irrigated area

/ / Water received

/ / Water share

// Household wise

And what types of resources are mobilized for maintenance ?

/ / Cash

/.../ Labor

/ / Kind (such as equipment, animals)

7.3.2 Do the farmers pay any irrigation fee ? Do the farmers pay right-of-way fee ?
What others ? (Collect figures of rate and amount realized from fees for past two years.)

7.3.3 How many farmers have been working in maintaining the intake facility for past five years ?

| <u>Year</u> | <u>No.of Farmers</u> | <u>Remarks</u> |
|-------------|----------------------|----------------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

7.3.4 How do farmers participate in maintenance work ? What percentage of the farmers participate in maintenance work ? What penalties are imposed on those who do not participate ? What penalties are imposed on those who create maintenance problems such as obstructing or destroying a canal or allowing animals to wallow in a canal ?

7.3.5 What is the schedule of maintenance work ? What difficulties are encountered in maintenance work ?

7.3.6 What are the external sources of resources for repair and maintenance ?

7.3.7 What is the nature and frequency of assistance received from outside the agency ?

7.3.8 Who initiated contacts with outside agency ?

7.3.9 What is the nature and frequency of assistance received from outside agency ?

7.3.10 Collect information on the planning and management of resources in the project.

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