WORKING PAPER

IMPACT OF GOVERNMENT'S ACCELERATED TANK DESILTING PROGRAMME CONDUCTED IN LATE 2012

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Working Paper: 06

August 2016

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First Published: 2016

ISBN: 978-955-612-211-4

Suggested citation Bandara, M.A.C.S. and Samarasinha, G.G de L.W (2016) Impact of Government's Accelerated Tank De-silting Programme Conducted in Late 2012. HARTI Working Paper No: 06, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo, Sri Lanka.

FOREWORD

People of yore realizing the value of water for man's existence on earth devised various ways to retain water whenever opportunity came. In Sri Lanka, they constructed village tanks and was known as a kingdom of tanks. However, due to poor attention paid for their maintenance by successive governments' over a long period of time, storage capacity of a majority of village tanks have significantly reduced.

Today we have experienced and the climatologists have admitted that the weather is "chaotic". This makes the Great King Maha Parakramabahu's famous saying "utilize every drop of rain before it flows to the sea" much more meaningful to the present than to the past. Therefore tank de-siltation should be consider as top priority and I hope the authorities will pay attention to lessons learnt from the study and the suggestions the report contain in future projects of this nature to get highest return to the huge investments of the government on these projects.

Haputhanthri Dharmasena
Director

ACKNOWLEDGEMENTS

The research team wishes to thank the officers of the project implementing agencies and beneficiaries of de-silted tanks for lending their fullest assistance by allocating their valuable time for us to collect required data and information.

We are very much thankful to the former Director, HARTI Mr. E.M. Abhayarathna and present Director HARTI, Mr. Haputhanthrige Dharmasena for their continuous support to bring this report out as a publication. A special word of appreciation is due to Mr.J.K.M.D. Chandrasiri, Additional Director, HARTI for giving valuable suggestions and necessary assistance to complete this study.

Our thanks also go to Mr. M.N.M. Nalim, Statistical Assistant of HARTI and the graduates who served as casual investigators, for their valuable assistance during the field data collection and data processing. We would like to sincere thank Mrs. W.N.P. de Silva for typesetting the report and all the other members of the division for supporting us in numerous ways throughout the study.

We would like to extend our thanks to Miss Suharshi Perera, and Mr.S.A.C.U. Senanayaka for editing the report and all the members of Publication and Printing Unit of HARTI for their valuable contribution in publishing this report

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ABSTRACT

During recent past Sri Lanka had experienced frequent water scarce situations though its severity showed variation in temporal and spatial basis. Water scarcity largely affects agricultural production in the dry zone since period of water shortage usually overlaps with the most critical period of crop growth. The seriousness of drought was felt significantly during 2012 *Yala* season and estimated loss of paddy yield of this season compared to the same season of previous year is 43%. Another 30% of paddy lands were destroyed at the initial stage after sowing. Drought has also affected 43% of the Other Field Crops (OFC) cultivated extent.

To ease the burden of the people affected by drought of 2012 *Yala*, emergency drought mitigation & relief programme was implemented by the Ministry of Economic Development. Considering the importance of de-silting existing tanks in the dry zone as a long term drought mitigation strategy, the accelerated tank de-siltation programme was initiated and was completed within few months. Nearly, Rupees million 3577 was disbursed to conduct this project.

Impact of the tank de-siltation project was assessed by the study in satisfying different water needs of the people and the environment. Tank de-siltation has increased the capacity of all the de-silted tanks though increase of irrigable capacity is somewhat less. Due to accelerated nature of the project de-siltation work has done without proper consultation of the technical experts and farmers, restricting many potential benefits of tank de-silting. However due to increase in total capacity of tanks farmers has gained high level of water security for cultivation, access to water for animals and other domestic needs. Proper planning which utilize technical and traditional expertise as well as tank specific issues will be useful in getting active involvement of beneficiaries for projects of this nature and providing lasting benefits.

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LIST OF ABBREVIATIONS

DAD	-	Department of Agrarian Development
FO	-	Farmer Organizations
ID	-	Irrigation Department
MASL	-	Mahaweli Authority of Sri Lanka
OFC	-	Other Field Crops
TO	-	Technical Officer

CHAPTER ONE

Introduction

1.1 Overview

Water is a basic human need as well as a crucial input to agriculture and many other production systems. Sri Lanka has been experiencing frequent water scarcity conditions in the recent past though its severity showed variation in temporal and spatial basis. In dry zone area water scarcity affects severely for agricultural production since period of water shortage usually overlaps with the most critical period of crop growth. In paddy cultivation sowing and panicle initiation period is more sensitive to water stress than other stages of crop life.

From ancient times a well planned network of irrigation reservoirs that included major reservoirs as well as small tank cascades played a significant role in fulfilling diverse water needs of people and environment, especially during dry seasons. However, beneficiaries as well as managers of these tanks claim that tank capacities have reduced and the volume of water retained has decreased over time due to siltation. Impact of reduced capacities of tanks was more significant during dry periods of the year.

During the 2012 Yala season due to the serious drought that prevailed, agricultural activities in the dry zone farmers were largely affected resulting in huge economic losses and leaving the country's food security at risk. Though farmers and agricultural officials attempted to minimize the impact of water shortage by changing usual management practices and cropping patterns, the estimated loss of paddy yield was about 43% compared to the corresponding season of the previous year. Another 30% of cultivated lands were destroyed at the initial stage after sowing. Drought has also affected 43% of land cultivated with Other Field Crops (OFC) by the end of *Yala* 2011 (Government of Sri Lanka 2012).

According to the anticipated climate change impacts, frequency of dry spells will increase as well as their severity in the coming years. Therefore the Government of Sri Lanka planned and implemented the Emergency Drought Mitigation and Relief Programme in 2012 with the objective of enhancing the livelihood condition of the drought affected people in dry

zone by relieving hardships faced by farmers in cultivation and everyday activities due to prolonged droughts.

The project was implemented under the supervision of the Ministry of Economic Development. Beneficiary participation was taken whenever necessary and a payment was made for the work done. Only one person from each family was given the opportunity to work in the project and the maximum earnings of him/her from the project was restricted to Rs. 6000 per month.

Emergency Drought Mitigation and Relief Programme had several components such as accelerated tank de-silting programme, improved drinking water facilities, rehabilitation of agro-wells and provision of water pumps. Accelerated tank de-silting project was expected to de-silt 1,278 number of major and medium size tanks located in dry and intermediate zones. It was expected to increase the total water holding capacity of tanks up to 7,378 Acre feet (9 million m^3) by the project. The estimated cost was Rs. 3,577 million which included Rs.844 million of machinery cost.

The drinking water programme was implemented by the Ministry of Disaster Management under its Disaster Relief Programme and it was expected to improve drinking water facilities for 52,430 families in 12 districts. The estimated budget for this was Rs.30 million.

The number of agro wells selected for rehabilitation was 4000 in the project area. During rehabilitation, lining of walls, deepening and de-silting were done to increase its water holding capacities, to minimize losses and to provide assured supply of irrigation water in water scarce periods. The estimated budget was Rs. 40 million.

As per requirement, 6 inch water pumps were distributed and the total cost was Rs. 12 million.

1.2 Scope of the Project

However, the present study was restricted only to the tank de-siltation component of the programme and the programme was evaluated basically for its contribution in increasing cultivable land extent and livelihood conditions of the beneficiaries. The other components that are included in the whole programme were not studied.

1.3 Rationale of the Study

The accelerated tank de-siltation programme was initiated as a quick response to the severe drought condition and it was completed within a few months. Nearly, Rs.3577 million was disbursed to conduct this project.

Therefore, it is important to study the impact of the programme and document the experiences gained and lessons learnt from the project for more successful planning and implementation of future projects related to tank de-siltation.

1.4 Objectives of the Study

The major objective of this study was to assess the success of accelerated tank de-silting programme in reducing the burden on farmers in cultivation and everyday activities during dry seasons.

The specific objectives are as follows,

I. To assess the impact of tank capacity enhancement to the beneficiaries
II. To examine the benefits to externalities by de-silting
III. To evaluate the overall quality of tank de-silting work
IV. To assess the methodology adopted for accelerated tank de-silting programme

1.5 Limitations of the Study

The study was initially planned to carry out an economic analysis of tank de-siltation project and in generating a cash flow for economic analysis it was expected to include an increased cultivation extent via increased water availability in the tank as one benefit of de-siltation. However, during the field data collection it was realized that in many tanks that were de-silted increase of depth was mostly in the dead storage and even in tanks with increased irrigation capacity measuring the increase was difficult as the increase of irrigation water volume is not much. Therefore an economic analysis was not carried out.

According to previous studies conducted in various parts of India, tank de-silting is economically viable, when considered the holistic impacts including environmental as well as social benefits, even though a huge sum of money has to be invested (Amarnath and Raja, 2006; Easter and

Palanisami, 1986; Palanisami et al, 2010; Reddy and Behera, 2009; Shankari, 1991; Thippaiah, 1998).

1.6 Study Sites

The programme was implemented mainly in Anuradhapura, Kurunegala, Puttalam, Pollonnaruwa and Vavuniya districts. For the evaluation purposes Anuradhapura and Kurunegala districts were selected among the rest due to availability of higher number of de-silted tanks. Nearly 1,278 tanks were expected to de-silt. The main institutions involved in project implementing were the Mahaweli Authority of Sri Lanka (MASL), Irrigation Department (ID) and Department of Agrarian Development (DAD).

Stratified random sampling technique was used for sample selection. Stratification was done in accordance with the district, implementing agency, the number of tanks de-silted and the tank categories (small, medium and large). Selected tanks are given in Table 1.1.

Table 1.1: Selected Tanks for the Study

Line Agency	Anuradhapura Scheme	Kurunegala Scheme
MASL	David Tank	Not available
	Eliyadiwul Wewa	
	Kalankuttiya	
	Karagaha Wewa	
	Kudabellankadawala	
	Kudameegaswewa	
	Pahala Wewa	
ID	Bellankadawala Wewa	Kabellawa Wewa
	Kukulkatuwa Wewa	Karuwalagaswewa
	Medawachchiya Wewa	Nadhigamawewa
	Rasnayaka Wewa	Nelum Wewa
	Thambalagollawa Wewa	Thammitawewa
DAD	Horrowpothana Wewa	Hudaliyawa Wewa
	Kelegamawewa	Ihala kalegamawewa
	Kannattiyawewa	Mannakkulamayagama Wewa
	Kannayamkulamawewa	Sadaranagama Wewa
	Kokpetiyawawewa	Wallaliyamahawewa
	Kudarambewa	Wellarawawewa

Source: HARTI Survey data, 2013

1.7 Data Collection Methods

The data were collected as primary and secondary levels. The primary data were collected through field visits by using formal and informal data collection methods.

a. Primary Information

Focus group discussion, key informant discussion and semi structured questionnaire survey were used as data collection methods. During the study line agency officials, farmer leaders and member farmers of the FOs' were interviewed. Field observations were used to gather information regarding conditions of physical, structural components in the rehabilitation and to validate the information received. Field surveys were carried out during the period from July to September in 2013.

b. Secondary Information

Progress reports and other published and unpublished documents that are relevant to the tank de-siltation programme were used to get secondary information.

1.8 Data Analysis

Descriptive analysis was done to understand the overall de-silting activity; quality of de-silting, fulfillment of the farmers' needs and impact on agricultural production. Further to that social impact was analyzed by gathering beneficiary perceptions.

CHAPTER TWO

Accelerated Tank De-silting Programme

2.1 Background

The immediate cause that led to initiate the tank de-silting programme was the severe drought that prevailed in the latter part of 2011 to early 2012. The objective of the project was to assure water security and protect irrigation systems as a national priority. In this project greater emphasis was laid on assuring food security and drinking water availability at household as well as community level.

The activities conducted under this project were;

1. Maintenance of critical water storage below the gate and remove debris in the tank
2. Maintenance of good working storage and secured water capacity in the tank
3. Maintenance of a water discharge capacity at gates, sluices and feeder channels
4. Strengthening the bund
5. Repairing leaks and remove barriers to water discharge

The tank de-siltation project was implemented jointly by the Ministry of Irrigation and Water Resources Management and the Ministry of Agrarian Services and Wildlife. The main objective of the Emergency De-silting Programme was to increase the water holding capacity to enhance the water security during drought seasons. It also expected to maintain the sustainability of the ancient irrigation network with tank cascade system.

Further, it was expected to achieve the following while achieving its objectives;

- Food security at farmer family and farmer community level
- Improvement of drinking water and environmental water requirements
- Enhancement of the critical storage of tank while improving the operational efficiency
- Providing attention to dam safety and flood protection while maintaining cleanliness and scenic beauty.

2.2 Institutional Arrangements for Tanks De-silting

At the designing stage three line agencies; Mahaweli Authority of Sri Lanka, Irrigation Department and Department of Agrarian Development were selected. However, de-silting projects in the tanks coming under the DAD was conducted under the supervision of the Divisional Secretariat attached to the District Secretariat in each district. Even though the project was coordinated by District Secretariat Office, hereafter those tanks are discussed and mentioned under DAD. Tanks operated under MASL were rehabilitated under the supervision of MASL and machines belonged to them were used or hired from outside. Tanks covered under ID also de-silted using their own human capital and machinery, but in some cases certain machinery was hired.

2.3 Tank Selection Procedure and Procumbent Methods Adopted

2.3.1 Tank Selection

Tank selection for de-silting has done using the information available with field officers attached to each line agency and in addition, they considered the requests of farmer organizations as well. Most of the time in selecting tanks line agencies had paid attention to the fact that whether those tanks had been rehabilitated recently or not and if those have been, then the budget allocation for that rehabilitation and priority was provided to the tanks which had not been rehabilitated. At the same time prevailing drought conditions in the tank area has also taken into account. In addition, some tanks had been selected based on the influence of local and national level politicians, this was more prominent in selecting tanks that comes under DAD. The final decision of DAD tanks selection for de-silting in DAD was done by the agriculture committee chaired by the Divisional Secretary and in that committee the requests and ideas of committee members and farmer organizations in each district had been taken into consideration.

2.3.2 Procurement Procedure

For the tanks coming under MASL and ID they have calculated an estimated budget and after receiving the approval the project had been initiated. Since this de-silting project has been implemented as an accelerated project and has to be completed within a short time period, the secretary of Ministry of Irrigation and Water Management issued a

special circular for procurement and services. That circular has introduced a new set of rules and regulations that should be followed in procurement for this project. Those new regulations are valid only for this particular project. In that circular they have introduced a flat rate for all machinery and relevant line agency has the power to hire machinery at that flat rate without calling for tender. This special circular also provides guidelines for purchasing materials for the project with minimum restrictions within a shorter period of time. There is a special provision for hiring of labour as well.

The ministry also has decided not to charge a fee for the removed silt from tanks and the silt coming from de-silting can be used for rural road development, cultivation land and commercial land development and land fillings on the approval of FO and agency officials.

Tanks under DAD had adopted a different procurement approach for its de-silting project. Final decision making of the tanks for de-silting was done by an agriculture committee and maximum of Rs. 500,000 was allocated for de-silting each tank and that allocation does not change based on the capacity of the tank. The intention of this fixed budget allocation was to de-silt the large number of tanks under DAD. This allocation was adequate only to de-silt one acre feet area of the tank.

2.4 Mechanism Adopted for Tank De-silting

The Mahaweli Authority of Sri Lanka and the Irrigation Department had used their own human resources and machinery for the de-silting process and they have hired machinery only when it is necessary. A series of discussions was held between the Department of Irrigation and Mahaweli Authority of Sri Lanka with the respective FOs to decide the amount of de-silting that should be done and the time frame for the siltation work, considering the budget allocation. The de-silting process was taken place under the supervision of the Irrigation Department/Mahaweli Authority of Sri Lanka.

For the tanks that are coming under DAD, an agreement was signed between the FO office bearers and Divisional Secretariat for de-silting one acre feet. The amount of silt that was to be removed has been set for one acre feet without considering the capacities or FO requirement. The Technical Officer (TO) assigned to the Divisional Secretariat Office has done the basic demarcation for de-silting. However, certain FOs have de-

silted more than one acre feet spending funds of their FO and human resources to gain maximum output from the opportunity they received after a long wait. Payments were made for these tanks after calculating the de-silted capacity at the end of de-siltation work.

2.5 Role of FOs in Tank De-silting Mechanism

When considering the implementation process the Mahaweli Authority of Sri Lanka and the Department of Irrigation held initial discussions to elicit the FO's ideas. The role of FOs in de-silting projects was mainly limited to handling of silt loads and supervisory work. Since government officials were not in a position to supervise all the tanks every day as the project was implemented all over the district, FOs were assigned the duty of supervision. A representative of FOs was stationed at the worksites to supervise hired machinery and tractors in site and maintaining records and managing the silt loads. FOs has determined the location to unload the silt. This has created a sense of ownership among the farmers and has ultimately inspired the farmers to do their best.

They have been working 10-35 days during the project period. Active participation of FOs in silt transportation has increased the efficiency of the de-silting process while building farmers' leadership qualities. ID has made a payment on daily basis to that particular farmer representative (one farmer representative per day). A payment for FO representative was allocated in the budget. However, no payment was allocated in the budget for the farmers who served for the MASL's tanks. However, from the income generated by selling the silt loads those respective FOs were able to supply food to the drivers and farmer representatives who worked in the de-siltation site. In some situations that income was used by FOs to hire the machines and it helped increasing the depth of de-silting. In the ID tanks, FOs were not allowed to charge any fees for the silt loads transported while, in tanks under MASL, most of the time a fee was charged by FOs to transport silt loads and that fee varied between Rs. 200 to 300 per load. In tanks coming under ID, both the FOs and ID had collectively decided not to transport silt loads beyond 1km to increase the efficiency of silt transportation from the work site, since this de-silting project was implemented as an accelerated project and they have to meet the deadline set by the Ministry. Due to active participation of FOs at field level, it has contributed a lot to increase the productivity and efficiency of the de-siltation work. Thammita tank managed under the ID and located in Ibbagamuwa Divisional Secretariat in Kurunegala district is one good

example for the effective participation of FOs and successful outcome of that participation.

With regard to the tanks coming under DAD, FOs was given the contract of de-silting the tank with necessary technical assistance. Initially it was decided to de-silt the tanks manually with the participation of member farmers. However, once the committee realized it was difficult to complete the task within the given time frame with the desired quality, authority was given to FOs to carry out the task using machinery or manual labour. Hiring of machinery for de-silting and tractors for transportation of silt was coordinated by the relevant FOs and payments were also borne by them.

Farmer participation has played an important role for successful completion of de-siltation work. In situations where farmer participation is less for project activities, project output was also low. Similarly, active participation of FOs has shown good outcomes. Kudabellankadawala tank in Thabuttegama area managed by MASL is a good example for a successful project. In this tank other than de-silting, FOs had been able to raise the tank bund by 15 feet, rehabilitate the spill and reallocate reservations for the tank from this project. Farmer participation at tank de-silting worksites is shown in Table 2.1.

Kalankuttiya tank is another good example to show the usefulness of good coordination among farmers to achieve the target of the project. There are 23 FOs operating under Kalankuttiya tank and all those FOs had worked collectively in this project as they have felt the actual need to de-silt the tank. Farmers in Kalankuttiya tank are highly satisfied with the de-silting process and its outcome.

In many cases ID and MASL has provided the machines needed for de-silting. However in certain situations when FOs were not able to finish the work at the scheduled time due to unavoidable circumstances such as rain, those FOs had to hire machines and they had to bear the expenses. In tanks coming under MASL, FOs were able to cover those extra expenses with the earnings that came from selling de-silted silt.

Table 2.1: Farmer Participation in the Project Activities by the Number of Man days in Anuradhapura and Kurunegala Districts

Line Agency	Anuradhapura District		Kurunegala District	
	Tank	Farmer Participa-tion (Man days)	Tank	Farmer Participa-tion (Man days)
MASL	David Tank	48	Not applicable	
	Eliyadiwul Wewa	60		
	Kalankuttiya	387		
	Karagaha Wewa	30		
	Kudabellankadawala	115		
	Kudameegaswewa	30		
	Pahala Wewa	90		
ID	Bellankadawala Wewa	120	Kabellawa Wewa	0
	Kukulkatuwa Wewa	0	Karuwalagaswewa	27
	Medawachchiya Wewa	0	Nadhigamawewa	60
	Rasnayaka Wewa	30	Nelum Wewa	0
	Thambalagollawa Wewa	0	Thammitawewa	87
DAD	Horrowpothana Wewa	30	Hudaliyawa Wewa	6
	Kelegamawewa	21	Ihala kalegamawewa	0
	Kannattiyawewa	9	Mannakkulamayagama	18
	Kannayamkulamawewa	0	Sadaranagama Wewa	60
	Kokpetiyawawewa	21	Wallaliyamaha Wewa	45
	Kudarambewa	21	Wellarawawewa	156

Source: HARTI Survey data, 2013

2.6 Quality and Appropriateness of Work Done

Since it is beyond the objective of the present study to technically evaluate the quality and appropriateness of the work done under the de-siltation project, it was measured qualitatively using beneficiary perception. Table 2.2 describes FOs' level of satisfaction on project activities.

Table 2.2: Level of Satisfaction of Farmer Organizations on Quality of Work

District	Line Agency	Percentage of Satisfaction (%)			
		Highly Satisfied	Satisfied	Somewhat Satisfied	Not Satisfied
Anuradhapura	Mahaweli Authority	28.6	28.6	42.8	0.0
	Irrigation Department	20.0	20.0	40.0	20.0
	DAD	16.7	33.3	50.0	0.0
Kurunegala	Irrigation Department	20.0	80.0	0.0	0.0
	DAD	0.0	50.0	33.3	16.7

Source: HARTI Survey data, 2013

Majority of the FOs are satisfied with the de-siltation work that has been done though they show various levels of satisfaction. In Anuradhapura district the proportion of 'somewhat satisfied' is the largest and they think if implementing agencies had paid more attention to farmers' views and ideas from the beginning, this project would have been more successful.

However, in Kurunegala district, all the FOs attached to tanks that comes under ID is either highly satisfied or satisfied with the work done. Even from the FOs attached to DAD tanks, not satisfied percentage is less than 20. The not satisfied FOs is not happy with the amount of work done. Various reasons had contributed to their negative impression regarding the project such as leaks in the spill, and weak bunds. They say the bunds are not strong enough to withstand the pressure increase due to increased volume of water. Getting required machinery was another problem that they faced with because many tanks in the same area had to be de-silted within the same duration. Therefore in certain tanks they were unable to de-silt the tanks even to one acre feet deep. Another reason is that certain farmers believe there are other important issues to be looked at other than deepening of the tank (Table 2.3).

Table 2.3: Other Issues Raised by Farmers in Relation to Irrigation System

Issues	Anuradhapura		Kurunegala	
	No of Responses	Percentage of Responses (n=36)	No of Responses	Percentage of Responses (n=15)
Badly damaged irrigation channel network	12	33.3	4	26.7
Encroachment of tank reservations	2	5.6	2	13.3
Problems in sluice, spillways and gates	6	16.7	4	26.6
Weak tank bunds	3	8.3	0	0.0
Soil with poor water holding capacities	10	27.8	2	13.3
Wild elephant threats	0	0.0	1	6.7
Badly damaged agricultural roads	2	5.6	1	6.7
Problem of invasive aquatic plants	1	2.7	1	6.7

Source: HARTI Survey data, 2013

In both districts higher numbers of farmers were said that the irrigation system channel networks available are not in good condition. Poor channel conditions are the other way that cause water losses through seepage and leaks other than evaporation losses. This is the other area in the irrigation systems that are needed to be addressed to minimize losses and increase the water use efficiencies.

CHAPTER THREE

Impact of the De-siltation Project

3.1 Water Availability for Cultivation

The ultimate result expected from the de-silting programme was to increase the water availability for cultivation in both *Maha* and *Yala* seasons. Table 3.1 shows the change in water availability in each tank in Anuradhapura district before and after the de-siltation project.

Water availability has increased in all tanks that were under MASL. Out of seven de-silted tanks water of four tanks has been increased considerably. Earlier the tanks could supply water only in *Maha* season or limited extent of the land in *Yala* season, but now the full land extent is being cultivated under those tanks in both seasons after de-siltation.

When considering the tanks de-silted under ID and DAD, water availability has not changed in most of the tanks de-silted. Water availability has increased only in Rasnayaka tank that is under ID and Kalegama tank under DAD.

Table 3.1: Water Availability for Cultivation Before and After the Project in Anuradhapura District

Line Agency	Tank	Before the Project				After the Project		
		Both Season	*Maha* and Part of *Yala*	Maha only	Part of *Maha* and Part of *Yala*	Both Season	*Maha* and Part of *Yala*	Part of *Maha* and Part of *Yala*
MASL	David Tank		√				√	
	Eliyadiwul Wewa	√				√		
	Kalankuttiya		√				√	
	Karagaha Wewa		√			√		
	Kudabellankadawala				√		√	
	Kudameegas Wewa				√	√		
	Pahala Wewa				√	√		
ID	Bellankadawala Wewa		√				√	
	Kukulkatuwa Wewa				√			√
	Medawachchiya Wewa		√				√	
	Rasnayaka Wewa			√			√	
	Thambalagollawa Wewa		√				√	
DAD	Horrowpothana Wewa		√				√	
	Kelegama wewa			√			√	
	Kannattiyawewa		√				√	
	Kannayamkulama Wewa		√				√	
	Kokpetiyawa Wewa		√				√	
	Kudarambewa				√			√

Source: HARTI Survey data, 2013

In Kurunegala district only ID tanks and DAD tanks were included in the de-silting project. According to Table 3.2, water availability has increased in all tanks de-silted under ID in Kurunegala district except in Karuwalagaswewa tank. However in tanks de-silted under DAD none of the tanks witnessed an increase in its water availability for cultivation even after implementation of de-silting project.

Table 3.2: Water Availability for Cultivation Before and After the Project in Kurunegala District

Line Agency	Tank	Before the Project		After the Project		
		Maha and Part of *Yala*	*Maha* Only	Both Seasons	*Maha* and Part of *Yala*	*Maha* Only
ID	Kabellawa Wewa	√		√		
	Karuwalagaswewa	√			√	
	Nadhigamawewa	√		√		
	Nelum Wewa	√		√		
	Thammitawewa	√		√		
DAD	Hudaliyawa Wewa	√			√	
	Ihala kalegamawewa		√			√
	Mannakkulamayagama Wewa	√			√	
	Sadaranagama Wewa	√			√	
	Wallaliyamaha Wewa	√			√	
	Wellarawawewa	√			√	

Source: HARTI Survey data, 2013

3.2 Enhanced Dead Storage of Tanks

Farmers' perception about increase of tank capacities are presented in Tables 3.3 and 3.4. After de-siltation dead storage has increased in all tanks though only a limited number of tanks show as increase in irrigable tank capacities. However, dead storage or both dead storage and irrigable water holding capacity have increased after de-siltation.

Table 3.3: Increase in Storage after De-siltation in Anuradhapura

Line Agency	Tank Name	De-silted Acre Feet	Increase in Irrigable Water		Increase in Dead Storage	
			Yes	No	Yes	No
			Count	Count	Count	Count
MASL	David Tank	5.15	1	0	0	1
	Eliyadiwul Wewa	13	0	1	1	0
	Kalankuttiya	22.22	0	1	1	0
	Karagaha Wewa	3	0	1	1	0
	Kudabellankadawala	5.5	1	0	1	0
	Kudameegaswewa	5.5	0	1	1	0
	Pahala Wewa	6	0	1	1	0
ID	Bellankadawala Wewa	10	0	1	1	0
	Kukulkatuwa Wewa	0	0	1	0	1
	Medawachchiya Wewa	23	0	1	1	0
	Rasnayaka Wewa	10	0	1	1	0
	Thambalagollawa Wewa	13	0	1	1	0
DAD	Horrowpothana Wewa	5	1	0	0	1
	Kelegamawewa	6	0	1	1	0
	Kannattiyawewa	2	0	1	1	0
	Kannayamkulama Wewa	1	0	1	1	0
	Kokpetiyawawewa	1	1	0	0	1
	Kudarambewa	1	0	1	1	0

Source: HARTI Survey data, 2013

Most of the MASL and DAD tanks in Anuradhapura district, amount of de-siltation was about 6 acre feet or less while the same was above 10 in ID tanks. However, the storage capacity of Kalankuttiya and Madawachchiya tanks of MASL and ID has increased by 23 and 22.2 acre feet respectively. Due to that farmers have the feeling of more secured water supply for cultivation and they had plans to expand aquaculture in those tanks.

Table 3.4: Increase in Storage after De-siltation in Kurunegala

Line Agencies	Tank Name	De-silted Acer Feet	Irrigable Water		Dead Storage	
			Yes	No	Yes	No
			Count	Count	Count	Count
ID	Kabellawa Wewa	19.3	0	1	1	0
	Karuwalagas Wewa	10.17	0	1	1	0
	Neligamawewa		0	1	1	0
	Nelum Wewa	9	0	1	1	0
	Thammitawewa	24	0	1	1	0
			0	1	1	0
DAD	Hudaliyawa Wewa	1	0	1	1	0
	Ihala kalegamawewa	1	0	1	1	0
	Mannakkulamaya gama Wewa	1	0	1	1	0
	Sadaranagama Wewa	1	0	1	1	0
	Wallaliyamaha Wewa	1	0	1	1	0
	Wellarawawewa	4.88	0	1	1	0

Source: HARTI Survey data, 2013

The highest increase in storage in Kurunegala district can be observed in Thammitawewa tank and Kaballewa tanks of ID and the increased volumes were 24 and 19.3 acre feet respectively.

3.3 Benefits of the Project

Most of the tanks that were included in the de-siltation project were tanks identified as having much demand for de-siltation from beneficiary farmers. Therefore it was a real need of the farmers and they are satisfied that their call was heeded. According to farmers' perception, de-siltation has enhanced the water availability in the tanks by increased storage capacity. Farmers have gained confidence to cultivate in less rainy periods as they feel the tank water will save their cultivation during severe drought periods.

In dry zone areas, one prominent feature is that people heavily rely on tanks to fulfill their daily water needs such as for drinking, cooking, bathing and washing clothes as well as for livestock farming. Therefore the increased water storage has facilitated people in obtaining their daily water needs. In addition, increased dead storage in tanks is important to increase the level of groundwater of the area and it enhances the groundwater recharge in domestic wells as well. Dharmasena (1994) has also highlighted that dead storage is the only live storage during dry seasons for the survival of surrounding vegetation, wild animals, cattle and other domestic purposes of the community.

Due to increased dead storage there is a possibility of growing inland fish species. While seasonal small tanks could be used for cultivation of fish species of short duration or harvesting half matured fish stock, tanks with sufficient dead storage and favorable geometry can be used for rearing long duration fish species (ibid).

Certain FOs has been able to earn some income by selling silt loads removed from tanks while certain other FOs have utilized the same to other useful activities such as rehabilitation of village roads, tank bunds, commercial lands and community centers etc.

Demarcation of tank reservations and their restoration is one other important benefit that has been achieved from this project. Many past studies in related subjects have revealed that tank reservation has been encroached and cultivation has been expanded to the watershed areas (Amarasinghe 2009; Gunarathna & Kumari 2014; Perera, Vidanage & Kallesoe 2005; Senaratne & Wickramasinghe 2011; Somaratne et al. 2005). This was creating several issues when providing irrigation water, demarcating the irrigation channels and bush clearing of channel and tank surroundings and so on. The other important aspects are the siltation of tanks beds due to land preparation activities and mixing of agrochemicals to tank water by cultivating reservation and watershed areas. Restoration of tank reservation and banding of encroaching watershed areas will prevent further deterioration of the tank systems and it will facilitate healthier irrigation systems to hold and deliver irrigation water to agricultural activities (Jayawardena 2014).

Box 1: Success Story of Thammita Tank

Thammita tank is located in Kurunegala district. Previously, the farmers had to face frequent crop failures due to water restrictions mainly arose with the reduction in tank water retention capacity and increasing number of cultivation extent. Due to this vulnerable situation, it was hard to appoint office bearers for the FOs as well. As a result of continues requests made by the President of the FO, farmers and local level officials, this tank has been selected for the de-siltation project. At the beginning, FO made the people aware of the project through participatory meetings. However, their participation in the project activities was poor at the initial stage. But with time, many people actively participated in achieving the task.

To increase the efficiency of the work, transportation of removed silt was limited to 1km distance from the tank. Other than selling for private users, the removed silt has been used for rehabilitation of tank-bund, developing roads of the school, temple and cemetery free of charge. FO took over the supervision of machine operators. They appointed one FO member for each machine as a supervisor. Initially, the loads of silt were counted referring to the number plates of vehicles. However, since it was not possible to continue the system they started tracking the silt loads by an alternate method using tokens. From the income generated by selling silt loads they were able to make the payments to drivers as well as to strengthen the finances of the FO. The project has de-silted 24 acre feet of the tank with the financial contribution of respective FO in addition to government funds. The project was completed within 29 days.

Because of the project, about 250 farmers are benefiting. At present they cultivate 250 acres with paddy as the main crop. The FO was able to acquire tank reservation area that has being used for illegal cultivations.

Farmers and FO officials were actively participated in all activities in de-siltation throughout the process. A water regulator (*Jala Palaka*) has been appointed for the better water management with the financial contribution of FO. An aquaculture project has been started with 1500 prawns and 5000 fish with the FO funds. The villagers received new places around the tank for their washing purposes.

De-siltation process of the Thammita tank can be identified as a success project that have been achieving great benefits from joint collaboration of farmers and Irrigation Department.

Box 2: Kuda Bellankadawala Tank (Mahaweli Anuradhapura)

Eighty three farmers are being benefited by Kuda Bellankadawala tank. While paddy cultivation is also taking place, the major cultivation under the tank is other field crops. The main request of the FO was de-siltation as well as to remove unfavorable aquatic plants which were highly spread all over the tank. The de-silting process continued for 24 days. Twenty persons were engaged in de-siltation per day over the period, and it was supervised by the FO. Other than that, the organization was involved in farmer-awareness programme, supplying of food for machinery operators, counting of silt loads and finance management. An excavator and five trucks have been used for de-siltation, and the process was done according to farmers' need. The tank-bund has been mounted from 8 feet to 15 feet, and the tank-spill has been renovated to avoid the damage to a house caused by spilled water, using removed silts. They have charged Rs.300/= for each load of silt, and provided free of charge for public places. A paddy field flooded at full supply level of the tank due to a leakage of the spill, has been raised and reconstructed. The removed silt has been used for the temple, public hall, 1.5 acres of land and for road development.

The de-siltation project has removed the barrier to carry adequate water for cultivations upto a certain extent. Previously it supplied water only for a part of Yala and Maha seasons. Presently with the intervention assured water supply has been ensured in both seasons. The ability of acquiring illegal cultivated lands in many reserved areas to the tank is significant. The expansion of the perimeter of the tank due to the removal of aquatic plants is also important.

The de-siltation project has satisfied the farmers, and the success of the project is a result of their awareness, dedication and the unity of their farmer organization.

Box 3: Hudaliyawa Tank (Hudaliyawa *Maha Wewa*)

There are 225 acres of cultivated lands under the Hudaliyawa tank which spreads across 113 acres. Though farmers coming under Hudaliyawa tank cultivate lands in *Maha* season, they usually do not cultivate in *Yala* season due to severe shortage of water.

The decision of selecting the Hudaliyawa tank for the de-siltation project was taken by the Agricultural Committee of Divisional Secretariat. The villagers were engaged in de-siltation by themselves from the start of the project. The objective of their decision was to draw the allocated funds of Rs. 500,000 to the village. They have paid Rs.400 per person for the work in one plot. But when they realized the difficulty of the task only with man power, they had shifted to machinery. The removed silt has been used only for the bund. According to the farmers, the tank has de-silted for around 1 acre-feet. As this is a large tank and only a small amount of silt is removed, the project could not able to increase the tank's capacity to a significant level.

The farmers are not fully satisfied with the result of de-siltation project, as the amount of silt removed was not adequate to store adequate amount of water to cultivate in *Yala* season. However, farmers accept that animals have benefited with the availability of ample amount of drinking water during dry periods, after the project.

The farmers require further de-siltation, and rehabilitation of the tank-spill to facilitate farm families with sufficient water for their cultivations.

CHAPTER FOUR

Conclusions and Recommendations

4.1 Conclusions

Due to accelerated nature of the project, implementation agencies have faced many difficulties such as proper selection of tanks, finding machinery and getting sufficient involvement of FOs when implementing the programme. Due to that some of the tanks' de-siltation work was not completed as planned.

In majority of the tanks, de-siltation work has mainly increased the dead storage of the tanks. Due to increased dead storage farmers have been able to meet their domestic water requirement as well as water for animal husbandry during water scarce periods.

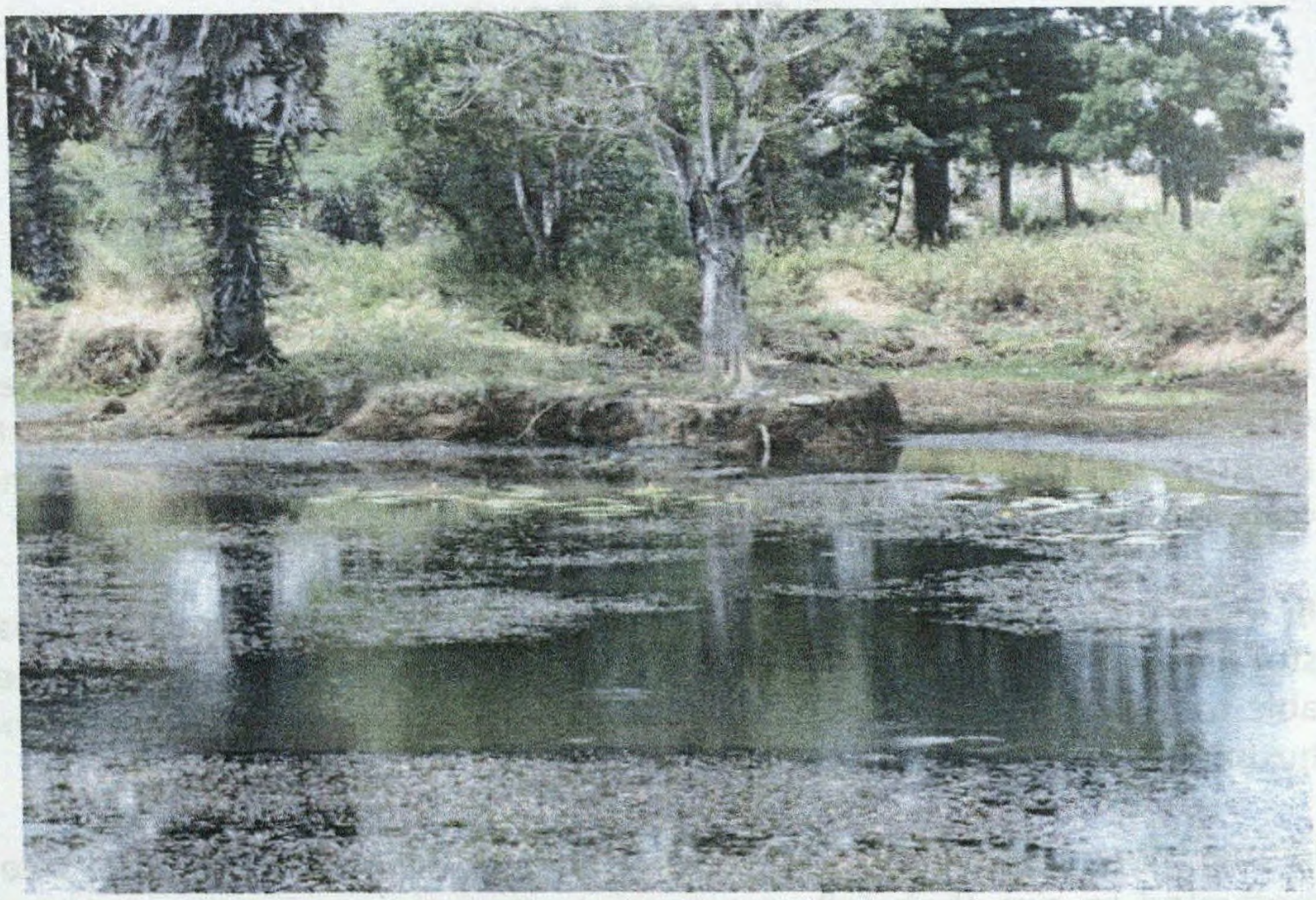
Farmer organizations have felt the project as their own and have been motivated to give their fullest support to it as the project has accepted their involvement. The programme has contributed towards improving their leadership qualities as well. Reservation demarcation, important rectification, and watershed restoration are some other achievements of the project.

4.2 Recommendations

1. Proper planning including expert technical knowledge as well as knowledge and experiences of the beneficiaries are must to gain maximum benefit for the investment.

2. It is vital to give due importance to community awareness component, before project implementation, to get beneficiaries' active involvement and to share responsibilities.

3. De-siltation programmes should be implemented as a gradual but continuous programme, so that it will be useful in sharing lessons, finding physical and human resources. It will further allow better use of de-silted sand.



A de-silted tank in Kurunegala District

The research team having a discussion with farmer organization representatives in Thambuththegama

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ISBN:978-955-612-211-4

9 789556 122114

PRICE LKR 220/-

Department of Government Printing

National Digitization Project

National Science Foundation

Institute : National Science Foundation

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