ALTERNATIVE APPROACHES TO SMALL TANK/CASCADE REHABILITATION: SOCIO-ECONOMIC AND INSTITUTIONAL PERSPECTIVE

M.M.M. Aheeyar

HARTI

2014/12

2015/11

Alternative Approaches to Small Tank/Cascade Rehabilitation: Socio-economic and Institutional Perspective

M.M.M. Aheeyar

Research Report No: 162

November 2013

Hector Kobbekaduwa Agrarian Research and Training Institute
114, Wijerama Mawatha
Colombo 07
Sri Lanka

First Published: 2013

ISBN: 978-955-612-161-2

Suggested citation: Aheeyar, M.M.M. (2013). Alternative Approaches to Small Tank/Cascade Rehabilitation: Socio-economic and Institutional Perspective, HARTI Research Report No: 162, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo, Sri Lanka.

FOREWORD

Cascade based irrigation systems are one of the amazing innovations demonstrating our ancient irrigation heritage and wisdom of water harvesting techniques. Our ancestors have effectively utilized the system to capture the seasonal rainfall to cultivate fertile dry zone lands. Ancient Sri Lanka was self sufficient in food due to the support of irrigation networks constructed and managed by the local community.

Therefore, restoration and rehabilitation of minor irrigation have been one of the strategies of developing dry zone agriculture second only to river diversion and development of major irrigation systems by all the past governments. The need for water storage structures has become more critical with climate change and the high variability of rainfall in order to tackle the problem of water scarcity. Increased incidences of floods in the recent past have caused breaching of small tanks in large numbers demanding more investment for rehabilitation. Though past irrigation rehabilitation interventions had helped to continue the production and sustenance of these systems, there is a requirement of repeated rehabilitation within a short span of life demanding more scarce resources.

The solution of tank rehabilitation with community participation by slight modification in the past has not done much for sustainability. Therefore, it is important to understand problems associated with this entire rehabilitation process and framework for the future development approach. This report would be useful to fill the knowledge gap in achieving sustainable existence of small irrigation systems from the lessons learned from three past projects implemented by different organizations adapting different approaches.

E.M. Abhayarathna

Director

ACKNOWLEDGEMENT

The author is thankful to Mr. E.M. Abhayarathna, Director, HARTI for his guidance and support provided to publish this report. The constant support and useful suggestions provided by Dr. L.P. Rupasena, the Additional Director throughout the study is highly appreciated.

I am very grateful to the project staff of Dry Zone Livelihood Support and Partnership Programme (DZLiSPP), Pro-Poor Economic Advancement and Community Enhancement (PEACE) project, and Cascade Systems Development Project of Plan Sri Lanka for sharing invaluable information and experiences to conduct this study. Special thanks are due to Eng. Ajith Kularathna of DZLiSPP, Mr. R.P.M. Dissanayaka of Irrigation Management Division (PEACE Project) and Mrs. Dharshini Samaranayake and Mr Ruwan Pothpitiya of Plan Sri Lanka for their cooperation and extending support for this project.

I wish to pay tribute to the farming communities of Thumbulla tank, Ihala Kone Wewa, and Kuda Kumbukgolla tank and Agriculture Research and Production Assistants of the respective areas for their valuable support and cooperation extended during the field research. The officers of the Department of Agrarian Development, especially Divisional Officers of the selected areas provided the necessary support and information.

Dr. Herath Manthrithilka of the International Water Management Institute, and Dr. P.B. Dharmasena, Free Lance consultant critically reviewed the earlier version of this report and provided valuable comments and suggestions.

My appreciation goes to Mr. Isuru Fernando, Statistical Assistant of HARTI for providing his assistance to collect necessary field data. The service provided by Ms. Niluka Priyadharshani de Silva of HARTI for typesetting, and page setting the report and preparation of the final manuscript is greatly valued. Finally, my appreciation goes to Mr. C.U. Senanayake, Head/Publication Unit of HARTI for proof reading the final report and making arrangements for printing the report and Ms. Udeni Karunarathna and the printing staff of HARTI for designing the cover page and other support services.

M.M.M. Aheeyar

November 2013

EXECUTIVE SUMMARY

Village tank systems are man-made ecological constructions, which served the rural peasant community to produce their own food and look after their social welfare with little outside interference since ancient times. Therefore, tank rehabilitation and restoration projects were implemented in the past through different approaches and strategies to ensure continuous sustenance of these systems. However, most of the past interventions were mostly limited to hardware aspects such as repair of tank structures and development of community infrastructure and developing individual tanks without paying attention to cascade connections and to the surrounding eco-system.

The major objective of this study is to draw lessons from the selected rehabilitation interventions made in the recent past with alternative approaches which had a substantial component of both software and hardware aspects in their development. The selected project for this study were "Cascade Systems Development Project" implemented by the Plan Sri Lanka (An NGO intervention); Small tank rehabilitation programme under the "Pro-poor Economic Advancement and Community Empowerment Project (PEACE)" implemented by the Department of Agrarian Development (Intervention by a state agency) and Small scale irrigation rehabilitation component under the "Dry Zone Livelihood Support and Partnership Programme (DZLiSPP)" (Intervention by a special project office/project staff operated independently under the Ministry of Agriculture). Secondary and primary data were collected mainly through qualitative techniques.

The study findings indicate that, investment made on small scale irrigation rehabilitation had made positive impacts on enhancing farm level income and household food security. Adoption of holistic and cascade based integrated development approaches was key in addressing various issues affecting sustainability. It is important to consider the small scale farming system in minor irrigation settlements and the role of upland farming and *chena* cultivation as the major sources of household income in order to ensure future sustainability of the system. Integration of aquaculture in the feasible small tanks and livestock activities has high potential of enhancing income of the beneficiaries. Tank selection for rehabilitation should be done with the participation of line agency and approval of Divisional Agricultural Committee.

Cascade connections, re-establishment of *Kattakaduwa, Kururulu paluwa* and other environmental components and promotion of soil and watershed management ideas in addition to ordinary physical rehabilitation could play a prominent role in this regard. The re-establishment of environmental components should begin with a land survey for the scheme and making reservations for the given component with the consent of the beneficiaries.

A participatory development approach is vital to address the real needs of the rural people and make the beneficiaries and line agencies strong partners in the project implementation and to create a sense of responsibility, ownership and accountability

and ensure involvement in the post project sustainable operation and maintenance (O&M). The project experiences indicate the necessity of integration of software and hardware aspects from the beginning as parallel activities, starting from tank selection and planning of activities.

The selection of tanks for rehabilitation should be based on the felt need of the beneficiaries. Beneficiaries of the selected schemes should be willing to participate actively and contribute their maximum in whatever possible form and should be ready to take as much responsibility as possible during all stages of the project implementation. Therefore it is important to have a strong component for community mobilization from initial stages of the project through appointment of specialist catalyst agents. Capacity building of all stakeholders from early stages of the project on their roles and responsibilities, emerging issues, available rich traditional knowledge and wisdom that were useful for the development had contributed positively to the project with more cooperation and collaboration. The experiences show that, formation of different rehabilitation committees viz; Procurement, construction and supervision and assigning the tasks have provided the opportunity to involved by most beneficiaries in the rehabilitation activities with some sort of responsibility and ownership.

The rehabilitation projects should carry out early orientation of the project approach to be adopted and a systematic training and assigning appropriate roles and responsibilities for the line agency officers during the project as well as post project to mobilize them and developing sense of ownership among them about the project by changing their traditional attitudes and mindset. Past experiences show that absence of clear roles and responsibilities for the line agency during the rehabilitation process has hindered in mobilizing officers towards post project scheme related activities and establishing sufficient links between farmers and the line agency officers. The experiences of selected funded projects showed that the total dependency on the line agency for project implementation had caused delays in achieving targets within the specified time period. Therefore, it is recommended that the services of technical staff on contract/hired basis should be obtained. But there should be a room for the line agency officials in the rehabilitation process in order to keep them intact with the scheme.

There should also be proper institutional arrangement to implement and monitor the rehabilitation works and carry out post project O&M. Beneficiary organization must be based on hydrological boundaries, focussing on individual tank, but there should be legal or official recognition for the institutions. Establishment of cascade management committee and apex level project steering committee under the chairmanship of Divisional or District Secretary with the participation of line agency officers and farmer representatives has contributed to positive results in achieving targets and mobilizing duty bearers into the process.

It is appropriate to award the construction contract to local FO in all feasible locations after providing basic construction and contract management training which facilitates

mobilizing more resources from beneficiaries, improving the quality standards of construction.

Actions to establish separate O&M fund for post project sustainable maintenance of schemes with necessary institutional arrangement and procedures for fund utilization is a very important aspect to be considered in the rehabilitation process. Appointment of dedicated care taker and payment of an honorarium for his services would boost the sustainable O&M. It is also important to formulate procedures for routine collection of direct O&M fee from beneficiaries. Traditional systems and practices of land and water management should be institutionalized as appropriately. Dividing the tank bund in proportion to size of land holdings of each farmer by installing tags permanently for routine maintenance has been very effective compared to common *Shramdana*.

CONTENTS

FOREWORD i
ACKNOWLEDGEMENT ii
EXECUTIVE SUMMARY iii
CONTENTS vi
LIST OF TABLES viii
LIST OF FIGURES viii
LIST OF ABBREVIATIONS ix

CHAPTER ONE 1
Introduction 1
1.1 Background 1
1.2 Role of Small Tank Systems in Food Security and Wellbeing 2
1.3 Salient Features of the Past Rehabilitation Interventions of Small Tank Systems 3
1.3.1 Village Irrigation Rehabilitation Project (VIRP) 3
1.3.2 The Anuradhapura Dry Zone Agricultural Project (ADZAP) 4
1.3.3 World Food Programme (WFP) Funded Minor Irrigation Rehabilitation 4
1.3.4 Small Tank Rehabilitation Project of the Freedom from Hunger Campaign (FFHC) 4
1.3.5 Minor Tank Rehabilitation under the Dry Zone Agricultural Development Project (DZADP) of Care International 5
1.3.6 Small tank Cascade Development Programme by Kala – Oya Basin Management Organization 5
1.3.7 'Kethata Aruna Nil Diyawara' – Ten Thousand Tank Rehabilitation Programme 6
1.4 Problem Statement 6
1.5 Research Objectives 7
1.6 Methodology 7

CHAPTER TWO 11
Alternative Approaches to Small Irrigation Development Interventions 11
2.1 Cascade System Development Project of Plan Sri Lanka (2004-2010) 11
2.1.1 Rehabilitation and Physical Improvement of Infrastructure Facilities 11
2.1.2 Conservation and Management of Catchment and Related Environmental Components 12
2.1.3 Community Mobilization and Capacity Building of Farmers and Farmer Organizations 13
2.1.4 Capacity Building of Line Agencies and Arrangement for Horizontal Coordination 14
2.1.5 Improving Productivity and Household Income 15
2.2 Minor Irrigation Rehabilitation under Pro-poor Economic Advancement and Community Empowerment (PEACE) Project (2006-2011) 15
2.2.1 Social Mobilization and Strengthening of FOs 16
2.2.2 Rehabilitation and Improvement of Irrigation Facilities 17

2.2.3 Strengthening of Agricultural Support Services 18
2.2.4 Improvement in Agricultural Productivity and Income Generation Activities 18
2.2.5 Improvement of Water Management and Maintenance Activities 19
2.3 Small Scale Irrigation Schemes Rehabilitation Approach Adopted by the DZLiSP Programme (2008-2012) 19
2.3.1 Institutional Development 20
2.3.2 Irrigation Rehabilitation 20
2.3.3 Water Management 21
2.3.4 Sustainable Operation and Maintenance 21
2.3.5 Diversification of Agricultural Activities 23

CHAPTER THREE 25
Relevance and Quality of Hardware Development Interventions 25
3.1 Relevance of the Works Undertaken 25
3.2 Quality of the Works Implemented 25
3.3 Role of Beneficiaries in Rehabilitation 26
3.4 Impacts of the Rehabilitation Interventions on Crop Production in the Selected Schemes 27
3.5 Issues and Consequences 28

CHAPTER FOUR 29
Institutional Aspects of Tank Rehabilitation and Management 29
4.1 Institutional Models Adopted for System Rehabilitation 29
4.1.1 Institutional Model Adopted by Plan Sri Lanka 29
4.1.2 Institutional Model Adopted by the PEACE Project 30
4.1.3 Institutional Model Adopted by DZLiSP Programme 31
4.2 Community Mobilization and Empowerment 31
4.3 Role of Line Agencies in the Rehabilitation Process 33
4.3.1 Role of Line Agencies in the DZLiSPP 33
4.3.2 The Role of Line Agencies in the Project Implemented by Plan Sri Lanka 34
4.3.3 The Role of Line Agencies under the PEACE Project 34
4.4 Systems for Sustainable Operation and Maintenance 35
4.4.1 O&M Arrangements under DZLiSPP 35
4.4.2 O&M Arrangements under Plan Sri Lanka Project 36
4.4.3 O&M Arrangements under the PEACE Project 36

CHAPTER FIVE 39
Proposed Model for Sustainable Minor Irrigation Rehabilitation 39
5.1 Development approach 39
5.2 Tank Selection and Planning of the Activities 39
5.3 Farmer Participation 40
5.4 Role of Agency Officers 41
5.5 Institutional arrangement 41
5.6 Human Resources Development/Capacity Building 42
5.7 Hardware development 43

5.8 Post project operation and maintenance 43

CHAPTER SIX 47
Lessons Learned and Policy Implications 47
6.1 Lessons Learned 47
6.1.1 Key Lessons from the PEACE Project 47
6.1.2 Key Lessons from the Plan Sri Lanka Project 47
6.1.3 Key Lessons from the DZLiSP Project 48
6.2 General Lessons 49
6.3 Policy Implications 50

REFERENCES 52
Annex 1 54

LIST OF TABLES

Table 3.1: Impacts of Rehabilitation on Crop Production in the Case Study Schemes.... 28

Table 4.1: Financial Status of Selected FOs in the study Areas by the end of 2012..... 33

LIST OF FIGURES

Figure 2.1: Arrangement for the O&M fund management in DZLISPP..... 23

Figure 4.1: Institutional Arrangement of the Plan SL 30

LIST OF ABBREVIATIONS

ADZAP	-	Anuradhapura Dry Zone Agricultural Project
ADC	-	Agrarian Development Centre
AI	-	Agriculture Instructor
ARPA	-	Agriculture Research and Production Assistant
CAP	-	Community Action Plan
CMC	-	Cascade Management Committee
DAC	-	Divisional Agricultural Committee
DO	-	Divisional Officer
DS	-	Divisional Secretary
DZADP	-	Dry Zone Agricultural Development Project
DZLiSPP	-	Dry Zone Livelihood Support and Partnership Programme
FFHC	-	Freedom from Hunger Campaign
FO	-	Farmer Organization
IO	-	Institutional Organizers
NAQDA	-	National Aquaculture Development Authority
OFC	-	Other Field Crops
O&M	-	Operation and Maintenance
OP	-	Organizational Partners
PEACE	-	Pro Poor Economic Advancement and Community Enhancement
PRA	-	Participatory Rural Appraisal
PSC	-	Project Steering Committee
VIRP	-	Village Irrigation Rehabilitation Project
WFP	-	World Food Programme
WUG	-	Water User Group

CHAPTER ONE

Introduction

1.1 Background

Minor irrigation systems are defined in the Irrigation Ordinance of 1946 as the schemes constructed by proprietors without Government support and maintained by the proprietors. The latest definition of minor irrigation system as stipulated in the Agrarian Services Act of 1979 is that, irrigation systems with command area of less than 200ac (80ha). Minor irrigation systems are also intermittently called small-scale irrigation systems and village irrigation systems.

The total number of village tanks in working conditions is reported to be 12,000 with an irrigable extent of around 169,000 ha (DAS, 2000). Out of the total small tanks, Kurunegala and Anuradhapura districts account for around 6,500 small tanks, which is almost 60% of the total small tank systems in the country. Over 90 percent of the systems in the Anuradhapura district have a command area of less than 40 ha, while in the Kurunegala District, about 95 percent of the systems have a command area of less than 20 ha. Therefore, Panabokke (2003) suggested the necessity of changing the current definition of less than 80 ha command area, as more than 95 percent of all small tanks in the country have a command area of less than 40ha (100 acres).

Of the total annual cultivated extent under minor irrigation tanks, 50-70 percent is cultivated during the *maha* season, depending on the scale of precipitation received during the season (DAD & ID, 2006). The average paddy yield under minor irrigation is 1 – 1.4 tonnes lower than the yield obtained from major irrigation areas. Inadequate water supply is the main factor which limits farming under minor irrigation tanks resulting in lower incomes. Improvement of access to water in the minor irrigation areas will improve not only the yield, but also increase the cropping intensity.

Small tanks are not randomly located, and normally not isolated. Rather a series of tanks are positioned along the natural drainage (especially where dendritic drainage pattern exists) to form a cluster of small tanks situated within a well defined small watershed. The cluster of tanks normally made up to 4-10 individual small tanks is called tank cascades (Panabokke, 2004). Cascade system allows reusing the water within the system.

Village tank is a man-made ecological construction, which includes several components for natural resources management. The village tank systems have provided due consideration for micro land uses in addition to macro land uses of '*Gangoda*' (home garden), '*Chena*' (shifting cultivation) and '*Welyaya*' (lowland paddy cultivation). Micro land uses include *Gasgommana* (the upstream land strip above the tank bed, where water stagnates only when spilling and also acts as a wind barrier), *Godawala* (a water hole to trap silt before water enters the tank bed), *Perahana* (a meadow developed under the *Gasgommana* to filter sediment coming

from upstream *chena*), *Iswetiya* (upstream soil ridge on either side of tank bund to prevent entering eroded soil from upper land slopes), *Kattakaduwa* (reserved land below the tank bund consisting of diverse vegetation to absorb salinity) and *Kiul ela* (natural stream utilized as the common drainage) (Dharmasena. 2004).

1.2 Role of Small Tank Systems in Food Security and Wellbeing

The total number of farmers benefiting from small tank systems (excluding small anicuts systems) is little more than 300,000 (DAS, 2000). Minor irrigation systems provide water for 25 percent of the total asweddumized (developed for paddy cultivation) paddy extent (DCS, 2011) and supply 22 percent of the national annual paddy production. Therefore, the minor irrigation system plays an important role in terms of food security and providing livelihood for a large number of rural families.

Minor tank based farming system is traditionally three-fold; namely '*gangoda*' (home garden), '*chena*' (shifting cultivation) and '*welyaya*' (lowland paddy cultivation). The farming system under the small tank system was considered as a more stable settlement averse to the risk of vagaries of weather and a subsistence nature of production.

A well managed home garden plays an important role in the village tank community by offering fruits and vegetables for household consumption and developing pleasant and cooler environment. Chena cultivation receives a most prominent place in the small tank based farming system than lowland paddy cultivation as it is the most stable and important portion of the household income. *Chena* crops on the other hand act as an insurance against any failure in the lowland paddy crop while providing a substantial income an important source of the family diet. However, due to population pressure, most of the *chena* lands are converted to rain-fed settlements, reducing the extent available for *chena* cultivation and reduction of fallow period between two cultivation seasons. These changes have caused reduction of land productivity and household incomes.

Small tanks or reservoirs that store water for a multiplicity of uses (e.g., Irrigation, domestic and livestock) in the dry seasons, thus, form the life line of the village economies and human well-being. It supports human settlements in a geophysical terrain that would otherwise have been left abandoned.

The rehabilitation or reconstruction of a minor tank is often beyond the capacity of poor communities in tank villages, although they fully recognize its importance for survival and for the improvement of their living conditions. In the recent decades, increasing uncertainties of rainfall and water availability associated with on-going climate changes have also further discouraged the farming communities from investing their meagre resources towards tank rehabilitation. It is in this context that both the Government as well as several international agencies came forward to undertake minor irrigation tank rehabilitation during the last several decades.

1.3 Salient Features of the Past Rehabilitation Interventions of Small Tank Systems

Although small irrigation systems are commonly known as 'farmer managed irrigation systems', the state and NGOs' interventions in restoration of small tank systems have been there at least from the mid 18th century onwards (Groenfeldt *et al*, 1987). British administration believed that the restoration of village tanks would serve the rural peasant community to produce their own food and look after their social welfare with little outside interference. In the meantime, the GOSL expected to distribute funds in a more equitable manner to the rural poor through restoration of the small tank system (*ibid*).

There were numbers of small irrigation rehabilitation projects implemented in the last few decades through different approaches and strategies. These attempts have benefitted most of the tanks on various aspects, especially extending the life of tanks. However, it has been argued that, most of the past rehabilitation interventions have not assisted to increase the productivity of small tanks. Dharmasena (2007) has identified various factors for the situation viz; limiting the development interventions to hardware aspects such as repair of tank structures and development of community infrastructure (access roads, community centres etc); developing individual tanks without paying attention to cascade connections; and insufficient attention paid to restoration of tank bed and its surrounding eco-system.

The following sections describe some of the selected past small tank rehabilitation interventions.

1.3.1 Village Irrigation Rehabilitation Project (VIRP)

The VIRP was started in 1980, with the financial assistance of the World Bank in 14 districts in the wet and dry zones of the country covering 1,200 small tanks and anicuts. The project was aimed at benefitting around 25,000 families. The project expected that, the Department of Agrarian Services would plan and execute an appropriate water management plan with farmer consultation after completion of the project.

VIRP had three main components;

i. Physical rehabilitation
   The physical rehabilitation of the project included improvement of the tank bund, spillways and main channels; replacement of sluices; construction of suitable drainage system, control structures, turnouts and measuring devices and alignment of both main channels and field channels.
ii. Improved agricultural practices
   The interventions made to improve agricultural practices are; promotion of dry sowing of paddy in the *maha* season with the onset of early rains, ploughing immediately after seasonal harvest to enable early land preparation for the next season, growing of non paddy crops in the *yala* season to save water and promotion of short duration paddy varieties in both seasons.

iii. System management
The project was aimed at establishing farmer organizations to perform O&M and implement water management programme. It was planned to implement cultivation of a part of the command area during water shortage seasons and rotational water supply through the FOs to achieve efficient use of water resources.

One of the serious drawbacks reported in the VIRP evaluation report is the disregard for local knowledge and experience in the design and construction phase of the project. The project did not utilize local farmers as labourers, but labourers and constructors were usually brought from outside (Abeyratne, 1986). Although, VIRP had failed as a rehabilitation project, it provided lessons of vital requirement of empowering farmers in village irrigation rehabilitation projects.

1.3.2 The Anuradhapura Dry Zone Agricultural Project (ADZAP)

IFAD and ADB funded Anuradhapura Dry Zone Agriculture Project (ADZAP) commenced in 1981 aiming at enhancing the living conditions of dry zone farmers by increasing agricultural production through introducing an efficient farming system. The main component of the project was the development of upstream (restoration of bund, sluices, and spill) and downstream (development of command area). The project expected the restoration of the village irrigation system to help stabilize *chena* cultivation, which is the major source of income of small irrigation farmers. However, according to Jayasena (1991) the project had failed to achieve its initial objectives due to poor coordination among stakeholders, agencies and this has led to weaknesses in the project implementation process.

1.3.3 World Food Programme (WFP) Funded Minor Irrigation Rehabilitation

World Food Programme (WFP) funded small tank rehabilitation works were carried out during the periods 1994 – 2000 (phase – I) and 2002 – 2006 (Phase – II) covering dry and intermediate zones. The project did not use outside labour or contractors for rehabilitation. The farmer participation was obtained in all stages of the project, such as planning, designing and implementation through the establishment and strengthening of Farmer Organizations (FOs).

1.3.4 Small Tank Rehabilitation Project of the Freedom from Hunger Campaign (FFHC)

The project started in the late 1970s with the financial support of various international NGOs. The project strategy was to facilitate the maximum role and contribution from beneficiary communities and provided funds far beyond the limit of farmers' capacity. The Freedom from Hunger Campaign (FFHC) mainly focused on rehabilitation of isolated tanks. Farmer contribution under the FFHC intervention was higher compared to VIRP and ADZAP (Groenfeldt *et* al, 1987). FFHC intervention discouraged the *chena* cultivation unlike the VIRP.

1.3.5 Minor Tank Rehabilitation under the Dry Zone Agricultural Development Project (DZADP) of Care International

Care International Sri Lanka launched the "Dry Zone Agricultural Development Project" (DZADP) during 2002-2005 in the Dry Zone districts of Moneragala, Puttalam and Mannar with the aim of increasing living standard of the rural masses. The main approach of the Project was to enhance productivity and income in command and catchment areas of micro tanks in the project areas through making interventions in four sectors namely, Farming Systems Development, Institutional Development & Organizational Strengthening, Business Development and Water Resources Management (WRM). The rehabilitation of dilapidated minor irrigation systems is one of the main priorities of WRM component. The Project had rehabilitated a total of 42 minor tanks; 20 in Puttlam, 18 in Moneragala and four in Mannar district.

The salient features of the tank rehabilitation project of the Care International Sri Lanka were not limited to the tanks but it focused on the surrounding watersheds and cascade connections. DZADP worked in collaboration with service providers of the Government of Sri Lanka (GoSL), Non-Governmental Organizations (NGOs) and Private Sector in implementing its activities. The project made it compulsory to contribute twenty percent of the total rehabilitation cost by farmers through intense farmer consultation. The project has selected tanks and implementation of the project activities with the approval of the Divisional Agricultural Committee (DAC) headed by respective Divisional Secretary and District Steering Committee (DSC) headed by respective District Secretary. The DSC consisted of the heads of line departments, representatives of DZADP and partner NGOs.

The project has encountered setbacks in achieving targets in the specified time due to delays in submitting documents of preliminary investigation reports, survey estimates, work estimate, and work recommendations by the Department of Agrarian Development. The time lag is mainly due to the lack of human resource capacity (especially Technical Officers) at the Department of Agrarian Development and overloaded work at the department (Jayawardane *et al,* U.D). Another problem experienced in the institutional arrangement adopted by the project was, difficulties in gathering the members of DSC and holding regular DSC meetings (*ibid*).

1.3.6 Small tank Cascade Development Programme by Kala – Oya Basin Management Organization

Kala-oya Basin Management Organization is a river basin organization formed by the Mahaweli Authority of Sri Lanka (MASL) in the Mahaweli H system. MASL launched a cascade development programme in 2004 through Kala Oya Basin Management Organization in two cascades namely Mahagalkadawala (in Galgamuwa DS Division) and Manewa (in Ipalogama DS Division). The project adopted partial de-silting technique to increase the capacity of ten tanks. The project intervened to restore the reservation areas of the cascade system by planting suitable species. Attempts were also made to improve water management in the down streams of the tanks (Dharmasena, 2007).

1.3.7 'Kethata Aruna Nil Diyawara' – Ten Thousand Tank Rehabilitation Programme

Ten thousand tank rehabilitation project was initiated by the GOSL in 2005 to rehabilitate both damaged and abandoned village tanks. The target of the programme was to rehabilitate 2000 tanks each year from 2005–2009. The objective of the rehabilitation was to increase water storage capacity of the village tanks and thereby enhance productivity. The project had a strong component to mobilize beneficiary communities for rehabilitation activities, but little emphasis was paid to post project sustainable maintenance activities. The tank selection and rehabilitation works were not much accomplished with technical input from the relevant technical people which led to the selection of unsuitable abandoned tanks and selection of tanks which were rehabilitated earlier.

The project made a special effort to rehabilitate small tanks based on cascade system in Rambewa DS division in the Anuradhaspura District in 2004 as a pilot project. The project was financed by a private sector company Jinasena PVT Ltd. The selected cascade was the *Kapirikgama* small tank cascade system located in the *Kadahathu Oya* sub-watershed of the *Malwathu Oya* watershed. Of 25 tanks, 17 tanks were renovated with improvement to tank bed geometry (Dharmasena, 2007). The project also made some institutional arrangements by forming a cascade management committee comprising farmers, officers from relevant government organizations and religious leaders. The 10,000 tank rehabilitation programme did not progress after one year of initiation due to changes in government political alliances and change of ministerial portfolio in charge of the irrigation subject.

1.4 Problem Statement

The crop damages during the last century due to drought hazard indicate that the damage is highest in the area served by small tanks (MaddumaBandara, 1982). The policy of rehabilitating minor tanks was emphasized in the budget speech of 2006. According to the 'Mahinda Chinthana' policy document, the tank rehabilitation programme is to be expedited with the participation of the targeted farmer community. Over 200 small tanks had breached due to floods in late 2010 and that also has increased the rehabilitation requests. The drought and the consequent water scarcity call attention to the importance of increasing storage capacity of irrigation tanks by proper rehabilitation.

"However, renovating and rehabilitating of the small tank system without addressing a host of surrounding issues that ranged from cascade hydrology, to catchment conservation and downstream impacts to name a few, may even contribute to increase drought damage, defeating the very purpose of the whole exercise" (MaddumaBandara, 2004). Therefore the rehabilitation of small tanks should be done with a sound understanding of all the implications of the activities. The past interventions undertaken by the government through various projects were by and large top down with limited beneficiary involvement and mostly limited to hardware development and improvement of the infrastructure. The small tanks are not only

production units, rather they are considered as social, cultural and economic systems. Therefore, comprehensive development approaches are essential.

In this context, it is useful to study various alternative approaches adopted by different NGOs and donor agencies such as the CARE international, Plan International, IFAD, the EU and other NGOs, which had a substantial component of both software and hardware parts in the development. The scientific analysis and drawing lessons from the past interventions are useful for future sustainable rehabilitation of small tank systems and the related livelihood activities.

1.5 Research Objectives

The major objective of this study is to draw lessons from different rehabilitation interventions made in minor tank systems by various development agencies for future interventions. The specific objectives of the study are,

i. To review different approaches adopted by three different organizations in rehabilitating small tanks/cascade systems
ii To identify the best practices and success and failure aspects of these rehabilitation models
iii To propose recommendations for future rehabilitation strategies

1.6 Methodology

Review of literature and key informant interviews were conducted initially to identify different intervention approaches and major components of rehabilitation undertaken by various organizations during the period 2000-2010. Thereafter, three different small tank rehabilitation projects were selected for the detailed study. The selected project interventions are,

a) "Cascade Systems Development Project" implemented by the Plan Sri Lanka during 2004-2010-An NGO intervention
b) Small tank rehabilitation project under the "Pro-poor Economic Advancement and Community Empowerment Project (PEACE)" implemented by the Department of Agrarian Development during 2006-2011 – Intervention by a state agency
c) Small scale irrigation rehabilitation component under the "Dry Zone Livelihood Support and Partnership Programme (DZLiSPP)" during 2008-2012 - Intervention by a special project office/project staff operated independently under the Ministry of Agriculture

The study was mainly based on quantitative and qualitative data collected from primary and secondary sources. Data collection for the study was conducted during August to November 2012. The study has adopted following technical approaches in the collection of necessary data and information.

I. Review of literature: A methodical literature review was undertaken by perusing the number of unpublished reports such as baseline survey reports, business plans of the project of different locations, progress reports and progress review meeting minutes of the village level institutions, mid-term review reports, and final evaluation reports.
II. Key informant interviews: Guided interviews were conducted among office bearers of village level institutions in the project sites, and officials of relevant government agencies. The research team visited the line agencies relevant to the implementation of the project such as agriculture officials, leaders of village level organizations and the beneficiaries, in order to understand the prospects and issues of the project.
III. Focus group discussions: Focus group discussions were conducted in all selected locations targeting office bearers of rural organizations and various beneficiary groups of the project villages. The focus group discussions were conducted using a checklist prepared from the initial information distilled from literature review and key informant discussions.

The guiding principles are;

a) To establish a learning exercise cycle: Review-dialogue-analysis-recommendations
b) Engage farmers and FOs to express their views, experience and aspirations

The variables and indicators for the assessment were finalized after the review of literature and key informant interviews. The following parameters were considered for the detailed analysis.

i. Approach of intervention and the relevance, major components, community mobilization, prioritizing the activities
ii. Establishment of community institutions - strength, suitability, effectiveness of the institutional arrangements, participation and cooperation of the beneficiaries and other line agencies with the established institutional arrangement, problems experienced
iii. Capacity building of the local organizations - Number and types of capacity building programmes conducted, quality and usefulness of the programmes (guidance, skills provided), follow up done after the training, new knowledge and skills imparted, drawbacks and the impacts
iv. Preparation of development plans - progress of preparing different plans (Vulnerability assessment, PRA and livelihood development needs etc, participation of the stakeholders, the contribution of the local people in the preparation and validation of the plan, appropriateness, usefulness)
v. Agency support for the implementation of the adopted holistic plan strategies, problems experienced
vi. Building linkages with external organizations - types of linkages, types of services received, usefulness of the assistance provided to increase income, drawbacks of the arrangements made, further requirement

vii. Implementation of agriculture and livestock projects - types of projects, selection of beneficiaries, suitability of the project, achievements and drawbacks

viii. Development of business skills, establishment of market linkages and other related infrastructure

ix. Implementation of non-farm enterprise projects - method of implementation, the type of enterprises, the number of beneficiaries, services received, impacts and drawbacks

x. Improved access to water for agricultural and domestic purposes- Rehabilitation of irrigation systems, efficiency, appropriateness, quality of the work, beneficiary contribution, suitability, usefulness

xi. Post project situation - Operation and maintenance, continuation of other activities, sustainability

CHAPTER TWO

Alternative Approaches to Small Irrigation Development Interventions

2.1 Cascade System Development Project of Plan Sri Lanka (2004-2010)

Failure to adopt cascade management approach in the past interventions of tank rehabilitation undertaken in the dry zone due to lack of proper technical guidance for planning and management of water resources in the tank cascade system had caused many problems such as inundation of upstream paddy fields, water shortage in downstream tanks, salinity development and higher risk of chain breaching (Dharmasena, 2004). Plan Sri Lanka adopted a 'Cascade-based' rehabilitation and development approach in its project of cascade based small tanks rehabilitation project in the Anuradhapura district during the five year period 2004-2010. The project activities were concentrated into five small tank cascades located in the Divisional Secretariat (DS) divisions of Mahawilachchiya, Nuwaragam Palatha Central, and Medawachchiya. The common feature of these three DS divisions was that they were in the border of the Northern Province and therefore, they were vulnerable due to civil war which prevailed in the country.

The project implemented its activities in five cascade clusters.

1. Navodagama cascade in Mahawilachchiya DS division.
2. Sandamal Eliya cascade in Mahawilachchiya DS division. The project activities were carried out in six tanks in this cascade.
3. Puwarasakulama cascade cluster in Madavachchiya DS division. Three small tanks within the cascade were rehabilitated.
4. Kahagollawa cascade cluster in Nuwaragam Palatha Central DS division. The project rehabilitated five tanks within the cascade.
5. Parana Halmillewa cascade cluster in Medawachchiya DS division

Plan Sri Lanka has adopted a strategy of an integrated and holistic development in the rehabilitation programme. The main components of the project are discussed below;

2.1.1 Rehabilitation and Physical Improvement of Infrastructure Facilities

Development and improvement of infrastructure facilities of selected 28 irrigation schemes was the largest financial investment component of the project. Beneficiary participation in all stages of project designing, planning, and implementation was one of the key components of the project. It was mandatory to contribute 10 per cent of the total rehabilitation cost through mobilization of labour.

Participatory Rural Appraisal (PRA) was conducted at the very beginning to identify the existing problems in the village in general and the irrigation system in particular. The estimates of the identified problems of irrigation system were prepared and presented to the community. The problems were prioritized and ratified within the available budget with the consensus of all stakeholders. One of the characteristic

features of Plan Sri Lanka's rehabilitation process was the adoption of a learning and living approach, which had a flexibility of introducing modifications of designs and new actions that emerged during the project implementation (Plan Sri Lanka, 2012). Similar actions were hardly possible in the past state sector interventions, as they were mostly based on 'blue print' models and with limited flexibilities in allocated fund utilization.

The construction works implemented include earthwork, concrete work and installation of gates and regulators. The construction contracts were given to local FOs as a measure to minimize wastage and improving efficient use of available resources, promoting mobilization of local resources, ensuring the high quality of construction and increasing the sense of ownership among farmers. FOs were given training in basic construction skills. Technical Assistant employed by the project supervised the activities and also provided necessary advices and guidance to ensure the quality standard.

2.1.2 Conservation and Management of Catchment and Related Environmental Components

Stability and productivity of small irrigation system are linked to the management of catchment, soil and moisture conservation in upland agriculture and protection and management of other environmental components in the small tank system such as *Kattakaduwa*, *Gasgommana*, and *Kurulupaluwa*. The project has provided training and awareness on watershed management, home garden development and land improvement at the community and school levels. The aim of the school level awareness programme was to transfer the traditional wisdom in small tank settlements to the new generation and promote child centered development activities.

After the training, awareness and community mobilization, three major activities were undertaken under the broad theme of watershed management, viz: demarcation of reservation, reforestation and regeneration of vegetation in the watershed and soil conservation. The project correctly identified the difficulty of motivating the community for watershed management activities due to lack of immediate tangible benefits and positive externalities of the expected benefits despite the community awareness on the critical importance of the watershed. Therefore, Plan Sri Lanka provided tree rights to the community in the reforested area for fuel wood collection and for timber.

The project has developed demonstration plots for soil and water conservation in the selected schools with the assistance of school administrations and the line agency officials. The plots were established with all the key components of ideal soil and moisture conservation such as suitable gradient, live fence, and drains. The project also promoted the use of mulch, green manure, compost and burnt paddy husk to improve the physical, chemical and biological properties of the soil.

A number of initiatives were put into practice to improve upland agriculture and home gardens. The introduction of Slopping Agriculture Land Technology (SALT) or

graded hedgerow, live fencing, bunds and drains, cultivation of perennial crops through distribution of budded fruit tree plants were some of these efforts. The major fruit crops distributed by the project and planted by the beneficiaries were coconut, mango, orange, lime, cashew and ambarella (*Spondias dulcis)*, which have shown high level of survival rates. Coconut plants have shown highest survival rate ranging from 70-98%, followed by orange. There were a number of model home gardens established in farmers' fields for demonstration purposes and diffusion of technology.

The project made interventions to re-establish *Kattakaduwa* (salinity filter zone) and *Gasgommana* by allocating land with the consensus of beneficiary farmers through providing required awareness and suitable plant species. The perennial tree species like Mee (*Maduka longiflia*) and Kumbuk (*Terminalia arjuna*) were provided to plant in *Gasgommana*. In addition to these tree species, other salt absorbing plant species were also introduced to *Kattakaduwa* to restrict the free flow of salt water to downstream fields.

2.1.3 Community Mobilization and Capacity Building of Farmers and Farmer Organizations

Several strategies were adopted to mobilize the beneficiaries towards the project activities and also to empower them. The main strategies implemented were;

- Involvement of farmers in the project activities from initial step of planning
- PRA and walk through survey to identify the problems of the scheme
- Preparation of community action plan
- Contribution of labour for project work to cover not less than 10 percent of the total project cost
- Conducting awareness creation and training programme (knowledge, skills and attitudes).

The training programmes conducted can be categorized into three major areas.

(a) Strengthening of FO activities
- Book-keeping and financial management
- Leadership skills
- Legal powers and authorities of FOs and the members under existing laws (rights and responsibilities)
- Micro credit management
- Basic construction and repairing skills
- Cross learning through exposure visits to successful FOs

(b) Productivity and income enhancing skills
- Use of low cost agricultural inputs
- Home gardening
- Coconut and cashew cultivation
- Compost fertilizer preparation

(c) Watershed and water resources management
- Watershed management
- Management of surface and groundwater resources
- Soil conservation techniques
- Use of burnt paddy husk for soil improvement
- Construction and management of rainwater harvesting tanks
- Establishment of *Kattakaduwa* and *Gasgommana*

Some of the trainings were not limited to farmers, but also benefited other members in the society and school children. However, CDR (2006) has found that, the training programmes implemented by the partner organizations had failed to develop well defined objectives and expected outcomes of the training either by themselves or in consultation with Plan Sri Lanka.

The training programmes conducted have strengthened the FOs by activating FOs and increasing their capacity to plan, organizing, and managing the required activities. More noticeably, FO members have been empowered to show their voices in various forums and to make representation to Government Departments and line agencies to entertain their services.

2.1.4 Capacity Building of Line Agencies and Arrangement for Horizontal Coordination

Holistic approach adopted by Plan Sri Lanka needed the support and cooperation of all the line agencies. The integration of line agencies in the project activities was also a pre-requisite to ensure post project involvement of all stakeholders in the scheme level activities after the project withdrawal.

The first step of making the involvement of the line agency was the requirement of approval from the Divisional Agriculture Committee (DAC) prior to any rehabilitation project. This provided an opportunity to the line agency officials to play a role in a key decision making process of tank selection and to establish initial linkages with the project staff. The main instrument used by the project to obtain continuous and close participation of line agency officers was through the establishment of a district level apex body called Project Steering Committee (PSC) under the leadership of District Secretary. The scheme selected for rehabilitation by the DAC had to be submitted with the selection criteria and justification to the PSC for the final approval. The committee had monthly and quarterly progress review meetings with the participation of representatives of all the participating FOs and line agency officers including, Assistant Commissioner of the Department of Agrarian Development (DAD), officials of the Department of Agriculture (DOA), Provincial Irrigation Engineer, Officers from National Aquaculture Development Authority (NAQDA), Sri Lanka Cashew Corporation, Coconut Cultivation Board, Department of Animal Production and Health (DAPH), Divisional Officers of DAD and Provincial Agricultural Officers and officers from the Forest Department and representatives of the Partner Organizations or Local NGOs. The PSC also provided a forum to discuss various practical issues and problems of the ongoing project. The

arrangement provided a partnership to the officers of line agencies and coordination between different departments.

In addition to the training programmes conducted for FOs, Plan Sri Lanka implemented a series of training programs to increase knowledge and skills of line agency officers and also to change their attitudes and perceptions. The project granted computers to some line agencies for their capacity development. However, the project had partially succeeded in changing attitudes of officers.

2.1.5 Improving Productivity and Household Income

The project made endeavours to improve household income through a number of measures such as increasing productivity of existing farming systems, crop diversification, improving input delivery systems and diversification of income earning opportunities. Several measures were instituted to increase water use efficiency including first priority in water issue to *Akkarawela* areas, conjunctive water use, rainwater harvesting, and instigate land preparation just before onset of seasonal rainfall. Farmers were motivated and guided to diversify cultivation of paddy mono crop to various other field crops.

In order to improve the input delivery and reduce the cost of cultivation following measures were introduced and encouraged.

- Seed paddy production at farm level
- Application of correct amount of fertilizer
- Increased use of organic manure
- An equipment fabricated locally called '*Kunthani*' was provided to facilitate the partial burning of paddy husk which would help to release micro nutrient Silicon(Si) to the soil
- Introduction of liquid fertilizers

The extension officers made arrangements to visit the field frequently and established linkages with the farming community. Farmers were able to make personal relationship with extension officers, which would help them easy access to officers in future activities.

2.2 Minor Irrigation Rehabilitation under Pro-poor Economic Advancement and Community Empowerment (PEACE) Project (2006-2011)

The main objective of the Pro-poor Economic Advancement and Community Empowerment (PEACE) project was to uplift the living conditions of rural farmers through the development and upgrading of irrigation infrastructure and thereby increasing the farmers' income and enhancing living standards. The project had a component of rehabilitation of 80 minor irrigation schemes, in addition to major and medium schemes in the Anuradhapura, Kurunegala, Matale and Puttalam Districts. The main feature of the "PEACE" project was that all the major activities of the project such as problem identification, planning, implementation and operation were solely executed by beneficiary farmers.

Minor irrigation rehabilitation under the project was put into action in four river basins in the North Central and North Western Provinces.

(a) Malwathu oya basin
(b) Kala oya basin
(c) Mee oya basin
(d) Deduru oya basin

The rehabilitation approach adopted by the "PEACE" project had several components to cover software and hardware developments of the project.

(a) Social mobilization and strengthening of FOs
(b) Rehabilitation and improvement of irrigation facilities
(c) Strengthening of agricultural support services
(d) Improvement in agricultural productivity, income generation activities and micro credit
(e) Improvement in water management and operation and maintenance activities in the rehabilitated scheme

2.2.1 Social Mobilization and Strengthening of FOs

FOs were the major stakeholders in minor irrigation rehabilitation programme implemented by the PEACE project. Therefore, the project adopted a number of strategies to mobilize farming community and to strengthen the FOs. The participatory approach used by the project had key aspects of awareness creation and training to enhance knowledge and skills and to change attitudes, facilitation and active participation of beneficiaries in planning and implementation of the project activities.

Farmers and farmer leaders of the selected schemes were given initial awareness separately about the project. The major aims of the awareness sessions were to introduce the approach and implementation procedures to be adopted by the PEACE project, roles and responsibilities of the project staff, farming community and other stakeholders, and input requirement. The expected outcome of the awareness programme was to increase the sense of ownership of beneficiary community and to maximize the community participation. FO leaders were given additional knowledge on the role and responsibilities of the farmer representatives in the project and on ways and means of maximizing the beneficiary participation.

After the initial awareness programme, a workshop was conducted at the village level to prepare Community Action Plan (CAP). The workshop was facilitated by the trained project staff. Farmers, farmer representatives, representatives of village level other community based organizations were the participants of the CAP workshop. The participants were formed into different thematic groups to identify the key problems and possible solutions. The group findings were presented at the workshop to prepare a common CAP report. The report had separate sections on introduction, map of the area, irrigation rehabilitation plan, water management plan, agricultural development plan, income generation plan, FO strengthening plan, and other common

problems in the area affecting the livelihoods of the people and on solutions for the identified problems.

At the next step, farmer representatives and the project staff had a transect walk in the project area to verify the problems identified and their significance and also to collect more detailed information necessary to prepare a project activity plan.

Before commencement of hardware development activities, engineering survey, and ratification meeting with farming community were conducted. Engineering survey was aimed preparing engineering estimates of the rehabilitation works. At the ratification meeting, estimates were presented to the farmers and ratified as per financial availability to the scheme. Farmer consensus was obtained to supply 10% contribution under different ratified items of rehabilitation. Finally, the rehabilitation plan was prepared based on ratified needs, which included the project contribution and total farmer contribution for different work items.

Farmers and farmer representatives were provided with a number of residential training programmes, mainly on following aspects;

(a) FO strengthening
(b) Financial management and book keeping – As farmers lacked previous experience on handling big contracts and large sums of money, the training on financial management was essential to deal and record the transaction properly and transparently.
(c) Construction and contract management - FO leaders were given knowledge on how to plan and implement rehabilitation, obtaining community participation, understanding the labour and material requirements, identifying quality construction materials and ensuring the standards in construction.
(d) Training on agricultural activities
(e) Income generation activities based on the identified projects.

2.2.2 Rehabilitation and Improvement of Irrigation Facilities

Before commencement of hardware development, FO was assisted to prepare a work plan to implement contracted work items which included cash flow, labour and material requirements. Voluntary resource mobilization (cash or kind) requirements of each farmer were estimated and informed about his/her individual contribution in terms of labour or cash payment.

Skill and unskilled labour requirements for the project was fulfilled from the local area, which provided an extra income for the villagers. Services of skilled labourers were sometimes obtained from other areas, when there was no sufficient number of skill labourers in the locality. The rate of payment was decided at the FO committee meeting.

As a strategy of increasing a sense of ownership, the construction work was started with a ground breaking ceremony at an auspicious time. A display board was

installed at the project site indicating the total contract value of the project, commencement date, expected date of completion, and value of beneficiary contribution to exhibit the transparency and to make aware of the beneficiary entitlement from the project. Technical officers of the project provided monitoring and necessary technical advices whenever necessary. All the project sites received the catalytic support from Institutional Organizers (IO) in strengthening FOs, proper management of FO accounts, conducting regular meeting and mobilization of farmers.

FO committee meetings were held regularly (fortnightly or monthly) to review the progress and plan of actions for the next month. Project officers and IOs attended the meeting. Payment for the contract works was given on instalment basis with the approval of IO depending on the work progress. About 5% of the total contract value was kept with the ADC account as retention money. The money had to be paid back to FO after six months of the completion of the rehabilitation contract if there was no damage in the construction due to poor quality of workmanship.

It was reported that, in many places, there was the problem of timely completion of contract works by the FOs mainly due to lack of previous experience on similar works. Delays occurred in payments, difficulties occurred in mobilizing beneficiary contribution and there were some other social problems such as solving of land encroachment issues.

The quality of the contract works was supervised by both project officials and farmers. It was necessary to submit the soil testing and concrete testing reports by the contracting FOs to receive the payments for the completed works.

2.2.3 Strengthening of Agricultural Support Services

PEACE project implemented all the activities through the ADC of the respective area. The DO and ARPA worked closely with the FOs, which helped farmers to build up a strong relationship with the line agencies to obtain support services. In addition to the ADC, DOA, the Coconut Development Board, Cashew Corporation, DAPH, and NAQDA implemented their development programmes through the FOs. ARPA of the respective areas coordinated the service delivery of line agencies. The working experience of FO members with the line agencies had developed the confidence of handling and negotiating with the officers in obtaining necessary support services.

2.2.4 Improvement in Agricultural Productivity and Income Generation Activities

The project with the collaboration of line agencies, made a number of efforts to increase the agricultural productivity and household income in the areas of interventions crop diversification in paddy field in the *yala* season and development of home garden through distribution of budded fruit plants (Orange, Mango, Pomegranate, Cashew and Guava). The upland cultivation (soybean, black gram, green gram etc.) was increased with the support of DOA. The provision of coconut seedling and necessary technical advice were done with the help of the Coconut

Cultivation Board. The supply of high bred cow, goat and poultry and the necessary equipments was with the collaboration of DAPH and release of fish fingerlings to the village tank with the support of NAQDA. All these activities were coordinated by the FO and ARPA with the participation of Provincial Directors and DOs.

2.2.5 Improvement of Water Management and Maintenance Activities

The project had formed a separate committee within the FO for water management affairs. The water management committee comprised of FO office bearers and farmer representatives from the head, middle and tail end of the scheme. The committee held meetings in each season to make key decisions on seasonal water management issues. The other strategies promoted by the project were '*Kekulam*' cultivation (dry sowing), delivering the water starting from the tail end to the head end and issuing water only during day time.

The project mobilized the farmers to clean the channels twice during a cultivation season. Main canal and tank bund were divided among the farmers for jungle clearing based on the size of land holdings of each farmer.

The project made an intervention to open a separate bank account for maintenance fund. The maintenance fund was started with savings from the rehabilitation contract. FOs were guided to collect O&M fee and salaries. The recommended amount of salaries was ½ bushel - 01 bushel of paddy per acre of a cultivated season. The project had granted 'bush cutter' machines to FOs for trouble-free clearing of jungles and weeds in the tank bund and irrigation channels. Some FOs had invested money from the maintenance fund to purchase maintenance equipments. Maintenance procedures had been developed to ensure the routine maintenance activities.

2.3 Small Scale Irrigation Schemes Rehabilitation Approach Adopted by the DZLiSP Programme (2008-2012)

Dry zone Livelihood Support and Partnership Programme was implemented in dry zone areas of four districts, namely Anuradhapura, Kurunegala, Badulla and Moneragala. The project was funded by the International Fund for Agricultural Development (IFAD). Small scale irrigation rehabilitation was the second largest component of the project in terms of financial allocation followed by infrastructure development. The project had completed little over 700 small scale irrigation schemes (tanks and anicuts) during the period 2008-2012.

The rehabilitation package introduced by the project had five major components.

1. Institutional development
2. System rehabilitation
3. Water management
4. Sustainable O&M
5. Diversification of agricultural activities.

2.3.1 Institutional Development

The project recognized the necessity of building stronger and supportive institutional structures at the village level to enable adopting participatory approaches and ensuring long term sustainable O&M of rehabilitated infrastructure. One of the novel aspects introduced by the project was the formation of scheme level Water User Group (WUG), where FO was responsible for multiple numbers of schemes. The WUGs were expected to act as the focal point for planning and management of scheme level activities.

The DZLiSP programme had realized the vital importance of making strong partnership linkages with line agency officers working at divisional and district levels, in order to ensure post project involvement of line agency in the scheme level activities. The changing mindset of the officers and convincing them on the approach adopted by the project were great challenges as the supply driven development interventions had more roots in the dry zone context. Moreover, the opportunities for the line agency officers to integrate with DZLiSP programme rehabilitation works were limited and not well developed. The approach made the officers to be distant from the project activities during the implementation period.

The project used Technical Officers and Social Mobilizers to catalyze the entire participatory approach. The farming community and selected farmer representatives were provided training on various aspects of organizational management, O&M, rehabilitation and construction affairs.

2.3.2 Irrigation Rehabilitation

Farmer involvement in all stages of rehabilitation from planning, designing, construction and finalization of project activities were solicited in the rehabilitation process. The requests for this rehabilitation had to come from the Divisional Agricultural Committees as in previously discussed two projects. The proposed tanks for rehabilitation by DAC were inspected by the project officials through field visits. The selected tanks were further screened through conducting PRA with the necessary technical support. The PRA findings were verified by the project staff with direct field observations and beneficiary consultation before final selection of project sites.

At the next stage, committee meeting was conducted to inform the beneficiary community about the project approach and the roles and responsibilities of the community during the project and after. The community was informed of the requirement of the level of beneficiary contribution and their consensus was obtained.

The construction contract was mainly given to the local FOs. In the first two years of the project, the services of the district and provincial line departments were requested to provide technical services but it had not succeeded and caused delays in achieving planned targets as the line agencies always had given priority to their departmental works. Therefore, the project had to hire own Engineers and Technical Officers to handle the technical aspects of the construction, monitor the quality of construction

and provide guidance to FOs. Social mobilizers assisted in mobilizing the community labour and arranging suppliers for construction materials.

Labour contribution from the beneficiary community was based on the extent of land holdings of each farmer. However, there were schemes, where farmers had committed for the project irrespective of the land extent they owned. Farmer commitment was ensured by the project at the beginning, requesting them to mobilize their labour for initial site clearing works.

2.3.3 Water Management

The project had planned to formulate a water management system and also to practice the same at least for two seasons after rehabilitation in order to minimize scarcity of water. The major components of the water management programme were:

(a) Introduction of an appropriate water delivery system;
(b) Introduction and adoption of water management devices and provision of quantitative impression among farmers about the amount of water used.
(c) Appointment of a 'caretaker' and entrusting him to manage gate operation, water distribution and conflict resolution in water sharing.
(d) Payment of an honorarium for 'caretaker' after each season.

The project introduced a package of activities for water management, namely the formation of a separate Water User Group (WUG), appointment of a separate caretaker for the scheme and payment of an honorarium for the appointed 'caretaker'. Capacity building trainings were organized by the project for the benefit of WUG members to enhance their skills in O&M and water management.

2.3.4 Sustainable Operation and Maintenance

Although, small irrigation schemes were traditionally farmer managed systems, repeated interventions of Government and NGOs in the improvement of small schemes had taken them far away from sustainable O&M of the schemes and sense of ownership. Therefore, DZLiSP programme attempted to institutionalize a mechanism for sustainable O&M.

The project had provided necessary guidance to all participating FOs to set up a bank account dedicated for system O&M. FOs were requested to deposit Rs.50,000 at the Regional Development Bank, using the retention money of the awarded rehabilitation contract, and farmer's contribution and other income sources. After deposit of Rs 50,000 by the FO, the project contributed Rs.50,000 to the O&M fund to make the fund as Rs. 100,000. The bank had agreed to provide an annual interest rate of 15.5%, which is an income of Rs.15,500 per year. The bank would transfer the interest return in instalments to FO account (Rs.7,750 per six months). In the Kurunegala District, this type of arrangement had been already made in 43 schemes by the DZLiSP programme.

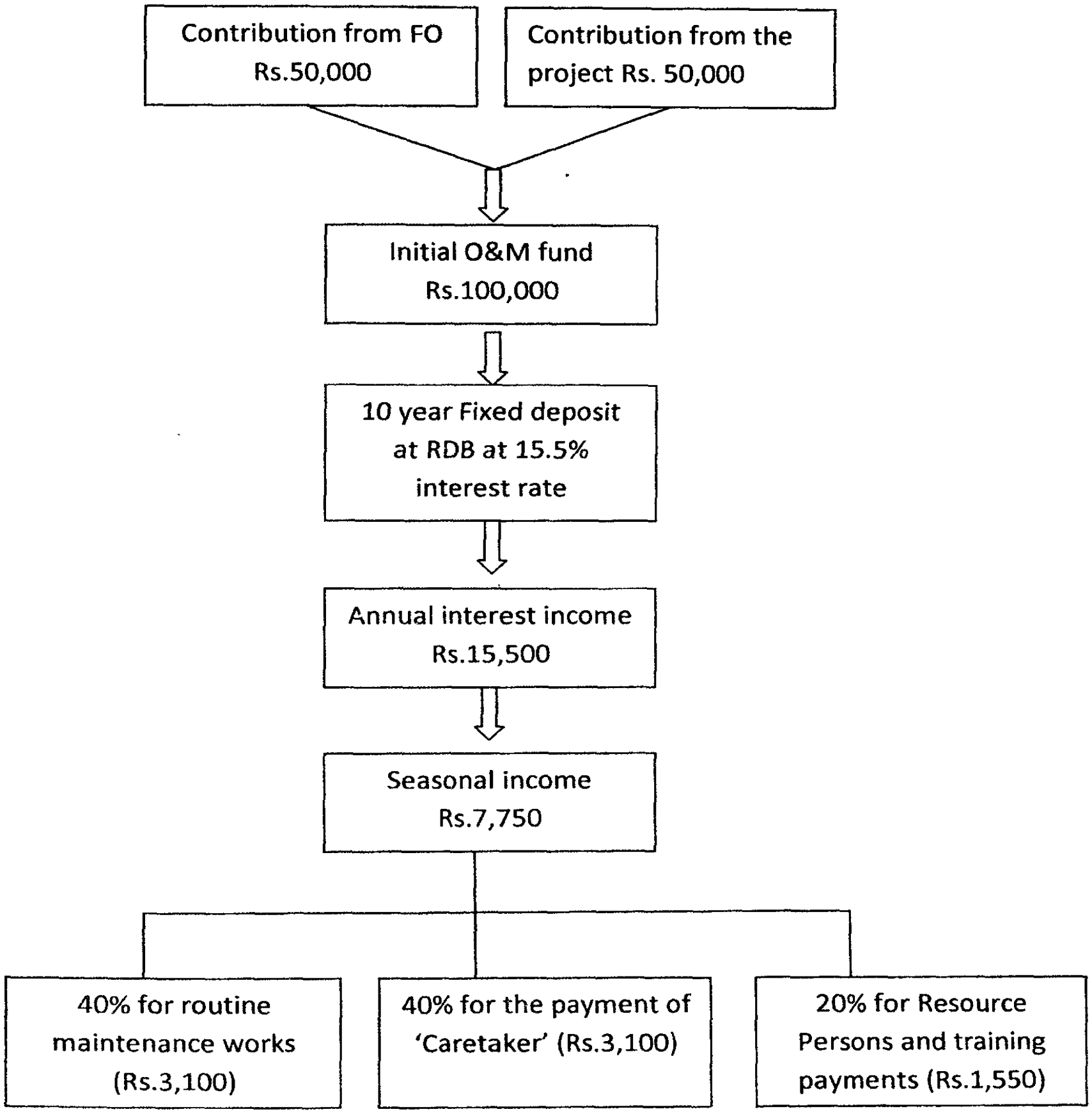
FOs were instructed to utilize the interest income in the following manner.

(a) 40% of income (Rs.3100/=) for routine maintenance
(b) 40% of income (Rs.3100/=) to pay salaries of the caretaker
(c) 20% of income (Rs.1550/=) to be used for monitoring of O&M activities and to cover the expenses of farmer training. This money would be transferred to the Divisional Agriculture Committee account.

Caretaker is responsible for painting and greasing of gates and structures, management of water (preparation of cropping calendar with FO officials, implementation of rotational water issues) and ensuring the proper maintenance of head system and the channel system. FO has the authority to pay an additional honorarium to the caretaker through the collection of '*salaries*' from farmers. The proposed arrangement for the management of O&M fund is illustrated in the Figure 2.1.

Transfer of 20% of interest income to the DAC was an incentive for the line agency to be partnered with the project activities and linked it with the scheme level activities.

Figure 2.1: Arrangement for the O&M fund management in DZLISPP



Source: Adopted from DZLiSPP (u.d)

2.3.5 Diversification of Agricultural Activities

The DZLiSP programme was aimed at enhancing the rural livelihoods through diversification of agricultural activities. The project promoted OFC cultivation in *yala* season, distributed high yielding perennial crop plants and introduced systematic aquaculture in the feasible tanks and implementation of livestock farming.

CHAPTER THREE

Relevance and Quality of Hardware Development Interventions

3.1 Relevance of the Works Undertaken

The findings show that the rehabilitation works undertaken by all the selected project interventions were highly relevant and the schemes selected had not undergone rehabilitation during the last five to ten years. Farmer participation in prioritizing and ratification of problems, farmer involvement in all stages of development, and the use of local knowledge and wisdom for construction works were the key aspects which helped to undertake most relevant works. Some projects had the flexibility to alter the design and/or add new items into the rehabilitation programme.

The important feature common to the selected projects was the adoption of holistic and integrated development approach than following conventional narrow technical perspective. The hardware development component was focused mostly on critical components of the tank, viz. bund, sluices, spills and the channel system.

Plan Sri Lanka had paid great attention to integrate channel protection with the introduction of demarcation of channel and tank bund reservation and planting of trees. PEACE project had undertaken a survey to demarcate the boundaries of the irrigation scheme and water spread area. Catchment management and awareness raising among farmers on on-site and off-site effects of soil erosion was a characteristic feature of the cascade based minor irrigation development project implemented by Plan Sri Lanka. Both Plan Sri Lanka and the PEACE projects had made efforts to demarcate *Kattakaduwa* area and to plant suitable tree species. Plan Sri Lanka had planted Kumbuk trees *(Terminalia arjuna)* and salt absorbing grasses and sedges, while the PEACE project had motivated farmers to plant Areca nut trees (*Areca catechu*) in *Kattakaduwa* areas as it would provide an income to the farmers.

3.2 Quality of the Works Implemented

In all the selected interventions, rehabilitation works were mainly implemented through the respective FOs. Quality of the works accomplished by the projects was highly praised by farmers and we have observed that, they were of good standard. Soil testing report and concrete testing report were compulsory for the payments. The test reports indicated that the strength of the structures was more than the standard strength required for payments in many places. Aheeyar and Bandara (2012) found that the works carried out and the quality standards of works of the DZLiSPP were much valued in terms of amount of investment made, compared to similar types of rehabilitation works conducted in the past in other areas as perceived by the farmers.

However, construction defaults were reported in the DZLiSPP where, construction contracts were given to third parties other than local FO. In addition, there were problems reported during the initial stages of the PEACE project. The finishing of the works completed by FOs were little lower due to insufficient construction skills of

farmers. But, with the progress of the project, farmers learned the necessary skills by doing and finally there were no any finishing problems. Plan Sri Lanka (2012) found that the quality standards of the Plan Sri Lanka rehabilitation was satisfactory, but, in order to ensure high quality of standards, it was necessary to have a blend of technical and social process, particularly in relation to the choice of rehabilitation components and with regard to community contributions.

3.3 Role of Beneficiaries in Rehabilitation

All the projects had adopted beneficiary centered development approaches including identification of rehabilitation needs, prioritizing the identified needs and ratification of prioritized needs. Rehabilitation and improvements of the works were by and large conducted with the consent and according to requirement of farmers. Height of the bund and spill, location of the sluices and spill and size of the sluice gates were decided jointly with farmers and officers. The projects had adopted different strategies to ensure the beneficiary contribution.

i Projects made it clear about the total project contribution and the needed total value of beneficiary contribution at the CAP meetings and obtained the beneficiary consensus. The process was transparent and made the beneficiaries unambiguous about their entitlement.
ii Project ensured the beneficiary commitments via mobilization of labour and/or cash at the very beginning of the project. Farmers completed the jungle clearing and other initial preparatory works at the very beginning and exhibited their commitment. The DZLiSPP had mobilized farmers in the Kurunegala District to contribute Rs.1,000/= each to FO fund in addition to initial labour commitment. In addition farmers provided their labour for removal of old masonry and concrete structures, turfing of tank bund, and supply of unskilled labour for masonry works.
iii. Provision of skills development training
iv Supply of livelihood support inputs - Fruits trees, livestock, etc.
v Recognition of farmers' initiatives, suggestions, wisdom and knowledge in project implementation

Different projects had adopted different field level arrangement for the successful implementation of project activities. Under the PEACE project, a separate subcommittee for construction was formed in the FO to make decisions and monitor the construction activities. The committee was entrusted with the following activities.

i. Estimation of voluntary labour contribution by each farmer based on their size of land holding
ii. Allocation of works for individual farmers, based on estimated voluntary labour
iii. Implementation of penalties for the members who were not contributing labour
iv. Allocation of wage labour opportunities of the project among the beneficiaries
v. Monitoring of all construction works

vi. Informing the project officials and the DO about the identified changes required in the ongoing project

The scheme selected for detailed case study under the PEACE project (Thumbulla tank) had adopted a unique method to allocate community labour tasks among beneficiaries. According to the project proposal, the total value of required labour contribution from the community was Rs. 300,000. This value was divided among farmers based on the size of land holdings. Accordingly, one acre extent land holder had to contribute roughly ten man days. Community labour tasks were listed (Ex: Clearing of bund and the surrounding, digging for new canals and structures, turfing of the bund, helping for masonry works etc) and total community labour days were allocated for the tasks based on the unskilled labour requirement. The beneficiaries had known in advance about the allocated tasks and they are accountable for the condition of their share (whether this is the tank bed, the bund or the canals etc)

The roles and responsibilities of the construction subcommittee of the PEACE project were handled by WUG in the DZLiSPP. The supervision of construction contracts works were done by one to two volunteer farmers everyday to ensure quality construction. However, the Plan Sri Lanka formed small groups of farmers with not less than eight members in each group to handle the community activities. The needed community works were equally divided among these eight member groups. A penalty system was implemented for non participating members, who had to pay the wage for the particular Labour Day or had to work on an alternative day. The FO had maintained a record book (log book) at the work site to record the activities done by the farmers on the particular day. They were aimed to increase efficiency of works and transparency.

Farmers had recorded all the activities of the day including attendance, name of the supervising officer, name/s of the external technical and other officers visited the site, number of cement bags used, number of steel bars used and amount of other construction materials utilized. The process of day to day record keeping had motivated the farmers to achieve the previous day target or more on the following day. All these activities were monitored by a five member supervisory committee appointed by the FO.

3.4 Impacts of the Rehabilitation Interventions on Crop Production in the Selected Schemes

The main direct impacts of the rehabilitation of small tanks are increase of extent of cultivation, land productivity and total crop production. Paddy is the main crop in all the selected schemes in *maha* seasons, but OFC cultivation was in progress in some schemes during *yala* seasons at least in part of the command area. After rehabilitation, yala season cultivation was possible to some extent in all selected schemes and it was the case in majority of the schemes covered by the selected projects.

Table 3.1: Impacts of Rehabilitation on Crop Production in the Case Study Schemes

	Ihala Koane Wewa (DZLiSPP)		Kuda Kumbukgolla Tank (Plan SL)		Thumbulla Tank (PEACE Project)	
	Pre-Project	Post - Project	Pre-Project	Post - Project	Pre-Project	Post - Project
No. of Farmers	20	26	102	117	65	65
Extent Cultivated –*maha* (ac)	10.5	10.5	25	117	55	55
Extent Cultivated –*yala* (ac)	0	7.5	0	17	0	30 (OFC)
Average Paddy Yield – *maha* (kg/ac)	1750	2200	1320	2650	1750	2200
Average Paddy Yield – *yala* (kg/ac)	-	2450	-	2650	-	-
Average total annual paddy Production (kg)	18,375	41,475	33,000	3,55,100	96,250	121,000
Annual production increase (%)	126		970		26*	
Increase in extent of cultivation (%)	71		436		55	

* Excluding the OFC production

Source: Authors' Survey Data, 2012

3.5 Issues and Consequences

On the whole, the quality and hardware development done by the selected projects were very good and had achieved the expected objectives of both farmers and the project. However, there were several issues reported and observed regarding the software development.

1. All aspects of software development should start from the initial steps of the rehabilitation to change the attitude and perceptions of the community. The mobilization of the community for intangible works is a difficult task after the end of tangible hardware development.
2. The finishing of the construction works done by the FOs were not up to standard in the initial years of the projects, but farmers were able to improve their skills up to the required standard with the progress of the project.
3. When FOs of the respective scheme were formed to cover more than one irrigation schemes, there should be a mechanism to include at least 1-2 representatives of given scheme to the office bearers of contracting FO.
4. Proper technical guidance and continuous monitoring from the Technical Officers are vital to ensure quality construction.
5. Flexibility to incorporate new components and adjustment to design had been granted benefits to the community. However, there is a question of balancing the financial availability and farmer preferences in some places.
6. The reservation areas (channel, bund, *Kattakaduwa* and catchment) should be demarcated at the beginning of the project with the consensus of farmers and should be free of any cultivation.

CHAPTER FOUR

Institutional Aspects of Tank Rehabilitation and Management

4.1 Institutional Models Adopted for System Rehabilitation

Different projects had adopted their own institutional setup to implement irrigation rehabilitation projects. The following sections describe and compare key features of different institutional models employed by the projects.

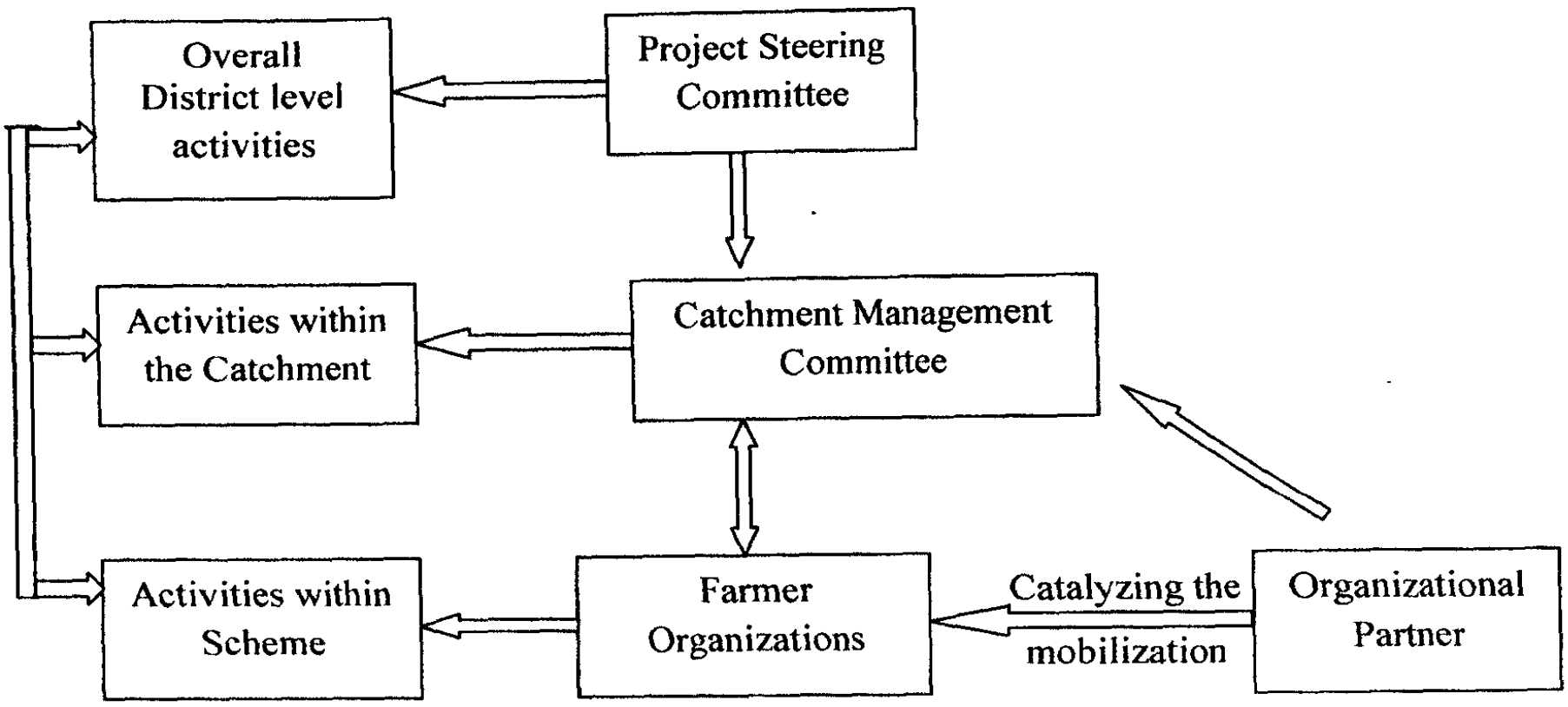
4.1.1 Institutional Model Adopted by Plan Sri Lanka

The Cascade development project of Plan Sri Lanka made efforts to strengthen the already available FOs or establish new FOs. The catalytic activities of community mobilization and empowerment of FOs were handled by organizational partners (OP), who were selected by the project among the area based relevant local NGOs.

As the Plan Sri Lanka attempted to introduce cascade based development, a new institution called Cascade Management Committee (CMC) was created. This consisted of the office bearers and one member from each FOs in the cascade boundary to discuss and make decisions about common cascade issues and on-site and off-site effects of development. The committee was successful in considering the cross cutting issues and problems of different tanks within the cascade boundary due to rehabilitation of selected tanks. However, these committees were not functioning after the completion of the project. The main reason for their non functioning was lack of legal recognition, power and authority.

The most interesting component of the institutional arrangement made was creation of the district level apex body named the Project Steering Committee (PSC) to implement rehabilitation activities. The PSC was chaired by the District Secretary and consisted of the Divisional Secretary of the project areas, Assistant Commissioner of Department of Agrarian Development, Provincial Irrigation Director, Divisional Officers of respective Agrarian Development Divisions, representatives from Provincial Department of Agriculture, NAQDA, DAPH, Coconut Cultivation Board and Sri Lanka Cashew Corporation. The PSC was responsible for facilitating, coordinating, progress monitoring, ensuring involvement of all relevant stakeholders and evaluating the Plan Sri Lanka approaches of holistic, integrated development. The PSC was not functioning after completion of the project.

Figure 4.1: Institutional Arrangement of the Plan SL



4.1.2 Institutional Model Adopted by the PEACE Project

The majority of the project works were implemented through FOs. The respective FOs had to appoint the following committees consisting of not less than five members with the approval of the respective committee members of the FO prior to commencement of the rehabilitation works.

1. Procurement Committee
2. Community Mobilization Committee
3. Construction Supervisory Committee

The names of the members of these committees had to be informed to the general body of the FO and approved by it. If any appointed member was inactive, FO committee had the authority to replace him/her with another suitable beneficiary farmer subject to approval of the FO. However, the case study findings of the PEACE project conducted at Thumbulla tank in Nikawaretiya ADC division indicates that only the construction supervisory committee was appointed in this particular scheme and it had the responsibility of monitoring the entire rehabilitation works.

The project ensured active participation of line agency officers (DO, AI, ARPA) in the entire rehabilitation process. The linkages with line agency officers with farming community were established by hiring resource persons for training programmes, from the DOA, DAD, Coconut Cultivation Board, the Sri Lanka Cashew Corporation, Department of Animal Production and Health and NAQDA. The project invariably sought the support of line agencies in selecting suitable beneficiaries for various project inputs and distributing the benefits at ground level. The approach was helpful to develop linkages between farmers and line agency officers, while making them as active partners of the project.

4.1.3 Institutional Model Adopted by DZLiSP Programme

DZLiSPP solicited the support of divisional and grass root level officers in the selection of tanks for rehabilitation and identification of key problems. The collected data through PRA were shared with officials and their observations were obtained. However, there was no mechanism to integrate the line agency officers with the project activities after the initial selection of the scheme.

The DZLiSPP interventions have mostly targeted small schemes, which had a command area of less than ten hectares. Existed FOs were mostly responsible for more than one scheme. The project made efforts to create scheme level WUG. The establishment of WUG was expected to act as the focal point for planning and management of the scheme level activities. The WUGs were functioning in many schemes independently.

The construction works were done by FO/WUG with the support and guidance of technical staff hired by the project. Therefore, the opportunities for line agency officers to integrate with the project activities were limited to initial selection of the tank and providing services to the capacity development programmes. However, the project was to integrate closely with the line agency after completion of the works to handover the system and institutionalize the introduced arrangements.

4.2 Community Mobilization and Empowerment

The DZLiSP programme and the PEACE project employed specialist social mobilizers to mobilize the farmers for the project. The Technical Assistants also had played a key role in mobilizing beneficiaries. However, Plan Sri Lanka assigned the tasks of both mobilization and empowerment to a local NGO hired as a partner organization (Organizational Partner). All three projects hired special trainers to conduct capacity development programmes and utilized available training facilities in various places. There are pros and cons of two approaches. The major advantages of using a local partner organization are that it would reduce the work load of the project management and help to empower the capacity of local NGOs working in the area. However, it was clear that, hiring of specialist catalysts and special resource persons for capacity development was more effective in these particular projects than entrusting entire activity to a partner organization.

PEACE project implemented following training and skills development programmes to empower farmers and farmer organizations.

1. Construction management
   - Planning of the construction works and implementation (contract agreement, resource requirements, prices of the items mentioned in the contract, construction plan)
   - Identifying quality of materials and quality construction
   - Skills development training on use of masonry and carpentry tools
2. Obtaining community participation

3. Organizational strengthening (leadership qualities, conflict management, awareness on the existing Acts)
4. Financial management (management of large sums of money, book keeping, financial transparency)
5. Organizing agricultural matters and income generating activities
6. Arranging agricultural credit
7. Operation and maintenance of irrigation system

The training on construction management and financial management were conducted at the initial stage of the rehabilitation and rest of the programmes were conducted throughout the rehabilitation process.

DZLiSP programme had conducted a training programme on construction skills and construction management at the beginning of the rehabilitation. The other aspects of training related to organizational management, financial management and O&M were conducted after completion of the rehabilitation works. However, the project made some interventions to build capacities of the beneficiaries on agricultural practices, OFC cultivation and aquaculture while implementing rehabilitation works.

Capacity development and empowerment of farmers and FOs were one of the core strategies of the intervention made by the Plan Sri Lanka. The approach had training, education and awareness programme for farmers, farmer leaders, civil society organizations and school children. The important training programmes conducted under the project are listed below.

a. Basic construction and repair of simple structures
b. Watershed management, soil conservation and home gardening.
c. Powers, authority and responsibilities of FOs under the existing Agrarian Acts
d. Leadership
e. Book keeping and financial management
f. Exposure visits to successful FOs outside the project area.
g. Micro credit management.
h. Re-establishment of *Kattakaduwa* (filter zone)
i. Water management
j. Use of low cost agricultural inputs
k. Cultivation of OFC, cashew and coconut
l. Use of burnt paddy husk for soil improvement and compost fertilizer preparation.

All three case studies indicate that, selected schemes maintained accurate and systematic record keeping and book keeping. The skills training given on construction matters had achieved the target of having quality construction works and enhanced ownership concept. Beyond that, the skills of masons had been developed in some areas which gave them additional livelihood opportunities within the village for future maintenance works.

Table 4.1: Financial Status of Selected FOs in the study Areas by the end of 2012

Name of the Scheme	Financial Status at 2012 (Rs)	Sources of Fund (Rs)
Ihala Koane Wewa (DZLiSPP)	132,000	Contract Savings: 90,000 Aquaculture income: 10,000 O&M fee (salaries): 4,500 Membership fee:120/annum
Kuda Kumbukgolla tank (Plan SL)	267,000	Contract saving: 100,000 Aquaculture income: 30,000 Membership fee:120/annum Penalties: 50-500 per incidence
Thumbulla tank (PEACE project)	740,000	Contract saving: 59,000 Membership fee:50/season O&M fee (salaries): 100/season

Source: Authors' Survey data, 2012

4.3 Role of Line Agencies in the Rehabilitation Process

Integration and involvement of line agency officers is a vital requirement during the entire process of rehabilitation through obtaining their consensus on different components and strategies to be adopted by the project in order to ensure their support for sustainable post project management. Different projects used different techniques to keep the line agency officers intact with the project and get their cordial cooperation.

4.3.1 Role of Line Agencies in the DZLiSPP

The methodology adopted initially for the implementation of the rehabilitation activities was through the district and provincial level line departments. This system was practiced during the first two years of the project. However, the project experienced difficulties in achieving annual target and required progress specified by the funding organization due to delays as the line agencies always had given priority to their own departmental works. Therefore, the project was compelled to hire own technical staff for timely implementation of the components including irrigation rehabilitation.

The project had sought the support of resource persons from line agencies in the last phase to conduct training programmes on water management and O&M. The collaboration of the line agency was imperative to implement the proposed water management package and O&M plan.

The approach adopted by the project had failed to implement a suitable methodology to provide early orientation and consultation for all stakeholders on the project approaches and roles and responsibilities of line agencies during the project and the post project period. This had mostly kept them away from the project during the rehabilitation period.

4.3.2 The Role of Line Agencies in the Project Implemented by Plan Sri Lanka

As in the DZLiSP Programme, the Plan Sri Lanka also attempted to implement the tank rehabilitation using technical supports of DAD. However, they had to hire their own technical staff due to delays in the project implementation and the relatively higher estimates given by the line agency for construction works. The project evaluation report also explained this phenomena as, "*working with DAD was proved difficult due to entrenched vested interests and unhealthy approaches to collaborative works*" (Plan Sri Lanka, 2012). CDR (2006) reported that, the construction works of the rehabilitation were delayed at the initial phase due to the attitudes of Technical Officers and administration procedures of DAD. One of the reasons for the delay was insufficient human resources and overloaded works (Plan Sri Lanka, 2012).

The project steering committee chaired by the District Secretary was an effective forum to integrate farmer representatives and the line agency officers and to review work progress and to make appropriate decisions. This forum also made the line agency officers active in the project activities.

The project hired line agency officers for various training programmes. Skills development trainings were also given to line agency officers. As a part of capacity building of line agencies, the project had granted computer facilities to selected organizations. Village level activities (home garden development, income generating activities, catchment management etc.) were facilitated by the respective ARPAs under the supervision of the DO. These strategies were aimed at providing ownership for the line agencies in the rehabilitation and also in subsequent development, while obtaining their expertise for the project rehabilitation works.

4.3.3 The Role of Line Agencies under the PEACE Project

The PEACE project conducted an awareness programme for officers at the early stage covering the need of the PEACE project; objectives, input, activities and outputs of the project; implementation structures and procedures and roles and responsibilities of officers to achieve the project objectives. The awareness programmes were conducted at both national and district levels. Following the awareness programme, divisional and field level officers attended the CAP workshop and transect walk (walk through survey) to identify the rehabilitation needs.

The PEACE project utilized technical expertise of the DAD for the rehabilitation works despite the delays as in other selected projects discussed in this report. However, similar to the Plan Sri Lanka, in the PEACE project also, the grass root officials were involved in the field level monitoring of the project activities, distribution of project benefits and selection of beneficiaries.

4.4 Systems for Sustainable Operation and Maintenance

Small tanks are traditionally farmer managed schemes, and therefore all the O&M activities are the responsibility of farmers/FOs. However, due to weaknesses of FOs, the maintenance of small irrigation schemes was not properly conducted in the past in most places. The availability of line agency officers and other Government support services is also very poor for these kinds of remote schemes. *Jalapalakas* are mostly traditional in nature and they are hardly paid an honorarium for their services. The traditional system of '*salaries*' collection for *Jalapalaka* was not in practice in the majority of the minor schemes. In the cases where, *salaries* are collected, the collection was irregular due to failure to institutionalize traditional practices. Therefore, rehabilitation interventions should have a strong component to ensure post project sustainability of the O&M.

4.4.1 O&M Arrangements under DZLiSPP

DZLiSPP made attempts to establish sustainable O&M in the case study scheme of Ihala Koane wewa through following strategies.

i. Establishment of O&M fund at the scheme level in a reputed bank
ii. Cost recovery arrangement to meet maintenance cost at FO level
iii. Arrangement for labour mobilization for routine maintenance work

The project had guided the establishment of a separate O&M fund at FO/WUG level. The sources of fund were *salaries* collection, collection of membership/ O&M fee, and profit/ savings earned from construction and other contracts implemented through the FO. The case study scheme, Ihala Koane wewa had a fund of Rs.104,500 at the time of investigation. The FO had earned Rs. 50,000 money from the construction contract of DZLiSPP. The remaining amount was from labour mobilization from the project (*Shrama Shakthi* – Rs.40,000), leasing of the tank for inland fishery (Rs.10,000) and collection of *salaries* (Rs.4,500). The money was deposited in a separate bank account. The DZLiSPP had deposited Rs.50,000 for this O&M fund as the project contribution for sustainable O&M.

The FO had appointed a caretaker to supervise the bund clearing, distribution of water from tail end to head and implementation of rotational water issue, painting and greasing of gates and structures, and conducting minor repairs. The project had granted a pack of implements (wheelbarrow, mammoty etc.) to the FO for easy performance of necessary maintenance works.

Role of farmers in the routine maintenance works had been properly institutionalized by the FO. The task of clearing bund seasonally had been allocated among farmers in proportion to the extent of the paddy land holding owned by each farmer. Accordingly the bund had been divided and earmarked for each farmer. This arrangement did not permit the farmers to be in the category of "free rider" since each person was clearly accountable for a practical problem of *shramadana* method, where some families sent their children and incapable adults as representatives, who were

unable to deliver the required output. The channel maintenance was also conducted by farmers to the extent proportionate to their land holdings. This was different from the more commonly used *shramadana* method, in which implementation was also done collectively but people were not responsible for a particular share. All these activities were monitored by the caretaker. The arrangement had been working well in the selected schemes.

4.4.2 O&M Arrangements under Plan Sri Lanka Project

Bund clearing work was allocated among farmers according to the size of land holdings, but it was not divided by tags unlike in the DZLiSP project. It was the farmers' responsibility to clear the field channels and other channels running through their fields.

Jalapalaka appointed by the FO has been paid an honorarium of ½ bushels of paddy per acre of cultivated land per season. He was responsible for overall supervision of routine jungle clearing and de-silting by farmers and application of grease and anticorrosive paint for gates and structures. FO had spent Rs.400 - 500 to purchase grease and paint per season in the last year. However, there were no any direct fees applied to all farmers to recover maintenance cost.

The Plan Sri Lanka had guided the FOs to consolidate the FO fund and procedures to utilize the FO fund, while strengthening FOs. The case study scheme of Plan Sri Lanka, Kuda Kumbukgollawa tank in Pemaduwa ADC division in the Anuradhapura District had already developed a fund of Rs.267,000, which was earned from rehabilitation contract saving of Rs.100,000 and an income of Rs.167,000 obtained from aquaculture. The FO had made arrangements to collect Rs.120 as annual membership subscriptions and Rs.50, Rs.500 and Rs. 100 as the penalties of non-participation at meetings, *Shramadana* and non-clearing of bund respectively. FO had the provision to utilize the fund with the approval of DO. FO had already utilized Rs.50, 000 from the fund to repair a gravel road.

4.4.3 O&M Arrangements under the PEACE Project

The PEACE project had made endeavours to address the sustainable O&M of the rehabilitated schemes after withdrawal of the project. As in previously discussed projects, strengthening of FOs, creation of separate O&M fund, appointment of *Jalapalaka*, collection of *salaries* and payment of *salaries* for *Jalapalaka* are major activities undertaken to ensure the O&M tasks.

The case study scheme called Thumbulla tank in Nikawaretiya ADC division has a fund of Rs.740,000. The fund was developed through the collection of salaries at the rate of Rs.100/ac/season, membership fee of Rs.50 per season, profit earned from the construction contract given by the PEACE project (Rs.59, 000), income earned from labour supply to the PEACE project activities (Rs.400, 000) and bank interest. The fund has been growing through the routine collections.

FO is organizing a *shramadana* prior to commencement of cultivation season to perform de-silting and jungle clearing. Majority of the farmers attend to this voluntary work. *Jalapalaka* has been appointed and *salaries* collection is in progress, but, he has not been paid any salaries yet at the time of study. However, *Jalapalaka* was doing his voluntary services of monitoring routine maintenance works, application of grease and paint to the gates and structures, gate operation and water distribution. The FO has been spending Rs.1000 per season for the purchase of grease and paint.

CHAPTER FIVE

Proposed Model for Sustainable Minor Irrigation Rehabilitation

5.1 Development approach

Small tanks are not randomly located and normally not isolated. The large majority of small tanks are positioned as cascade schemes. Increasing storage capacity of one or two tanks in the cascade or expanding irrigated command area or diverting water form the cascade would alter the cascade hydrology, unless there is excess water than demanded in the cascade. As the tank hydrology strongly influences groundwater, alteration of catchment hydrology also affect the water ground availability for both irrigation and domestic uses. Therefore the science of cascade should be used in any rehabilitation or restoration programme. Farmers in the small scale irrigation schemes are more dependent on upland cultivation, *chena* cultivation and off farm income. Therefore attempts are important to increase farmers' income through OFC cultivation in upland, crop diversification in lowland and perennial crop cultivation in home garden considering the small size of irrigated low land holdings under minor irrigation schemes and low level of household income. These interventions could be effectively used to build the initial trust among the beneficiary community about the proposed project and for soliciting community participation. Adoption of holistic and integrated development approaches would address the issues and considerations of small-scale farming system in minor irrigation settlements.

The development approach should be holistic to incorporate the development of traditional ecological components of minor tank systems in the development process. Interventions are needed for the development/restoration of the tank catchment, *kattakaduwa* and other traditional environmental components of small tank settlements with beneficiary concerns and participation to achieve long-term sustainability. The rehabilitation projects must allocate necessary funds for the land survey at scheme level and to make necessary demarcations for reservation areas and other environmental components with the consensus of beneficiaries in the early stage of the project itself. The project should clearly identify the three key groups of stakeholders; beneficiary, sate agencies and the project team. All three groups have different roles, but are complementary.

5.2 Tank Selection and Planning of the Activities

Tank selection should be done at the request of the Divisional Agrarian Development Committees (DAC) with their approval. The recommended tanks should be investigated by the project staff with the participation of line agency officers to verify the significance of the rehabilitation requirement. Selection of tanks for rehabilitation should be based on the felt needs of the beneficiaries. Beneficiaries of the selected schemes should be willing to participate actively and make them to contribute their maximum in whatever possible form during all stages of the project implementation. Farmers and farmer leaders of the selected schemes must be given initial awareness about the project focusing on the approach and implementation procedures to be

adopted by the project. The awareness should include the elements in the cascade and a tank and the role each element plays and the importance of those elements for the function of the cascade as interdependent system components. The awareness creation should recognize the major steps of rehabilitation; mobilization of beneficiaries and line agency officers, field level institutional development, capacity development and empowerment of beneficiaries, hardware development, and post project O&M plan.

After the selection of the tank and initial awareness of the community, the next step would be elements to be rehabilitated and contribution by each party. This would begin with Participatory Rural Appraisal (PRA) to identify the existing problems in the village in general and the irrigation system in particular. The identified problems are needed to be prioritized with the community. In the next step it is advisable to prepare a village level Community Action Plan (CAP), which should be facilitated by trained project staff, after the transect walk in the project area with the participation of farmer representatives and the project staff to verify the problems identified and their significance and also to collect more detailed information necessary to prepare a project activity plan. The CAP report could cover the irrigation rehabilitation plan, water management plan, agricultural development plan, income generation plan, FO strengthening plan, and other common problems in the area affecting the livelihoods of the people.

Then the estimates of the identified problems of irrigation system have to be prepared by the project staff to be presented to the community. The project staff has to discuss and decide with the community about both community and project contribution at various stages of the project. At the ratification meeting, estimates should be presented to the farmers and ratified as per financial availability within the available budget with the consensus of all stakeholders. Finally, the rehabilitation plan has to be prepared based on ratified needs, which includes the project contribution and total farmer contribution for different work items.

5.3 Farmer Participation

As the minor irrigation systems are farmer managed schemes, the role of farmers in all stages of the development is vital to address their real need and to ensure their sense of ownership, responsibility and accountability.

One of the strategies to maximize the beneficiary participation is to open up avenues for a continuous dialogue between the technical advisors and beneficiary farmers to enable them to provide beneficiary views, opinions and ideas and to exploit available rich traditional knowledge and wisdom for the development of the tank. The rehabilitation projects should be transparent to the all stakeholders, especially for beneficiary community through discussing the budgets, estimates with beneficiaries and informing their entitlements and publicly displaying the project details.

The experiences show that the strategy of formation of different rehabilitation committees (Procurement, construction and supervision) and assigning the tasks for

beneficiaries in theses committees have paved the way to involve most beneficiaries with some sort of responsibility and ownership.

5.4 Role of Agency Officers

The line agency officers have to play a considerable role during the project and post project maintenance and improving livelihoods of the people. Therefore it is essential to provide recognition to line agencies to play a role in rehabilitation activities in order to develop a sense of ownership among the line agency officers on the scheme. The project should exhibit clearly the roles and responsibilities of the line agency during the rehabilitation process and the post project from the early stages in order to ensure their participation in post project scheme related activities. Training programmes designed to change the attitude and perceptions of the relevant officers are important to motivate the officers from their traditional mindset. Officer participation and integration with farmers would establish sufficient links between farmers and the officers in order to carry forward the imparted knowledge and skills.

The project would arrange progress review meetings separately or as a part of DAC meeting monthly or quarterly basis with the participation of representatives of all the participating FOs and line agency officers including, Divisional Officers (DO), officials of the Department of Agriculture (DOA), Engineer/Technical officer of DAD, Officers from National Aquaculture Development Authority (NAQDA), Sri Lanka Cashew Corporation, Coconut Cultivation Board, Department of Animal Production and Health (DAPH), and officers from the Forest Department. Another strategy to integrate grass root officers with the project is to obtain their services to distribute the project benefits, which would offer them some kind of recognition among beneficiaries and ownership about the project.

5.5 Institutional arrangement

The experiences show that formation of the district or divisional level apex body comprising line agency officers and the farmer representatives under the chairmanship of the District or Divisional Secretary has the ability to increase officer participation and responsibility, while creating strong monitoring mechanism and ensuring the performance of roles and responsibilities of all stakeholders. Apart from progress monitoring, the district level senior officials could play the role of auditors/arbitrators of the project activities.

It is important to have community organizations based on hydrological boundaries (such as scheme level FO/WUG and cascade level cascade management committees), but these informal institutional arrangements made by different projects have to be given some kind of legal recognition or formal acceptance. Formation of separate community based organizations such as WUG to conduct scheme level activities independently is important where the multiple small schemes are managed by a single FOs or FOs are formed based on administrative boundaries.

5.6 Human Resources Development/Capacity Building

The development formula of the rehabilitation project should have sufficient space for social mobilization, capacity building and empowerment of beneficiary communities and community institutions by providing guidance, skills and knowledge required for their efficient functioning. Software development begins from the tank selection stage. The appointment of specialized catalysts is highly recommended to mobilize the community and build their capacities. It is important to integrate the software and hardware aspects from the beginning of the project as parallel activities. The projects should be flexible for activities and components and for changes with immediate lessons learnt through the implementation of activities and should suit the local context.

As discussed above, several strategies could be adopted to mobilize the beneficiaries towards the project activities and also to empower them.

- Involve the farmers in the project activities from initial step of planning
- PRA and walk through survey to identify the problems of the scheme
- Preparation of community action plan
- Contribution of labour for project work to cover not less than 10 percent of the total project cost
- Conducting awareness creation and training programme (knowledge, skills and attitudes).

The training and skills improvement programmes can be categorized into several themes.

(a) FO strengthening
- Book-keeping and financial management
- Leadership skills
- Legal powers and authorities of FOs and the members under existing laws (rights and responsibilities)
- Micro credit management
- Basic construction and repairing skills and ensuring standards
- Management of rehabilitation contracts

(b) Productivity and income enhancing skills
- Use of low cost agricultural inputs
- Home gardening and upland cultivation
- Cultivation of perennial crops
- Crop diversification in irrigated land
- Livestock management and aquaculture

(c) Watershed and water resources management
- Watershed management
- Management of surface and groundwater resources
- Soil conservation techniques
- Rainwater harvesting
- Establishment of *Kattakaduwa* and *Gasgommana*

(d) Sustainable operation and maintenance of schemes
- Establishment and management of maintenance fund
- Operation and management of gates and other structures
- Routine maintenance of the tank bund and the canal system

5.7 Hardware development

Local FO has to play a dominant and direct role in the hardware development, but necessary technical support must be provided by the line agency or technical staff of the project. It would be ideal, if the project is able to make the tank owner community as the client of rehabilitation by making them to procure everything needed for rehabilitation including required technical services. The project could do the fund transaction based on the approval of the community. This could strengthen the entrepreneurship cum ownership of the community, while improving the service orientation of the agency staff. The project staff should play the role of auditor/overseer of the process/transactions, so that community get some experience in doing so. In such a negotiated fee could benefit all three parties.

Alternatively, the project could hire the services of technical staff on contract basis, wherever possible, but there should be a room for the line agency officials in the rehabilitation process in order to keep them in good contact with the scheme. According to the experiences of all the selected project sites, total dependence on the line agency for hardware development had caused delays in achieving targets within the specified time period. In case of hiring external technical consultants, line agency officers has an opportunity to be involved with the project in institutional strengthening, supervisory role of construction works and quality assurance which would not make any delays to the project while they are active partners of the project.

5.8 Post project operation and maintenance

The FO with allocated money for O&M work has proved to be unsuccessful. Therefore, the rehabilitation project should commence with the arrangement for sustainable O&M from the initial stages and need to be integrated and linked with hardware components. This includes the provision of necessary training and formation of appropriate institutional arrangements. The establishment of a separate O&M fund for post project sustainable maintenance of schemes with necessary institutional arrangement and procedures for fund utilization are very important to make sure the sustainable operation and maintenance. The rehabilitation projects could make an initial contribution to the O&M fund directly or using construction retention money, but with the realised commitment of FOs to the fund. The innovative carrot and stick measure adopted by DZLiSPP in establishing maintenance fund by project contributions with the equal amount of FO contribution is a good model. The procedures are also important for continuous direct routine collection of O&M fee/*salaries*.

The project should consider the existing or traditional practices and systems in water and infrastructure management and adopt them appropriately with necessary changes

(if any) from the beginning of rehabilitation. The model implemented by the DZLISPP is an innovative model practised by a project for O&M arrangement.

The appointment of dedicated caretaker (*Jala Palaka*) and provision of an honourarium for his services is vital to re-establish traditional O&M arrangement. "Salaries" collected could be used to develop the O&M fund. The provision of tools necessary to undertake routine maintenance would empower the FOs and enhances the performance of the caretakers.

The role of farmers in routine maintenance and a punishment system for non participation must be institutionalized. It has been effective of allocating the tank bund and canal system among farmers in proportion to the landholdings of each farmer than age old *shramdana* approach. Tank bund can be tagged permanently with a responsible farmer for that portion for the care and maintenance which is a good arrangement for accountability and transparency.

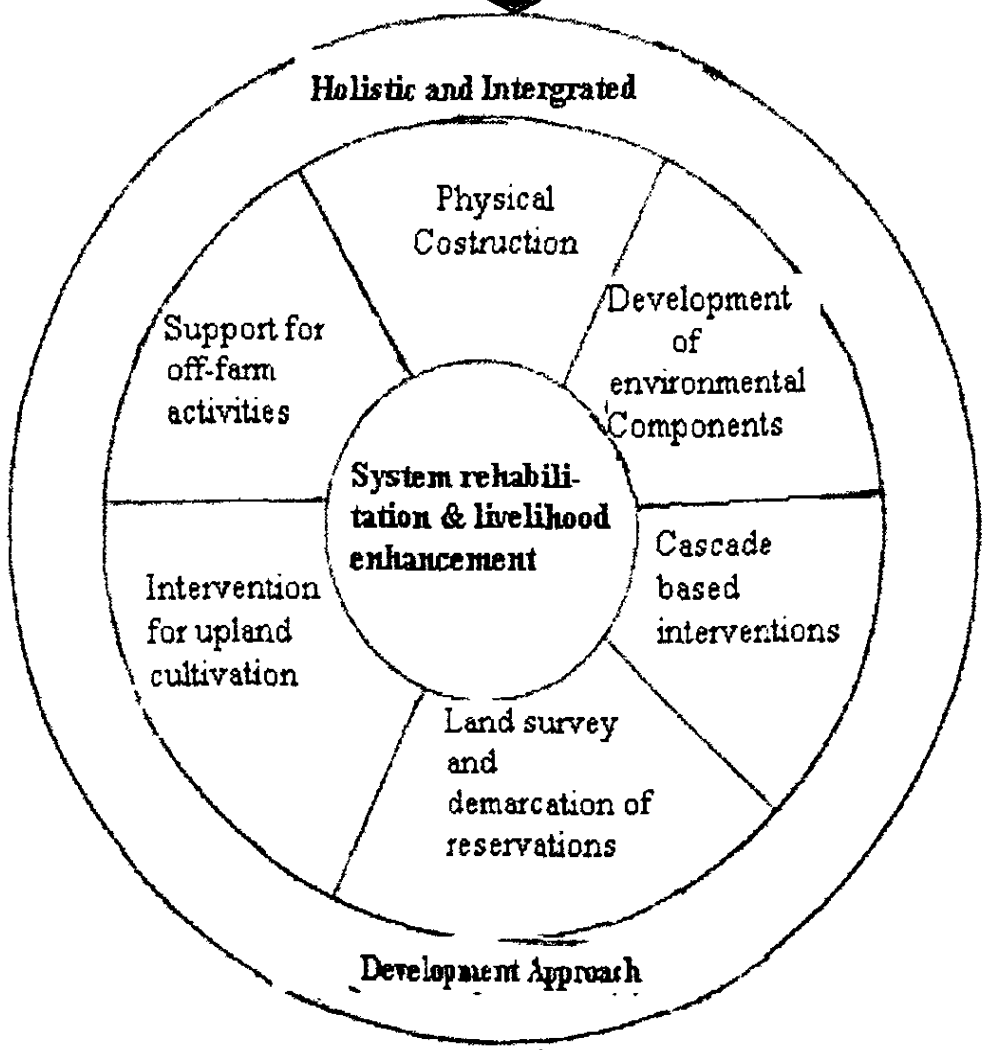
Figure 5.1: Proposed Model for Small Irrigation Rehabilitation

Tank selection & planning of rehabilitation

1. Approval through DAC
2. Verification of selection by field investigation
3. PRA and walk through survey
4. Decide the beneficiary and project construction
5. Prioritization of problem
6. Ratification
7. Display the beneficiary entitlement

Mobilization of beneficiary farmers

1. Systematic training and awareness programmes
2. Use of community knowledge and wisdom
3. Arrange continuous dialog with project and agency staff
4. Award construction contract to local FO's providing necessary skills.



Mobilization of Agency staff

1. Orientation on roles and responsibilities
2. Training and capacity building to change traditional mindset
3. Ensure participation in all stages of development
4. Make them involve in distribution of benefits

Appropriate institutional arrangement

1. Community based scheme level organization
2. Cascade management committee

Sustainable irrigation Scheme

1. Formation of O&M fund
2. Collection of salaries/O&M fee
3. Appointment of caretaker
4. Routing maintenance arrangement
5. Empowered FO

CHAPTER SIX

Lessons Learned and Policy Implications

6.1 Lessons Learned

6.1.1 Key Lessons from the PEACE Project

1. The due recognition given to line agencies to play a role in rehabilitation activities had helped to develop a sense of ownership among the line agency officers on the PEACE project. The project was successful in creating a clear idea about the project approach and roles and responsibilities of the officers during the project and post project periods through providing early orientation about the project at district and divisional level. The distribution of the project benefits facilitated by the field level officers had provided opportunity to integrate grass root level officers with the project activities. The training programmes conducted to change the attitude and perceptions of relevant officers are important to motivate the officers from their traditional mindset.

2. Rehabilitation projects need a strong component for community mobilization through appointment of specialized catalysts and systematic training programmes.

3. Formation of different rehabilitation committees (Procurement, construction and supervision) and assigning the tasks have paved the way to be involved most beneficiaries with some sort of responsibility and ownership.

4. Re-establishment of *Kattakaduwa* and surveying and earmarking of scheme boundary is a good move undertaken by the project

5. Provision of bush cutters to the FOs had provided motivation and facilitated easy clearing of jungle.

6. Institutionalization of post project routine O&M activities through appointment of caretaker, collection of O&M fee and payment of "*salaries*" with the provision of needed awareness and capacity building to farmers and FOs has ensured sustainable maintenance at scheme level. FOs have invested both cash and labour to solve the routine maintenance problems, unlike the past efforts of only *shrmadana*.

6.1.2 Key Lessons from the Plan Sri Lanka Project

1. Considerations of cascade level issues are key to long term sustainability of cascade based minor irrigation development. Adoption of holistic and integrated development approaches addresses the issues and considerations of small scale farming system in minor irrigation settlements.

2. Interventions for the development/restoration of catchment, *kattakaduwa* and other traditional environmental components of small tank settlements were timely and need to be recognized to achieve long-term sustainability.

3. Establishment of a district level apex body comprising line agency officers and the farmer representatives under the chairmanship of the District Secretary was an innovative idea adopted by the project to have a strong monitoring mechanism and to ensure the performance of roles and responsibilities of all stakeholders.

4. Flexibility of activities and components of the project has contributed to make changes with the lessons learnt through the implementation of activities appropriate to the local context.

5. Capacity building of all stakeholders on their roles and responsibilities, emerging issues, available rich traditional knowledge and wisdom that were useful for development, had contributed positively to the project with more cooperation and collaboration. The line agencies and the grass root level officers had entrusted tasks in the project considering their future potential role in the scheme level activities. Provision of computers and other equipments to the Divisional Secretariats had added advantage in this regard.

6. Implementation of soil conservation and watershed management concepts through establishment of school and farmer level demonstration plots had educated and motivated farmers to practice soil and water conservation activities

7. O&M fund has been developed and procedures for utilization of fund had been institutionalized. However, lack of procedures for routine collection of direct O&M fee has posed a threat in sustainable management of already established fund.

6.1.3 Key Lessons from the DZLiSP Project

1. Formation of separate WUG to conduct scheme level activities independently was a novel arrangement introduced by the project considering the multiple small schemes managed by a single FO.

2. Establishment of separate O&M fund for post project sustainable maintenance of schemes with necessary institutional arrangement and procedures for fund utilization was an outstanding feature of the project.

3. Insufficient allocation/concerns given to the capacity development and empowerment of farmers and FOs was a drawback of the project. The project experience showed the necessity of integration of software and hardware aspects from the beginning as parallel activities.

4. Absence of at least few beneficiary farmers as office bearers of contracting FO or some authority for them to monitor the contract works had caused quality deterioration in some schemes.

5. Introduction of water management package and the related training for farmers at the end of hardware development, without mobilizing them from the beginning of the project had been less effective.

6. Provision of maintenance tool kit to FO caretaker and fixing a minimum honorarium had boosted the performance of the caretakers, while increasing their responsibilities.

7. Absence of clear roles and responsibilities for the line agency during the rehabilitation process has created difficulties in mobilizing officers towards post project scheme related activities and establishing sufficient link between farmers and the line agency officers in order to carry forward imparted knowledge and skills.

6.2 General Lessons

1. Participatory development approach had addressed the real needs of rural people and had made them strong partners in the project implementation. The method created a sense of responsibility and ownership and accountability.

2. Absence of integration between software and hardware aspects of development from the early stages of the project had weakened the entire mobilization process and post project maintenance of the schemes.

3. Total dependency on the line agency for project implementation had caused delays in achieving targets within the specified time period. Therefore, it was correct to obtain the services of technical staff on contract/hired basis, but there should be a room for the line agency officials in the rehabilitation process in order to keep them close contact with the scheme.

4. All the projects had attempted to increase farmers' income from OFC cultivation in upland, crop diversification in low land and perennial crop cultivation in home gardens considering the small size of irrigated low land holdings under minor irrigation schemes and low level of household income. Income earning interventions also have been used as the entry approach to the project area and to build trust among the beneficiary community about the proposed project's tangible outputs.

5. Appointment of caretaker/*Jalapalaka* and collection of "salaries" had effectively re-established the traditional O&M arrangement.

6. All the three approaches discussed in this report are implemented in the same geographical area with almost same objectives. But unfortunately there were no reported events during the project period to share the experiences and lessons of individual approach among the projects.

6.3 Policy Implications

1. Investment made on small scale irrigation rehabilitation had made positive impacts on increasing farm level income, and household food security.

2. Selection of tanks for rehabilitation should be based on the felt need of the beneficiaries. Beneficiaries of the selected schemes should be willing to participate actively and contribute their maximum in whatever possible form. They should be given as much responsibility as possible during all stages of project implementation.

3. The development formula of the rehabilitation project must provide more weight to social mobilization, capacity building and empowerment of the communities and community institutions by providing guidance, skills and knowledge required for their effective functioning. There should be sufficient allocation for financial, human and technical investment for capacity building and to introduce institutional mechanisms to ensure sustainable operation and maintenance.

4. It is important to open up avenues to have a dialogue between the technical advisors and beneficiary farmers in order to obtain beneficiary views, opinions and ideas.

5. Rehabilitation projects have to adopt suitable methodology to provide early orientation and consultation for all stakeholders on project approach and roles and responsibilities of line agencies during the project and also during the post project period.

6. There should be a role and room for the involvement of line agency officers in the project activities considering their input required for the scheme after withdrawal of the external interventions, but without hampering the project targets. They have the opportunity to play a strong role in institutional strengthening and supervisory role of construction works, which would make them as the partner of the project.

7. It is important to have community organizations based on hydrological boundaries (such as scheme level FO/WUG and cascade level cascade management committees), but these informal institutional arrangements made by different projects have to be given some kind of legal recognition or formal acceptance.

8. The rehabilitation projects must allocate necessary funds for the land survey at scheme level and to make necessary demarcations for reservation areas and other environmental components with the consent of beneficiaries.

9. Traditional and introduced practices and systems in water and infrastructure management should be institutionalized appropriately with necessary changes (if any) from the initial steps of the rehabilitation.

10. Rehabilitation projects should be transparent to all the stakeholders, especially for beneficiary community through discussing the budgets and estimates with beneficiaries and publicly displaying the project details. The beneficiaries should be fully aware of / made aware of the benefits of the projects and their entitlement prior to design and implementation

11. Implementation of aquaculture in the feasible minor irrigation schemes has the ability to generate sufficient funds for maintenance of the scheme while supplying low cost animal protein to villagers.

12. Obtaining farmer participation is more effective if the work on the irrigation system takes place during periods of farming inactivity. Otherwise people have conflicting demands on their time and energy.

REFERENCES

Abeyratne, S. (1986). Village Irrigation Rehabilitation Project (VIRP), Paper Presented at the Seminar on Participatory Irrigaiton Management in Sri Lanka's Irrigation Schemes, 20-21 February, IIMI, Kandy.

Abeysekara, W.A.T. (1986). Mobilizing Farmer Participation in Irrigation Rehabilitation and Management Programmes Through tank Committees:The Case of Tank Irrigation Modernization Project. *Workshop on the Participatory Management in Sri Lanka's Irrigation Schemes.*: International Irrigation Management Institute, Digana Village, Kandy, Sri Lanka.

Aheeyar M.M.M. and Bandara M.A.C.S. (2012). Impact of Small Irrigation Rehabilitation and Water Management under Dry Zone Livelihood Support and Partnership Programme. Report Submitted to the DZLiSPP, Ministry of Agriculture, Colombo.

Centre for Development Research (CDR) (2006). Mid-term Review of the Small Tank Rehabilitation Project in the Anuradhapura District (Plan Sri Lanka), Report Submitted to the Plan Sri Lanka, Colombo (unpublished).

Department of Agrarian Development and Irrigation Department, (2006). "Kethata Aruna-Nil Diyawara; Guidance for the Implementation of 10,000 tanks/anicuts", Department of Agrarian Development, Colombo

Department of Agrarian Services (2000). *Data book for village irrigation schemes of Sri Lanka –Island summary,* Water Management Division, Department of Agrarian Services, Sri Lanka.

Department of Census and Statistics (2011). *Agricultural Statistics*. Department of Census and Statistics, Colombo

Dharmasena, P.B. 2007. "Water Resources Planning and Management in the Dry Zone Tank Cascade Systems". Proposal submitted to the National Water Management Improvement Project (NAWAM), Ministry of Irrigation and Water Resources Management, Colombo (Draft).

Dharmasena, P.B., 2004. Small Tank Heritage and Current Problems. In Aheeyar, M.M.M. (Ed.), *Small Tank Settlements in Sri Lanka*, Proceedings of a symposium, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo.

Dry Zone Livelihood Support and Partnership Programme (U.d). Operation and Maintenance Hand Book- Kurunegala District, DZLiSPP, Kurunegala. (Sinhala Publication)

Groenfeldt, D. Alwis, J. and Perera J. (1987). Strategies for Improving Minor Irrigation Systems in Sri Lanka. IIMI Working Paper No. 6, International Irrigation Management Institute, Digana Village, Kandy, Sri Lanka

Jayasena, W.G. (1991). *Anuradhapura Dry Zone Agriculture Development Project: Socio Economic Study of the Project Beneficiaries*, Agrarian Research and Training Institute, Colombo.

Jayawardene G.D.D.T., Kumara P.B.S.S. and Walisinghe B.R. (2004). "An Overview of Minor Tank Rehabilitation Process of DZADP", Dry Zone Agricultural Development Project (DZADP), Care International, Sri Lanka.

MaddumaBandara, C.M. (1982). Effects of Drought on the Peasant Families in the Dry Zone of Sri Lanka: A study of the Mahapotana Korale of the North Central Province. In Yoshino, M. *et al* (ed.), *Climate, Water and Agriculture in Sri Lanka,* Tsukuba, Japan.

MaddumaBandara, C.M. (2004). Small Tank Cascade Systems: Their Relevance for Minor Irrigation Rehabilitation. In Aheeyar, M.M.M. (Ed.), *Small Tank Settlements in Sri Lanka*, Proceedings of a symposium, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo.

Panabokke, C.R. (2003). Role of Village Irrigation Systems in Food Security and Poverty Alleviation, In A.P.R. Jayasinghe *et al* (ed) Proceedings of a National Workshop on Water for Agriculture and Rural Development in Sri Lanka, Marawila, Sri Lanka, 10-11 February, Ministry of Irrigation and Water Management, FAO and the Japanese Institute of Irrigation and Drainage.

Panabokke, C.R. (2004). Small Tank Settlements in Sri Lanka, In M.M.M. Aheeyar, (Ed.), *Small Tank Settlements in Sri Lanka,* Proceedings of a symposium, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo.

Plan Sri Lanka. (2012). Cascade Irrigation Systems for Rural Sustainability of the Cascade Systems Development Project in the North Central Province of Sri Lanka, 2004 – 2010. Plan Sri Lanka, Colombo. Pp 185.

Annex 1

Dry Zone Livelihood Support and Partnership Programme Memorandum of Understanding to Deposit and Withdraw Money from Saving Account and Fixed Deposit Account for Sustainable Maintenance of Small Irrigation Schemes

This agreement was signed and agreed between both Kurunegala District Programme Manager of DZLiSP programme and Deputy Commissioner of the Department of Agrarian Development, Kurunegala district as first party (hereafter called as First party) and Regional Manager, Regional Development Bank, North Western province Office as a second party.

1. First party has agreed to open a sustainable operation and maintenance (O&M) saving deposit account for individual rehabilitated tanks' name and to deposit Rs.50,000/=.
2. DZLiSP program has agreed to contribute Rs.50,000/= to sustainable O&M saving deposit account started by small tanks and having a deposit of not less than Rs. 50,000/=. This would make the total saving of Rs. 100,000.
3. Sustainable O&M fixed deposit account would be jointly open by FO and WUG of each tank with the above sum of Rs.100,000/= for ten year continuous fixed deposit at the Regional Development Bank. In case of any changes occurred in pre agreed interest rate of 15.5%, the Bank has agreed to provide extra 1% for the new market interest rate.

The interest income will be provided to the FO bi annually.

I. The second party has agreed to transfer 40% of the interest income to the sustainable O&M saving account of the FO bi annually. On the recommendation of Divisional Officer of the relevant Agrarian Development Centre, the money can be withdrawn by either President or Secretary of WUG and Treasurer of the FO.
II. Another 40% of the interest income is allocated to honorarium payment of Caretaker. First party has agreed to transfer the authority to second party to transfer this amount of money firstly to sustainable O&M saving account and then to the saving account of 'Caretaker' after obtaining recommendation from the DO. The Caretaker is free to utilize the transferred money.
III. 20% of the above interest income is allocated for monitoring of O&M activities and farmer training programmes. Second party has agreed to send a cheque to the relevant Agrarian Development Committee to make necessary payments. The relevant DO/ project training officer should make necessary action to send the bank account details.

The first party has granted permission to the second party to transfer the interest income firstly to sustainable O&M savings account, and then to make payments on above proportions with the recommendation of the DO in charge of the scheme.

IV. It has been agreed by second party to act on the instruction to be given by Deputy Commissioner of the Department of Agrarian Development after 10 year period, on continuation of sustainable O&M savings deposit account and sustainable O&M fixed deposit account.
Further, the second party has agreed to provide a special interest rate for other fixed deposit made by WUG to the same account.

This agreement was signed by the both parties on ..... day, at ..... as per conditions stipulated above.

First Party

1. .....
Deputy Commissioner of Agriculture
Development
Kurunegala

2. .....
District Programme Manager
DZLiSPP
Kurunegala

Witnesses

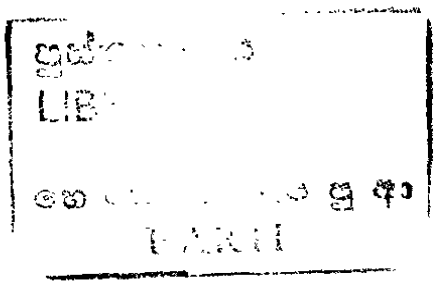
1. .....
Assistant General Manager
Regional Development Bank
North West Province Office
Kurunegala

2. .....
Project Engineer-Kurunegala
DZLiSPP

Second Party

1. .....
Regional General Manager
Regional Development Bank
North West Province Office
Kurunegala

2. .....
Assistant General Manager
(Administration and Business Promotion)
North West Province Office
Kurunegala



P.O. Box 1522
Colombo
Sri Lanka

Tel: 94112696981
94112696437
Fax: 94112692423

E-mail:library@harti.lk

Web : www.harti.gov.lk

ISBN 978-955-612-161-2

Rs 260

National Digitization Project

National Science Foundation

Institute : National Science Foundation

1. Place of Scanning : Sanje (Private) Ltd, Hokandara
2. Date Scanned : 02/06/2017
3. Name of Digitizing Company : Sanje (Private) Ltd, No 435/16, Kottawa Rd, Hokandara North, Arangala, Hokandara
4. Scanning Officer

Name : Angelo Melvin Luwis

Signature : A. M. Luwis

Certification of Scanning

I hereby certify that the scanning of this document was carried out under my supervision, according to the norms and standards of digital scanning accurately, also keeping with the originality of the original document to be accepted in a court of law.

Certifying Officer

Designation : Information Officer

Name : Renuka Sugathadasa

Signature : R. P. Sugathadasa

Date : 02/06/2017

"This document/publication was digitized under National Digitization Project of the National Science Foundation, Sri Lanka"