

Ministry of Agriculture, Irrigation and Mahaweli Development
Democratic Socialist Republic of Sri Lanka

**THE STUDY
ON
INCREASING THE CAPACITY
OF
INTEGRATED MANAGEMENT IN IRRIGATION SECTOR
IN
SRI LANKA**

FINAL REPORT

APPENDICES : SECTOR REPORT

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Irrigation O&M and Water Management

Appendix A IRRIGATION O&M AND WATER MANAGEMENT

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Chapter 1 RULES AND REGULATIONS RELATED TO IRRIGATION

1.1 Introduction

Irrigation is an age-old art in Sri Lanka and it had been the backbone of the civilization of Sri Lanka. The importance given by the ancient kings for irrigation works in the country has been proved with many inscriptions related to irrigation. Although it is generally believed that the customs and traditions governed the irrigation works in the country, the pillar inscriptions like “Kondawatuwana”(details of the inscription annexed) has described certain basic instructions laid down by the king and all the farmers had to follow that. In addition, certain 10th century scripts like the “Wevelkotiya” slab and the “Horabora” pillar inscription too prove that the king had given instructions on water management and agricultural activities. These facts move towards proving that the farmers had to adhere to the rules and regulations laid down by the king or the chieftain. As a result of following these rules and regulations from generation to generation, customs and traditions related to irrigation established and all these customs and traditions provided opportunity to discipline the ancient irrigation works in the country.

Maintenance of irrigation works was done by village communities under “Rajakariya” system, which was explained like compulsory service for the king. Rules and regulations laid down by the king which had finally become social customs and traditions, had to be followed by the communities under “Rajakariya” system. However with the British administration in the country, the “Rajakariya” system was abolished in 1832 and it resulted that nobody was officially responsible for maintaining irrigation works for several years until British rulers identified the necessity. This vacuum led to degradation of irrigation works in the country resulting negative effects not only for irrigation works but also social cohesiveness.

The same Act, which abolished the “Rajakariya” system, had introduced the “Grain and Paddy Tax” and it affected very badly on irrigated agriculture. British rulers would have expected to discourage paddy cultivation with the introduction of “Grain and Paddy Tax” and thereby get necessary human resources for coffee plantation that had been paid more interest by British rulers at that time.

Adverse effect of abolishing “Rajakariya” system and introduction of “Grain and Paddy Tax” was comprehended by British rulers and took steps to get involved with irrigation maintenance and paddy cultivation. Consequently, the ancient irrigation system and the customary laws in the country were identified and suggested the system to be refreshed immediately. Based on the submission made, British government took steps for drafting 1st Irrigation Ordinance of the country.

Later the 1st Irrigation Ordinance underwent several amendments with time to suit the changes that took place in the country and at present, Act No. 48 of 1968, that is referred to as the “Principal Enactment” of Irrigation Ordinance and its subsequent amendments that Act No. 23 of 1983, Act No.34 of 1990 and Act No.13 of 1994 provide substantial legal support in irrigation sector. In addition to the irrigation ordinance, Agrarian Development Act, No 46 of 2000 and Mahaweli Authority Act No 23 of 1979 provide legal backing for irrigation sector.

Currently, five government institutions namely, Irrigation Department, Irrigation Management Division, Department of Agrarian Development, Mahaweli Authority and Provincial Irrigation Department are dealing with matters relating to irrigation in the country.

Paddy-producing countries in the Asian region that Sri Lanka, Japan, Philippines, Thailand, Indonesia and India agree that irrigation is essential for food production and accept the need of improving the irrigation efficiency. Water policy in those countries is already available or under preparation. General tendency in all the countries is to shift irrigation policy from construction to rehabilitation, operation and maintenance (O&M), and supply driven to demand driven. In all irrigation matters, especially under the rehabilitation and O&M, all the countries consider the importance of community participation.

1.2 Rules and regulation related to irrigation

Rules and regulations related to irrigation in Sri Lanka are supported by Irrigation Ordinance Principal Enactment (chapter 453, Act No.48 of 1968), Irrigation Amendment Act No.23 of 1983, Irrigation Amendment Act No.13 of 1994 and Agrarian Development Act No.46 of 2000. Mahaweli Authority Act No 23 of 1979 has the legal authority on irrigation matters in the areas under the administration of Mahaweli Authority.

1.2.1 Irrigation Ordinance and its Amendments

(1) First Irrigation Ordinance, No 9 of 1856

The first irrigation Ordinance was passed in 1856 and it was described as an ordinance to facilitate the revival and enforcement of ancient customs regarding irrigation and paddy cultivation and it was named as “paddy Land Irrigation ordinance”. The main purpose of this ordinance was

- a. To revive the enforcement of ancient customs regarding irrigation and cultivation of paddy lands.
- b. To remedy the defects and remove delays in the settlement of differences and disputes among cultivators relating to water rights.

For the first time in the country, this ordinance recognized the rights of the proprietors of paddy lands and the provision was made for proprietors in each Korale (a specified area

of administration) to appoint a committee of five persons at a duly attended meeting and this committee was given the authority to sketch out a set of rules that embodied the custom of each Korale. The GA was also empowered to observe and enforce these customs on the recommendation of the five-member committee. The Governor's approval had to be taken before implementation of these customs as laws.

Under this ordinance, Village Councils were established consisting of selected proprietors of paddy lands and presided over by the GA. With the assistance of the Village Council, the GA was empowered to impose a penalty for all irrigation offences based on the rules agreed in the particular village and the provision was not made to challenge on such penalty in judicial court.

Consequently, the paddy cultivation in the country underwent a remarkable change in taking the traditions into law. The rules pertaining to irrigation and paddy cultivation for each Korale were duly gazetted and people had to adhere to that (a set of rules gazetted in some of the Korales is annexed). It is true that these rules have formed the basis for ordinary paddy cultivation in the country.

Irrigation districts in certain areas were gazetted and based on that "Velvidane"(Irrigation Headman/a person in charge of irrigation works in the village) was appointed for supervising all the irrigation works and paddy cultivation. Different areas followed different rules and however, it was able to identify some common rules such as payment for "Velvidane" by proprietors, Velvidane was responsible for scheduling & distribution of water, proprietors were responsible for maintenance of irrigation canals adjoining their fields, the head works and common canals maintenance to be done by joint labor on a roster prepared by Velvidane, irrespective of cultivating land shared labor should be provided and Village Councils need to be consulted before new construction etc.

(2) Paddy Land Irrigation Ordinance, No. 21 of 1861

The Paddy Land Irrigation Ordinance, No. 21 of 1861, superseded the first Irrigation Ordinance, No. 9 of 1861.

The important amendments made under this ordinance were that,

- Creation of irrigation districts (the ordinance provided powers to GA to organize various parts of the country in to irrigation districts).
- Election of Irrigation Headman by proprietors and his duty was under the direction and control of GA.
- The proprietors had the option of selecting the way of executing rules, whether it was through Headman or Village Council.
- The Headman had the authority to take quick preventive action against to damage of irrigation system and such action was not allowed to investigate by the Village Council and the expenditure incurred by the Headman could be recovered by GA with an order by Police Court (generally double the expenditure incurred).
- If the Headman acts using his authority beyond his limits and bad behavior, he would be guilty of an offence.

(3) Paddy Cultivation Ordinance No. 21 of 1867

With the aim of promoting irrigation maintenance and extending paddy cultivation in the country “The Paddy Cultivation Ordinance No. 21 of 1867” was announced and the important changes introduced were that,

- Government assistance could be requested when proprietors were unable to construct, repair or improve any irrigation works by their contribution alone.
- The Governor had the authority to direct his officers to prepare proposal and estimates for the repair/improvement works.
- Government officers carried out the work and proprietors were given the option to attend the earthwork. The proprietors were liable to pay the expenditure incurred to repair or improvement works in installments and any case of default the GA had the authority to seize and sell land, crops, produce and movables.
- Any survey plan covering tanks, channels, watercourses etc prepared by Surveyor General were considered as legally authorized proof of the irrigation scheme.

(4) Irrigation and Paddy Cultivation Ordinance, No. 23 of 1889

This ordinance repealed all the previous acts relating to paddy land irrigation and was important as it had lay down and explained some of the principles enunciated by the earlier acts. The followings were the main points to be considered under this ordinance.

- Formation of Irrigation Boards at central and provincial levels namely Central Irrigation Board (CIB) and Provincial Irrigation Board (PIB).
- Demarcation of irrigation districts by Governor with or without any request from proprietors.
- Formation of irrigation fund and Colonial Treasurer to provide money annually for the irrigation fund to be vested with CIB. CIB to prepare estimates for irrigation works.
- GA was empowered to decide releasing of government funds for the irrigation works maintained by proprietors.

(5) Irrigation Ordinance, No.10 of 1901

Irrigation Ordinance, No.23 of 1889 was amended in 1892 and again amended in 1901 and it was described as “an Ordinance to amend the Irrigation and Paddy Cultivation Ordinance of 1889 and 1892”.

The key change made under the Irrigation Ordinance, No. 10 of 1901 was the interpretation of appropriate words to include “the cultivators” and also the actual persons on such land was defined as “any person nominated by GA to represent the crown when crown lands are benefited by such irrigation works”. Accordingly, the act provided opportunity to define persons who occupy colonization lands also as “proprietors”.

The other important changes made under this ordinance were that,

- Utilization of funds for construction, restoration and maintenance of irrigation works, which benefit crown lands.

- Punishment declared for irrigation offences such as obstruction or encroachment to irrigation works, illegal tapping of irrigation water and wasting irrigation water etc.

(6) Irrigation Ordinance No.16 of 1906

The Irrigation Ordinance No. 16 of 1906 covered various changes in irrigation sector and it repealed the Irrigation and Paddy Cultivation Ordinance No.23 of 1889. The significant changes made were that,

- The Central Irrigation Board and Provincial Irrigation Board were abolished and the Irrigation Fund was ceased.
- The power of demarcating irrigation districts by GA and proprietors was withdrawn and the Governor was empowered to do the same.
- The Governor was empowered to declare any irrigation scheme, which shall be placed under control and management of Director of Irrigation (Irrigation Department was formed in the year 1990). With that, similar to the power of GA on other schemes, Director of Irrigation had powers to make rules for proprietors meetings, formation of committee for revival of customs, maintenance of irrigation works, water distribution and appointing irrigation officers who were similar to Irrigation Headman.
- GA was empowered to fix the rate for maintenance based on the estimate prepared by the Director of Irrigation.
- With the discretion of Village Council, salaries for the services of Irrigation Headman were decided and proprietors were legally responsible to pay that; this was either in kind (produce) or money.
- The proprietors were able to decide and request funds from the Government for any irrigation works if necessary. When the Government fund was not expected, the contribution of proprietors were determined by them and approved by GA. The rate of contribution was on the basis of either per acre per year or a lump sum per acre or both.
- It was able to sell crown lands whenever the crown lands were irrigated under new scheme or improved scheme.
- Plan or Survey prepared by Surveyor General or Director of Irrigation was considered as final proof.
- Village Committees that were formed under the Village Communities Ordinance 1889 were authorized to provide financial assistance for people to cultivate crown lands when they were unable to cultivate crown lands in the village. Apart from providing such assistance from Village Fund, government provided grants for paddy cultivation.
- Violating rules were referred to Village Tribunal through GA and Punishments for Offences had been explained clearly.

(7) Irrigation Ordinance, No.45 of 1917

Irrigation Ordinance, No.16 of 1906 was followed by another two amendments that No.20 of 1908 and No.11 of 1915. The Irrigation Ordinance No.45 of 1917 elaborated some of

the clauses in previous ordinances. The important features introduced in this ordinance were that,

- GA was empowered to fix the irrigation rates (clear definition for irrigation rate was mentioned in the ordinance and it covered direct use of irrigation water as well as indirect use of irrigation water such as use of drainage or seepage water, taking water using mechanical appliances etc; Director of Irrigation was authorized to issue permits for using such mechanical appliances) with the assistance of Director of Irrigation and Survey General.
- Irrigation works (tank, bund, channel, distributory canal, field canal etc) and scope of irrigation scheme were defined clearly.
- Director of Irrigation was empowered to issue permits for diverting water from public streams for the persons who wanted to do irrigated agriculture.
- Director of Irrigation was able to appoint an arbitrator in a court of arbitration.
- Governor had the authority to take steps to rectify the defects of poorly maintained irrigation works by proprietors and recover the cost from them. Governor had to obtain the opinion of Director of Irrigation in this regard.
- Protection of irrigation works and conservation of water were explained and the Governor was empowered to make rules on utilization of irrigation (diversion, prevention of obstructions to irrigation works etc).

(8) Irrigation Ordinance, No.32 of 1946

A remarkable change took place in irrigation sector with the introduction of this ordinance. The Irrigation Ordinance No.45 of 1917 was repealed by this ordinance and once again, consolidated the law relating to irrigation. The most outstanding features of this ordinance were as follows.

- District Agricultural Committees were set up for each administrative district under the chairmanship of the GA. Members of this committee consisted of government officers who were dealing with agricultural development in the district such as Director of Irrigation, District Agricultural Extension Officer, Assistant Commissioner of Co-operative Development, Assistant Commissioner of Agrarian Services, Assistant Commissioner Marketing etc and representatives of interest groups relevant to agriculture.
- Advisory Committees were established for each scheme comprising Director of Irrigation, Director of Agriculture, GA and at least 12 members elected from proprietors. GA chaired the Committee.
- The powers of Irrigation Headman were defined clearly.
- Major and minor irrigation works were defined separately that major schemes as constructed and maintained by Director of Irrigation with using the money provided by the parliament and all other schemes as minor.
- Rules were enforced on paddy lands that were not under irrigation water but under rain, well or nay other source (“manawari” lands).
- Special attention was paid on irrigation offences strengthening Rural Courts with

added powers for prosecution of persons for such offences.

(9) Irrigation Ordinance No.48 of 1968

The Irrigation Ordinance, No.32 of 1946 was in force without any change until 1968. With the implementation of Paddy Land Act No.01 of 1958, Cultivation Committees were established with the authority of carrying out all activities connected with irrigation maintenance works and implementation of irrigation rules. The Cultivation Committees were farmer-elected organization and it resulted the role of Irrigation Headman invalid. However, the Cultivation Committees had to face many problems, as the Irrigation Ordinance No.32 of 1946 was still valid and as a consequence of that a breakdown of rural irrigation sector was observed. The situation was taken into consideration by the government and realized the necessity of amending the Irrigation Ordinance No.32 of 1946. Accordingly, the Irrigation Ordinance was amended and passed as ***Act No. 48 of 1968. This is referred to as the “Principal Enactment” of Irrigation Ordinance and still valid with subsequent amendments that Act No. 23 of 1983, Act No.34 of 1990 and Act No.13 of 1994.***

- One of the main changes made under this act was the power given to the Commissioner of Agrarian Services to carry out their duties under the Irrigation Ordinance, in line with Paddy Land Act No.01 of 1958. With this, some of the duties carried out by GA under previous irrigation act came under the Commissioner of Agrarian Services.
- Regarding the matters connected with irrigation, the Cultivation Committees and their agents were given powers under the new ordinance.
- The post of Irrigation Headman was abolished and the Irrigation Agent appointed by the Cultivation Committee took over the authority of Irrigation Headman.

(10) Influence of other related Acts to Irrigation Ordinance

The Paddy Land Act No.01 of 1958 was completely taken off in 1972 with the introduction of Agricultural Productivity Act of 1972 and the Agricultural Land Law of 1973. Consequently, Agricultural Productivity Committees came into operation and it replaced the Cultivation Committees established under the Paddy Land Act No. 01 of 1958. Also, the concept of new laws resulted, once again, a number of contradictions between the new laws and the Irrigation Ordinance of 1968. As a result of that, the Irrigation Ordinance failed to solve some of the problems related to irrigation maintenance and irrigation offences. Again, with the abolishing of Rural Courts in 1975, the Irrigation Ordinance faced the problem of executing its power on irrigation offences. All jurisdictions under Rural Court were passed to Magistrate Court. Meanwhile, the government started drafting a new irrigation Ordinance and was ready to be forwarded to Parliament when Parliament was prorogued in 1977. With the new government formed in 1977, the Agrarian Services Act of 1979 replaced the Agricultural Productivity Act of 1972 and Agricultural Land law of 1973. Under this new Act, Agrarian Services Committees were formed and that replaced the Productivity Committees formed under the

previous Act. Once again, problems arose on matters connected with Irrigation works in rural sector. However, the Irrigation Ordinance No.48 of 1968 prevailed without any change until 1983.

(11) Irrigation (Amendment) Act No.23 of 1983

With this Act, some of the sections in principal enactment were amended. The main features of the amendment were that,

- GA was empowered on removal of obstruction or encroachment upon any ela, channel, watercourse or tank and repairing damages to any irrigation structure and recovering the cost incurred to such removals or repair works.
- Recovery of contribution from persons other than allottees and tenant cultivators were further elaborated covering landowners and encroachers.
- The word “Rural Court” mentioned in the principal enactment was replaced with the word “Magistrate Court”.
- Formation of irrigation fund from fines and penalties over irrigation offences.
- Clear definition was inserted for the term “encroacher”

(12) Irrigation (Amendment) Act No.34 of 1990

The section 118 of the principal enactment was amended by the substitution for the definition of “Government Agent”. Accordingly, “Government Agent” includes an Additional Government Agent, an Assistant Government Agent, Secretary to the Minister of the Board of Ministers of a province in charge of the subject of irrigation and Divisional Secretary of a Provincial Council.

(13) Irrigation (Amendment) Act No.13 of 1994

The main purpose of this amendment was to provide legal backing for the new concepts in Participatory Management. The prominent features appear in this act are as follows.

- The expression “Cultivation Committee” in the principal enactment of Irrigation Ordinance was replaced by the expression “Farmer Organization”.
- The powers that had been given to Cultivation Committees under the Part IV, Section 23 of principal enactment have passed to “Farmers’ Organizations (FOs)”.
- Farmers’ Organization that has taken over O&M activities for distributory and field canals system in the command area of organization shall be exempt from irrigation tax.
- Establishment of “Project Management Committee” for the schemes specified by the secretary to the Ministry in charge of Irrigation.
- Definition for the Cultivation Committee in the principal enactment was deleted and the term “Farmers’ Organization” has defined.

1.2.2 Agrarian Services Act and Amendments

With the passage of the Paddy Lands Act No.01 of 1958, the Department of Agrarian Services was established. The Agrarian Services Act of 1979 was the outcome of several

Acts (the Paddy Lands Act No. 01 of 1958, Agricultural Productivity Law of 1972 and the Agricultural Land Law of 1973) implemented in the country.

The Agrarian Services Act of 1979 was amended in 1991 to provide opening for establishment of Farmers' Organization and to grant them powers regarding cultivation and other matters.

The Agrarian Services Act of 1979 was repealed with the introduction of ***Agrarian Development Act No.46 of 2000***, which is in force currently.

(1) Agrarian Development Act No.46 of 2000

This is an Act to provide for, matters relating to landlords and tenant cultivators of paddy lands, for the utilization of agricultural lands in accordance with agricultural policies, for the establishment of Agrarian Development Councils, for the establishment of a land bank, for the establishment of Agrarian Tribunals, and for the matters connected therewith or incidental thereto.

The preamble for the act states: Whereas it has become necessary to set up national policy in relation to the right of tenant cultivators and the restrictions to be imposed on persons using agricultural lands for non-agricultural purposes, in order to ensure maximum utilization of agricultural land for agricultural production.

Part I of the Act has created major changes in rights of persons who cultivate paddy lands. Regarding selling of paddy lands the owner of such land shall give first priority to tenant cultivators of such land. In which the tenant cultivator fails to meet the offer given by owner, Agrarian Development Council (authorized under this act part VI) shall decide the price in consultation with the owner. Tenant, who fails to act in line with the decision taken by the said council, could be evicted from the land. Tenant can transfer his rights to the landowner if he wishes to do so. Concerning the lands belongs to temples, the right of tenants have exempted. Other matters relevant to tenant cultivators, such as maximum extent of cultivation, leasing of paddy lands, evictions of tenant cultivators, paying of rent by tenant cultivators etc are elaborated in the act.

Part II of the Act has explained in detail on utilization of agricultural lands in line with agricultural policies in the country. Cultivating agricultural lands shall be the duty and responsibility of owner cultivator or occupier and when the Commissioner General is informed that an agricultural land is not being cultivated, owner cultivator or occupier could be kept under Commissioner General's "supervision Order". Owner cultivator or occupier who fail to obey the "supervision Order" shall pay compensation to the credit of Agrarian Development Fund.

Commissioner General may decide that certain land is paddy land or not and also in consultation with Farmers' Organization and Agrarian Development Council, the Commissioner General shall do identification of paddy lands, which can be cultivated with paddy and other crops. The Commissioner General and the officers have the powers to inspect such lands to find out the purpose of which the land is used. Any person, using

paddy land other than cultivation without the permission of Commissioner General, shall be guilty of an offence under this Act.

Appointment of key officers to carryout duties under the act is summarized in Part III of the Act. There shall be appointed for the purpose of this Act a Commissioner General of Agrarian Development and every reference in any other law to Commissioner of Agrarian Services shall be deemed to be a reference to the Commissioner General of Agrarian Development.

The Agrarian Tribunal introduced in Part IV of the Act, shall inquire into all applications, complaints or appeals referred to it under this Act and shall inform the parties thereto and the Commissioner General of its decisions thereon.

Regarding violation of irrigation rules by any person, Farmers' Organization within whose area of authority such irrigation work is located may report to Agrarian Tribunal. An appeal could be made to the Court of Appeal against the decision of Agrarian Tribunal within 30 days of receipt of the decision.

Under the Part V of the Act (Establishment of Farmers' Organizations), Registration of Farmers' Organization has relaxed for only one registration in which under the previous Act, it was two steps as "registration under 56 a" and "registration under 56 b".

Every person whose livelihood is agriculture shall be eligible for membership of a Farmers' Organization and however the Act has provided a passage for person whose main livelihood is not agriculture also (owner or occupier of agricultural land in the area of Farmers' Organization, person who is engaged in any production relating to agriculture or marketing of agricultural product or goods) to get the membership and however, this has become a debatable issue in farming community.

Regarding the credit facilities, Farmers' Organizations are given powers to obtain loan facilities from prescribed Banks or State Institutions. Forming of "Small Farmers Groups" has been taken into consideration and it shall be the duty of Farmers' Organizations.

The Commissioner General of Agrarian Development has the power to cancel the registration of Farmers' Organization and liquidate, with reference to the clause No.50 of the Act.

As stated under Part VI of the Act, establishment of Agrarian Development Councils is one of the important features in the Agrarian Development Act where it has provided opportunity for farmers as members of the council, to contribute in agricultural planning; clause 52, part VI of the Act states that "every Agrarian Development Council shall before every cultivation season formulate an agricultural program for its Agrarian Development Area and prepare necessary development plans".

Agrarian Development Council consists of at least one representative from each Farmers' Organization in the area of Agrarian Development Council and the Commissioner General shall appoint other persons to represent government departments. However, it is

not clear in appointing Chairman, Secretary and Treasurer to the council and regulations may be made with regard to such appointments.

Agrarian Development Council shall be a body corporate with perpetual succession and a common seal and may sue or be sued in this corporate name.

As stated in the Act, clause 52(2), the Agrarian Development Council has the authority – to impose on and recover acreage tax, to form Farmers’ people’s Company, purchase shares in Farmers’ people’s Company, to promote small groups and Farmers’ Organizations, to educate farmers, to act as a guarantor for Farmers’ Organization, to provide financial advances and loans to Farmers’ Organizations, to make use of its funds to repair, maintain and develop irrigation works within its area of authority.

A register of the agricultural lands has to be prepared, maintained and amended when necessary by the Agrarian Development Council in its area of authority.

The opportunity has been provided in the Act for framers to represent up to National level through three main steps that establishment of “Farmers’ Organization District Federation”, “Farmers’ Organization Provincial Federation” and “Sri Lanka National Farmers’ Organization Federation”. The main role of the “Sri Lanka National Farmers’ Organization Federation” is review agricultural policies and assists the government in implementation of such policies.

Under the Part VI of the Act, clause (80), the Commissioner General shall have all the powers of a District Court (to summon and compel the attendance of any witness, to compel the production of document and to administer any oath or affirmation to witnesses) for the purpose of hearing and deciding any dispute referred to him under the Act.

Part VII of the Act has brought up important aspects related to irrigation works and water management.

As per the section 81,

- Every tank, dam, canal, watercourse, embankment reservation or other irrigation works, within the area of authority of Farmers’ Organization, shall be subject to the supervision of that Farmers’ Organization.
- Regulations may be made setting out the manner in which a Farmers’ Organization shall exercise such supervision and any person who violates such regulations shall be guilty of an offense under this act.

The authority of making such regulations is not defined under this section that whether such authority is with Farmers’ Organization or not. However, as per the section 95 “the Minister may make regulations of all matters which are stated or required by this act, to be prescribed or for which regulations are required by this act to be made”.

The Section 82 has provided opportunity for Farmers’ Organizations to strengthen their sense of ownership within the area of authority of Farmers’ Organization in which any construction related to irrigation should be informed in advance by the authority

(government department, public corporation, person, a body of persons who proposed the construction) to Farmers' Organization; upon receipt of the comments of Farmers' Organization, the relevant authority should forthwith inform that Organization how the comments have been treated.

The Commissioner General of Agrarian Development has been empowered fully under the Act for protection of all irrigation works. As per the Section 83 and 84 of the act, the Commissioner General can make an order,

- If any person has blocked up, obstructed, encroached upon or caused to be blocked up, obstructed or encroached upon, damaged or caused to be damaged, any irrigation work.
- If any person has willfully or maliciously caused the waste of water conserved in any irrigation work.
- Without prior approval of the Commissioner General, if any person has done any cultivation in, or removed earth from or caused earth to be removed from, a tank channel, watercourse, bund, bank, tank reservation, catchment area, dam, or irrigation reserve.
- If any person has released, caused to be released or allowed the flow of waste matter into any channel, watercourse, irrigation reservation or paddy field.

Every person who fails to comply with an order of the Commissioner General shall be guilty of an offence under the act.

Dumping of waste matter into paddy lands and watercourses is also a punishable offence under the act and the Farmers' Organization in the area may report such activity to the relevant Agrarian Tribunal, according to the procedure given under the Section 85 of the Act.

As per the Section 86 of the Act, Farmers' Organization shall convene meeting of the Owner Cultivators and Occupiers to discuss matters relating to irrigation and agriculture. Also in such meeting, Farmers' Organization can make rules regarding irrigation and agriculture. Procedure of conducting such meetings such as method of convening, presiding, recording minutes and decision-making etc are mentioned in the act. Though this meeting is not specified as Kanna Meeting, currently, Kanna Meetings are held under this section for Minor Schemes by the Department of Agrarian Development. However, summoning such meeting of Owner Cultivators and Occupiers by Farmers' Organizations is not specified whether it is only for Minor Schemes or Major Schemes. Hence, without considering the level of scheme, any Farmers' Organization registered under the Agrarian Development act can convene this meeting.

Under the Section 87 of the Act, it is mentioned that the action to be taken when a person does any activity against the established customs or rules relating to irrigation and agriculture in the area of authority of a Farmers' Organization.

Attention has been paid on use of ground water for cultivation activities; under the Section 89 of the Act, no person shall dig or construct or maintain any well for the purpose of cultivation without written permission of the Commissioner General.

Under the Part VIII, General Provision of the Act, one of the important sections is “Section 98” that has given the provisions to prevail over other written law. It describes that,

“The provisions of this act shall have effect notwithstanding anything to the contrary in any other written law, accordingly, in the event of any conflict or inconsistency between the provisions of this act and such other law, the provisions of this act shall prevail.”

Regarding irrigation works, almost similar sections have covered under Acts, Irrigation Ordinance and Agrarian Development. In a case like irrigation offence (damage to irrigation structure, canal, bund etc), action could be taken under both Acts, through Magistrate Court or Agrarian Tribunal, which is questionable for people to decide that which procedure should be followed.

Apart from the power given by the Agrarian Development Act, the Commissioner General of Agrarian Development has been empowered by the Irrigation Ordinance No.48 of 1968 also. Accordingly, “the Commissioner General of Agrarian Development is responsible for the general supervision and control of Government Agents in the exercise and discharge of the powers and duties conferred and imposed upon them by the Irrigation Ordinance”. Such authority given to Commissioner General of Agrarian Development is debatable while having a separate leading agency for irrigation works in the country.

1.2.3 Laws Governing the Irrigation Management Transfer

The term “Irrigation Management Transfer” implies that the transfer of all or part of management functions and authority from government to irrigation water users (generally, farmers).

The Government of Sri Lanka has taken a policy decision in 1989 that O&M of Distributory and Field canals under major Irrigation schemes to be handed over to Farmers’ Organizations. With the aim of facilitating the activities under this policy, necessary changes in the Irrigation Ordinance and related Acts have also been made.

Currently, four important laws have provided the necessary legal backing for Irrigation Management Transfer in major irrigation schemes.

- Irrigation Ordinance Principal Enactment (chapter 453, Act No.48 of 1968).
- Irrigation Amendment Act No.23 of 1983.
- Irrigation Amendment Act No.13 of 1994.
- Agrarian Development Act No.46 of 2000.

All the members of relevant agencies like Irrigation Department, Irrigation Management Division, Department of Agrarian Development, Mahaweli Authority of Sri Lanka and Divisional and Provincial Administration etc should aware thoroughly about the legal provision under these Acts. Similarly, farming community should also aware these laws.

1.3 Legal Authority and Duties of Government Administration related to Irrigation

According to the prevailing law in the country, basically, the Irrigation Ordinance No.48, 1968 and its subsequent amendments and the Agrarian Development Act provide legal backing for irrigation matters in Sri Lanka. However, the Mahaweli Authority Act No.23 1979, which covers 25 important Acts including Irrigation Ordinance, has given the authority for irrigation matters in the area of authority to be handled by Mahaweli Authority of Sri Lanka. Also, with the 13th amendment to the constitution (devolution of power for Provincial Council) some changes have taken place in the legal framework related to irrigation works in the country; however, the responsibilities between Provincial Council and the Central Government have not been explained clearly and also these changes have not been included in the Irrigation Ordinance or its amendments.

1.3.1 The Duties of Director of Irrigation

According to the prevailing laws, the duties of Director of Irrigation (currently designated as *Director General of Irrigation*; however, it has not yet changed in the Irrigation Ordinance) in relation to irrigation matters are summarized below.

- Representation of District agricultural Committee and the Advisory Committee of Major Irrigation Schemes as specified in the Principal Enactment of Irrigation Ordinance.
- Represent Project Management Committee of Major Irrigation schemes, which is established under the Irrigation (Amendment) Act No.13 of 1994.
- Assist Government Agent by facilitating for settlement of disputes connected with irrigation and for preventing damages to irrigation works according to the section No.71 of the Principal Enactment of Irrigation Ordinance.
- As per the section No.62 of the Principal Enactment of Irrigation Ordinance, express opinion on defective maintenance of minor irrigation work connected with major irrigation works.
- In consultation with Government Agent, Director of Irrigation should prepare scheme of annual maintenance as per the section No.57 of the Principal Enactment of Irrigation Ordinance.
- Prepare estimate of the probable cost of annual maintenance enable Government Agent to assess maintenance rate as explained under the section No.56 of the Principal Enactment of Irrigation Ordinance.
- Authorization of use of any mechanical appliances for deriving benefits from major irrigation works according to the section No.54 of the Principal Enactment of

Irrigation Ordinance.

- As per the section No.53 of the Principal Enactment of Irrigation Ordinance, assist Government Agent in taking decision on Seepage Rates.

1.3.2 The Duties of Government Agent

Powers of the Government Agents still continues in the Irrigation Ordinance and these powers now have been transferred to *Divisional secretaries* under “Transfer of powers to Divisional secretaries Act No.58 of 1992”. As per the prevailing law, the responsibilities of Government Agent (*Divisional secretaries*) related to irrigation are summarized below.

- Impose Irrigation Rates for lands benefited by irrigation water (section 2 of Irrigation Ordinance).
- Act as the Chairman of District Agricultural Committee and get advices from the same on matters connected with irrigation and agriculture (section 3 of Irrigation Ordinance).
- Chairman to the Advisory Committee in major irrigation schemes except the schemes that Project Management Committees have been appointed (section 6 of Irrigation Ordinance).
- Approve the decisions taken by the cultivators regarding cultivation practices and irrigation maintenance (section 11 of Irrigation Ordinance).
- Approval of resolutions relating to minor irrigation work (section 15 of Irrigation Ordinance).
- Prepare proposals for construction and maintenance of irrigation work as specified under section 33 of Irrigation Ordinance.
- In consultation with the Advisory Committee appointed under section 6 of the Ordinance, make variations on Irrigation Rates (section 33 of Irrigation Ordinance).
- Incur expenses in carrying out operations necessary for the maintenance of any irrigation work and charge such expenditure to relevant cultivators (section 33 of Irrigation Ordinance).
- As per the section 50 of the Irrigation Ordinance, prepare or revise specifications of lands with the assistance of Director of Irrigation and Surveyor General.
- Decide “Seepage Rates” in consultation with Director of Irrigation in line with the section 53 of Irrigation Ordinance.
- Impose “irrigation rates” for lands benefited by special mechanical appliances or nay other special supply (section 54of Irrigation Ordinance).
- Based on the annual maintenance cost prepared by the Director of Irrigation, assess the “maintenance rate” (section 56 of Irrigation Ordinance).
- Under the Part VI, Protection of Irrigation Works and Conservation of Water, Government Agent has been empowered to take action against person who obstructs or encroaches upon any irrigation works (ela, channel, watercourse, tank etc) and also to recover the expenses incurred in effecting the removal of any obstruction or encroachment.
- Regarding the disputes related to irrigation works, Government Agent has the

- authority to take steps to arrange arbitration (section 67,68,69 of Irrigation Ordinance).
- As per the section 74 of the Irrigation ordinance, Government Agent has the power to carry out orders of arbitrators.
- In the case of damaging irrigation work or using water without authority or wasting water by a person who cannot be identified, the Government Agent may determine the liability of such activity and take action to recover the loss as specified under section 75 of the Irrigation Ordinance.
- Where default is made in the payment of any payment under the Irrigation Ordinance, Government agent is empowered with seizing lands, crops, produce and movables (section 78 of Irrigation Ordinance).

1.3.3 The Duties of Commissioner General of Agrarian Development

Commissioner General of Agrarian Development is empowered with both the Agrarian Development Act and the Irrigation Ordinance. The duties (connected with irrigation) of Commissioner General of Agrarian Development are summarized below.

- The Commissioner General of Agrarian Development is responsible for the general supervision and control of Government Agents in the exercise and discharge of the powers and duties conferred and imposed upon them by the Irrigation Ordinance (Part 1 of the Irrigation Ordinance).
- Commissioner General shall take action to evict persons who fail to act in accordance with the decision taken by the agrarian development council (Part I of the Agrarian development Act).
- Where an agricultural land is not being cultivated, owner cultivator or occupier could be kept under Commissioner General's supervision order (Part II, section 23 of the Agrarian development Act).
- Commissioner General may decide certain land is paddy land or not (Part II, section 28 of the Agrarian development Act).
- Commissioner General and his officers have the power to inspect agricultural lands to find out the purpose for which such land is used (Part II, section 31 of the Agrarian development Act).
- Any person, who uses a paddy land for a purpose other than agricultural cultivation, should obtain written permission from Commissioner General (Part II, section 32 of the Agrarian development Act).
- Issue permits for obtaining mineral resources in a paddy land as specified in section 36 of the Act.
- As per section 43 of the Act, make registration of Farmers' Organization.
- Commissioner General or an authorized representative may examine accounts of Farmers' Organization (section 44 of the Agrarian development Act).
- Cancellation of registration of Farmers' Organization as mentioned under section 50 of the Agrarian development Act.
- Deal with Magistrate's Court on recovery of acreage tax. (Section 56 of the Agrarian development Act).

- Setting out of auditing procedures for Agrarian Development Councils and Federations.
- Farmers' Organization District Federation may be registered under a name to be designated by the Commissioner General (Section 60 of the Agrarian development Act).
- Registration of Farmers' Organization, Farmers' Organization District Federation, Farmers' Organization Provincial Federation and Sri Lanka National Farmers' Organization Federation.
- Appoint persons from Departments and Public Corporations to represent in the Sri Lanka National Farmers' Organization Federation and also, appoint a coordinating secretary to the Sri Lanka National Farmers' Organization Federation. (Section 64 of the Agrarian development Act).
- Where the Commissioner General is of opinion that nay Farmers' Organization or Farmers Federations or Agrarian Development Councils has misused the power under the Act, he shall forthwith take steps to prevent such misuses. Also, Commissioner General is in authority to inform Farmers' Organizations, Farmer Federations and Agrarian Development Councils, which do not use their power, to exercise the power given to them (Section 77 of the Agrarian development Act).
- Initiation of proceedings in respect of offences under the Act (Section 79 of the Agrarian development Act).
- Commissioner General shall have all the powers of a District Court for the purpose of hearing and deciding any dispute referred to him under the Act (Section 80 of the Agrarian development Act).
- As per section 83 of the Act, Interfere with the protection of irrigation works (blocked up or obstructed or encroached or damaged irrigation works; waste water, illegal cultivation, dumping of waste matter into paddy lands, allowing flow of waste to paddy fields etc).
- Issue written permission for digging any well or constructing any well or maintaining any well for the purpose of cultivation (Section 89 of the Agrarian development Act).
- Interfere with cultivation rights of owner cultivator or occupier (Section 90 of the Agrarian development Act).

1.3.4 The Duties of Farmers' Organizations

Farmers' Organizations have been empowered mainly by two important Acts in the country. Those two acts are "Irrigation Ordinance No.48, 1968 and its subsequent amendment Irrigation (Amendment) Act No.13 of 1994" and the "Agrarian Development Act, No.46 of 2000". With those Acts, Farmers' Organizations do possess the powers but unfortunately the relevant parties are not fully aware or not dedicated to use these available powers. The main purpose of Irrigation (Amendment) Act No.13 of 1994 is to empower the Farmers' Organizations in line with irrigation and water management within its area of authority, especially under the concept of "joint management". The key

responsibilities of Farmers' Organizations, which are related to irrigation and cultivation, and authorized under these two Acts, are summarized below.

(1) Irrigation Ordinance and key responsibilities of Farmers' Organization

Farmers' Organizations have been given authority to make rules under the section 11 of the irrigation Ordinance. Accordingly, Farmers' Organizations will be able to make rules pertaining to the followings. However, no rules shall be made for which regulations have already been made under section 64 of the Irrigation Ordinance.

- a) Encouragement, extension or management of paddy cultivation or any other cultivation that is capable of being benefited by irrigation works.
- b) The enforcement of established customs affecting cultivation.
- c) Appointment of Irrigation Agents and their duties, duration and payments.
- d) Assessment of labor contribution for construction or maintenance activities.
- e) Maintenance, conservation, protection or management of the irrigation works.
- f) If any Irrigation Scheme falls within the purview of more than one Farmers' Organization area, the rules shall be made at a joint meeting.

All the rules made by Farmers' Organizations should be approved first in a duly summoned general meeting and it should be forwarded to the approval of the Minister in charge of irrigation and thereafter published in the Government gazette to implement such rules as a law.

- Attend to all matters connected with the irrigation and cultivation of land and the preservation of rights and the maintenance of irrigation works connected therewith (section 23 of the Irrigation Ordinance).
- Prevent, as far as practicable, any act or omission which is contrary to any rules or regulations in force under the Irrigation Ordinance or to established customs relating to irrigation or cultivation, or whereby damage may be caused to any of the allottees, tenant cultivators or proprietors (section 23 of the Irrigation Ordinance).
- Appoint an Irrigation Agent and with the permission of Government Agent (now Divisional Secretary), delegate duties to him, which have been assigned to the Farmers' Organization under the irrigation Ordinance (section 24 of the Irrigation Ordinance).
- Any expenditure incurred by Farmers' Organizations or their Agents on protecting irrigation works is recoverable from the person who is responsible for the damage (section 25 of the Irrigation Ordinance).
- As per the Section 3 of the Irrigation (Amendment) Act No.13 1994, Farmers' Organization that has taken over O&M of a whole or part of a Distributory Canal area could be exempted from the irrigation tax (refer section 2 of the Irrigation Ordinance) and such Organization can impose and recover a levy to cover the cost of O&M of the relevant canal system and any other work beneficial to the farming community of the area of authority.

In the performance of duties of Farmers' Organizations or their representatives, the necessary protection has been provided under the Irrigation Ordinance; Section 95 of the Ordinance states that every person who without lawful cause resists, molests or obstructs any Farmers' Organization or its Agent in the lawful discharge of any duty imposed by the Irrigation Ordinance or any rule or regulation made thereunder shall be guilty of an offence triable by the Magistrate Court having jurisdiction over the place where the offence was committed.

(2) Agrarian Development Act and key responsibilities of Farmers' Organization

- Obtain written notices on transfer or cede of rights of tenant cultivators (section 3 of the Agrarian Development Act).
- Provide information to Commissioner General of Agrarian Development on agricultural lands, which are not being cultivated in accordance with the provisions made under the Agrarian Development Act or the regulations made in that regard (section 23 of the Agrarian Development Act).
- Provide observations to Commissioner General of Agrarian Development for the purpose of identification of paddy lands, which can be cultivated with paddy and other field crops (section 29 of the Agrarian Development Act).
- Encourage "Small Group of Farmers" to organize themselves together having regard to the agricultural activities carried on by them and the relationship among them (section 46 of the Agrarian Development Act).
- Appoint members to the Agrarian Development Council (section 47 of the Agrarian Development Act).
- Assist Agrarian Development Council (section 48 of the Agrarian Development Act).
- Provide information of owner cultivators and occupiers to Agrarian Development Councils (section 49 of the Agrarian Development Act).
- As per the Section 81 of the Agrarian Development Act, Farmers' Organization has the authority to supervise and administrate irrigation works. It describes,
 - a) Every tank, dam, canal, watercourse, embankment reservation or other irrigation work, within the area of authority of any Farmers' Organization, shall be subject to the supervision of that Farmers' Organization.
 - b) Regulations may be made setting out the manner in which such supervision shall be exercise by a Farmers' Organization.
 - c) Every person who without lawful cause resists or obstructs any person authorized by a Farmers' Organization in the exercise by such person of any powers conferred on him by regulations made under above b) shall be guilty of an offence under this Act.
- Farmers' Organizations have the authority to know and comment about construction activities related to irrigation tank, dam, canal, watercourse or any other development project, within the area of authority of Farmers' Organization (section 82 of the Agrarian Development Act).
- Report Agrarian Tribunal on matters relating to dumping of waste materials into

paddy lands and watercourses (section 85 of the Agrarian Development Act).

- As per the Section No. 86 of the Agrarian Development Act, every Farmers' Organization within its area of authority, shall have the authority to attend followings,
 - d) Encourage and extend the cultivation of agricultural lands or paddy cultivation or any other form of cultivation.
 - e) Enforce the established customs affecting paddy cultivation or other forms of cultivation.
 - f) Ensure the proper timing of agricultural operations.
 - g) Ensure the efficient management of water, irrigation works and water used for agricultural activities.
 - h) Attend to matters relating to irrigation works in accordance with established customs of cultivation.
 - i) Take measures for the conservation of soil and the protection of crops against pest & diseases.
 - j) Convene meetings of the owner-cultivators and occupiers of agricultural lands in the area, for the purpose of making rules relating to the development of lands and collective agricultural activities. (Under this section, currently Kanna Meetings are held for Minor Irrigation Schemes with the intervention of Agrarian Development Department)
- Take action where any act is committed or omission made by any person within the area of authority of any Farmers' Organization contrary to any established custom or any rule relating to irrigation or cultivation (section 87 of the Agrarian Development Act).
- Provide Commissioner General the recommendations on digging wells for cultivation (section 89 of the Agrarian Development Act).
- Take action on stray animals (section 92 of the Agrarian Development Act).

In the exercise of duties of Farmers' Organization under this Act- No prosecution shall lie against any member, any servant or agent of Farmers' Organization for any act, which in good faith is done or purported to be done by him under this Act, or under any regulation made thereunder (section 73 of the Agrarian development Act).

(3) Cultivation Meeting (Kanna Meeting)

The kanna meeting is one of the important activities coming down from centuries in the field of irrigation and agriculture in Sri Lanka. All the proprietors of paddy lands in a scheme had to get together before the commencement of cultivation season to make common decision on irrigation and agricultural activities such as ploughing, sowing, water issues etc. Every farmer had to adhere to those decisions. However, with the time went on, the system weakened due to various reasons such as breaking down of discipline, leaving of proprietors from village and giving lands for others to cultivate ("Ande") etc.

Currently, there are two methods of holding Kanna Meetings in the country for Major Irrigation Schemes, one for the specified schemes under the Irrigation Ordinance (Amendment) Act. No. 13, 1994 and the other (old method) for unspecified schemes, under the Irrigation Ordinance Act. No.48.1968.

As explained in the Part III, Section 11, clause (5) of the Irrigation Ordinance Act, No.48 of 1968, - Before the commencement of the cultivation season, at a meeting of the allottees and the tenant cultivators and where there are no allottees or tenant cultivators of any lands the proprietors of those lands, within any irrigable area or tract, a majority of those present at such meeting shall have the power to take decisions on following items.

- Dates of the commencement of cultivation operations such as ploughing, sowing, reaping etc.
- Arrangement for the maintenance of irrigation works and other matters relating to the execution of rules made under the authority given by the Irrigation Ordinance.

The Government Agent (now Divisional Secretary or District Secretary) chairs the meeting and all the decisions taken in the meeting are to be approved by him.

In a situation where a decision cannot be reached due to insufficient quorum or any other reason, the Government Agent (now Divisional Secretary/District Secretary) shall take decisions as per the authority given under the Subsection (6) of Section 11 of Irrigation Ordinance principal enactment.

However, with the Amendment Act (No.13. 1994) to Irrigation Ordinance principle enactment, the traditional Kanna Meeting mentioned above underwent a remarkable change. The section 5(a) of the Amendment Act describes another way of holding Kanna meeting. This has aimed to overcome the drawbacks in the current system and it is confined only to the irrigation schemes specified by the Secretary to the Ministry in charge of Irrigation (List of schemes specified is annexed).

Kanna Meeting under the specified schemes

The procedure for holding Kanna Meeting for the specified schemes as mentioned in the Irrigation (Amendment) Act No 13, 1994 has been explained by the Secretary to the Ministry of Irrigation in the Circular No. 02/04/24 dated 23rd September 1996 and it is summarized below.

Preliminary Arrangements

The preliminary arrangements for holding Kanna Meeting are supposed to commence at least six weeks before the commencement of each season. It has been recommended that around 1st of March and 1st of August for Yala and Maha

cultivation seasons respectively to start the preliminaries. Firstly, Divisional Secretary/District Secretary should collect the information from Range Deputy Director Of Irrigation (currently designated as Range Director of Irrigation)/Irrigation Engineer and the information should cover the following details. In addition to the Divisional Secretary/District Secretary, a copy of the information should be sent to the Project Manager of the relevant scheme.

- An appropriate date for Kanna Meeting.
- Last date for completion of irrigation maintenance works.
- Proposed extent of cultivation and cropping pattern.
- Recommendation for the dates for commencement and completion of water issues.
- Recommended date for completion of land preparation.
- Detail on rotational water issues (if applicable only)

Pre Kanna Meeting

As per the Irrigation (Amendment) Act No 13, 1994, the Project Manager should summon a Special Project Management Committee meeting (A committee consist of Farmer Representatives and Government Officers and the detail of this is provided next section) named as “Pre Kanna Meeting”. Generally, this meeting is summoned after receiving of the information indicated in the paragraph above and it is discussed in the Special Project Management Committee meeting, giving proper consideration to the opinion of other line agencies. Outcome of the Special Project Management Committee meeting should be forwarded to Divisional Secretary where the scheme is located within the same Divisional Secretary’s area and to District Secretary where the scheme is located covering more than one Divisional Secretary’s area.

Kanna Meeting

After receiving the decision of Special Project Management Committee, under the power given by the Irrigation (Amendment) Act No 13, 1994, Divisional Secretary/District Secretary inform Project Manager to summon a Special Project Management Committee meeting named as Kanna Meeting. It is the duty of the Project Manager to give ample publicity enabling all members to be present in the meeting. Divisional Secretary/District Secretary is in power to summon any person who on his opinion is necessary to be in the meeting. However, to have a legal validity, the farmer representatives attendance should equal or greater than the 2/3 of the total number of farmer representatives in the Project Management Committee.

In a situation where a decision cannot be reached due to inadequate quorum or any other reason, the Divisional Secretary/District Secretary shall take decisions as per the authority given under the Irrigation (Amendment) Act No 13, 1994.

According to the section 5 Part 11 of the Irrigation Ordinance principle enactment, rules and regulations required to have a smooth implementation of the cultivation schedule could also be formulated at this meeting.

The Irrigation (Amendment) Act No.23 of 1983 has provided the required legal backing for the Divisional Secretary/District Secretary (as the case may be) to ensure the farmers follow the decisions of the Kanna Meeting. Accordingly, where any person acts in breaching of the decision of Kanna Meeting, it is lawful for the Divisional Secretary/District Secretary to,

- Refuse the supply of irrigation water to the land.
- Collect the harvest from the land cultivated.
- Recover the value of irrigation water and any loss incurred.

With the aim of discouraging farmers on late cultivation, it has been decided not to extend water issues beyond the date decided in the Kanna Meeting. However, there may be a necessity to make one or two water issues to save the standing crop and such extra issues should be charged at the rate of Rs.250.00 per hectare per issue. This amount should be deposited by the relevant farmers in advance before the extra water issues, in a miscellaneous fund at a Divisional Secretary's/District Secretary's office.

Apart from the standard Kanna Meetings held before commencement of cultivation seasons, the Government Agent (now Divisional Secretary/District Secretary) shall on his own motion summon meetings of the cultivators within any irrigable area or tract, in line with the powers vested under the Irrigation Ordinance and also on a written request of cultivators representing 1/5 of the acreage of any irrigable area or tract, the Government Agent shall summon a meeting of the cultivators of that irrigable area or tract(Section 19 of the Irrigation Ordinance, No.48 of 1968).

Project Management Committees

With the aim of implementing the Participatory Management concept, the Irrigation (Amendment) Act No.13 of 1994 has legally recognized the Project Management Committee (PMC). As stated in the Act, for the Major Irrigation Schemes specified by the Secretary to the Ministry of Irrigation, shall have PMC and Project Manager.

PMC consists of,

- Farmers' Organization Representatives who should form more than 50% of the total membership of PMC.
- Project Manager appointed by the Secretary to the Ministry of Irrigation.
- Government representatives covering the Director of Irrigation, the Land Commissioner, the Commissioner of Agrarian Development, the Director of Agriculture and the Commissioner of Co-operative development.
- In addition to that, any representative from other agencies decided by the

Secretary to the Ministry of Irrigation and the Divisional Secretary or Secretaries of the divisions within which that irrigation works is situated.

The Project Manager appointed by the Secretary to the Ministry of Irrigation shall function either as Chairman or Secretary of the PMC. The Chairman shall summon meeting of the PMC as often as may be necessary but in any case before the commencement of each cultivation season. The main duty of the PMC is to provide the necessary coordination to all project management activities.

The PMC has the authority to setup Sub Project Management Committees in order to have better coordination for the project management activities. The Act states that a Farmer Representative should chair such committee meeting. The also PMC has the authority to make recommendations on seasonal agricultural calendar (dates for water issues, ploughing, sowing etc) and water management activities.

The PMC forms a good forum for the Government Officers and the Farmers representatives to share ideas and it is a platform for them to discuss their problems and minimize the gap between officers and farmers, strengthening the participatory management concept.

Decisions taken at the PMC, Kanna Meeting is regarded as legally valid and as per the Section 96 of the Irrigation Ordinance violation of such decisions is a punishable offence.

Kanna Meeting-Mahaweli Systems

Seasonal water issues and cultivation pattern is decided in a meeting almost like Project Management Committee as explained above. Mahaweli systems are generally not independent and many schemes are linked and therefore, firstly Water Management Secretariat considering all systems takes decision on seasonal water issues for agricultural purposes, in the Water Panel Meeting, which is chaired by Director General, Mahaweli Authority of Sri Lanka or his representative and consists of Farmer Representatives and officers from all Mahaweli Systems and relevant officials from various Government Departments and Corporations.

Later before the season, the decision of Water Panel Meeting is discussed with farmers in relevant systems in the Project Coordinating Committee meeting and approve for the implementation with minor changes if necessary. This Project Coordinating Committee meeting held in the system to decide seasonal water issues and agricultural calendar, is the Kanna Meeting for that particular Mahaweli system. Project Coordinating Committee of a Mahaweli System is chaired by the Resident Project Manager and consists of farmer representatives and other relevant officials from Mahaweli as well as various Departments/Corporations such as Banks, Crop Insurance Board, Department of Agrarian Development, and Divisional Secretariat

etc. Apart from the main Kanna Meeting at project level, Kanna Meetings at field level are also held depending on the administrative setup of the system.

Kanna Meeting- Minor Irrigation Schemes

Currently, under the Agrarian Development Act, Kanna Meetings are held for Minor Irrigation Schemes. As per the Section No.86 of the Act, Farmers' Organizations shall convene meetings of the Owner Cultivators and Occupiers for the purpose of taking necessary decisions relevant to irrigation and cultivation. Accordingly, in such meeting called before the season, farmers can take decision on water issues and cultivation practices for the particular season. Agrarian Development Officer in the area of authority generally attends the meeting and he/she should maintain the minutes of the meeting.

A meeting convened under the provisions of Section 86 of the Act shall not be deemed to be validity constituted unless there are present at such meeting at least $\frac{1}{4}$ or 25% of the total number of owner cultivators or occupiers of agricultural land in the area of authority of the Farmers' Organization. If there has been no quorum at two consecutive meetings, the person acting as the presiding officer shall adjourn the second meeting and shall fix the date for the third meeting. If there is no quorum even for the third meeting, it shall be deemed to be validity constituted for all purposes, notwithstanding the lack of quorum.

Under this Section No.86 of the Act, the power to hold Kanna Meeting is not specified whether it is for Minor irrigation schemes or Major irrigation schemes and it is open for Owner Cultivators and Occupiers of agricultural lands under any type of schemes. (Accordingly, if need, Kanna Meeting of Major irrigation schemes could also be held under the Agrarian Development Act. However, practically no such incidents have recorded so far).

1.4 Brief Comparison with other Asian Countries

1.4.1 Selection of Countries

Not only Sri Lanka, but also other Asian countries are in the process of making and improving irrigation policies and practices to have an efficient utilization of available water. Thus comparison of irrigation policies and related practices in other Asian region countries would be useful in water resource management in Sri Lanka. In this study, five countries have been selected for the comparison with Sri Lanka. The selected countries are Japan, Philippines, Thailand, Indonesia, and India, which are paddy-producing countries and for which certain study reports under JICA or other institutions are readily available.

1.4.2 Items compared

Four key items that:

- general information of the agricultural aspects,
- water policy and legislation,
- irrigation policy and legislation, and
- irrigation management & O&M,

have been taken for the comparison as shown in Table 1.4.1.

1.4.3 Major Findings

(1) General Information

Under the general information, the comparison has been made over six main items that population, land area, agricultural area, GDP, agricultural shares in GDP and work force are provided.

Figure A1.4.1 explains agriculture share contributing to GDP and

workforce in each country. Agriculture shares to GDP vary from 1.3% to 22%; Japan 1.3%, Thailand 9.8%, Sri Lanka 19%, Philippines 19.9%, Indonesia 16.6% and India 22%.

Workforce in agriculture sector has, on the other hand, recorded as 59% in India showing highest value out of all the countries considered; in Sri Lanka, agricultural labor force is 45% where as Japan, Philippine, Thailand and Indonesia have recorded 4%, 34%, 55%, and 47% respectively.

(2) Water Policy and Legislation

In all countries, irrigation is the main consumer of water and there is excessive pressure to allocate water to other sectors too.

Water policy law is already available or under preparation in all countries at present. In Sri Lanka, National Water Policy is available in draft form and stagnating for long time without further action.

Water rights are clearly defined in Japan and Philippines and indirectly defined in India. Water rights are ready to be defined in case of Sri Lanka and Indonesia.

(3) Policy and Legislation on Irrigation

All countries agree that irrigation is essential for food production and accept the

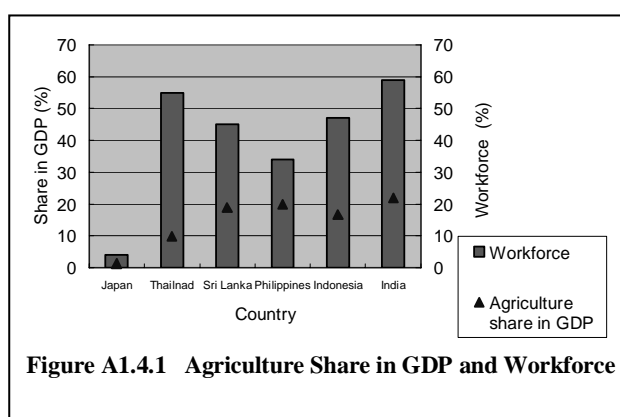


Figure A1.4.1 Agriculture Share in GDP and Workforce

need to improve irrigation efficiency. All countries consider that participation of farmers' organization, water users' association, irrigators associations for O&M of irrigation facilities are essential and various activities have been carried out including preparation of relevant legislation.

There appears to be general tendency to shift irrigation policy from construction to rehabilitation & O&M, and from supply driven to demand driven.

In the most of these countries, irrigation is under the Agriculture Ministry. In Indonesia, irrigation is under public works, and in India, irrigation is an independent Ministry.

(4) Irrigation Management and O&M

In most of these countries, surface water and ground water are handled by different organization.

As an issue on O&M & WM, all countries pointed out the inadequacy of the available budget to carry out appropriate O&M and WM work. This may be one of the reasons for promoting the introduction of participatory management.

As for the farmers' organization relating to O&M of irrigation, it is called as Land Improvement Division (LID) in Japan, Irrigators Association (IA) in Philippines, Water Users' Association (WUA) in Indonesia and India, and Water Users' Group (WUG) in Thailand. These organizations have been established having irrigation aspects as their main objective. Only in Sri Lanka, name of the organization is Farmers' Organization registered under Agrarian Development Act, 2000, which covers not only irrigation aspects but also overall agricultural aspects.

Eligibility of membership is both for owner farmers and tenants except in India, where only owner farmers are eligible for membership.

In order to establish an organization, it is compulsory for all farmers of the area to be members in Japan, Philippines and India, while in Sri Lanka, Thailand, and Indonesia it is spontaneous. This could perhaps be a reason why the collection rates of water charges of the former countries are higher than latter ones.

Collection of the irrigation fee varies from one country to another. It is nearly 100% in Japan, but only about 10% in Indonesia. In other countries, it varies from one project to the other.

Irrigation fee is charged in all countries through WUA or FO to cover O&M cost of tertiary irrigation system. In Japan, recovery of a part of investment costs is also collected through irrigation fee collection. The irrigation fee, in most of the countries, is not adequate to cover entire expenses to extent it is necessary. It differs from US\$1.0/Ha/annum in Thailand to US\$270/Ha/annum in Japan.

Chapter 2 REVIEW OF PAST IRRIGATION REHABILITATION PROJECTS

2.1 Introduction

After realizing the need of beneficiary participation in irrigation management of Sri Lanka, several rehabilitation and restoration projects have been implemented in irrigation sector using the “participatory approach” in fully or partly. “National Irrigation Rehabilitation Project”(NIRP), “Mahaweli Upgrading Project”(MUP), “Mahaweli Consolidation Project”(MCP) and “Mahaweli Rehabilitation and Restructuring Project”(MRRP) are among them.

2.2 National Irrigation Rehabilitation Project (NIRP)

2.2.1 General Information

The NIRP was the first countrywide project that aimed to ensure the sustainability of irrigation schemes through rehabilitation and improved O&M and strengthening of FOs (FOs). NIRP followed and build on the formats and procedures developed under the Village Irrigation Rehabilitation Project (VIRP) and other similar projects assisted by the World Bank that were based on beneficiary participatory approach. World Bank and the European Union assisted the NIRP. The total cost of the project was US\$ 50.34 million and out of that 14% was contributed by the Government of Sri Lanka. In addition to that, the farmers of relevant irrigation schemes were supposed to contribute 10% of the civil cost of the total rehabilitation in the form of labour especially engaging on earthworks, with the aim of creating sense of ownership. The project commenced its activities in October 1992 and completed in June 2000.

Rehabilitation and improvement of 1000 minor and 60 major/medium irrigation schemes, Establishment of Farmer Organizations, Introduction of improved O&M practices in rehabilitated schemes and Training of farmers and staff members of implementation agencies were the key components of the NIRP.

A consultancy team including both foreign and local consultants supported the project planning, implementation and monitoring & evaluation. The responsible agency for the implementation of the project was the Ministry of Irrigation & Power. The actual implementation of project activities was done through Irrigation Department together with Department of Agrarian services and Provincial Councils. Apart from the staff of three implementation agencies, “Institutional Organizers”(included male & female both and they worked as catalyst/facilitators in the field with FOs) had been recruited on casual basis to assist Farmers’ Organizations at field levels. NIRP training component covered training for staff members of three implementing agencies, training for Institutional Organizers and training for farmers. The main objective of NIRP training programs was to provide knowledge & skills required for motivating and assisting FOs to rehabilitate,

operate and maintain their irrigation schemes. The areas of training covered were, Project Awareness, Participatory Approach, Irrigation Rehabilitation, Water Management, O&M, Financial Management, Environmental Protection and Project Management.

The NIRP obtained the farmer participation in planning and implementation of project activities especially for identification of rehabilitation needs and implementation of construction activities.

2.2.2 Achievements

As mentioned in the Final Report of NIRP, it has completed physical rehabilitation of 1022 minor schemes and 34 major/medium schemes by June 2000.

In all the selected schemes FOs were able to obtain the registration under the section 56a of Agrarian Services Act. Further 134 FOs under minor schemes were able to get the registration under 56b of Agrarian Services Act, by performing their duties to meet the registration requirement under 56b during the NIRP period.

In major/medium schemes, out of 206 Distributory Canal FOs (DCFOs) only 100 DCFOs took over the O&M responsibilities of the irrigation system. In minor schemes, out of 1022 FOs 788 took over the O&M responsibilities of the irrigation schemes.

The compulsory contribution of farmers that 10% of civil cost of rehabilitation has been successful only in 802 out of the total number of 1022 minor schemes targeted. In the case of major/medium schemes only 104 DCFOs out of 206 have successfully made their 10% voluntary contribution to the civil cost of rehabilitation. However, it has been reported that some of the jobs allocated for farmers' 10% contribution was beyond the capacity of FOs.

Under the training component, it has covered 5544 training man-days for staff members, 826 training man-days for Institutional Organizers, 8900 training man-days for farmer leaders and 2778 training man-days for farmers in relation to major/medium schemes and regarding the minor schemes, it was 3688 training man-days for staff members, 7204 training man-days for Institutional Organizers, 43524 training man-days for farmer leaders and 20007 training man-days for farmers.

However, the final outcome of NIRP has provided ample evidence that this type of participatory intervention in irrigation rehabilitation would help FOs to gather knowledge & skill in construction activities and also to build up financial capacity of FOs.

2.2.3 Lessons learned

As explained in the Final Report of NIRP, it has provided useful experience for the agencies working in the irrigation sector in Sri Lanka. The key lessons learned are summarized below.

- Both software and hardware components of irrigation rehabilitation projects must be

coordinated well and equally prioritized.

- Before physical rehabilitation starts, sufficient lead-time should be allocated for preparation of community and government officers towards participatory management approach.
- Forming Farmer Organizations and implementing rehabilitation works at the same time does not work well and therefore, before start actual rehabilitation at least one year period should be allocated to established well-motivated FOs by providing an effective institutional support.
- Without up-front commitment on agriculture sector policy and related institutional reforms, it is difficult to achieve successful irrigation investment projects.
- Political commitment is highly required at higher levels for policy changes and at field levels for implementation of the policy.
- A change in attitudes of all stakeholders including politicians and government officials towards participatory irrigation management is imperative for a successful O&M turnover program.
- Irrigation policy and institutional reform must be implemented as a national program, and not as components built into irrigation rehabilitation projects funded by donors.
- Future programs must focus on improving agriculture productivity and farmer income through appropriate interventions and not through irrigation rehabilitation alone.

2.3 Mahweli Restructuring And Rehabilitation Project (MRRP)

2.3.1 General Information

Mahweli Restructuring And Rehabilitation Project (MRRP) was implemented over the period of 1998-2003 with the financial assistance from the World Bank. The two main objectives of the MRRP were, 1) Institutional transformation of Mahaweli authority of Sri Lanka into a River Basin Management Agency, 2) Improving the productivity and sustainability of “Mahaweli System H”. The first objective mainly connected with reducing the staff members of MASL and introducing new tasks to remaining members with broad objective on river basin management. The second objective directly related to participatory irrigation water management.

The second objective was based on improving the agricultural productivity in Mahaweli System H through rehabilitation, improvement and better O&M of irrigation facilities. Accordingly the project had planned to restore the lost capability and capacity of the systems by rehabilitation and improvement firstly and secondly to improve irrigation efficiency by introducing new structures and replacing old structures with modern ones. The third item was to make the systems user-friendly enable farmers to do O&M.

The project activities were carried out under a Project Director assisted by technical staff and subject matter specialists for agriculture, institutional development, training, women & youth activities, business development and farmer companies etc.

The total cost of the project was US\$ 71.13 million covering all the components (including restructuring of MASL and Village Self Help Learning Initiative Pilot program)

As explained in the Project Completion Report of MRRP- the Distributory Canal FOs (DCFOs) as key stakeholders of the rehabilitation program were grouped and staggered over the project period and a two year implementation plan was prepared for each DCFO covering three phases that Pre-Construction Phase, Construction Phase and Post Construction Phase. All the activities planned were accommodated under this three phases and inline with the progress of work DCFOs underwent training and awareness programs.

Farmer friendly construction methods were introduced in the rehabilitation on trial basis during first two years and later widely adopted based on experiences gained.

Distributory and Field Canals construction was not fully done by the FOs and only some selected contract packages were awarded for respective FOs of the construction area and others were awarded to legally registered contractors.

A new water management concept was introduced by the project. The concept was based on bulk water issue to DCFO to systematize their claim on irrigation water and thereby to develop sense of ownership of the irrigation asset. In this regard, farmers were trained and guided on bulk water handling.

Farmers of each DCFO appointed a water master and he was paid by the DCFO from the O&M fund. Those water-masters were trained by the project.

Water measuring devices were installed and farmers were trained practically on operation and maintenance of those devices.

A properly planned monitoring & evaluation system was setup and linked with the project based Monitoring Unit.

2.3.2 Achievement

MRRP has completed its targets on rehabilitation activities and as per the records by end of December 2003, just before the World Bank Credit Closure, 95% of the Distributory and Field Canals and 79% of the Main Canals were completed.

In the MRRP project area, 256 DCFOs covering 31559 hectares have been in operation and out of that 204 have taken over the O&M responsibilities of D&F Canals at the end of year 2003 with the project closure. As stated in the MRRP completion report that as a consequence of handing over of D&F canals to DCFOs, MASL was able to save the public fund of Rs.38.8 million that would have been spent on D&F Canals maintenance.

Water Use efficiency of Mahaweli System H has increased at the end of the project period. It has recorded that the annual water usage has declined by 45% at the end of project period in comparison to the water duty in 1997. Similarly water usage in field level also has declined by 26%. The water productivity, in terms of value of product per unit of

water usage (Rs. Million/Unit water) has gone up with respect to the long-term value of Rs.4.05 million/MCM; the same at the end of the project was Rs.7.53million/MCM.

The Cropping Intensity has increased to 165% from long-term coverage of 150%. The project target was 200%.

Private Sector Development Program, which was implemented with the objective of commercialization of all agricultural activities in System H and to transform itself into a farmer led commercial venture was however not met as anticipated. However, some individual assistance has helped to link farmers with buyers.

With all these activities, Farmers Household Income has not increased as expected and the average household income at the end of the project period was 5 percent below the project target. As indicated in the MRRP completion report, the Household income is given in Figure A2.3.1.

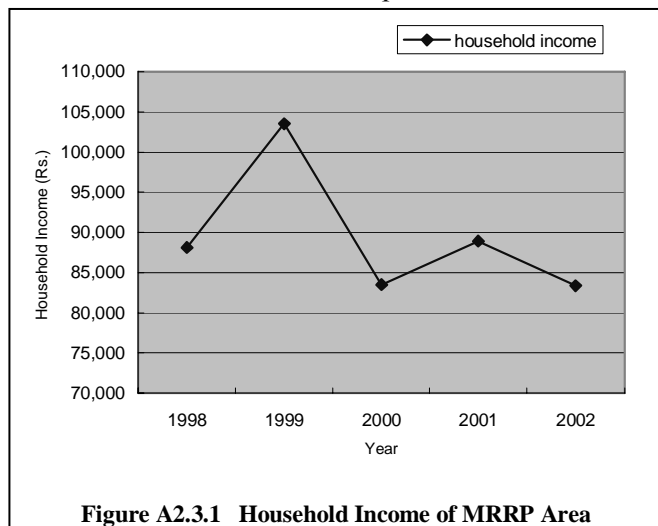


Figure A2.3.1 Household Income of MRRP Area

Nine fully independent self-Managed Farmers Federations and Eight Farmer companies have been established and three of them have proved the capability of handling agro-business ventures.

Farmers Compulsory Contribution of 10% for rehabilitation activities was fairly successful. The total target of the project was Rs.230.89 million and the actual contribution was Rs.140.11 million, about 61% achievements.

The DCFOs, irrespective of carrying out rehabilitation activities, have collected Rs.16 million for the O&M fund. DCFOs use this fund for O&M of D&F canals under the DCFO command area. This is a good sign that FOs are in the processes of evicting dependency.

2.3.3 Lessons learned

Except the institutional transformation of MASL, achievements in other components of MRRP were successful. The project has recorded some valuable experiences in the field of Institutional Development, Participatory Irrigation Management, Irrigation Management Transfer, and Empowerment of Farming Communities etc. Most of the experiences have been accepted as feasible and viable to be applicable and replicable in the respective development programs in the field of irrigation and water management.

- The key outcome that the project expected was increasing farmers' income by 20 percent. But, at the project design stage the main focus of the project was water

resource management and agriculture. Other factors such as improvements of farm to market roads, hamlet roads etc were not addressed successfully by the project although marketing of agricultural product in System H was seriously affected by the deteriorated road condition had in the area. As a result of this the project lost an opportunity to make significant contribution in increasing farmers income.

- The rehabilitation was mainly “supply driven” although initial problem identification was in a participatory way. It would have been in a “demand driven” basis allowing farmers to decide their priority from the areas such as agriculture, rehabilitation, marketing, strengthening of FO etc and prepare work plan accordingly. If “demand driven” approach had been implemented, the rehabilitation exercise would have been more cost-effective and direct as a response to needs of farming community.
- The physical rehabilitation was end as scheduled at the end of the project period. However, some of the important components such as institutional development, agricultural productivity increase, enterprise development etc, which have direct effects on strengthening of FO and farmers’ income, began to move at the end of the project. It is certain that these components take time for making a contribution to overall goal of the project. There is no doubt that the FOs need further assistance to reach the final goal of the project as stated. After the project period, who will do that? Can government institutions do that under prevailing situation?
- Due to lack of a cohesive post-project aftercare program that promotes a gradual lowering of external support following a gradual handing over of management, FOs may dissipate the interest and momentum gathered during the project period. Hence, the withdrawal of external support provided for strengthening of any organization, not only for FO, should be done gradually with well-defined work program.

2.4 Mahaweli Upgrading Project (MUP)

2.4.1 General Information

MUP in Mahaweli System C started its activities in last quarter of year 2000 and completed in September 2004. However, the project was extended by two years that up to September 2006 for completion of some construction activities.

The MUP was funded by JBIC and the total estimated cost of the project was Rs.3737 million. At the end of the initial project period, the project had spent 70% of the estimated amount and extension of the project was planned with the balance 30%.

Principle agency for implementation was Mahaweli Authority of Sri Lanka and a consultancy team including Japanese experts and local consultants supported it. A Project Director headed the project and he implemented the activities in collaboration with Resident Project Manager, Mahaweli System C.

The project used the “Participatory Approach” in planning, implementation and monitoring of project activities, giving priority for actual beneficiaries (Mainly farming community) of the project.

The project had three main objectives,

- 1) To increase the productivity of the existing irrigation system
- 2) To strengthen the capability of FOs enable them to manage and maintain the irrigation system.
- 3) To rectify defects of the existing irrigation system.

The first objective covers agricultural and water management activities. The 2nd objective is directly related to human behavior and it is the essence of the project in terms of sustainability. Also, it is a result of many activities that should be performed by both farmers and officers. However, results of this software component will not be seen like a structure constructed in a canal. The third objective is mainly link with the main and branch canals rectification works.

Registered contractors did Main system rectification works whereas respective FOs did the D&F canals rectification works under the community contract basis. With regards to the 2nd objective of the project, the activities implemented could be divided into three main areas,

- **Area – 1:** change of knowledge, attitudes and skill of farmers significant to O&M of irrigation system
- **Area – 2:** set up institutional arrangement for O&M of irrigation system by farmers
- **Area – 3:** improve financial capability of FOs to ensure the future financial needs for O&M activities of secondary & tertiary irrigation system

Under the “Area – 1”, awareness sessions, workshops, training sessions, study tours, small group discussions, individual visits, common social activities, demonstrations etc were carefully planned and implemented.

MUP activities started in the field implementing an awareness session for whole community in the village taken for MUP work program. This awareness session was specially planned to inspire the community to have a sense of ownership about irrigation system and project activities.

As beneficiaries of the project, using the participatory techniques, farmers’ contribution was obtained from planning, implementation and monitoring & evaluation of restoration activities of the secondary and tertiary irrigation system; in line with that, MASL staff were trained enable them to facilitate farmers in achieving project objectives.

Farmers were facilitated to form and strengthen small groups on field canal basis. At the initial stages of the project, these groups were expected to participate in restoration activities and later mainly for water management and maintenance activities of the irrigation system.

Before farmers engage with restoration works, they underwent “construction and contract management training” which helped them to gain knowledge and skill required to do the restoration works and other related activities of their own canals by them.

With the aim of streamlining the financial activities of FOs, “Financial Management Training” sessions and practical follow-up programs were implemented. This helped FOs to maintain the financial records to the set standard specially pertaining to restoration works.

With the completion of restoration works, farmers participated two training programs which relevant to secondary and tertiary irrigation system maintenance and water management. Maintenance training included facts mainly relevant to change of farmers’ attitudes, which lead to create sense of ownership of the irrigation system. Content of the water management training was somewhat technical but it had been planned to transfer in layman language with practical sessions; this helped farmers to do their water management activities with understanding.

Field study tours in and outside the project area were organized and implemented for farmers small groups. Main purpose of these tours was to share the experiences of various farmer groups and buildup cohesiveness among them.

“Legal aspects of FOs” was another training program conducted by the project. This was planned to make the farmers aware about the legal backing they have for their activities.

Under the “Area – 2”, O&M responsibilities of secondary and tertiary irrigation system was entrusted to FOs. After completion of the restoration works of the canals, FOs took over its O&M responsibilities entering to an agreement in public with a social function. Firstly, FO takes over O&M responsibilities of secondary & tertiary system from MASL and hand over the same of tertiary system to Field Canal Groups keeping the secondary system with the Organization.

Under the “Area – 3”, O&M Fund was introduced by the project; this is a fund that could be used only for the O&M activities. Savings from the contracts carried out under MUP was deposited in this account and later O&M fee that would be collected from farmers could also be deposited in this account.

Agricultural training and extension system was strengthened having training programs, study tours and field demonstrations etc. In parallel to that an agricultural credit program was introduced with Rural Development Banks in the area.

2.4.2 Achievements

At the end of the initial project period, the project period was extended up to September 2006 and still the project is going on for rectification of some main and branch canals. Hence, the achievements are discussed here is limited to initial period of the project, that from year 2000 to September 2004.

Regarding physical rehabilitation, 141 FOs under the community contract concept completed rectification works worth about Rs.560 million and registered medium & large-scale contractors completed rectification works of main irrigation system, worth

about Rs.250 million. Apart from the irrigation system rehabilitation, refurbishing of warehouses and improvement to training facilities were also done by the project.

Outputs of the activities conducted in relation to strengthen the capability of FOs, could be divided as Staff Training, Farmer Training, Mobilization of Farmers for Restoration Works, Handing Over of O&M Responsibilities, O&M Fund and Publications.

- **Staff Training:** Under the staff training, eleven training programs were conducted covering the area of Project Awareness, Community Action Planning, Participatory Rural Appraisal, Formation and Strengthening of Field Canal Groups, Maintenance by FOs, Water Management, Financial Management, Group Credit, Training of Trainers and Study tours. At the end of the project, achievement of staff training has recorded 94%.
- **Farmer Training:** Ten training programs were planned and conducted for farmers and office bearers of FOs. These programs covered the area of Project Awareness, Legal Aspects of FO, Group Credit, Financial Management, FO Office Development, Construction & Contract Management, Water Management, Irrigation Maintenance and Field Study Tours sharing experiences. The achievement of this component was 82% of the project target.
- **Mobilization of Farmers for restoration works:** With the aim of creating sense of ownership, improving financial capabilities, developing skilled labor force and improving social cohesiveness that would need for sustainable O&M of irrigation system, 141 FO were mobilized to complete about Rs. 560 million worth of restoration works in a period of 4 years. At the initial stages, FOs were moving very slow due to the inexperience of handling contracts. Under the 141 FOs, 1575 Field Canal Groups have been formed and about 65% of that was in operation at the end of initial project period.
- **Handing Over of O&M responsibilities:** After completion of restoration works, handing over of secondary and tertiary irrigation system to FOs was performed. At the end of the project period, out of 1575 Field Canals and 173 Distributory Canals targeted, 1348 and 78 have been handed over respectively. As the restoration works of some canals went on up to the project closure, handing over did not take place during the project period.
- **O&M Fund:** With the savings of contracts income under MUP, 139 FOs have started accounts for an "O&M Fund". Total number of FOs targeted to do the same was 141. Depositing money in these accounts was in progress and as at end of August 2004, the total saving was Rs. 10.747 million.
- **Credit Program:** MUP has released Rs. 48 million to Uva Development Bank (UDB) and Rajarata Development Bank (RDB) in installments to implement the credit program. Recovery rate of the credit has recorded as almost 100%. Compulsory savings of farmers to qualify for the credit program has increased up to about Rs. 11 million at the end of 2004. Indirect saving due to not borrowing inputs from the village moneylender/trader at the rate of 20-30% interest per season, a farmer who join the credit program was able to get the indirect benefit of Rs.1900 per season. The

total amount of “indirect savings” at the end of 2004 was about Rs. 18 million. Apart from the benefit of monetary value, relief of obligation to give the harvest to moneylender, supply of inputs in time, improving social cohesiveness, recognition of the FO and developing relations with banks and market should also be taken into consideration.

- **Publications:** MUP has produced, training manuals, leaflets, booklets and magazines covering important areas relevant to strengthening of FOs. Altogether 22700 booklets including 10500 for Irrigation Maintenance, 3700 for Water Management, 500 for Sustainability of FO, 6000 for Construction & Contract Management, 2000 for O&M Fund and 120 guidebooks for Financial Management have been distributed for farmers after the training programs. Brief description of all publications is given in Table A2.4.1.

Table A2.4.1 Publications produced under MUP

Title of the Publication	Description
1. Field Canal Group Strengthening	Guidebook for field officers to use in formation and strengthening of small groups.
2. Financial Management for FOs	Training Manual to be used by trainers for training farmers in financial management.
3. Participatory Development	Handout for refreshing field officers in Participatory Rural Appraisal.
4. Construction and contracts activities for FOs	Training Manual to be used by trainers for training farmers in construction activities.
5. A guide to financial management in FOs	Guidebook for farmers and field officers for financial activities of FO
6. FOs’ Office Development	Guidebook for field officers to use in organizing and improving FO offices
7. Leadership skill development	Training Manual to be used by trainers for training farmers in leadership development.
8. Organizational strengthening	Training Manual to be used by trainers for training farmers in FOs strengthening program.
9. Irrigation Maintenance	Training Manual to be used by trainers for training farmers in irrigation maintenance
10. Water Management	Training Manual to be used by trainers for training farmers in water management.
11. Guide to Irrigation Maintenance	Booklet to guide farmers in maintenance
12. Guide to Water Management	Booklet to guide farmers in water management
13. Sustainability of FOs	Booklet to guide farmers for sustainable organization
14. Identify standards of construction	Booklet to guide farmers in restoration works
15. Construction & contract details	Booklet to guide farmers in restoration works
16. Buildup an O&M fund	Booklet to guide farmers for an O&M fund

The effects of MUP activities have been identified and explained in the completion report of the Institutional Development section of the project and they are summarized below.

- It has been observed that the farmers were more curious on what was happening in the irrigation system and they were in the process of changing their attitudes towards the ownership of irrigation system; they are thoroughly aware that the secondary and

tertiary irrigation system is belongs to them and it should be looked after by them and not by Mahaweli Authority or any other Government Institution.

- Farmers were more concern about the sustainability of irrigation system restored under MUP. Growing attention paid to canal maintenance by Farmers, establishing O&M fund in the FOs, purchasing Bush Cutters by FOs for cleaning canals, increased number of farmers participation in voluntary works in the irrigation system and making by-laws related to O&M activities are the signs to prove the enthusiasm developed in the farming community for O&M activities which finally lead to sustainable irrigation system. Farmers who have cultivated canal reservations for last 10-15 years have given up it for the shake of canal's protection. Further, it has been observed that farmers are in the process of becoming more liberal on O&M and trying to evict from the dependency they had. This is a positive development and an indication of an increased level of sustainability.
- It was very conspicuous at the end of the project, the farmers had become to the stage of bearing responsibilities with sense on the activities of their FO such as sharing available irrigation water, completion of restoration works in time, implementation of the credit program, prompt action for maintenance activities, successful repayment of credit in time, high rate of attendance for farmer meetings, expressing ideas without hesitation etc.
- The social benefits flowed to the farming community in terms of skill development and money should also be taken into consideration. There were masons and helpers emerged in the community with the canal construction works. One way it is an important resource for future maintenance activities and the other way it is a personal benefit to those who wish to work as masons and helpers. Further, the skill gained by the community in small-scale contract management should also be taken as a social benefit.
- Regarding the financial benefits, it has been observed that farmers have owned some assets by spending the income got from labor work of restoration works; some have got released paddy fields mortgaged, some have bought bicycles, furniture, tractors etc, some have started small scale income generating activities and some have settled passed due loans.
- Farmers' saving habit has been improving alone with the implementation of credit program. Apart from the compulsory saving for credit program, Field Canal Groups also have started saving accounts in Rural Development Banks. Though this is not in a significant level, it is a good sign that should be taken into consideration, as the saving habit is imperative in social upgrading.
- Farmers who joined the credit program have become independent in purchasing of their inputs and sale of harvest in contrast to the practice they had earlier, which governed by the village moneylender/trader.
- Most of the Farmers' Organizations have realized the necessity to move out from "traditional level Organization to Institutional level"; acquisition of office for the organization, tendency to see the legal cover to solve certain problems, keep

necessary records and documents, developing relations with other agencies etc are the evidence to prove the changes taking place.

2.4.3 Lessons learned from MUP

Planning, Implementation and outcome of the MUP provides a useful experience for future projects and the main lessons are listed below.

- In a project like MUP which has given more emphasis on human resource development, both software and hardware components of irrigation restoration/rehabilitation should be equally prioritized. However, sufficient lead-time should be provided to orient the farmers and strengthen the FOs and relevant supporting agencies before physical rehabilitation/restoration works begin.
- Farmers Compulsory Contribution of 10% for rehabilitation activities was fairly successful.
- Over loading and pressing community organizations to accomplish a task in a given time frame decided by an outsider may result poor quality outcome. Considering the carrying capacity of the organizations and other social commitments, both contractor (community organization) and client together should decide the contract period and the value of contract. As many community organizations are not experienced contractors, frequent on the job support is compulsory.
- For a successful credit program with remarkable recovery rate, considerable attention should be given to credit management. Credit management should include changing attitudes of borrowers and a systematically planned follow-up program. Furthermore, a technical package, which leads to significant yield increase, should be introduced alone with the credit program.
- Strengthening of FO is not an activity, it is a process and it will continue even after the project. During the project period FOs mainly involved with restoration works and after that the time should be allocated to institutionalize O&M of irrigation system alone with the self-sustaining agricultural input service. Hence an “Aftercare” phase is necessary to achieve the MUP objectives as specified.

2.5 Brief comparison of the past projects-NIRP, MRRP and MUP

Comparison of the past irrigation rehabilitation projects including NIRP, MRRP and MUP from various points are described as follows and summarized in Table A2.5.1.

- **Project Purpose:** All three projects that NIRP, MRRP and MUP have attempted to increase the agricultural production and thereby increase farmers income ensuring the sustainability of irrigation schemes through rehabilitation, improved O&M and strengthening of FOs. The projects were funded by donor agencies and major portion of the fund was allocated for physical rehabilitation.
- **Project Approach:** Three projects have used participatory approach in project planning and implementation but in different levels. All three projects have obtained farmers participation before rehabilitation to identify rehabilitation needs. However,

MRRP and MUP have gone deeper than NIRP in this connection.

- **Community Contract:** NIRP and MRRP have not contracted out all the construction activities of D&F canal to FOs whereas MUP has given all contract packages of D&F canals to FOs. Main system rehabilitation has been done without farmers' participation in construction activities in all three projects.
- **Farmer voluntary contribution:** All three projects have planned to obtain 10% contributions from farmers for the cost of rehabilitation activities. It has become fairly successful but not as anticipated.
- **Training programs:** Training programs conducted in three projects have covered almost common areas such as awareness for community, construction and contract management, water management, financial management, agricultural development, strengthening of community organizations etc. In addition to that, MRRP has covered business development training programs and MUP has covered the area of small group formation and strengthening.
- **Handing over of D&F canals:** Handing over of O&M responsibilities of D&F canals to FOs have been done under all three projects but the way and level of handing over is different. Under the MUP, handing over took place at two different levels that one is at D canal level and other one is at Field canal level whereas in other two projects only at D canal level.
- **O&M Fund:** NIRP has attempted to establish an O&M fund at FO level with the aim of ensuring the O&M of D&F canals under the FO. It had started in the last year of the project under the AFTERCARE program. However, under the MRRP and MUP that concept have been developed further and achieved significant results having considerable amount of money in the O&M Fund of FOs.
- **Agricultural Production:** Under the NIRP there is no conclusive evidence to show that agricultural production has increased. MRRP has noted that cropping intensity in System H has increased to 165% from long-term average of 150% and the agricultural production has gone up to 262410 MT with respect to the long-term average of 191370MT.
- **Sustainability of project outputs:** It is true that during the project period, FOs work with enthusiasm in almost all the activities. However, after withdrawal of project support most of the FOs drop their interest on the activities conducted during the project period. All three projects have realized this situation and however, no proper action has been taken to overcome the situation. NIRP had implemented an "Aftercare" program only for some selected schemes.

2.6 Conclusions and suggestions

NIRP, MRRP and MUP have provided useful learning experiences in the field of irrigation rehabilitation. Based on the achievements and lessons learned under three projects, some important conclusions and suggestions could be made which may be useful for future irrigation rehabilitation projects.

- Strengthening of FO is not a single activity; it is a process mainly dealing with human

being. Strengthening process will continue even after the project period and hence, FOs may need external assistance until they reach to a certain level, which should be defined before the project implementation. During the project period FOs mainly involved with physical rehabilitation works and after that the time should be allocated to *institutionalize O&M of irrigation system alone with the self-sustaining agricultural input service*. Generally, responsible agencies pay very poor attention for continuation of the activities conducted during the project period.

- *Over loading and pressing FOs to accomplish a task in a given time frame decided by an outsider may result poor quality outcome*. Considering the carrying capacity of the organizations and other social commitments, both contractor (FO) and client together should decide the contract period and the value of contract. *As many community organizations are not experienced in construction activities, frequent on the job support should be provided to complete the job with sense of ownership, but not as a professional contractors*.
- Before physical rehabilitation starts, *adequate lead-time* should be provided for preparation of community and relevant government officers towards participatory approach and for creating *well-motivated FOs*.
- Changing irrigation management policies and implementing such changes practically in the field, *should not be restricted only for donor funded special projects*. It should be implemented as a *national program*. In this regard, top-level political commitment for irrigation management is required.
- Farmers are more concern about the sustainability of irrigation system and they are in the process of *becoming more liberal on O&M and trying to evict from the dependency* they had. This is a positive development and an indication of an increased level of sustainability. In this connection, relevant government agencies should provide necessary assistance as a National program and not as an interest of individuals.
- For a successful agricultural credit program with remarkable recovery rate, considerable attention should be given to credit management. Credit management should include *changing attitudes of borrowers* and a systematically planned follow-up program. Furthermore, *a technical package, which leads to significant yield increase, should be introduced alone with the credit program*.
- Community has lot of *latent capabilities* and it has to be inspired by an outsider in correct way with properly planned activities.

Chapter 3 PRESENT CONDITION OF THE STUDY AREA

3.1 O&M of Irrigation Facilities and Water Management

The Study Team has intensively visited the field and inspected irrigation facilities of Nachchaduwa major scheme, Thuruwila medium scheme and Rajangana major schemes as well as having meetings with farmers and government field staffs. Furthermore, the team has collected and analyzed information on practice of irrigation water management and operation and maintenance (O&M) of irrigation facilities. Based on such studies, this section describes water resources trend, condition of irrigation facilities and its operation and maintenance, water quality, validation study of tertiary water management improvement and comparison with Mahaweli System C leading to problems to be considered in irrigation sector.

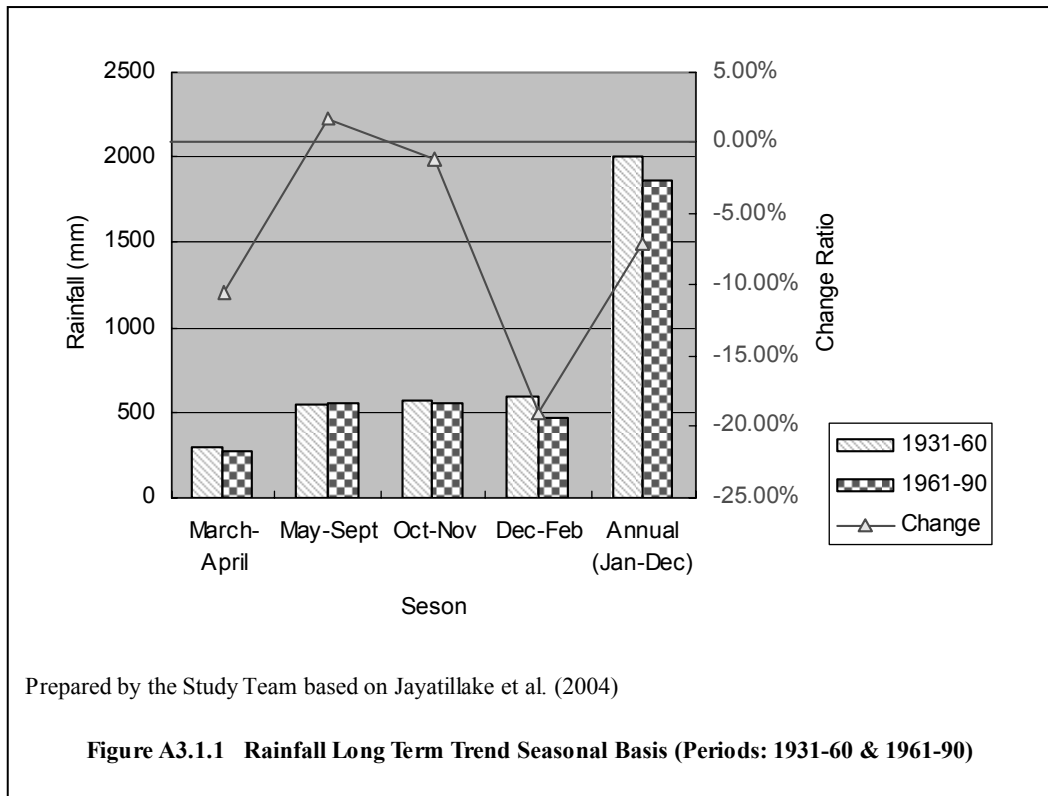
3.1.1 Long Term Trend of Rainfall¹

Rainfall is the main impetus of variability in the water balance over irrigation practice, therefore, its changes in the long term trend have very important implications and assumptions for the formulation of capacity development plan in irrigation sector. In this sub-section, long term trend of rainfall in Anuradhapura Region is reviewed by referring existing research paper.

Rainfall long term trend in Sri Lanka has been recently analyzed by Initial National Communication (INC) on Climate Change in 2000 by the Ministry in charge of the subject of Environment including water resources, together with the participation of other agencies and stakeholders. The INC attempts to identify issues arising out of climate change and contribute to formulating policy and possible measures to counter or mitigate the impacts. This study covers entire country including Anuradhapura Region.

As for the entire country, analysis was made using the data of annual rainfall with the period from 1880 to 2003. One of the distinguished characteristics of rainfall pattern in the country is its high year-to-year variability. In addition, the result clearly shows that, while alternating dry and wet periods till about 1970, a significant change is recognized during the period from 1970 where the average annual rainfall has been below average though except during only three years over a total period of over 30 years. In order to clarify more changes of rainfall pattern in the long term, such a comparison of changes and variability in terms of different rainfall seasons is analyzed. A comparison of the mean seasonal rainfall during these two recent 30 year reference periods of 1931-60 and 1961-90 are made as illustrated in Figure A3.1.1.

¹ This sub-section is prepared based on Jayatillake et al. (2004). Jayatillake, H M, Lalith Chandrapala, B. R. S. B. Basnayake, and G. H.P. Dharmaratne. 2004. *Water Resources and Climate Change*



The analysis result shows that an average annual rainfall decrease by 7 % from 2005 mm in 1931-60 to 1861 mm in 1961-90. Clearly seasonal disparity is also observed that May-Sept even increase while Dec-Feb, the middle of Maha cultivation season, significantly decreased by nearly 20 %. Overall, tendency of rainfall decrease for entire country with seasonal disparity is recognized.

Such an analysis was made for district-wise basis. It has been found through the analysis that the average annual rainfall has decreased with different degree in all the districts other than Colombo and Matara. Anuradhapura district is not an exception from this long term trend. The analysis on district-wise change in annual mean rainfall from 1931-60 to 1961-90 shows the decrease of nearly 150 mm annum.

Among all, the significant issue in this change pointed out is the shifting of country's climatic demarcation lines. The research indicates the climatic shifting of current Wet Zone, Dry Zone and the Intermediate Zone, with parts of earlier Wet Zone getting into the Intermediate Zone and parts of earlier Intermediate Zone getting into Dry Zone.²

² According to Jayatillake et al. referring from the Survey Department (1988), *National Atlas of Sri Lanka*, climatic demarcation in Sri Lanka is categorized into three as follows.

Wet Zone: the area which receives moderately high annual rainfall of over 2,500mm with no rain shadow effect during monsoons, comprises the South-West quadrant of Sri Lanka

Dry Zone: the area which receives a mean annual rainfall of less than 1,750 mm with a pronounced dry season, involving primarily the Northern and Eastern sectors of the island

Intermediate Zone: the areas which receive a mean annual rainfall between 2,500 mm and 1,500 mm with or without rain-shadow effect

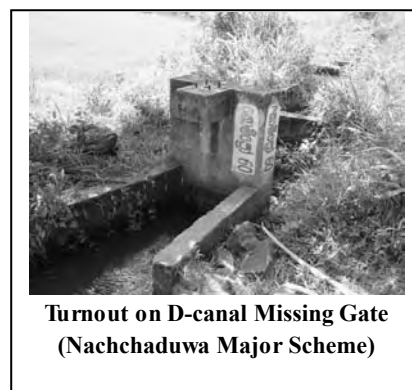
3.1.2 Irrigation Facilities

(1) Nachchaduwa Major Scheme

Villagers under Nachchaduwa scheme was originally settled in 1930s. Site reconnaissance, investigation and construction for the irrigation scheme was, subsequently, carried out from 1932 to 1939. the irrigation network including main, D- and F-canal are gradually extended during 1960s by ID.

The Nachchaduwa reservoir is one of the ancient tanks in Sri Lanka. It receives water augmentation from Mahaweli System through Kalawewa Feeder Canal in addition to the water from own catchments. The spillway of the Nachchaduwa tank is located at the right bank. There is no command area on the right bank though there are two feeder canals to Nuwalawewa, one of which is the natural stream with gate facilities, and the sluice of the other attached to the spillway.

There are two Main canals on the left bank, one is the High Level (HL) Main Canal and the other is the Low Level Main Canal. There is only one LB sluice, which is divided into two canals just downstream of the sluice. At the station 14.5km of HL Main canal, the Tissawewa Feeder Canal from Kalawewa RB Canal joins and the HL Main Canal functions as the feeder canal. The maximum command area of the Nachchaduwa scheme is 2,904 hectares in accordance with the available cultivation records on paddy.



Since the canals are single band canals, the HL Main Canal flows follows in accordance with the contour line of landscape, which has necessitated many curves.

The HL Main Canal cuts off the command area of the Thuruwila scheme, causing drainage problems as the section of a siphon crossing the HL Main Canal may not be adequate.

There are many irrigation structures, which require rehabilitation and improvement. Since maintenance of earthen canals is not properly carried out, sediments, vegetation and erosion is widely observed. It too, therefore, needs to be rehabilitated. Facilities evaluation through GIS-based irrigation block mapping identifies, details of which are explained in section 3.6, that nearly 60% of the canal and the structures in the pilot area (Isuru FO) needs to be rehabilitated representing general condition of the scheme.

(2) Thuruwila Medium Scheme

The Thuruwila scheme is an old scheme in the area. The scheme is being rehabilitated at present in connection with the installation of pumps to convey water for the Anuradhapura

water supply scheme implemented under National Water Supply and Drainage Board (NWSDB). The construction supervision is entrusted to ID since 2004.

The scheme has never faced any water shortage before and had fully depended on the flow from the own catchments. Water augmentation from Mahaweli system at Mawatawewa of Nachchaduwa feeder canal has commenced after the decision for water intake for Anuradhapura water supply to provide the Anuradhapura water supply needs

The rehabilitation works has been carried out from the feeder canal to irrigation canals in the scheme. Main canal and D- canals are constructed using concrete U-flume canals. Rehabilitation of F- canal with structures has been partially started, however, the work is far behind original rehabilitation schedule. Insufficient farmers' participation in the work would be one of the issues to be addressed. According to the field survey, farmers expressed that the rehabilitation was carried out with limited consultation with them.



Left Bank Main Canal Recently Rehabilitated under Anuradhapura Water Supply Scheme (Thuruwila Medium Scheme)

The result of facilities inventory survey are detailed in section 3.6 showing that almost 80% of canals and appurtenant structures are in better condition thanks to above-stated rehabilitation works.

(3) Rajangana Major Scheme

The Rajangana reservoir was constructed across the Kala Oya downstream of command area of Mahaweli System H, and collects its return flow. The maximum command area of the Rajangana scheme is 6,639 hectares as per the cultivation records of paddy, while other data including pumping scheme shows 3,673 ha in right bank (RB) and 3,450 ha in left bank (LB). There are several pumping stations on the both right and left bank canals covering 352 ha and 1,029 ha respectively.

The Main Canals are both the single bank canals, and pump stations are constructed beside the Main and Branch Canals directly taking water from those canals to irrigated upland areas. Pumping schemes are not so popular in Sri Lanka except some schemes in North such as Vavunikulan, Akkarayankulam, etc. Pumping scheme is, however, appropriate to promote irrigation for OFC and perennial crops.

Irrigation facilities, both structure and earthwork, have not been rehabilitated for quite some times since Major Irrigation Rehabilitation Project (MIRP) in late 1980s, therefore, they are required for rehabilitation and improvement. Particularly, because initial 300 m of LB (0+00 to 0+30) are not well formed, water



Distributory Canal 1 in LB Tract 2 Sedimentation and Vegetation inside the Canal (Rajangana Major Scheme)

issued from the tank are extensively inundating upstream of the area causing high water losses. Downstream tract such as RB tract 16 to 18 has been facing serious water shortage. In addition, the main roads along LB and RB main canal and Branch Canal (BC) 2 are highly deteriorated which would constrict market access by farmers. The RB BC 3 is running along the boundary of Manel Wewa scheme, and it causes the drainage problem in the Manel Wewa command area though spillways are provided in two places.

The result of facilities evaluation carried out at the pilot area (Isuru FO in LB tract 2) through irrigation block mapping is detailed in section 3.6. This pilot area is in better condition showing that nearly 80 % of F-canals with those structures are unnecessary to be further rehabilitation since this area was selected as experimental areas for water management improvement demonstration thereby being intensively managed by ID after MIRP. Although such exception is found, facilities on main, D- and F-level are not in good condition overall.

(4) Irrigation tank

Nachchaduwa and Thruwila tank has multi-function. The water is issued not only for irrigation but also for drinking water through NWSDB. Multi-functional use would frequently make it complicated in water allocation. Therefore, current water issue from the tank at each scheme to irrigation and water supply is specifically mentioned in this part, the amount of which is tabulated in Table 3.2.1.

Table A3.1.1 Tank Water Issue for Irrigation and Water Supply

Scheme	Purpose	Water issue (MCM)		
		Irrigation	NWSDB	Other Tank
Nachchaduwa Major Scheme	Irrigation and supply water to Nuwarawewa, Anuradapura	Yala – 25.03 MCM Maha – 24.65 MCM		20 MCM per year*
Turuwila	Originally for irrigation. From last year, 2005 supply water to NWSDB for drinking water	Yala – 4.38 MCM Maha – 3.94 MCM	10,000 CM per day from October 2005 and it will increase up to 25000 CM per day, year 2020	
Rajangana	Irrigation	Yala – 141.7 MCM* Maha- 141.13 MCM		

Note: * 10 years average

Source: prepared by the Study Team based on the data collected from RDI Office Anuradhapura

In Nachchaduwa and Thruwila scheme, substantial amount, 29 % and 30 % of annual issue is given to Anuradhapura water supply respectively. At present, water rights are clearly controlled, however, it could be more critical situation in water allocation when population growth in the future pressure water use in irrigation purpose.

3.1.3 Irrigation Performance

(1) Handing Over of O&M and Water Management

Before 1970s, all the (i) major, those with commanding over 800 ha, and (ii) medium, those with between 80 and 800 ha, irrigation schemes in the country were intensively managed by the government. Budgeting for the management of those schemes was arranged from general government revenues while no irrigation fee was collected from farmers.

The participatory irrigation management policy was introduced since 1970s in Sri Lanka. Although specific and practical guidelines were not prepared, the government initiated participatory irrigation system management policy in 1988 as declared in a Cabinet Paper, which mentioned that full responsibility for O&M and for resource mobilization of D- and F-canal level facilities are to be taken by FOs. Based on this concept, a policy decision has been finally made that O&M of the tertiary irrigation facilities such as D- & F- Canals are handed over to farmers' organizations (FOs) in accordance with the Irrigation Ordinance (Amendment) (1994). Under collection of the Act a fee to cover O&M expenses required for the works shall be determined.

The main purpose of the Irrigation ordinance (1994) was to provide legal backing for the new concepts in participatory irrigation management. Previously, farmers had been paying irrigation tax to the government so that overall irrigation management had been consistently carried out by the government as discussed above. However, the amended irrigation ordinance evidently stipulated that FOs are to take charge of O&M activities for D- and F-level facilities instead they are exempted from irrigation tax.

As for Nachchaduwa and Rajangana major irrigation schemes, handing over of D- and F-canal level facilities to FOs has been officially declared. However, in realistic terms, it is not fully implemented and ID is still been providing a part of O&M expenses from its annual budget. This situation is caused by various reasons such as:

- (i) insufficient process of handing over by the government, for instance, insufficient awareness and training program to FOs, preparedness of facilities, insufficient follow-up from the government and so forth, and
- (ii) lack of capability and sense of ownership of FOs, which hinders appropriate O&M of facilities by FOs.

According to the interview, one week training program, contents of which include O&M of facilities, water management, financial management and so on, was organized for the representative of FOs from Nachchaduwa and Rajangana major schemes prior to the handing over. Follow-up by the government was, however, insufficient afterward dropping into unsatisfactory achievement of handing over.

(2) Water Consumption and Water Productivity

Water consumption of each scheme is calculated based on water issue amount and harvested area. Based on such exercise, water productivity for paddy was also analyzed,

which express the relation of total issue of water and production meaning that how water is effectively utilized for agricultural production. The analysis details are tabulated in Tables A3.1.2-3.1.4 and summarized in Table A3.1.5 below.

Table A3.1.5 Water Duty and Water Productivity in the Study Area

Scheme	Season	Water Issue (MCM)	Area Harvested (ha)	Water Duty (mm)	Production (kg/ha)	Water Productivity (kg/m ³)
Nachchaduwa	Yala	22.8	1,622	1,411	4,566	0.322
	Maha	27.6	2,635	1,116	5,133	0.630
Thuruwila	Yala	4.4	1,92.9	2,325	5,004	0.216
	Maha	3.9	1,92.9	2,075	5,004	0.242
Rajangana	Yala	152.0	5,508	2,681	4,796	0.186
	Maha	126.6	5,658	2,518	5,135	0.282

Note: Periods of Data is not same.
 Production in Thuruwila is assumed.
 Source: Prepared by the Study Team

Although it should be noticed that the period of the data of items utilized for the analysis is not the same, the result shows that water productivity of Nachchaduwa major scheme is higher than other two schemes particularly in Yala cultivation season. This could be explained by the situation that shortage of water resources in Nachchaduwa scheme would encourage farmers to effectively utilize available water resources for cultivation. In addition, geographical location of Nachchaduwa where area is located near large city, Anuradhapura and accessible to Dambulla market would gradually be fostering business mind among FOs through effective resource mobilization including water resources.

3.1.4 Operation and Maintenance

(1) O&M Practices

As having been discussed, the Government policy in accordance with amended Irrigation Ordinance (1994) mentions O&M responsibility of irrigation scheme. As per such policy, ID is responsible for the O&M of tanks, head-works, main and branch canals and those related structures while the responsibility of O&M of the tertiary irrigation facilities such as D- and F- canals has been entrusted to FOs.

However, in actuality, FOs have not still taken full responsibility due to various reasons. Accordingly, ID is still providing a part of O&M expenses of D- and F-level system in a form of contract to FO.

The responsibility of O&M of major and medium irrigation scheme can be summarized in Table A3.1.6:

Table A3.1.6 Responsibilities of O&M

Work item	Major scheme (Nachchaduwa and Rajangana)	Medium scheme (Thuruwila)
Decision-making for O&M	Farmers meeting PMC Kanna Meeting	Farmers meeting PMC Kanna Meeting
Gate Operation		
- Tank Sluice	ID (Jalapalaka)	FO assisted by ID (Jalapalaka)
- Main and branch canals	ID (Japapalaka)	FO (Japapalaka)
- D-canals head gate	ID (Japapalaka)	FO (Japapalaka)
- F-canals head gate	FO (FO Water master/Jalapalaka)	FO (Jalapalaka)
Maintenance		
- Tank	ID	ID
- Main and branch canals	ID	ID
- D-canals	FO	FO
- F-canals	FO	FO

Source: Modified based on Dry Zone M/P

Operation

In major schemes, ID carries out operation of head sluice of the tank down to turnout gates on main canal diverting to each D- canals by assigning gate masters or water issue laborer (WIL or ID Jalapalaka). Operation of D- and F-canal with those related facilities are, on the other hand, implemented by FO through nominating D-canal level Jalapalaka by each FO, called FO Jalapalaka.

Maintenance

The budget provided by ID for maintenance work is quite limited, therefore, very small repairing works could be undertaken together with routine maintenance such as de-silting, grass cutting, gate painting, minor repairing and so forth. Although FOs are responsible for maintenance of D- and F-canal level irrigation system, ID still provide funds for some maintenance works on D- and F-canal level system through the contracts with FO.

In the case of medium irrigation scheme including Thuruwila, operation of tank sluice is carried out by FO Jalapalaka with the assistance of WIL. Maintenance work responsibility is as same as major irrigation scheme.

(2) Staffing and Roles

Organizational structure of RDI Anuradhapura office is illustrated in Figure 3.2.2. Two Chief Irrigation Engineer (CIE) and four Irrigation Engineer (IE) are positioned under RDI. Two CIE take charge of construction and IMAC program while IEs are deployed respectively in Anuradhapura, Huruluwewa, Padaviya and Rajangana supervising 13 major

schemes (24,427 ha) and 84 minor schemes (11,072 ha) in total. On the other hand, IMD appointed one RPM and one IDO to each major scheme for the management under INMAS program.

Technical staffs attached to IE's Office primarily consists of Irrigation Engineer (IE), Engineering Assistant (EA), Work Supervisor (WS) and Water Issue Laborer (WIL; ID Jalapalaka), role of which are summarized in Table A3.1.7:

Table A3.1.7 Role of Field Staff of IEs' Office

No.	Designation	Role
1.	Irrigation Engineer (IE)	Overall management of irrigation system
2.	Engineering Assistant (EA)	Technical supervision of operation and maintenance works, budget preparation, certifying payment for contracts, technical guidance to farmers etc.
3.	Work Supervisor	Technical guidance to farmers on O&M instructed by EA
4.	Water Issue Laborer (WIL) (ID Jalapalaka)	Operation of spillway, sluice and turnout gates under the instruction by EA

Source: Prepared by the Study Team

(3) Expenses on Operation and Maintenance

The ID's budgets provided for the O&M of the irrigation facilities in Nachaduwa, Thruwila and Rajangana scheme are shown in Table A3.1.8:

Table A3.1.8 O&M Budget of Irrigation Department

No	Item to Compare	Unit	Nachchaduwa	Thuruwila	Rajangana
1	Operation Budget	Rs. (Rs./ha)	134,200 (46)	9,000 (46)	281,600 (42)
	a ID's Expenses	Rs.	67,100	9,000	84,480
	b FO Expenses	Rs.	67,100	0	197,120
2	Maintenance Budget	Rs. (Rs./ha)	874,600 (301)	58,500 (303)	1,835,900 (277)
	a Headworks	Rs.	174,920	No separate budget for Sub-items	555,700
	b Roads	Rs.	87,460		535,731
	c Main & Branch Canal	Rs.	349,840		377,286
	d Distributory Canal	Rs.	262,380		
	e Field Canal	Rs.	FO's Responsibility	FO's Responsibility	367,180

Source: Prepared by the Study Team

Operation budget are nearly same among three schemes as Rs. 42-46 /ha. While Rajangana's maintenance budget shows somehow lower level (Rs. 277/ha) than other two schemes (Rs. 301-303/ha), however, Rajangana scheme are provided with higher amount of government support, budget for D- and F-canal level facilities.

The O&M budget allocated from the central government is reported to be only 20-30% of the actual requirement to maintain existing facilities. Consequently, the facilities have been deteriorating. ID provided substantial amount for O&M of the D- and F-canal level facilities. If FOs could accomplish those tasks, the funds could be used for O&M of main facilities.

(4) Collection of O&M Charges

Since the Government has relinquished collection of O&M Charges directly from farmers, FOs should be the organizations responsible for O&M of D- and F-canal level irrigation system including collection of other relevant charges from FO members. Such charges consist of: (i) acreage tax, (ii) membership fee and (iii) O&M fee for FO Jalapalaka & maintenance. The present collections of various fees, the farmer has to pay, are shown in Table A3.1.9.

Table A3.1.9 Water Charges and Ration of Collection

No.	Item to Compare	Unit	Nachchaduwa	Thuruwila	Rajangana
1	Acreage Tax paid to ADC	Rs/ha/Annum	15	16	15
		Collection %	100	100	100
2	Membership Fee	Entrance Rs.	100	130 (Life Time)	100
		Collection %	100	100	100
		Annual Rs.	25	0	0
		Collection %	100	-	-
3	O & M Fee for FO Jalapalaka & Maintenance	Rs/ha/Annum	1,500 (1 bushel/ crop/acre)	750 (250/acre/ year)	1,500 (1 bushel /crop/acre)
		Collection %	Very Poor	Poor	17-25

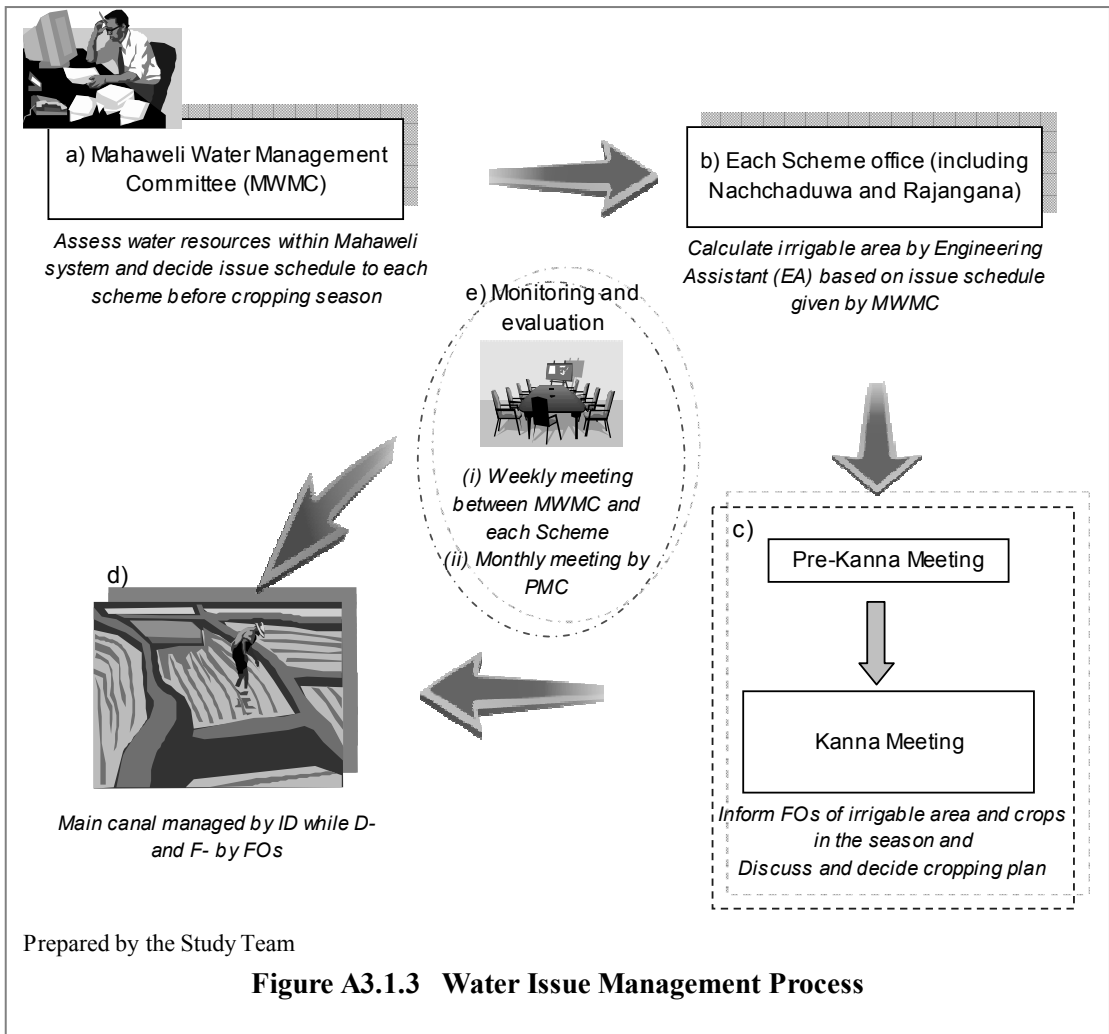
Source: Prepared by the Study Team

As clearly observed, collection rate of acreage tax and membership fee (Thuruwila and Rajangana is not collecting) is quite 100 %, however, all the schemes shows extremely low level in collecting O&M fee for FO Jalapalaka & maintenance.

3.1.5 Irrigation Water Management

(1) Decision-making Process of Irrigation Water Management (Macro Level Issue)

Water issue schedule within the system largely depend upon distribution schedule to each irrigation scheme prepared by Mahaweli Water Management Committee (MWMC), before every cropping season. In this sense, the irrigation schemes including Nachchaduwa, Thuruwila and Rajangana are defined as “supply-oriented system.” The water issue decision-making and management process is illustrated as follows in Figure A3.1.3:



The process is based on two legal backings consisting of Mahaweli Internal Regulation and Irrigation Ordinance (Amendment) (1994). Step a), shown in the figure, depends on former regulation while Step b) to d) is carried out according to amended Irrigation Ordinance. Step e), M&E is related with both legal system. Each step associated with this process is briefly explained as follows:

- a) The MWMC at the first setout assesses water resources within Mahaweli system. In seasonal Water Panel Meeting, they decide water distribution schedule to each irrigation scheme belonging to Mahaweli system every before cropping season.
- b) After receiving distribution schedule from MWMC, each office roughly calculate irrigable area in the season. In the case of major irrigation scheme including Nachchaduwa and Rajangana, 5 acre feet/acre (Maha) and 7 acre feet/acre (Yala) is generally utilized as unit water requirement. This unit is revised to some degree based on lessons learnt from the past water management and cultivation result.

- c) Prior to a “Kanna Meeting (a seasonal cultivation meeting)”, a Pre-Kanna Meeting is usually taken place to deliver information on water availability as well as rough estimation of cultivable area to the farmers in order to broadly determine cultivation schedule. In succession, Kanna Meeting is held to finalize cultivation schedule.
- d) Water issue among main system is managed by ID while D- and F-system is by FOs. Any unforeseen case such as delayed sowing, delayed land preparation, or other climate change affecting cultivation, emergency Kanna Meeting with joint field inspection is carried out among EA, WS, WIL and FO members to confirm field condition. Then, issue schedule is revised if such change is verified and also tank storage is sufficient.
- e) Water issue practice is scheduled to be regularly monitored by WIL under the instruction of EA and WS. Meeting is also held (i) among MWMC and each scheme office (weekly), and (ii) Project Management Committee (PMC) meeting (monthly) so as to monitor and evaluate water management activities as well as to rectify issue schedule, if necessary.

There are some issues to be addressed at the macro level water management decision-making process such as:

- limited farmers’ participation in PMC and/or Kanna Meeting, and
- Insufficient function of PMC and/or Kanna Meeting.

Firstly, the field interview and PMC minutes of meeting review clarified that those meetings or committees are not organized in interactive manner but somewhat one-way talk shop and farmers opinions are not generally reflected on decisions, which discourage farmers to actively participate in the meeting. Secondly, insufficient function of the meeting and the committee is another issue to be pointed out. In the abovementioned process, Kanna Meeting and PMC is to propose measures based on the monitoring and evaluation of water management in the field level, however, practical measures are not sufficiently proposed and also putting such decisions into implementation is limited according to the opinion shown in the minutes of Kanna meeting. Therefore, at present, compelling power on decisions of Kanna or PMC seems to be questionable.

Box: Fine determined by the Kanna Meeting and its authorization

One of the important functions of the Kanna Meeting is to determine Shramadana schedule for O&M of D- and F-canal level irrigation systems to be carried out by FOs. For example, canal cleaning is carried out by Shramadana, schedule and work volume of which are discussed and decided among FOs in the meeting. Farmers, who do not attend Shramadana as scheduled are supposed to be fined, the amount of which has been determined for Nachchaduwa and Rajangana major schemes is as follows:

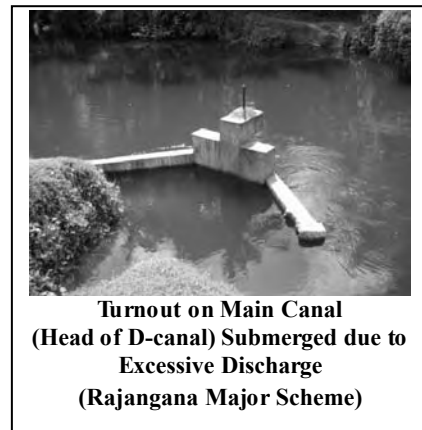
	<i>Nachchaduwa</i>	<i>Rajangana</i>
D-canal	Rs. 150/2m	Rs. 500/2m
F-canal	Rs. 100/2m	Rs. 50/2m

According to the interview through field survey, however, this fine was rarely collected even if Shramadana is not carried out on schedule, which implies insufficient decision implementation power of Kanna Meeting.

(2) Water Management Practices (Micro Level Issue)

In Kanna Meeting, water issue schedule is prepared for land preparation and normal cultivation period. In the land preparation period, water is continuously released to all D-canals for approximately one and half months. Subsequently, in the normal cultivation period, rotational irrigation is scheduled within both main, D- and F-canal level system except for Thuruwila medium scheme. In the main system, the area is divided into two: upstream and downstream for practicing rotational irrigation (3-4 day irrigation interval), which are managed by ID. In D-canal command area from the head of D-canal to F-canals, rotational irrigation is also scheduled to be employed. Gate operation is supposed to be implemented by FO Jalapalaka.

Although such rotational irrigation schedule is prepared, it is not satisfactorily practiced particularly within D-canal command area, which should have been adequately managed by FOs. As a result, significant inequality in water issue between upstream and downstream area is observed. Deterioration of turnout gate is widely found along D-canals, which is also, in actuality, accelerating this defective water management practice within D- and F-canal level system.



ID Jalapalaka usually patrols water flow of main and D-canal once a day during water issuing period. On the other hand, FO Jalapalaka regularly are supposed to confirm water flow of D-canal and operate turnout gate at the head of F-canal as scheduled. The discharge of both inflow to D-canal and F-canal is, however, not measured and recorded at all the three schemes since almost all the measuring device has been seriously deteriorated. Excessive water tends to be, consequently diverted from main down to D-canals leading deterioration of D-canals.

(3) Performance Evaluation of Long-crested Weir and Baffle Distributor

ID implemented water management experiments in 1990s at Rajangana major irrigation scheme during MIRP in order to find out appropriate methodology to alleviate inequality of water distribution between the upstream and the downstream thereby improving water use efficiency among D-canal command area. This demonstration was carried out by adopting automatic head & flow control systems. In the area, both pilot (along D-1) and control area (along D-2) was selected in LB tract 2, former of which was equipped with automatic head and flow control devices, and long-crested weir³ with baffle distributors⁴ while latter of

³ See picture. The pilot area of Rajangana LB tract 2 adopted duckbill weir and diagonal weir. In general, the concept of long-crested weir is to ensure longer length of weir than is possible with typical weirs installed across the canal with the crest perpendicular to the centerline of the canal. Such additional length enables design flow discharge to pass with smaller variable of heads, meaning that even large changes in discharges over the crested weir will result in smaller changes in head

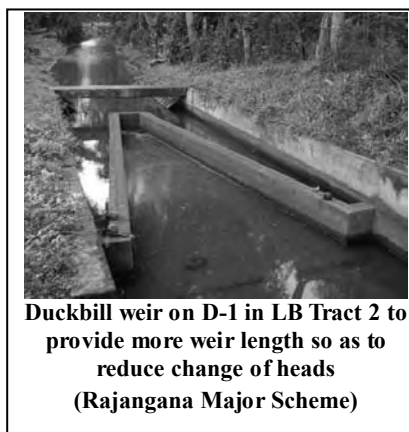
which utilize conventional steel slide turnout gate without check structures. The result was quite promising that water distribution within pilot area was improved than that in control area in terms of the equity and the efficiency.

The study team, at this time, carried out water measurement at said pilot and control areas with the purpose of:

- reconfirming and verifying an effectiveness of long-crested weir and baffle distributor in improving equity and efficiency in water use,
- proposing further modification and future improvement process in above-said water management structure, and
- proposing an approach of improving water management within D-canal command areas.

Measurement was carried out from January to March, 2006. According to the observation, following findings are obtained.

- ***Less variation of discharge among F-canal block observed in pilot area:*** in general, enough water was supplied in both pilot and control area. However, inequality of discharge was observed in both areas, which would be caused due to several reasons such as (i) unworkable gate condition and (ii) less water needs by farmers during the final stage of Maha season. In such like condition, however, more variation was observed in control area, which justifies some parts of effective function in equal water distribution utilizing long-crested weir and baffle distributor.
- ***Much more water diverted to D-canals:*** discharge to D-canal has not been measured at most of the head of D-canal due to the deterioration of measuring devices. Observation result at both pilot and control areas is able to clearly explain that much more water has been diverted than it is scheduled, therefore, some of the facilities are significantly deteriorated by such excessive discharge. In addition, water wastage is observed



Duckbill weir on D-1 in LB Tract 2 to provide more weir length so as to reduce change of heads (Rajangana Major Scheme)



Baffle distributor installed at the head of F-canals in the pilot area (Rajangana Major Scheme)

thereby changing smaller in flow into F-canals. In general, constant flow rates are comparatively user-friendly requiring less workforce in irrigation water management, therefore, long-crested weir can contribute to reducing difficulties in water management. In addition, if adopting conventional system, upstream area are often provided with excessive water due to difficulty in managing large variation of head as well as misuse of turnout, however, the system of long-crested weir can be helpful for water to be allocated among command areas equally in accordance with water management schedule.

⁴ See pictures. Baffle distributor control discharge by opening specified number and combination of different width of baffle gate so that the required discharge is released through the opening of the gate. This system is not related to the downstream discharge conditions to maintain the flow nearly constant. They are easily understood by gate operators as well as water users', if appropriately introduced. The flow rate is easily known by observing how many gates are open. Therefore, from technical point of view, combination of long-crested weir with baffle distributor enhance diverting constant discharge from D-canal to F-canal as scheduled.

particularly in the downstream of control area.

- **Users' capability and acceptability toward new technologies:** Users' capability and acceptability should be carefully considered in selecting new technology. The interview result to FO Jalapalaka revealed that water management by operating facilities in pilot areas were comparatively easier than conventional slide turnout gates in control areas in terms of adjusting water level so as to divert scheduled discharge to F-canal. Although, as mentioned below, research should be continuously carried out in next Yala season, long-crested weir would have some possibilities in improving water management from technical and social point of view.

As discussed, the measurement was carried out in the final stage of Maha cropping season in a condition that farmers relatively don't need much water. It was observed that the upstream farmers even closed the gate not to introduce water in their own F-command area. Water was spontaneously released and even water wastage was frequently observed. Therefore, discharge should be continuously measured in Yala season expecting to be commenced from the latter half of the April, under more critical water resources condition, so as to appropriately justify the effectiveness and efficiency of the combination of long-crested weir and baffle distributor which contribute to improving D- and F-canal level water management.

3.1.6 Water Quality Analysis

This analysis was carried out to clarify the quality of irrigation and drinking water in the Study area in order to assess the impact over irrigation and drinking water through fertilizer application.

Sampling points are illustrated in Figure 3.2.4. Sampling sites consists of the main inflows to two tanks, for Nachchaduwa major scheme and Thuruwila medium scheme, tanks themselves, main canals, return flow and the mainstream of Malwathu Oya. Drinking water samples were taken from dug wells in

Nachchaduwa, Thuruwila and Rajangana villages. Number of sampling sites is 16 for irrigation water and 12 for drinking water as shown in Table A3.1.10:

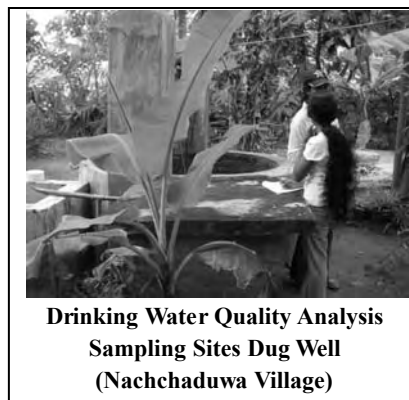


Table A3.1.10 Number of Sampling Sites

Scheme	Irrigation Water	Drinking Water
Rajangana	0	6
Nachchaduwa	12	4
Thuruwila	4	2
Total	16	12

Source: Prepared by the Study Team

Although there is no particular standard, parameter for irrigation water is quoted from “the Water Encyclopedia (second edition)⁵”. In addition, values for some parameters were complemented by “Japanese Water Quality Standard for Paddy Field⁶.” Draft “Guidelines for the Surface and Ground Water Quality for Designated Uses of River Basins in Sri Lanka, Part I: Kala Oya Basin⁷” was also referred to analyze the parameters which are not shown in abovementioned standard. As for the standard for drinking water in Sri Lanka, it is usually given from the standard published by World Health Organization (WHO).⁸

Sampling was commenced in December 2005 and carried out once a month for three consecutive months from December to February. Parameters for the analysis are tabulated in Table A3.1.11.

Table A3.1.11 Parameters of Water Quality Analysis

Parameter	Abbreviation	Unit	Irrigation	Drinking	Method
01. Temperature	Temp.	°C	+	+	The mister
02. Dissolved Oxygen	DO	mg l ⁻¹	+		DO meter
03. Conductivity	EC	μS cm ⁻¹	+	+	EC meter
04. Total Suspended Solids	TSS	mg l ⁻¹		+	Gravimetric
05. Turbidity	Turb.	NTU		+	Turb. meter
06. pH	pH		+	+	pH meter
07. Alkalinity	Alk.	mg l ⁻¹	+	+	APHA
08. Sodium	Na	mg l	+	+	AAS
09. Calcium	Ca	mg l	+	+	AAS
10. Magnesium	Mg	mg l	+	+	AAS
11. Potassium	K	mg l	+	+	AAS
12. Chloride	Cl	mg l	+	+	APHA
13. Sulphate	SO ₄ ²⁻	mg l	+	+	APHA
14. Hardness	Hd	mg l		+	APHA
15. Total Dissolved Salts	TDS	mg l	+	+	Calculation
16. Ammonia N	NH ₃ -N	μg l ⁻¹	+	+	APHA
17. Nitrite as N	NO ₂ -N	μg l ⁻¹	+	+	APHA
18. Nitrate as N	NO ₃ -N	μg l ⁻¹	+	+	APHA
19. Fluoride	F	μg l ⁻¹		+	Electrometric
20. Total Iron	Fe	μg l ⁻¹	+	+	AAS
21. Total Phosphorous	TP	μg l ⁻¹	+	+	APHA
22. Dissolved Phosphorous	DP	μg l ⁻¹	+	+	APHA
23. Biological Oxygen Demand	BOD ₅	mg l ⁻¹	+	+	APHA
24. Chemical Oxygen Demand	COD	mg l ⁻¹	+	+	APHA
25. Copper	Cu	μg l ⁻¹	+	+	AAS
26. Manganese	Mn	μg l ⁻¹		+	AAS

⁵ Van der Leeden, F. Troise, F.L. & Todd, D.K. 1990. Geraghty & Miller Ground Water Series: The Water Encyclopedia (Second Edition), Lewis Publishers. NY, USA.

⁶ Ministry of Agriculture, Forestry and Fisheries (MAFF), Research Committee on environmental pollution. 1970.

Japanese Water Quality Standard for Paddy Field, MAFF, Tokyo, Japan

⁷ Draft Sri Lanka Standard. 2006. Guidelines for the surface and ground water quality for designated uses of river basins in Sri Lanka Part 1 : Kala Oya Basin , Sri Lanka Standard Institute. Colombo, Sri Lanka.

⁸ WHO. 1989. Guidelines for Drinking Water Quality. Vol 1. Recommendations. WHO, Geneva, Switzerland.

Parameter	Abbreviation	Unit	Irrigation	Drinking	Method
27. Zinc	Zn	$\mu\text{g l}^{-1}$	+	+	AAS
28. Boron	B	$\mu\text{g l}^{-1}$	+		AAS
29. Sodium Absorption Ratio	SAR	meq l^{-1}	+		Calculation

Source: Prepared by the Study Team

(1) General features of water quality in the study area

Based on the analysis, the features of water quality in three schemes (Nachchaduwa, Thuruwila and Rajangana) are summarized as follows.

Irrigation Water

Nachchaduwa Irrigation Scheme

- Irrigation water were not suffered from salinity problem and toxic concentration, though there were some salinity concentrations in the return-flow and drainage river.
- Concentration of nitrogen and phosphorus was observed in the return flow and drainage river. Some fields in the downstream in paddy-to-paddy irrigation have a risk to be affected by nitrogen concentration, although impact to the source river is not highly significant. On the other hand, extremely high $\text{NH}_3\text{-N}$ concentrations were observed at some occasions, which imply that farmers discharged water soon after the fertilizer application.
- High values of COD were observed in the entire system and some sites are above the recommended level for Sri Lankan surface water.

Thuruwila Irrigation Scheme

- Basically same trend as Nachchaduwa was observed in terms of salinity, toxicity, and eutrophication, although condition of inflow water was slightly better in terms of salinity. High values of COD were also observed in the entire system.
- There were some differences in phosphorus distribution. Return flow was not significantly concentrated in Thuruwila.

Drinking Water

- Most of the parameters analyzed for drinking water wells located in the three irrigation systems fall well within the permissible levels for designated use. The well water was less hard, non-saline and non-contaminated with concerned toxic metals or other non-hygienic chemicals such as fluoride.
- There were signs of contamination with either coliform or other bacteria since BOD5 was positive and substantial in some wells.
- The presence of fluoride ion is an endemic feature of North Central Province of Sri Lanka, however, the concentration was relatively low since the source of the well water were seepage from surface runoff rather than ground water from aquifers.

(2) Approach for Improvement of the Water Quality in the Study Areas

The analysis result indicates that the water quality in the study areas is within the suitable range for the designated use, irrigation and drinking, however, some nutrient enrichment were observed in all three schemes. In order to avoid further concentration, the following approaches can be proposed:

i) Proper input of fertilizer

Excessive input of fertilizer does not contribute to increase in crop production but it causes high production cost and bad taste in case of paddy. Guidance should be given to the farmers to familiarize them with application of proper amount of fertilizer. It should be also noted that irrigation water flowing to the downstream in paddy-to-paddy irrigation contains fertilizer residue from upstream field and does not need same amount as that in the upstream field.

ii) Suitable Water Management to Avoid Effluent of Fertilizer

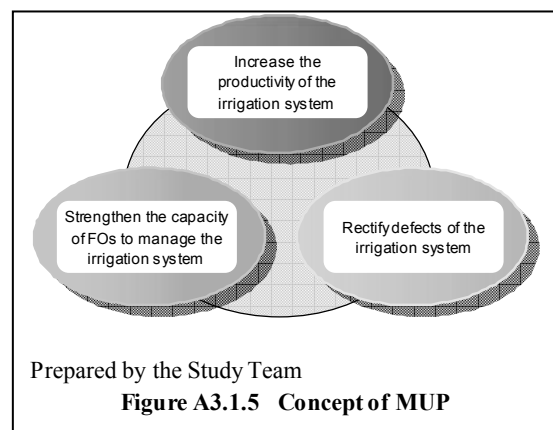
Extremely high NH₃-N concentrations observed at some occasions imply that farmers discharge water unconsciously after the fertilizer application. Proper water management at field level is prerequisite in view of effective input utilization.

3.1.7 Comparison between Irrigation Systems in the Study Area and Mahaweli System C

Mahaweli Upgrading Project (MUP) in Mahaweli System C is one of the most futuristic and triumphant irrigation rehabilitation projects, employing participatory approach in planning, implementation and monitoring of project activities, putting priority on actual communities, mainly farming communities, of the project. On the other hand, since insufficient participation and follow-up by the government in Nachchaduwa and Rajangana major scheme, handing-over is not satisfactory level at present. Fostering environment where farmers' participation can be facilitated is one of the important keys to revitalize irrigation schemes. In this section, therefore, it would be really beneficial to reconsider its approach and to derive lessons from it in order to formulate capacity development plan in irrigation sector.

The major characteristics, by which Mahaweli System C differed from Nachchaduwa, Thruwila and Rajangana schemes are:

- Rectification works of D- and F-canal level irrigation facilities have been carried out with full participation of FOs and farmers, and
- RPM of the System C has all authorities for human and institutional



development, agricultural support services, marketing aspect and so on in addition to O&M of irrigation facilities.

As illustrated in Figure A3.1.5, MUP is the combination of three areas of components: (i) increase the productivity of irrigation, (ii) strengthen the capacity of FOs to manage irrigation system, and (iii) rectify defects of the irrigation system.

Under the MUP, which covers 16,500 ha out of total 21,500 ha of Mahaweli System C, the rectification works have been carried out since 2000 with community-driven participatory approach, from planning to construction and O&M with guidance provided by Mahaweli officers, while no substantial improvement or rectification works have been carried out recently in Rajangana and Nachchaduwa schemes because the commencement of PEACE project was delayed. Although Thuruwila scheme is now being rehabilitated in conjunction with the Anuradhapura water supply scheme under National Water Supply & Drainage Board (NWS&DB), participation of farmers for the rehabilitation works is quite limited.

In Mahaweli System C, after the rehabilitation works, the D- and F-canal level irrigation system is fully operated and maintained by FOs with technical guidance provided by MASL staff. The collection of O&M charges has substantially increased with the recent rehabilitation program implemented under JBIC fund. Some FOs have exceeded 80% in collection of O&M fee. The relevant FOs carried out D- and F-canal level level rehabilitation activities. On the other hand, ID bears some O&M costs of D- canals in Nachchaduwa major scheme and Thuluwila medium schemes and of D- and F- canals in Rajangana major scheme.

The comparison of various aspects consisting of general information, FO activities and fees, agencies provided services, operation and maintenance expenses and water duty and productivity among Nachchaduwa, Thuruwila, Rajangana and the System C are tabulated in the Tables A3.2.12 to A3.2.16. Lessons learnt from Mahaweli System C are discussed in section 2.2 and are also summarize as follows:

- Both software and hardware components of irrigation should be equally prioritized. Reorientation of farmers and strengthen FOs is, first and foremost, important steps through allocating sufficient lead-time.
- Outsider-oriented, overloading, and oppressing rehabilitation fell into poor quality of outcome from the activities. Considering the carrying capacity of the organizations, both contractor (community organizations and/or FOs) and client together should determine the contract period and the value of contract.
- Since many community organizations are not experienced in such rehabilitation works, frequent on-the-job training and follow-up is required. In the System C, aftercare phase is provided to achieve the objectives as specified.
- Strengthening of FOs is not an activity but it is a process and it will even continue after the project.

3.2 Minor Irrigation Scheme

Study on minor irrigation is carried out in this sub-section so as to compare with major and medium irrigation schemes and to derive useful lessons to incorporate them into capacity development plan of target schemes.

The minor tank irrigation is traditional irrigation system developed in the dry zone in the country. As defined in the Agrarian Development Act No.46 of 2000, irrigation works serving up to 80ha (200 acres) are treated as *Minor Irrigation*.

The minor tank systems were constructed in ancient time in the centers of village settlements. Generally, the center of the village was the tank and houses were located on one or both sides of the tank. The irrigable extent below the tank bund is located along the main axis of main valley. Unirrigable slopes of the uplands are used for rainfed cultivation.

Based on the historical commentaries, the construction and settlement of about 15,000 village tanks would have taken place at different periods in the different regions of the dry zone throughout a long period of time.

As indicated in Table 3.2.1, about 7,620 minor tanks are in use currently and about 7,753 are abundant; that is, in other way, about 50% of minor tanks are not in use. Higher number of operational village tanks is located in North Western Province (NWP) and North Central Province (NCP)⁹.

Table A3.2.1 Distribution of small tanks provincial level covering dry zone part

Province	Number of small tanks		
	Operating	Abandoned	Total
Northern	608	816	1,424
North Central	2,095	1,992	4,017
North Western	4,200	2,273	6,473
Southern	653	757	1,410
Lower Uva	16	543	559
Eastern (south of Mahaweli River)	0	1,017	1,017
Eastern (North of Mahaweli River)	48	425	473
Total	7,620	7,823	15,373

Source: Prepared by the Study Team

As per the data collection survey conducted and updated, 1997, by the Department of Agrarian Development, about 8,148 tanks are currently operating in four districts as given in Table A3.2.2.

Table A3.2.2 Number of operational tanks in 4 districts surveyed by DAD

District	Number of minor tanks operating currently
Anuradpura	2,481
Kurunagala	4,482
Puttalam	752

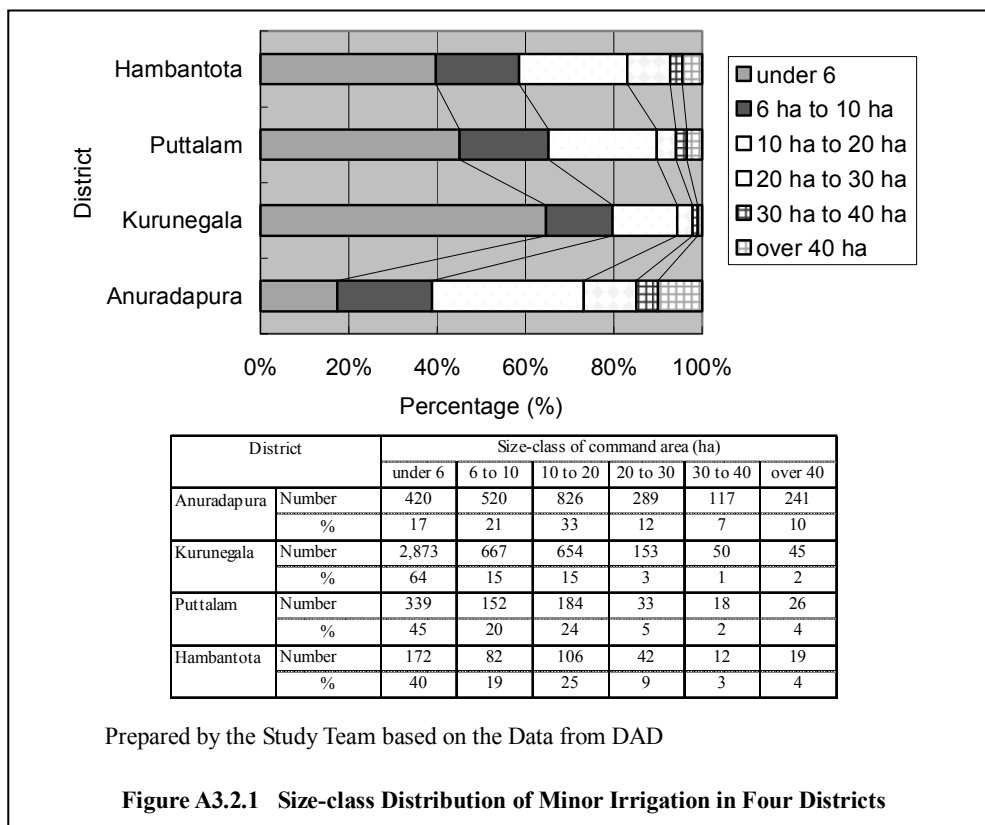
⁹ C.R. Panabokke, R. Sakthivadivel, A.S. Weerasinghe, Small Tanks in Sri Lanka: Evolution, Present Status and Issues, IWMI, 2002

District	Number of minor tanks operating currently
Hambantota	433
Total	8,148

Source: Prepared by the Study Team

On the other hand, DAD has collected and summarized the data on the basis of size-class of command area. Figure 3.2.1 shows the size-class distribution of small tanks in the four districts.

Most of the minor irrigation systems in Kurunegala District, nearly 80 % of all, is less than 10 ha while those in Anuradhapura is comparatively larger scale than other districts.



As having been understood, minor irrigation system has long series of history. The organizational changes and some institutional landmarks in management of minor irrigation works are summarized in Table A3.2.3.

Table A3.2.3 Institutional Landmarks in minor irrigation

Period	Description
Up to 1832	Village communities maintained minor irrigation works under “Rajakariya” system and British rulers abolished it 1832.
1832-1887	Nobody was responsible up to 1887. This vacuum led to degradation of minor irrigation works
1887-1900	Provincial Irrigation Board established. Government Agents were entrusted with responsibility of minor and major irrigation works.
1900-1932	Irrigation Department was established and responsible for construction of all irrigation works. Government Agent responsible for minor irrigation maintenance. Provincial Irrigation Board abolished.

Period	Description
1932-1948	Construction, improvement and maintenance of minor irrigation works were done by Irrigation Department
1948-1958	Maintaining minor irrigation works were done by Ministry of Agriculture and Food.
1958-1972	Department of Agrarian Services was established and entrusted with minor irrigation responsibility. "Velvidane" traditional irrigation headman system was abolished and Cultivation Committees formed.
1972-1979	Department of Agrarian Services was responsible for minor irrigation works. Agricultural Productivity Committees replaced the Cultivation Committees.
1979-1991	In 1979, responsibilities of minor irrigation were handed over to Irrigation Department and in the same year again back to the Department of Agrarian Services. Agrarian Services Committees were established and abolished Agricultural Productivity Committees.
1991 to date	Responsibility of minor irrigation works remained with Department of Agrarian Services. Farmers Organizations work as village level institution for operation & maintenance of minor irrigation works.

Source: Prepared by the Study Team

The minor irrigation works were maintained and operated continuously by village communities under Rajakariya (Ancient custom of compulsory service for irrigation system maintenance) system despite a decline and decay of major irrigation systems from the 13th century. The Rajakariya system was abolished in 1832 by the British administration and nobody was officially responsible for maintenance of minor irrigation works up to 1887 resulting deterioration in such minor systems in the country.

In 1887, Provincial Irrigation Boards were established and Government Agents were entrusted with the responsibility of executing all irrigation works in their own areas.

In the year 1900, Irrigation Department was created which was responsible for construction of all irrigation works in the country and maintenance of major irrigation works whereas the Government Agent remained responsible with maintenance of minor irrigation works with the help of communal labour.

In 1932, the Ministry of Agriculture and Lands introduced a new irrigation policy and under this policy construction, improvement and maintenance of village irrigation works were entrusted to the Irrigation Department.

Following independence in 1948, Ministry of agriculture took over the responsibility of maintaining all minor irrigation works as the Irrigation Department was heavily involved with major irrigation works

With the introduction of Paddy Land Act of 1958, Department of Agrarian Services was established and it took over the responsibility for constructing and maintaining all minor tanks in the country. Nevertheless, the attention of DAS over minor irrigation works was less and its effort had been put on implementation of Paddy land Act. Velvidane (traditional irrigation headman) system was totally abolished under Paddy Land Act of 1958, which resulted in the decay of discipline of operation and maintenance conducted by the farmers' participation for minor irrigation schemes. After eliminating the "Velvidane" system, "Cultivation Committee" was established in its place.

Responsibility of operating and maintaining minor irrigation works were again changed with the introduction of Agricultural Productivity Law No.2 of 1972. Accordingly, an organization named as Territorial Civil Engineering Organization was handed over the responsibility of O&M of minor irrigation works. Once again, changed the village level institutional setup eliminating “Cultivation Committee” and placing “Agricultural Productivity Committees”. With the dismantling of Territorial Civil Engineering Organization in 1979, O&M of minor irrigation works was handed over to Irrigation Department.

Once again, in the same year, Department of Agrarian Services took over the responsibility of minor irrigation works, with the introduction of Agrarian Services Act No 59 of 1979. This Act was repealed with the introduction of Agrarian Development Act No.46 of 2000 and the responsibility of minor irrigation works remained same.

In 1980s and onward, various efforts through the Government and bi-lateral and multi-lateral foreign assistances to restore and rehabilitate minor irrigation systems had been carried out and physical facilities had been improved.¹⁰

It could be observed that the responsibility of minor irrigation works has changed with various Acts introduced time to time in the country after abolishing of Rajakariya system by British rulers. However, the same responsibility of Major/Medium irrigation works is with the Irrigation Department without major changes since the Department established in 1900.

The IWMI study on “Small Tanks in Sri Lanka” has covered the five (5) cascade systems in three (3) different climatic zones in Intermediate, Dry and Semi Arid. Some of the important findings of the study are summarized below.

- Minor tanks are sources of water not only for irrigation but for bathing, cattle needs, brick making, building up ground water, fish culture, and so on.
- Incomes of farmers in traditional minor tank systems are depending both on irrigated paddy production under the tank and Chena (shifting dry land cultivation) cultivation in the surrounding areas.
- Population in the areas have increased more than double in the last 100 years, which caused fragmentation of farmlands and decrease of the Chena areas.
- Due to population increase and other reasons, Chena cultivation area has decreased and farm incomes of farmers are relatively decreased.
- The Kanna Meeting is the most important for O&M of the system. All community members should follow the decisions made in Kanna Meeting. Recently, participation ratio of the Kanna Meeting is low and as the result, the decisions taken in the meeting

¹⁰ Those projects are Village Irrigation Rehabilitation Project, National Irrigation Rehabilitation Project, North East Irrigated Agriculture Projects under World Bank, Participatory Rural Development Project in Arunadhapura under International Fund for Agricultural Development (IFAD), Integrated Rural Development Projects (IRDP) in Hambantota by Norwegian Agency for Development Cooperation (NORAD), Rural Rehabilitation Project in Northern Western Province (NWP) by Asian Development Bank (ADB), etc.

has not been followed.

- Due to population increase, extent of paddy cultivation area has increased in general. The original paddy area is called Puranawela and new paddy area is called Akkarawela. In some cases, because of increase of cultivation area and non-compliance of the Kanna Meeting decisions, crop failure often took place due to shortage of water.
- Farm power used for ploughing has been changed recently from draught animals to tractor.
- Due to increasing costs for inputs of paddy cultivation and stagnation of paddy price, profit of paddy cultivation remains low, which causes the farmers reluctant to provide adequate inputs for paddy cultivation. It is negative spiral of inputs and outputs in paddy cultivation.
- Because of the decrease of on-farm income, farmers depend on non-farm incomes, for which significant sources are employment in Middle East, armed forces, garment factories, teachers, skilled and non-skilled labours and so forth.
- In parallel with Sri Lanka's development, social infrastructure in the villages such as road, health, education, etc. has been upgraded substantially in the villages. Road improvement is contributing much for off-farm income generation.

One of the main problems under minor irrigation lowland cultivation is the fragmentation of land. As a result of this, land holding size has become small that 0.1 to 0.4 ha. As mentioned in the IWMI "Small Tank In Sri Lanka", in a study where 20 minor tanks were studied has found that on an average a family receives Rs.1000.00 per month as an income from paddy cultivation under minor irrigation; based on the data over 25 years it has been found that yield difference between minor and major irrigation is approximately 1 ton/ha.

A brief comparison of two minor schemes (Sembukulama, Mahakanumulla) with pilot schemes (Nanchchaduwa, Turuwila and Rajangana) in the study area is shown in Table A3.2.4.

Table A3.2.4 Comparison of Major, Medium and Minor Schemes

No.	Subject	Unit	Major		Medium	Minor	
			Nachchaduwa	Rajangana	Thuruvila	Sembu Kumala	Mahakanumulla
1	Major Restoration or Construction*1	Year	1926	1957-72	Before 1900	Before 1900	Before 1900
2	Latest Rehabilitation	Year	1989	1989	2005	Nil	1994
3	Area Extent						
	a Original Plan	Ha.	2,384	5,371	173	20	32
	b Present Extent (Maximum)	Ha.	2,905	6,639	193	30	80
	c Maha (Max)	Ha.	2,905	6,639	193	30	78
	d Yala (Max & Min)*2	Ha.	2,905-0	6,515-3,397	193	20-7	20-10
4	Farm Families*3	Nos.	2,935	7,400	280	75	200 (80)
	a Puranawela Farmers	Nos.	N.A.	N.A.	N.A.	60	125
	b Akkarawela Farmers	Nos.	N.A.	N.A.	N.A.	25	75
	c FO Members	Nos.	2,448	6,340	140	45	60

No.	Subject	Unit	Major		Medium	Minor	
			Nachchaduwa	Rajangana	Thuruvila	Sembu Kumala	Mahakanu-mulla
5	Operation Area per Farmer	Ha.	0.99	0.90	0.69	0.40	0.39
6	Average Yield of Paddy						
a	Yala	ton/ha	4,556	4,796	N.A.	Purana 3.3	Purana <4.0
b	Maha	ton/ha	5,134	5,136	N.A.	Akkara 5.3	Akkara >5.0
7	Annual Family Income	Rs.	163,267	110,137	125,241	NA	NA
a	On-Farm Income	Rs.	123,885	73,847	94,419	NA	NA
b	Off-Farm Income	Rs.	39,382	36,290	30,822	NA	NA
8	Attendance to Shramadana*4	%	93.4	81.7	70.7	80	50
9	O&M Fee Contribution*4	%	0	5.4	0.1	100	60-70

Note: *1 D.M. Ariyaratne, Towards a New Agriculture through 50 Years Independence, Ministry of Agriculture.

*2 Period of Data for Major and Medium Schemes are for 1990 onwards and Minor schemes are 2003 & 2004.

*3 Some families in Sumba Kumala cultivate both Puranawela and Akkarawela.

Farmers operating in Mahakanumulla Village are nearly 200, but residents in the village are only 80.

*4 Attendance to Shramadana and O&M Fee contribution of Major and Medium Schemes are based on Mapping surveys.

Those in minor schemes are based on interviews on 24th Jan.

Source: Prepared by the Study Team based on the survey and interviews.

In general, minor irrigation systems face lack of water resources, however, because of that kind of situation, there found various good practices in irrigation system management. Although it would be difficult to instantaneously apply such good irrigation management practice into major irrigation schemes such as Nachchaduwa and Rajangana, following points in minor irrigation are derived which could be some parts of guideline contributing to improving the performance in major irrigation schemes.

- Ownership mind among FOs over irrigation systems are largely higher than that in major schemes. It would be difficult to acquaint FOs of entire major scheme with such positive mind from the beginning, however, such practices should be gradually introduced to FOs and FCGs for more micro levels of the maintenance such as D- and F-canal level facilities.
- Though traditional social cohesion among community members has been recently vaporizing as mentioned above, such relationship remain still playing important role in maintaining minor irrigation system. In the case of major irrigation scheme, like that relationship is observed in individual FOs and FCGs rather than FOs federation covering entire system. Therefore, one of the ideas on capacity development of FOs should be initiated from smaller units of organization then expanding to federation level.
- Kanna meeting attendance ratio is gradually decreasing even in minor irrigation recently, however, activities are still much better than major irrigation system, which are resulted from ownership mind and social cohesiveness as discussed. Farmers are well familiar with water resources as well as operation and maintenance of facilities, therefore, such confidence may encourage them to actively participate in water management decision-making process. It would be effective in major irrigation

schemes as well if FOs members confirm tank storage capacity every before Kannna meeting together with government field staff so that FOs side also have an idea of available water resources for their own system thereby stimulating them to actively take part in the meeting.

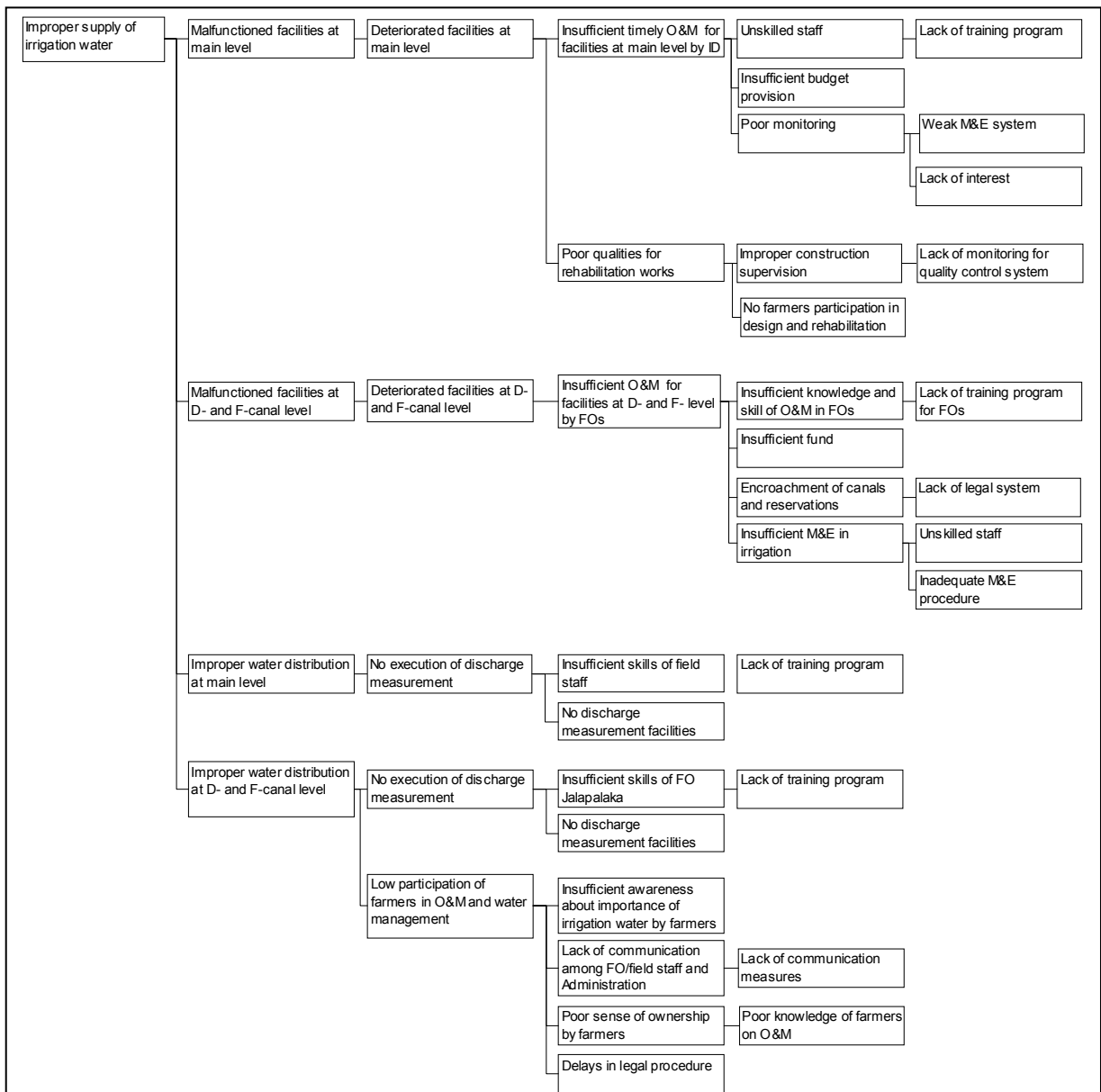
3.3 Problem Analysis

As discussed in the previous section, problems and constraints in irrigation sector extend to variety of the area, which are identified through field survey and investigation in the study area and the series of problem analysis workshop gathering government staff and representative of FOs' members.

The purpose of irrigation is, first and foremost, to provide appropriate amount of irrigation water according to schedule. Considering such fundamental purpose of irrigation as well as findings from field survey and workshops, core problem in the sector can be defined as "improper supply of irrigation water." This core problem is caused by following primary category of issues:

- malfunctioned facilities at main level,
- malfunctioned facilities at D- and F-canal level,
- improper water management at main level, and
- improper water management at D- and F-canal level level.

Those problems are surely associated with various factors including physical, organizational, institutional, financial, capability, human behavior and so forth. Present situation and problems for irrigation sector is summarized in Table 3.3.1. In addition, in order to explain those correlations, the problem tree of irrigation sector is illustrated in Figure A3.3.1:



Prepared by the Study Team

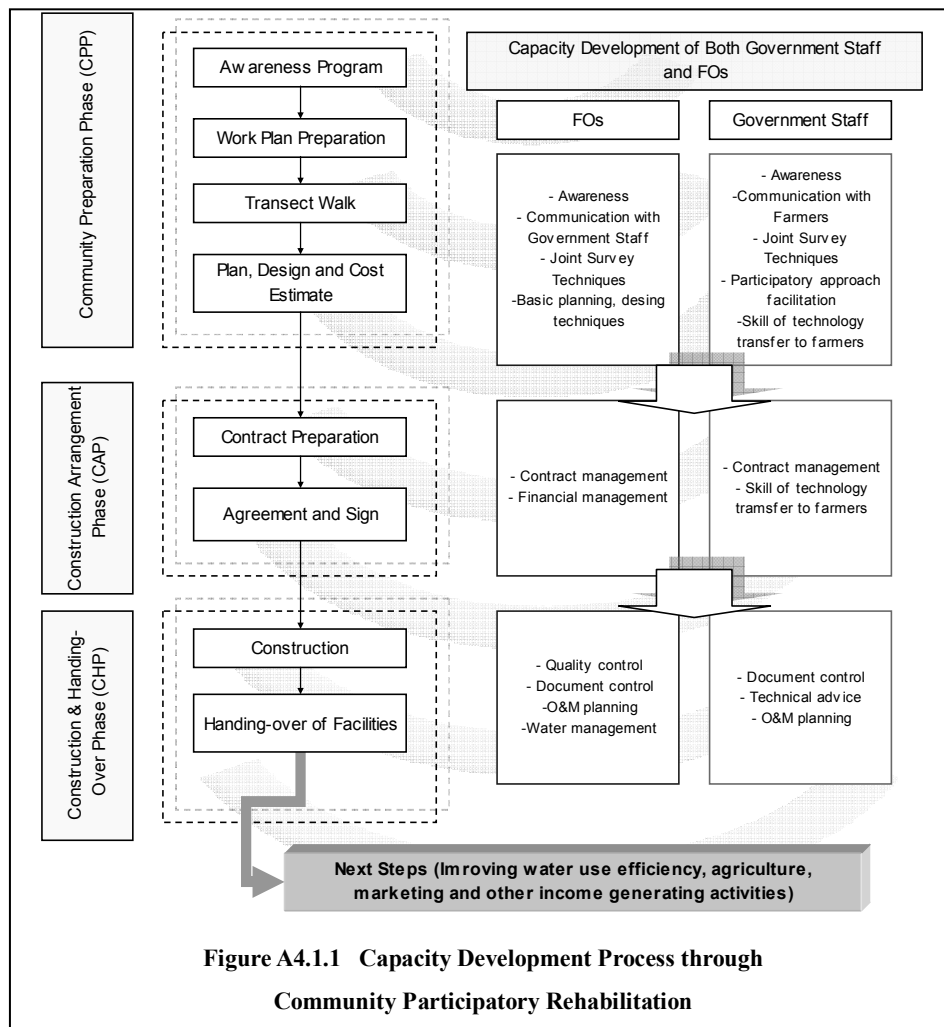
Figure A3.3.1 Problem Tree of Irrigation Sector

Chapter 4 BASIC APPROACH TO INCREASE THE CAPACITY OF INTEGRATED MANAGEMENT

4.1 General

Although there would be varieties of issues to be covered in order to achieve successful irrigation management, it is not realistic to solve or cover all such issues instantly and simultaneously. Improvement in irrigation management is not easy straightforward and cannot be simply classified as a technical exercise involving calculated choices of sophisticated techniques. Therefore, it would be down to earth to carry out stepwise, then scaling-up as the process goes on.

Proposed capacity development process in integrated irrigation management in irrigation sector is illustrated in Figure A4.1.1.



Here, participatory approach in facilities rehabilitation would be considered as an entry point to improve integrated management in irrigation as having been explained in

preceding section. Through such rehabilitation process, FOs are empowered from various view points such as awareness in irrigation water, contract management, basic irrigation plan and design, and construction management while government field staff is reoriented to support such community participatory approach. New partnership between the government and communities are anticipated.

This process primarily consists of three phases: Community Preparation Phase (CPP), Construction Arrangement Phase (CAP), and Construction & Handing-over Phase (CHP).

CPP is the preparatory period to promote community participatory approach. Although it cannot be easily fixed, substantial period should be dedicated to gradually raise awareness of new approach among government staff and FOs. Followed by such awareness program, general work plan is prepared. The next activities, joint transect walk among government field staff and FOs, is expected to contribute to bridging the gaps of perspectives on irrigation facilities between both parties. Plan, design and cost estimate is made through communities' participation with the technical support of government field staff. Such process is supported by providing necessary capacity development program such as communication skills with the government staff, joint survey techniques, facilitation skills and basic planning and designing techniques.

CAP is the second steps in this process. Based on the plan, design and cost estimate, rehabilitation work is entrusted to FOs with community-contract style. In order to manage contracting, capacity development on contract management and financial management is prerequisite for FOs.

CHP, as a final but substantial phase, is the construction and preparation of handing-over step. Communities' participation in construction as well as quality control of the works would be facilitating to increase FOs capacity in irrigation rehabilitation and construction. This step is supported through the technical support by the field staff of the government in terms of construction quality control, document control, financial management, O&M planning and water management.

The CPP through the CHP contribute to empowering farmers as well as reorienting supporting mechanism by the government. In particular, in the course of this process, FOs are expected to obtain basic skills on plan, design, costing, O&M, financial management, organizational management and so forth. In succession, FOs actions are anticipated to be extended to broader things such as improving water use efficiency and agricultural productivity, promoting crop diversification, expanding marketing activities in the next step. It should be also noticed that the proposed process herewith is the guideline of capacity development process through facilities rehabilitation. Current capability, organizational cohesion and other preparedness differs among FOs, therefore, simple clean-cut process cannot be applied. Instead, trial and error approach should be carried out to incorporate the process into reality of the field and FOs.

4.2 Approach to Improve the Present Constraints and Problems in Irrigation Sector

As already discussed in the section 3.2, issues and problems in irrigation sector are gathered up into following four categories: (i) deteriorated function of main facilities, (ii) deteriorated function of D- and F-canal level facilities, (iii) inadequate water management at main level and (iv) inadequate water management at D- and F-canal level, categories of which are made in consideration of demarcation of responsibility among the government and FOs based on participatory irrigation management and handing-over policy stipulated in the Irrigation Ordinance (Amendment) (1994), and Agrarian Development Act (2000).

It is proposed that capacity development of integrated management in irrigation sector is principally carried out through promoting community participatory approach in rehabilitation and water management as above-explained in 4.2.1.

Figure A4.2.1 shows overview of irrigation sector from problem identification, approach to Proposed training courses based on approaches. Left side of the Figure describes causal relation (problems and those causes) in the irrigation sector. Subsequently, approaches with those target groups, under activities (projects) under approaches, those implementers and appurtenant putative training courses. In this sector, present situation analysis has clarified primal sixteen problems and those causes of which plural factors are interrelated. Based on such analysis, thirteen approaches are listed up as shown in the figure. In order to clearly understand approaches which corresponds to each problem and causes, approaches are minutely divided, however, it should be noticed that in the implementation stages some different approaches can be combined so as to effectively carry out programs. Therefore, finally seven activities are proposed under those thirteen approaches and also seven training courses are proposed as briefly explained below:

(1) Function of main facilities

Instead of one-shot and repeating facilities rehabilitation at the main level, sustainable facilities maintenance cycle, so called asset management plan, should be established by the government. In order to establish such system, the proposed approaches under the scope of the study includes: capacity development through rehabilitation works and financial management improvement. Increasing budget for irrigation sector should be attended by the government. Within the framework of the study, two training program with sub-programs to be envisioned under those approaches are as listed below:

Capacity development through rehabilitation works approach

- Rehabilitation planning
- Construction supervision
- Maintenance planning

Financial management improvement approach

- Financial management in irrigation scheme
- Effective auditing system

(2) Function of D- and F-canal level facilities

As having been discussed, D- and F-canal level facilities are to be managed by FOs under the monitoring and evaluation provided by the field staff of the government in accordance with current participatory irrigation management policy. However, such new vertical linkages have not been adequately matured through the handing-over process in Nachchaduwa and Rajangana major irrigation schemes, which were resulted from insufficient training and follow-up support by the government. Under the five problems with causes analyzed based on the study, three approaches are considered within the scope of the study: rehabilitation of D- and F-canal level facilities through community participation, capacity development on M&E of D- and F-canal level facilities, and farm turnout construction. In practical manner, however, it would be effective to integrate those approaches into participatory tertiary level facilities rehabilitation with M&E by the government. In this approach, NGOs would be important partners in implementation of the rehabilitation at D-and F-canal levels. NGOs, acting rather as catalysts, would have potentials to serve as multipliers in facilitating community participatory works.

Proposed training courses consist of two: for government staff and FOs as listed below:

- (Government staff) Community participatory approach facilitation in irrigation rehabilitation, and
- (FOs) Community participatory approach in irrigation rehabilitation

Government staff courses aims to reorient management strategy for D- and F-canal level facilities from comprehensive to supportive and facilitative manner, contents of which would be including participatory planning, communication skills with farmers, skills on technology transfer and facilitation. On the other hand, capacity development program for FOs is proposed with the purpose of empowering FOs for participatory rehabilitation, prospective contents of which involves broader points from planning to O&M such as participatory planning, transect walk and field investigation, basic plan, design and cost estimate, contract management for construction works, field inspection, preparation of document for rehabilitation and construction, O&M fee collection and so forth.

(3) Water management at main level

Three main problems are raised to hinder adequate water management at the main level. Then, three approaches are proposed: (i) Project Management Committee (PMC) activities improvement in M&E for water management, (ii) measuring device rehabilitation and (iii) capacity development of government field staff in water management of main system. As discussed in chapter 3, PMC consist of representatives of the FOs and of the government agencies concerned with irrigated agriculture in order to monitor and evaluate water management. However, in actuality, farmers' participation to PMC is quite limited according to the survey, which makes PMC's activities carcass in terms of water management. Survey reveals that the committee is organized not interactive manner between government agencies and FOs but somewhat "top-down" and one-way talk-shop.

Latter two which can be combined in practical stage are related with capacity development of government staff through water management. The proposed training course is listed as follows:

- (ID / IMD and other related agencies and FOs) Organizational management
- (Government field staff such as ID and IMD) Water management on main level facilities

(4) Water management at D- and F-canal level

There are five main problems on water management at D- and F-canal level which are supposed to be conducted by FOs: (i) not measured discharge at D- and F- canal level, (ii) unsatisfactory handing-over result, (iii) lack of communication among government field staff and FOs, (iv) dependency attitude among FOs and (v) rotational distribution not practiced in D-canal command area. As seen, first two are categorized into government side issue while latter two are the side of FOs. Issue (iii) is ascribable to the relationship of both parties. In this context, three approaches are proposed:

- Capacity development on the facilitation of community participatory water management,
- Development of M&E guideline to support FOs' water management, and
- Capacity development for community participatory water management.

Former two approaches are connected with government side issue to support FOs' water management activities, therefore, those are combined to be effectively carried out in practice. Training courses propose are:

- (Government staff) Community participatory water management facilitation, and
- (FOs) Community participatory water management.

As discussed above, participation of FOs members to PMC is limited. Such lack of incentive on the part of FOs to attend the committee is caused not only by organizational characteristics as having above-mentioned but insufficient participation in water management activities attributed to the lack of water management skills. Therefore, capacity development for community participatory water management would also contribute to facilitating FOs participation to PMC thereby directly improving the function of PMC.

Abovementioned approach and training areas with brief contents is summarized in Table 4.2.2. Sequencing of above-discussed proposed training courses are also important issues to be considered. As explained, in section 4.2.1, FOs and government staffs are empowered through rehabilitation works and subsequently activities are expanded to improving water use efficiency and other income generating activities. In irrigation, water management are not necessarily correlated with level of facilities, however, well-rehabilitated facilities will

enhance water use efficiency. In addition, water management can be carried out by FOs with basic skills on irrigation to be obtained through community participatory rehabilitation works as proposed in section 4.2.1. Therefore, improvement of facilities function at main, D- and F-canal level followed by water management improvement program. As shown in Figure 4.2.3, this process is not one-way but interactive and gradual scaling-up to increase awareness of FOs and empower community participatory management framework.

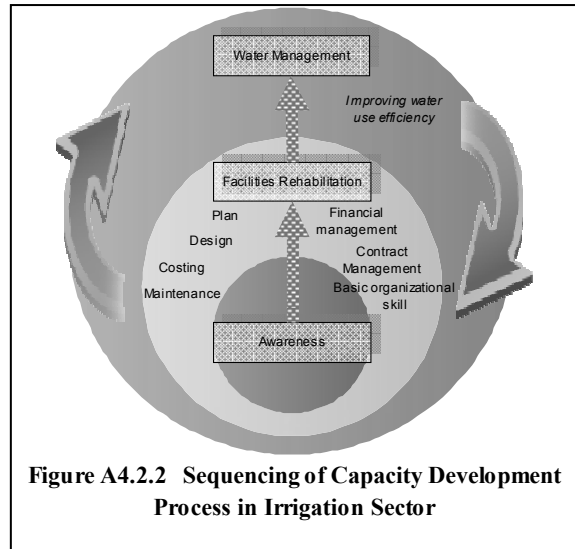


Figure A4.2.2 Sequencing of Capacity Development Process in Irrigation Sector