

**ANNEX-4. FORM FOR APPRAISAL OF THE PROJECT BY REGIONAL APPRAISAL COMMITTEE**

The \_\_\_\_\_ Regional Appraisal Committee ( RAC ) herewith confirms that it has appraised the \_\_\_\_\_ irrigation rehabilitation for implementation through Japanese grant aid with the agreement made between His Majesty's Government of Nepal and the Government of Japan in \_\_\_\_\_.

**Summary of the Project:**

Location: \_\_\_\_\_

Net Command Area: \_\_\_\_\_

Water Sources: \_\_\_\_\_

Total Project Cost: \_\_\_\_\_ Cost per hectare: \_\_\_\_\_

Financing Plan: HMG \_\_\_\_\_

Government of Japan \_\_\_\_\_

Farmers' Contribution; In Kind/Labor \_\_\_\_\_

In cash \_\_\_\_\_

**Description:**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

For the appraisal of this project under reference, the following documents and information are available for review.

<u>No.of Document</u>	<u>Title of Document</u>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____

- 6. \_\_\_\_\_
- 7. \_\_\_\_\_
- 8. \_\_\_\_\_

After the review of the above documents and information, the Regional Appraisal Committee certifies that the project meets the following criteria.

- 1. The project is based on a genuine demand from the majority of the farmers-beneficiaries.
- 2. The project is judged to be technically feasible.
- 3. The farmers have agreed with the terms and conditions of the assistance to be provided by HG and the Government of Japan regarding the required contribution towards the capital cost, and their responsibilities in planning, construction, and operation and maintenance of the project.
- 4. The economic internal rate of return is \_\_\_\_\_ %.
- 5. The project uses exclusive water from the rivers/streams with which originate entirely within Nepal.

The project is therefore recommended for implementation under the grant aid of the Government of Japan.

<u>Name</u>	<u>Signature</u>	<u>Title</u>	<u>Date</u>
for DOI			
for DOA			
for NPC			
for ADBN			

Approved for implementation:

\_\_\_\_\_  
 Director, Regional Appraisal Committee.

Dated: \_\_\_\_\_.

## ANNEX-5. PROJECT PROFILE

**\*\*Note** :This document should be kept at DOI, DIO, ADBN and concerned WUA and should be referred whenever necessary and the document should be modified according to latest information obtained. And the document should be open to everybody.

### I. SALIENT FEATURES OF THE PROJECT

- (1) Project Classification: \_\_\_\_\_.
- (2) Village Development Committee: \_\_\_\_\_.
- (3) District: \_\_\_\_\_.
- (4) District Headquarters: \_\_\_\_\_.
- (5) Zone: \_\_\_\_\_.
- (6) Total Canal Length:  
Main Canal: \_\_\_\_\_ Km.  
Secondary Canal: \_\_\_\_\_ Km.  
Tertiary Canal: \_\_\_\_\_ Km.
- (7) Net Command Area; \_\_\_\_\_ ha.
- (8) Name of Sources: \_\_\_\_\_.
- (9) Type of the Representative Canal: \_\_\_\_\_.
- (10) Maximum Design Discharge in the Main Canal: \_\_\_\_\_ m<sup>3</sup>/sec.
- (11) Side slope of the Main Canal: \_\_\_\_\_.
- (12) Bed Slope of the Main Canal: \_\_\_\_\_.
- (13) Kind and Number of Diversion Structures: \_\_\_\_\_.
- (14) Total Project Cost: \_\_\_\_\_.
- (15) Economic Internal Rate of Return ( EIRR ): \_\_\_\_\_ %.
- (16) B/C Ratio. \_\_\_\_\_.

### II. DETAILED FEATURES OF THE PROJECT

#### 1. Name:

Type and Classification:

#### 1. Location

1.1 Zone \_\_\_\_\_.

- 1.2 Region \_\_\_\_\_.
- 1.3 District \_\_\_\_\_.
- 1.4 Village Development Committee \_\_\_\_\_.
- 1.5 Ward No. \_\_\_\_\_.
- 1.6 Mean Elevation of the Project Area \_\_\_\_\_.
- 1.7 Latitude \_\_\_\_\_.
- 1.8 Longitude \_\_\_\_\_.
- 1.9 Topo-map sheets Nos. \_\_\_\_\_.
- 1.10 Drawing Nos. \_\_\_\_\_.

**2. Access**

- 2.1 Access to the Project Area by Road \_\_\_\_\_ Km.
- 2.2 Description of the Route

---

---

---

**3. Climate**

- 3.1 Mean Annual Rainfall
- 3.2 Temperatures
  - (1) Mean Daily Minimum.
  - (2) Mean Daily Maximum.
- 3.3 Evapotranspiration
  - (1) Minimum
  - (2) Maximum

**4. Topography**

- 4.1 Topography Along the Main Canal
- 4.2 Topography of the Command Area



## 7. Water Rights

### 7.1 Upstream

Name of Scheme	Discharge (liters/second)	Area ( ha )
----------------	---------------------------	-------------

### 7.2 Downstream

Name of Scheme	Discharge ( liters/second )	Area ( ha )
----------------	-----------------------------	-------------

## 8. Socio-Economic and Organizational Situation

### 8.1 Population

#### 8.1.1 Number of the Households

#### 8.1.2 Ethnic Groups

Name	Percentage (%)	Number
------	----------------	--------

#### 8.1.3 Migration

Annual Migration Rate	Seasonally	Permanently
-----------------------	------------	-------------

Out of the area

Into the area

## 8.2 Land Tenure and Farm Size

### 8.2.1 Land Tenure

Categories	Number	Percentage (%)
Land Owners		
Tenants		
Tenants cum Owners		
Landless		

### 8.2.2 Farm Size

Categories	Irrigated (%)	Rainfed (%)
Small		
Medium		
Large		
Very Large		

## **ANNEX-6. FORMALITIES TO BE FILLED BY THE MEMBERS OF THE WUA DURING O&M ACTIVITIES**

### **1. General**

All the members ( farmers ) of the WUA are requested to keep the monthly observation results on the irrigation systems during their O&M activities to be conducted according to the specifications given in sections 3.11 to 13 of chapter 3 of Chapter II of this O&M manual. And the observation results shall be recorded according to the formalities given in Annex-6-(1) to Annex-6-(3). The responsible members of respective irrigation scheme must keep attendance records for O&M activities by the members ( farmers ) according to the formality given in Annex-6-(4). The responsible accountant(s) must prepare a brief accounting report according to the formality given in Annex-6-(5). Also, it is recommended to publish a brief paper ( like a bulletin board ) on the monthly-basis and distribute it free of charge to all the members of the respective irrigation scheme. The publication should be made by the responsible members ( 2 to 3 persons ) on the scheme-basis. A sample paper for the said is given in Annex-6-(6). At the end of every meeting, the responsible members of the WUA shall prepare a minutes of meeting immediately and distribute copies of the minutes of the meeting to the turn-out leaders of the designated irrigation scheme without delay. A sample formality for preparation of a minutes of the meeting is given in Annex-6-(7).

### **2. Documentation**

Unless otherwise specified, all the documents mentioned above shall be made by the responsible members ( farmers ) of the WUA. Especially, documentation after finishing O&M activities shall be made by all the members in turn so that maximum number of the members of the WUA , who are requested to willingly participate in the O&M activities. Frankly speaking, farmers even in the valley have not been well accustomed to prepare documents in any form, which makes the O&M activities incomplete. However, this situation have to be improved this time through the effort by the farmers in collaboration with the government officials from DOI and DIO etc. This means that in this manual it is requested that all the documentation related to any O&M activities should be done by the members ( farmers ) of the designated WUA as much as possible, and not by the specially assigned members for that purpose only.

### **3. Filing of the Documents**

All the documents mentioned above shall be compiled by the committee of each WUA and shall be filed in the library of the committee in good order for everybody's reference. And if requested by any members of the WUA to show them the documents, the responsible members have to willingly do it and the documents after going through by them should be returned to the library of the committee as quickly as possible. To secure the documents, responsible members of the committee of the WUA shall keep the records on the name of borrower, borrowing/returning date of the documents and the records should also be kept at the library of the committee of the WUA in good order. A sample formality for library record keeping is given in Annex-6-(8).



**OBSERVATION SHEETS OF \_\_\_\_\_ IRRIGATION SYSTEM**

\*\*These observation sheets should be filled on the monthly basis by the observers and approved by the responsible members.

Date of Observation: Date      Month      Year

Weather Condition

Working Hours: AM:      to      PM:

Name of Observers and Name of Village to Which They Belong

- (a) \_\_\_\_\_
- (b) \_\_\_\_\_
- (c) \_\_\_\_\_
- (d) \_\_\_\_\_
- (e) \_\_\_\_\_

**Name of Structures and Observation Items**

**Description of the Conditions**

**Intake Facility**

(a) Weir

(b) Gates

(c) Upstream Protection Work

(d) Downstream Protection Work

(e) Upstream Silting Condition

(f) Downstream Silting Condition

(g) U/S and D/S Scoring Condition of the River

(h) River Bank Condition ( Left/Right Bank )

(i) Others ( to be specified )

Name of Structures and Observation Items	Description of the Conditions
<b>Main Irrigation Canal</b> (a) Gates at the Head of the Canal (b) Gates Along the Canal ( Turn-outs ) (c) Lining Condition of the Canal (d) Condition of the Spillways (e) Silting Condition in the Canal and Foreign Matters (f) Condition of the Drop Structures (g) Road Condition Along the Canal (h) Surrounding Condition of the Canal (i) Others ( Such as leakage through the gates, landslides, etc., to be specified. )	
<b>Secondary Canal</b> (a) Gates at the Head of the Canal (b) Gates Along the Canal ( Turn-Outs ) (c) Silting Condition in the Canal and Foreign Matters (d) Condition of the Drop Structures (e) Road Condition Along the Canal (f) Lining Condition of the Canal (g) Surrounding Condition of the Canal (h) Condition of the Other Structures (i) Others ( Such as leakage from the gates, landslides, farmers' opinion, etc., to be specified. )	

Name of Structures and Observation Items	Description of the Conditions
<b>Tertiary Canal</b> (a) Gates Along the Canal (b) Silting Condition in the Canal (c) Silting Condition in the Canal and Foreign Matters (d) Surrounding Condition of the Canal (e) Condition of the Other Structures (f) Any item to be specified. (g) -do- (h) -do- (i) Others ( to be specified )	
<b>Monthly Overall Views Through the Observation ( Including Farmers' Opinion )</b>	
Prepared by	
Checked by	
Approved by	

**Monthly Accounting Report for Water Charge**

Collected Water Charge for the Month Monthly Income From Other Sources Total Monthly Income  Monthly Expenditure Spent for O/M Activities (a) Expenditure for repair of gates (b) Expenditure for repair of canal (c) Expenditure for painting gates (d) Expenditure for protection work against landslides (e) Expenditure for provision of gabion work (f) Expenditure for procurement of miscellaneous material (g) Payment to special assignment which is not specified in the O/M manual (h) Other expenditure ( To be specified )  Total Monthly Expenditure  Balance for the Month ( Surplus/Deficit )  Balance to be Carried Over Next Month ( To be deposited in the authorized bank )	
Comments by the Responsible Accountant	
Prepared by	
Approved by	





**Minutes of Meeting**

Note: This minutes of meeting shall be prepared by the responsible members at the end of every meeting and the copy of the minutes shall be distributed to the responsible members of the WUA without delay.

Date:

Place:

Attendams:

Signature

Discussions and Confirmed Matters

Prepared by:

Checked by:

Signature

Signature





## **ANNEX-7. SAMPLE RULES FOR OPERATION AND MAINTENANCE OF THE HEADWORKS ( INTAKE FACILITIES )**

### **Chapter 1. General Rules**

#### **( Objectives )**

These rules have been prepared for operation and maintenance as well as for proper management of the headwork of each irrigation scheme based on the technical suggestions given in the manual.

#### **( Manager )**

The responsible person for operation and maintenance of the headwork shall manage the headwork according to and as stipulated in these rules.

1. The manager shall obtain in advance, approval from the representative of the respective WUA when he must manage any matters that are not defined in the rules. However, any matters to be managed urgently owing to the occurrence of an emergency are expected from these rules.
2. In case of the above provision, he must report to the representative of the respective WUA as quickly as possible and receive instructions regarding necessary measures to be taken.

### **Chapter 2. Matters Related to Operation of the Gates, Taking Irrigation Water and Release of Water**

#### **Section 1 Water Level**

##### **( Limitation of Water Level )**

1. The river water level at the headwork shall be EL. \_\_\_\_\_ m as upper limit and EL. \_\_\_\_\_ m as lower limit.
2. The manager shall be responsible for taking irrigation water considering the limitation stipulated in the above article and endeavor to maintain constant river discharge as much as possible.

##### **( Criteria for Water Level )**

Measurement of the water level at the headwork shall be based on the reading of the water level gauging staff installed on the pier of the headwork.

#### **Section 2. Drawing the Irrigation Water**

##### **( Irrigation Period )**

The irrigation period shall be from \_\_\_\_\_ to \_\_\_\_\_ every year unless otherwise specified by the rules.

##### **( Taking the Irrigation Water )**

The manager shall be responsible for taking necessary irrigation water paying attention to the conditions of irrigation, meteorology and hydrology during the irrigation period.

( Planned Amount of Irrigation Water to be Drawn )

The amount of irrigation water to be drawn at the headwork shall be as follows unless otherwise specified.

Period	Irrigation Period				Remarks
	Nursery Period	Transplanting Period	Ordinary Period	Other Period	
Canal Name	___ mm/day	___ mm/day	___ mm/day		
	to	to	to		
	___ mm/day	___ mm/day	___ mm/day		
___ Irrigation Canal					

( Unit: cubic meter per second )

### Section 3 Operation of the Gates at the Intake

Irrigation water shall be drawn by adjusting the opening of the gates at the intake paying attention to the water level at the headwork as well as to the discharge to be diverted into the irrigation canal.

( Check Measurement of Intake Discharge )

Check measurement of the intake discharge shall be made by reading the staff gauge installed inside the gates once a year to find its accuracy. And the relationship between discharge and readings shall be collected if it is found necessary to do so.

### Section 4. Release of Discharge and Operation of the Gates

( Duty Discharge to be Released and Discharge to be Released at Normal Stage )

The duty discharge to be released at the headwork shall be \_\_\_ m<sup>3</sup>/sec unless otherwise specified. When the water level at the headwork is lower than El. \_\_\_ m of upper limit, water shall be released keeping the water level ( at the headwork ) at El. \_\_\_ m ( upper limit ) to El. \_\_\_ m ( lower limit ) by adjusting the opening of the gates.

( Water Releasing at Floods )

In the case that the water level at the headwork is anticipated to become higher than the above elevation, all the gate shall be kept open to avoid damages to the head work, irrigation canals, river protection etc. Even in this case, the gates should be operated slowly and carefully.

## **ANNEX-8. BRIEF INTRODUCTION OF WATER USERS' ASSOCIATION IN JAPAN**

### **Chapter 1. Water User's Associations Initiated and Participated by Farmers**

#### **1. Brief History of Irrigation farming and Evolution of the Water Users' Associations**

Throughout the long history of rice cultivation in Japan, rice farming has supported its population rise, nurtured its culture, and played an important role in development of the economy. In this connection, improvement of irrigation and drainage systems have largely contributed to raise land and labor productivity. In Japan, irrigation is essential for production of rice, and consequently, the water management system and paddy rice cultivation have developed hand in hand. Drainage improvement in paddy fields and upland crop irrigation, on the other hand, have been a relatively recent phenomenon.

At present, management of irrigation and drainage water is being efficiently carried out by associations organized by the beneficiary farmers called " Land Improvement Districts ( LIDs ). This water management system has evolved in a unique manner over many years by adapting to Japan's climatic and natural conditions as well as the various political, socio-economic conditions as they underwent regional and historical changes. And the following is a brief look at those historical changes.

From the 3<sup>rd</sup> century B.C. to the 8<sup>th</sup> century A.D. (Antiquity) , rice paddy farming expanded throughout Japan centering on areas that allowed easy access to irrigation water. In this process, many simple canals and small irrigation ponds were constructed to serve as irrigation facilities. In the later period, a centralized state model after China was formed which established state-management of farmlands and irrigation facilities and vigorously carried out improvement and expansion of these facilities.

In the period encompassing the 9<sup>th</sup> to the 15<sup>th</sup> century ( Middle Ages ), contact with China gradually diminished, and with the shift of power from a central to a feudal government, the control of farmland and irrigation facilities moved from the hands of the state into the private management of the ruling class, the Samurai warriors, and in the process decentralized water management systems came into being. In the latter part of the Middle Ages, paddy fields were expanded along streams and tributaries of major rivers, and communities were established and enlarged at these locations. Since these sites were more vulnerable to water shortages, and irrigation had to be carried out by several farmers or communities on an equal basis, water management required not only the cooperation within a community but even cooperation among communities. Although water disputes could not always be avoided, after a number of them had occurred a ruling system for water allocation gradually developed. In this manner the community's self-government of water management was formed as the basic model of an orderly water management system at the terminal end of irrigation networks.

From the 16<sup>th</sup> to the 19<sup>th</sup> century, agricultural land reclamation in the large river basins progressed, and the basic groundwork for today's 3 million hectares of paddy fields was laid down. While the water management system of this age basically inherited the system formed in the Middle Ages, where communities at the terminal end of the irrigation network undertook their own water management, the communities were now generally larger and organizations were set up to maintain the entire water supply complex for the region. Between communities, these organizations coordinated water

rights and other interests; within the communities as well they came to regulate the use of water and land. The character and structure of these water management systems were inherited by the legally registered water users' associations of the 20 th. century and have influenced today's LIDs.

After Japan took its first steps towards modernization in the year 1868 of the Meiji Restoration , the old systems were recognized and wide scale improvement of irrigation/drainage systems were undertaken by combining Japan's traditional paddy farming techniques with modern science and technology . Until then the irrigation of paddy fields had been the main focus while irrigation systems in upland fields and drainage systems in paddy fields had received little attention. In the 1990s, however, several legal systems were consolidated, and equal importance was placed on irrigation and drainage. Under this system, drainage improvement projects were actively pursued in order to raise the productivity of mostly ill-drained paddy fields in the downstream areas of large river basins.

Furthermore around 1970s, a crop diversification policy was adopted to deal with the general surplus production of rice. This provided an opportunity to shift the existing emphasis on paddy fields to aggressive development of irrigation/drainage systems for upland fields. In principle, the structure of water users' associations for paddy farming has been directly applied to those for drainage and upland crop irrigation. Thus, a consensual decision making system based on each community's group identity evolved in the course of Japan's long history and it was on the basis of this kind of community identity that community-based water management systems came into being for the management of agricultural water. What the Land Improvement Act, enacted sooner after World War II, in effect did was to confer legal status to such water users' associations in rural areas, based on the farmers' initiative and participation, by designating them as Land Improvement Districts.

## **2. Institutional Structure of Water Users' Associations and Their Present Situation**

Land Improvement Districts ( LIDs ) function as the core water users' associations in Japan today. LIDs are associations established and managed in accordance with the Land Improvement Act enacted in 1949, and whose membership consists of those farmers in the regions concerned. It has a strong characteristic as a juridical person (public juridical person ) whose activities are dedicated to the public good, and is thus legally similar to a local government. The Land Improvement Act stipulates both the construction and management of irrigation/drainage systems by the LIDs and it is through the operation of these systems that the LIDs conduct water management.

Those eligible to become association members are as a master of principle not the landowners of farmland that benefit from the water management but the farmers engaged in cultivation themselves. This principle bears the influence of the post-World War II agricultural land reforms which made available to tenant farmers the agricultural land until then held by absentee landowners. Furthermore, all those eligible to become association members in that region must become association members of that LID. All matters pertaining to the management of the LID are democratically decided upon at meetings composed of its members. Thus, the beneficiary farmers ( members ) determine fundamental items such as the area supplied with water by the system under the LID's management, how it is to be managed, and what criterion to adopt in bearing the monetary burden in the management of the system. LIDs can commence the management of a system once the required procedures stipulated under the Land Improvement Act have been undertaken. These include the application by farmers for LID establishment, the agreement of at least two-thirds of those farmers involved, and preparation of a management plan.

There are at present approximately 8,000 LIDs in Japan, covering an area of around 3.3 million ha, with a total membership of about 4.7 million. The number of directors and general staffs per LID varies with each district. For example, an LID with a beneficiary area of 1,500 hectares typically has 19 directors and 6 general staffs.

Number of LIDs Classified by Area ( as of 1993 )

Area of agricultural land	Less than 100 ha	100 to 500 ha	500 to 5,000 ha	Over 5,000 ha	Total
Number of LIDs (%)	3,802 (47.0)	2,828 (34.9)	1,346 (16.8)	102 (1.3)	8,096 (100.0)

### 3. Operation, Maintenance and Management ( OMM ) of the Systems

Depending on the size of the beneficiary area or the scale and type of facility, the project executing body responsible for the construction of irrigation/drainage systems may be the national/local government or LID. The management of these systems, on the other hand, is in almost all cases carried out by LIDs whether those systems were constructed by the national/local governments or the LID itself. In these cases, the LIDs are usually entrusted with operation, maintenance and management ( OMM ) by the national/local governments ( i.e. contracted between the farmers and the national/local governments ) or the facility ownership is transferred to LIDs. A subordinate organization of the LID can be organized at the discretion of the farmers and is operated according to independent rules. It undertakes the OMM of the terminal systems ( e.g. secondary and tertiary canals ) which diverge from the main irrigation/drainage canal managed by the LID.

This kind of arrangement predominates because the LID's operation involves not only the maintenance and repair of the facilities but the entire water management in that district, which is directly and deeply bound up with the interests of the individual beneficiary farmers. Thus the autonomous management by an LID whose membership consists of those farmers is considered to be the most rational one, especially within the context of the water management system that evolved from Japan's long tradition of rice farming.

On the other hand, the management of large reservoirs, headworks constructed across major rivers and drainage pumping stations that also benefit extensive non-farmland areas, is often carried out by local government by local governments or municipalities. Some particularly large and important facilities for flood control and water usage are more managed by the national government. This is because ensuring the OMM of such facilities to LIDs is difficult in terms of their technological capability, or the capacity to accept liability for flawed management, or because the system may involve the coordination between agricultural and non-agricultural water use. For such works usually the LID confers with the local government or municipalities, to decide which facility will be managed by them.

**Percentage Share of Major Irrigation/Drainage Systems  
Constructed by the National Government Classified by OMM Executing Body  
( March 1992 )**

Executing body	National government	Local government	Municipality	LID	Other	Total
Reservoir	12	24	6	58	-	100
Pond ( tank )	-	1	4	94	1	100
Headwork	3	6	2	83	6	100
Irrigation/drainage and pumping station	1	10	11	77	1	100
Subtotalled share	2	10	8	78	2	100

#### 4. Monetary Burden for OMM

The costs incurred in the OMM of irrigation/drainage systems have been considered as something that should be borne by the farmers cultivating the farmland that stands to benefits from the effects of those systems. The dues to be paid by the beneficiary farmers are determined according to the area of farmland under cultivation by those farmers or the volume of irrigation water they use, and the LID is given the power to enforce compulsory collection of these dues.

In recent years, however, due to various socio-economic changes, the proper OMM of irrigation/drainage systems is bringing great benefit not only to the farmers, but also to local communities as a whole. For this reason, although a considerable portion of the cost incurred in the OMM of irrigation/drainage systems falls upon the LID ( farmers ), more and more local governments and municipalities are bearing part of the monetary burden. Since each local government and municipality autonomously determines its share of the burden to conform with the benefit it receives and the local situation, differences naturally exist between districts. Furthermore, there are systems by which the national government subsidizes part of the cost necessary for the periodic repair and management of facilities that meet certain criteria. In recent years, the aim has been to gradually expand these government subsidy systems.

At present, the level of monetary burden assumed by the farmers for costs incurred in the OMM of irrigation/drainage systems is in general under 5 % of the income ( agricultural income ) generated by the cultivation of farmland by those farmers. In addition to the costs involved in OMM as outlined above, farmers are required to share a part of the monetary burden of facility construction costs and LID operational expenses.

**Distribution of LIDs According to Farmers' Dues per 0.1 ha for OMM**  
( at US \$ 1= 100 yen )

Farmers' dues per 0.1 ha ( U.S.\$ )	Under \$ 1	From \$1 to under \$ 5	From \$ 5 to under \$ 20	From \$ 20 to under \$ 40	\$ 40 and over	Total
OMM dues as a percentage of agricultural income	Under 0.1 %	0.1 % to under 0.6 %	0.6 % to under 2.4 %	2.4 % to under 4.8 %	4.8 % and over	
Distribution of LIDs (%)	24	16	32	16	12	100

Notes: 1) " OMM dues as a percentage of agricultural income " refers to the percentage of farmers' dues per 0.1 ha for OMM of facilities in relation to the average agricultural income per 0.1 ha of farmland ( US \$ 840 in 1991 )

Notes: 2) "Agricultural income" is the agricultural gross income minus agricultural expenses (variable expenses invested in production and depreciation of fixed assets for the fiscal year of operation ).

## 5. New Issues and Directions for Water Management

Japan's water management system, centered on the LID, has evolved to its present form over a period of many years maintaining a rational water management system adapted to the natural and social environment. In recent years, however, rapid changes in the socio-economic conditions that underlie the present principles and system of water management have given rise to the necessity for LIDs to make various new responses. The following is an introduction to the main directions LIDs are expected to take in the future.

### (1) Necessity of Strengthening LID's Institutional and Financial Status

Rapid democratic growth has led to urbanization of the country side and increased the number of part-time farmers, thus weakening the capacity of rural communities to conduct autonomous OMM of irrigation systems. In the past, all the members of a rural community would assemble once or twice a year to collectively repair facilities or clean canals. But because the ratios of both part-time farmers and non farmers have increased in rural areas, it has become increasingly difficult to uphold such an arrangement. The strong community ties, once so characteristic of Japan's rural society, are also on the decline.

There is also the matter of the worsening financial status of the LIDs. This has come about because LIDs are experiencing difficulties in increasing the amount in dues the farmers must pay, a problem directly related to the changes taking place in rural communities or the farmers themselves, as well as the decline in the relative income in the agricultural sector as compared to other industries. Furthermore although sewage treatment systems are rapidly spreading among the rural communities of Japan, the growing number of non-farmers in these communities has resulted in a large amount of sewage water being discharged directly into irrigation canals and rivers, thus raising the level of irrigation water pollution. The increase in the OMM costs incurred in the upkeep or functional recovery of the irrigation systems caused by this pollution is also contributing to worsening financial situation. Although the parties responsible for the increases in OMM costs should essentially bear the burden of cost, because of the

difficulty involved in identifying those parties, the LID ultimately bears the burden in many cases.

In order to rectify this situation, strengthening the institutional and financial status of LIDs, the promotion of unification and reorganization of those LIDs, or expansion of the scope of systems managed by the national/local governments. The national and local governments participate in these systems. Irrigation/drainage systems provide a great service to the region. Water supply systems serve not only farmers through the provision of irrigation water but the entire region by securing water for fire protection and creating waterfront environment. Drainage systems, on the other hand, contribute greatly to the drainage needs of the entire region, including those of non-agricultural lands. For over 2000 years Japan's paddy field agriculture has existed with nature and played a large role in protecting the land through ground water conservation and flood control, and in nurturing rural culture. One of our tasks is to protect and nurture Japan's agriculture, based on these irrigation/drainage systems and water management in general, and uphold it as a model of sustainable development consistent with environment conservation and the guarantee of food supplies.



## (2) Expanded Role of LIDs in Water Management

The rapid economic growth beginning in the latter part of the 1960s brought with it an increase in the demand for water supplies mainly in domestic and industrial use, thereby making coordination of water use more complex. In addition, the development of new water resources is now quite difficult. Besides the large increase foreseen in the demand for irrigation water due to expansion of upland crop irrigation, domestic and industrial water resources, it is necessary to form a comprehensive order in water use through the participation of all water users. The agricultural sector is the largest water user. From now on the LIDs not only will be involved in simply the management of irrigation water, but must play a core role in formation of a regional water use order through coordinating and reviewing the utilization of irrigation water.

### Projected Water Demand in Japan

(Unit: billion m<sup>3</sup> per year)

	<u>Year 1983</u>	<u>Year 2000 (projection)</u>
Domestic water use	14.9	20.8
Industrial water use	15.8	22.2
Agricultural water use	58.5	62.6
Total	(89.2)	(105.6)

Note: Figures are based on intake discharge.  
Source: National Land Agency (1987)

## **Chapter 2. Institutional Framework of Land Improvement Districts (LIDs)**

### **1. Legal Background of LIDs**

- (1) LIDs are farmers' associations based strongly on communal and territorial bonds and established with the approval of the prefectural governor and in accordance with the Land Improvement Act of 1949. The purpose of LIDs is to execute within a specified region land improvement works such as the construction, improvement, operation and maintenance of irrigation/drainage systems, as well as land consolidation.
- (2) Because of the public nature of the LIDs, compulsory participation of the member farmers and compulsory payment of dues are legally recognized. This lends the association an extremely strong public character and it has been given an important role in the construction and OMM of the systems.
- (3) The members of an LID which manages cultivated land within a certain specified region are those farmers who are the owners of the land ( landed farmers ) if that land is being cultivated based on property rights, or those persons who use and profit from that land ( tenant farmers ).

### **2. Establishment and Management of LIDs**

- (1) Establishment of LIDs

(a) First, 15 or more farmers designate a specified region which they would like to benefit from land improvement projects, and make a public notice summarizing those land improvement projects. After garnering the agreement of at least two-thirds of the farmers in that beneficiary region, and setting up a land improvement plan ( for construction and OMM ) and a set of regulations, the LIDs can be established once the approval of the prefectural governor has been received.

(b) At the time of establishment the LIDs and thereafter, all parties who qualify as members in that region of land within the LID, whether having agreed or disagreed with the establishment of the said LID, automatically receive membership with all the corresponding rights and duties.

(2) Voting Procedures

(a) The general assembly is the decision making body of the LID, and is to be held at least once a year.

(2) Proceedings are resolved at the general assembly with the attendance of at least 50 % of the total membership and the voted approval of over 50 % of those present. However, for issues of considerable importance to the existence of the LID, changes in regulations, the implementation of new land improvement projects, the dissolution or merger of the LID, proceedings are resolved with attendance of at least two-thirds of the total membership and the voted approval of at least two-thirds of those persons.

(c) The Land Improvement Act bestows upon all members equal voting rights regarding both resolutions and elections, and while these rights should be exercised by each member's attendance at the general assembly, in the event attendance is not possible the assembly will recognize a vote submitted in writing by a member or a vote by a representative of that member. And if the membership of an LID should exceed 200 persons, a board of representatives may be established in the place of the general assembly. The representatives are elected from among the total membership. In this case, procedures regarding convening the board of representatives and resolutions carried out therein are in general the same as that of the general assembly.

(3) Executing Body

(a) A board of directors, consisting of five or more directors, and a board of auditors, consisting of two or more auditors are formed to carry out LID administration. In this case, at least three-fifths of the directors, and at least one -half of the auditors must be members of the LID. The method of selection is to be stipulated in the regulations.

(b) Directors appointed by the general assembly must conscientiously carry out their duties in accordance with the Land Improvement Act, regulations, rules, and resolutions of the general assembly, and must bear the responsibility to compensate for any damage to the LID resulting from neglect of duty.

(c) The term of a director is as a matter of principle four years, though this term can be set to be less than four years by stipulating thus in the regulations.

(4) Dissolution or Merger of LIDs

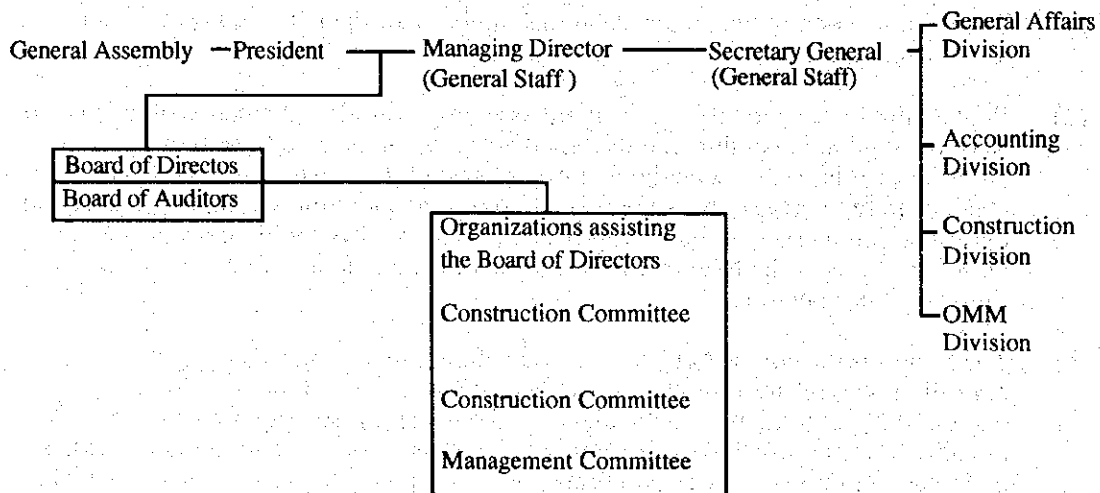
(a) Dissolution

In the event the construction or OMM undertaken by the LID has been completed, governor, or merger will dissolve that LID. Dissolution according to general assembly resolution must be approved by the prefectural governor.

(b) Merger

In the event the land improvement project being carried out by the LID have become related to that of a neighboring LID, then the two LIDs may merge after receiving the approval of the prefectural governor.

**Organization Chart of an LID( Example )**



**3. Supervision of LIDs by the National/Local Governments**

The Minister of Agriculture, Forestry and Fisheries, and the prefectural governor, to ensure that the LID upholds the laws, ordinances and regulations, and properly carries out land improvement projects and LID operations, may request operational and accounting reports and conduct on-site inspections. If the LID's operations or accounting are deemed to be in violation of the laws and/or ordinances, then the LID may be ordered to make the necessary corrections.

**4. Operations of LIDs**

The following operations can be undertaken by the LID as stipulated in the Land Improvement Act. ( Any operations not listed here are prohibited )

**(1) Implementation of Land Improvement Projects**

(a) Construction

Construction of new irrigation/drainage facilities, and construction involved in land consolidation, etc. The procedures for these construction and the OMM in

(b), below, are identical to the procedures required to establish LIDs given in 2 (1) above.

(b) OMM of irrigation/drainage facilities

- (i) OMM of irrigation/drainage facilities created by the construction defined in (a) above.
- (ii) OMM by trust or transfer of ownership of facilities constructed through national/local government projects.
- (iii) OMM of facilities constructed prior to LID establishment.

(2) Attendant Projects

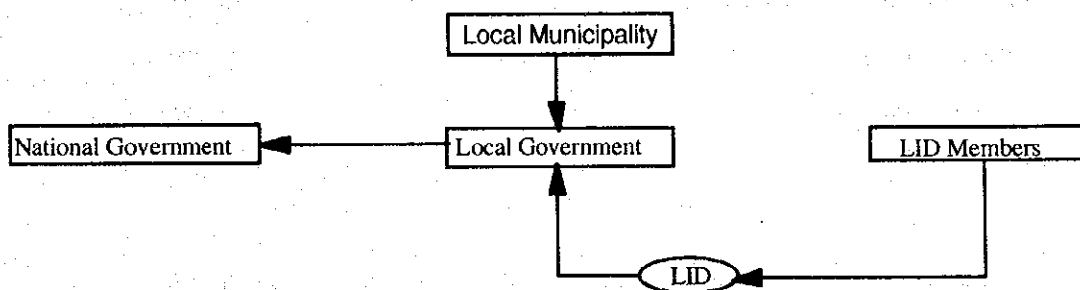
The LID is legally authorized to carry out attendant projects organically related to the above stated OMM, such as rural sewerage, electric generation, and fish farming projects, or the management of headwater conservation forests.

(3) Application To Set in Operation National/Local Government

To apply for permission to set in operation a land improvement project as a national/local governments an application filed by fifteen or more farmers is necessary. In the case of facility rehabilitation projects, however, an application based on an assembly resolution is allowed. ( Although the national/local governments may set up land improvement projects on its own initiative, these types of projects are rare.)

(4) Flow of Dues for National/Local Government Projects

- (a) The cost incurred in national projects is borne by the national/local governments, municipalities, and the beneficiary farmers. The national government collects them from the prefecture. The LID collects the dues from its members and submits them to the prefecture as stipulated in its ordinance.



- (b) In the case of local government projects, dues are collected from LID members in the same way as for national projects.
- (c) In addition to the dues for national/local government projects, the expenses (\*) necessary for the implementation of projects is collected from LID members ( beneficiary farmers ) ( In lieu of monetary burden members may be required to provide labor or goods necessary to the land improvement project.) In some cases the LID may receive assistance in the form of subsidies from the national/local governments or local municipality to cover part of these expenses.

\*\*Expenses collected from members by the LID:

- (a):Expenses necessary for land improvement projects (construction or maintenance).
- (b):LID operational expenses.

- (d) The expenses for above (a) to (c) which are borne by an LID are determined by the articles of association, according to the benefit that each member farmland receives, including such objective indices as cultivated land area, irrigation water volume, etc. If dues are not submitted within the payment period the board of directors is authorized to enact coercive collection in money or in kind.

## 5. Loan Systems for LIDs

The cost necessary for land improvement projects is high, and considering the economic situation of the farmers, in many cases collection from the members can be quite difficult during the period in which the land improvement project is underway. Accordingly, long-term low interest loans may be obtained, by way of a general assembly resolution, from farmers' financial institutions (Agriculture, Forestry and Fisheries Finance Corporation, etc.)

<u>Average Income per LID</u>		
<u>Item</u>	<u>Share (%)</u>	<u>Average Income per LID (US &amp; )</u> (at & 1 = 100 Yen)
1. Dues*	30.8	342,000
(a) Ordinary dues	9.6	106,000
(b) Special dues	21.2	236,000
2. National/local government subsidies, local municipality subsidies.	22.1	245,000
3. Loans (Agriculture, Forestry, and Fisheries Finance Corporation, etc.)	14.3	158,000
4. Other income	19.1	211,000
5. Balance carried over	13.7	152,000
Total	100.0	1,108,000

**\*Dues**

- (a) Ordinary dues: Dues allocated to cover the administrative OMM costs of the LID.  
 (b) Special dues: Dues to cover expenses incurred in construction undertaken by the LID, expenses to be shared by LIDs for national/local government projects, or dues for repayment of loans.

Loan Conditions of the Agriculture, Forestry, and Fisheries Finance Corporation  
( as of December 1993 )

<u>Classification</u>	<u>Yearly Interest Rate</u> (%)	<u>Repayment Period</u>	<u>Grace Period</u>
Local Government Projects	4.25	Within 25 years	Within 10 years
Projects Operated by LID	3.90	(including grace period)	

### Chapter 3. Case Studies

Water Management systems vary somewhat depending on the facility being managed by the LID. Systems differ depending on the natural conditions of the region such as climate and geography, crop types, and water use conditions. Their systems furthermore incorporate the ingenuity of farmers in adapting to the respective regional conditions. The following is an introduction to representative LIDs engaged, respectively, in the management of systems for rice paddy irrigation, drainage and upland crop irrigation.

#### 1. LID Management in Paddy Field Irrigation ( Meiji Irrigation Project )

This LID manages irrigation systems for reclaimed farmland ( mainly paddy fields ) on the diluvial plateau stretching along the river's right bank. Many of these facilities were constructed before 1910 and in subsequent years were renovated several times by the national and local governments. This LID has one oldest histories in Japan. The following is a profile of the LID and its main facilities.

##### Profile of LID

(1) Beneficiary Area	Approx.	6,500 ha ( paddy fields )
(2) Number of Members	Approx.	15,000
(3) Number of Directors		18
(4) Number of General Staff	Approx.	40

##### Main Facilities

<u>Type</u>	<u>Number</u>
(1) Headwork	1
(2) Irrigation Pump Station	1
(3) Irrigation Canal	430 km.
(4) Drainage Canal	90 km.

Because this region lies on a plateau, where water supply was difficult to secure, for many years the region was neglected as a wasteland. The development of large scale irrigation systems beginning in 1875, however, developed the region into one of Japan's major agricultural areas based on well organized farm management by the 1950s. The water management system in this district is divided into the LID itself and two terminal teams organized at the discretion of members. Thus, the LID manages the main facilities including the main canal, while two teams called the "canal maintenance team" and "water allocation team" manage the branch canals which supply water to several communities; the "canal maintenance team" desilts the canals, cut the grass, and conducts repairs, while the "water allocation team" carries out the daily distribution of water. Water allocation is mostly left up to the autonomous management of the teams, and the LID does not intervene except in periods of extreme drought or flooding, or when the terminal teams cannot come to an agreement.

Operational expenses, such as general staff salaries and facility operation costs (e.g., electrical bills for the irrigation pump station, canal maintenance and repair), are borne by the members with the assistance of a subsidy from the local municipalities. While member dues are decided based on the area cultivated, in consideration of the differing historical circumstances, namely that large investments have been made in the older paddy fields over a long period of time, the dues supporting OMM expenses per unit area for older paddy fields are less than those for newly reclaimed ones. Since the area managed under this LID spans a number of municipalities, the collection of dues is consigned to those municipalities. The collection rate is extremely good.

This LID is carrying out a progressive program in Japan. It was central in establishing an organization composed of representatives from the related local municipalities and fisheries cooperatives to engage in various activities to prevent further river pollution. This organization further possesses and manages forests in the watershed area for the purpose of water resource conservation.

## 2. LID Management in Drainage ( Kamedago Drainage Project )

This LID is entrusted the management of government-built facilities to conduct irrigation/drainage of farmland located on a low plain surrounded by two rivers. The following is a profile of the LID and main facilities under its management.

### Profile of LID

(1) Beneficiary Area	Approx.	5,000 ha	( 4,200 ha of paddy fields, 800 ha of upland crop fields.)
(2) Number of Members	Approx.	5,000	
(3) Number of Directors		19	
(4) Number of Administrative Staff	Approx.	70	

### Main Facilities

<u>Type</u>	<u>Number</u>	
(1) Irrigation Pump Station	19	
(2) Drainage Pump Station	4	( 3 managed by prefecture or cities )
(3) Irrigation Canal	150 km.	
(4) Drainage Canal	110 km.	

---

About 1000 years ago, this area was a tidal flat connected to the Sea of Japan, but gradually developed into terrestrial land through the alluvial process of the rivers. Due to the area's geography of being surrounded by two rivers, in the past flooding and inundation resulted in great damage to crops and disrupted the lives of the inhabitants. In order to improve the hydrological conditions and develop an agricultural production infrastructure, embankments, drainage pump stations, and drainage canals were constructed, and also land consolidation and soil dressing projects to increase land productivity were executed. At present, it is one of Japan's grain belts.

Management of the major drainage pump stations is left up to the prefecture and/or local municipality, but the LID manages all the other facilities above. For OMM, in addition to the main office, the district is divided into four areas, each of which has an LID branch. At the main office, the area planted, water levels and discharge in the rivers, water levels in canals, and rainfall data are subjected to computer analysis, and water allocation plans and operation plans for irrigation/drainage pump stations are devised to achieve the most efficient water use.

As for operational expenses, members bear part of the expenses related to the facilities managed directly by the prefecture or local municipalities, as well as expenses related to LID-managed facilities with assistance in the form of subsidies from the local municipalities. The amount of dues collected corresponds to the respective areas of paddy and upland fields cultivated by those members. Given the fact the amount of irrigation/drainage required for paddy fields is greater than upland fields, the dues per unit area for paddy fields are considerable higher.

### **3. LID Management in Upland Crop Irrigation ( Toyogawa Integrated Irrigation Project )**

LID is entrusted the management of some of the facilities constructed by the Water Resources Development Public Corporation ( WRDPC ) to irrigate farmland ( paddy and Upland ), especially in a peninsular section lacking in water resources. The following is a profile of the LID.

#### Profile of LID

(1) Beneficiary Area	Approx.16,000 ha ( 5,400 ha of paddy fields, 10,600 ha of upland crop fields )
(2) Number of Members	Approx. 23,000



(3) Number of Directors	18
(4) Number of Administrative Staff Approx.	30

---

Main Facilities

<u>Type</u>	<u>Number</u>
(1) Irrigation Pump Station	329
(2) Farm Pond	296
(3) Irrigation Canal	540 km.
(4) Irrigation Pipeline ( Upland Irrigation )	2,700 km.

---

Although this region has a temperate climate and is blessed as a site for agriculture, farming production had been hindered due to a shortage of irrigation water. Therefore, from 1949 until 1968 irrigation facilities consisting of reservoirs, canals, and irrigation pump stations were constructed. At present, this region has become one of Japan's major areas carrying out agricultural management in cultivation of upland crops that provide a high return.

WRDPC manages reservoirs and the main canal while the LID manages the terminal facilities listed above. Because of the vastness of the region under management, the LID has installed branches in three locations, under which 14 management teams are organized at the discretion of LID members. These teams manage the water allocation, and inspect, maintain and repair the facilities.

Concerning operational expenses, members bear part of the expenses related to the facilities managed directly by WRDPC., as well as expenses related to LID-managed facilities with assistance in the form of subsidies from the local municipalities.

The amount of dues collected corresponds to the respective areas of paddy and upland fields cultivated by those members, while such factors as the water-use-level for upland fields and crop profitability are also taken into consideration. In this case upland fields require the use of irrigation facilities for a longer period time than do paddy fields ( upland requires year-round usage ) and for this reason the dues per unit area for upland fields are slightly higher than for paddy fields.

Note : The contents of Annex-8 were quoted from the pamphlet on " Water Users' Associations in Japan Initiated and Participated by Farmers " prepared by Japanese National Committee of the ICID (International Commission on Irrigation and Drainage ).

