Socio Economic Changers effect from The Renovation of small Tanks in Dry Zone in Sri Lanka (Case Study In Galgamuwa D.S Division)

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Abstract
Small tanks in Sri Lanka are those having an irrigated command area of 80 ha (1 ha = 2.47 acres) or less. They must be treated as single systems as most of these individual tanks meet irrigation water requirements of one village or one command area. Small tanks consist of a tank bund, sluice or sluices, a spillway, and main and field channels. There are 30000 small tanks in Sri Lanka, and 48 present are abandoned. From annual paddy production 18 present covered by the command area under small tanks. Three –fold land use system is traditionally practiced in small tank villages .They are Gangoda or home gardening , Chena or shifting cultivation and paddy cultivation. In small tank villages, smallholders produce paddy manly for home consumption. Total annual household cash income from selling paddy was only 11 present. Paddy cultivation in small tank villages is quite modernized. All works are mechanized. Farmers used improved paddy varieties. Three major social groups live under small tanks in Galgamuwa. Majority is Sinhala. Kanna meetings (grooving season) are organized by farmers associations. The kanna meeting is a mechanism through which cultivator can reach a general consensus on fixing working dates, selecting paddy varieties , extent of command area to be irrigated, preparing a cultivation calendar, preparing irrigation schedule for issue water, putting fences around the command area and put up watch huts and others. Land erosion and silt sedimentation in tank, vegetation cover on the tank, Land fragmentation, not enough water for two growing season, and elephant attacks are major problems in small tank villages.

Key words: Small tanks. Paddy cultivation, Renovation, Economic condition

Introduction

Small tanks are used for collecting runoff water during the monsoon for irrigation and domestic water supply. They are created by constructing an earthen bund across a natural drainage basin. According to Thennakoon (2002), Aheeyer (2005) and Ausadahami (1999), tanks are developed in response to the need for more intensive cultivation when traditional forms of extensive cultivation can no longer support the growing population.

Tank irrigation systems are not unique to Sri Lanka, they are found in other Asian countries, including Myanmar, Thailand, Cambodia, and India. Within India, tanks are used primarily to irrigate paddy and are found mainly in three southern states, Tamil Nadu, Karnataka and Andhra Pradesh. According to Farmer (1954), tank irrigation systems of Tamil Nadu have a similarity to those of Sri Lanka because of their close climatic resemblance in terms of seasonal variability and ineffectiveness of rainfall. There are about 3900 tanks in Tamil Nadu state (Saktivadivel et.al, 2002). These tanks fall into two categories: system and non system tanks. System tanks receive Supplementary water from nearby major rivers or reservoirs in addition

to collecting water from their own catchment area; for non system tanks the only source of water is runoff water from their own catchment area (Palanisami,1982) . Minor tanks in Sri Lanka fall into the latter category as their storage of water depends entirely on direct rainfall and runoff water from their own catchment area. According to Somasiri (1979) yield from these catchment areas depend on "the moisture condition of the soil profile in the catchment (area) and the intensity – duration relationships of the rainfall".

1.1 Objectives

General Objective

By identifying the factors that affect the social make-up of the region it is hoping to propose suitable and viable methods to adopt in renovating the small-scale tanks which will sustain

Specific Objectives

1. to study the factors associated with existence and intention of the tanks.
2. to quantify the outcomes resulted from the renovation of tank on the social make-up of the region.
3. To comparatively assess the benefits and demerits of renovating activities in terms for economic dimensions.

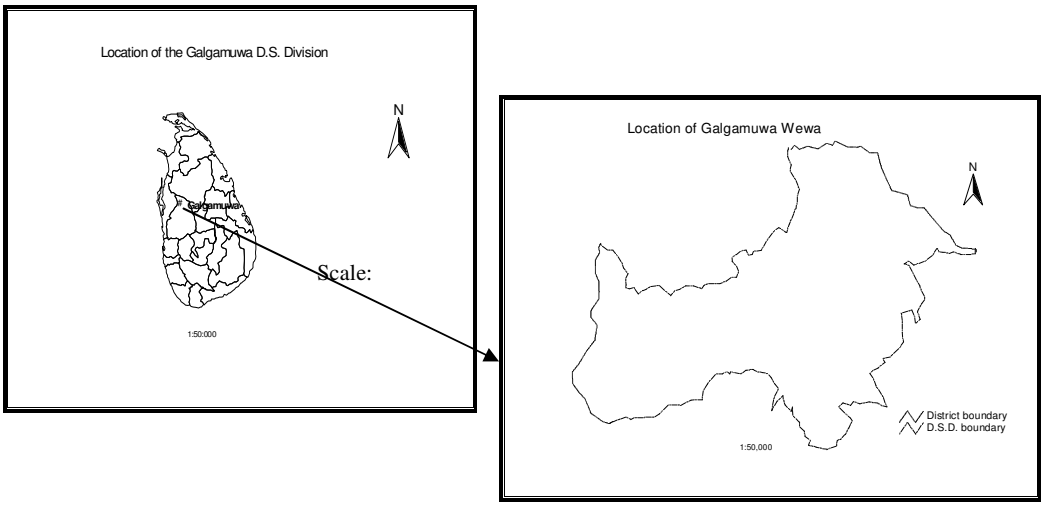
Methodology

Study area

The selected site is located in Kurunegala District of North West Province covering an area of 278km. The area is representative of a wider agro ecological region known as the Lowland Dry Zone, which experiences high levels of rural poverty associated with short rain fed growing seasons and degrading, nutrient-poor red soils. North West Province is the Province in Sri Lanka most richly endowed with small-scale tank systems which situated betweenand $7^0$50' north latitude and $8^0$15' and 79 ^{0}67' and $80^0$45' East longitute and 300m above sea level.

Location of the Galgamuwa D.S Division

Figure 1



Source -: D.S Office, Galgamuwa

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The Division has 182 nos. of small villages and 62 nos. of Gramaniladhari Divisions with the number of service Institutes such as Police Stations, Banks, Schools, Hospitals, etc;

Methods used for Data collection

The study has being used primary and secondary data to collect the information. Primary data refers the data which researcher collect by individually with his own survey. There are several techniques to collect primary data.

- Questionnaire Method
- PRA
- Focus Group Discussion
- Interviewing
- Observing

Secondary data refers the data which were directly taken from Government or Private Publications. They are also several types.

- Government Publication
- Institutional Publications
- News Magazines
- Journals
- Internet

Primary Data

The primary data for this research will be conducted by the questionnaire method. Each questionnaire will be filled by the researcher while he discuss with the people in towel small tank villages, selected using stratified random sampling techniques (table 1,2,3 and 4) .Further Focus group discussion may be including in the primary data. It also make discussions with group of people while supervise the tank environment. Those facts also collected for this research paper.

Next primary data method is Field observation; the researcher will get an idea about the exact field by observing them.

Selection method for Tank samples(Step I)

Table 1

No of farmers Command area (Akers)	0 -29	30 - 59	60 - 89	90 - 119	120 - 149	150 - 189	190 - 209	Total
0 – 17	25	4	1	0	0	1	0	31
18 – 35	16	10	2	0	0	0	0	28
36 – 53	1	7	2	0	0	0	0	10
54 – 71	0	2	1	0	0	0	0	03
72 – 89	0	0	0	3	0	0	0	03
90 – 107	0	0	0	0	0	0	1	01
108 - 126	0	0	0	1	0	0	0	01
Total	42	23	06	04	00	01	01	77

If there is not fill standard sells for suitable sample, table must be radius as follows.

Selection method for Tank samples(Step II)

Table 2

No of farmers Command area (Akers)	0 - 59	60 - 119	120 - 189	190 - 249	Total
0 – 35	55	3	1	0	59
36 – 71	10	3	0	0	13
72 – 107	0	3	0	1	04
108 – 143	0	1	0	0	01
Total	65	10	01	01	77

Selection method for Tank samples(Step III)

Table 3

No of farmers Command area (Akers)	0 - 59	60 - 119	120 - 189	190 - 249	Total
0 – 35	55/77 ×12 = 8	0	0	0	08
36 – 71	10/77× 12 = 2	3/77 × 12 = 1	0	0	03
72 – 107	0	3/77 × 12 = 1	0	0	01
108 – 143	0	0	0	0	00
Total	10	02	00	00	12

Name of selected tanks using random table and no of selected farmers for sample

Table 4

In no	Random No	Name of The Tank	No of Farmers	Command area (Akers)	no of selected farmers for sample
01	118	Pahala Pulachchiya wewa	58	08	15
02	87	Ihalagama wewa	13	08	3
03	41	Pahala koon wewa	31	34	8
04	05	Ihala Palukendawa wewa	40	12	10
05	11	Ottukulama wewa	18	18	5
06	83	Dullawa wewa	49	30	13
07	16	Kurundankulama wewa	35	35	9
08	10	Monnankulama wewa	46	27	12
09	02	Pahala Palukendawa wewa	35	35	9
10	29	Bulnewa wewa	59	54	16
11	90	Medawachchiya wewa	105	71	27
12	93	Mahagalkadawala wewa	90	75	23
		Total	579		150

Secondary data

It will do by using Government reports, periodicals & other publications which have published by Government or any other institutions.

The divisional secretariat office Galgamuwa also vital in providing data for the research

And also the agrarian office and other sub institution which relevant to farmers affaires provide much secondary data.

The internet also helpful in supplying data for this research

Results and Discussion

The effect of tank renovation over the economic development of small tank villages.

When concerning on the people of small tank villages of dry zone, Sri Lanka agriculture is the main career path of living of much of them. Hence, all the activities of them are connected with the tank. Therefore, the renovation is directly connected with their economic activities.

It is expected positive changes of the economy of tank villagers through the renovation of a small tank by either state or NGO.

It is expected to clarify from here the economic changes, which have occurred within past 15 years in Galgamuwa divisional secretariat after the small tank renovation.

The table 6.29 below shows economic activities of the people who live in 12 tank villages randomly selected from Galgamuwa divisional secretariat.

Table 5 Attending Economic Activities Depending Small Tanks

Economic Activities		Before Renovation				After renovation			
		Attend		Not attend		Attend		Not attend	
		No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1	Paddy cultivation	150	100	0	0	150	100	0	0
2	Highland crop cultivation	131	87	19	13	122	81	28	19
3	Fishery	37	25	113	75	50	33	100	67
4	Flower selling	14	9	136	91	9	6	141	94
5	Lotus roots selling	9	6	141	94	8	5	142	95

Source -: Questionnaire survey 2007

As per, 100 % of people by the sample selected have cultivated rice after the renovation as before. The percentage of farmers in high land crop cultivation has reduced to 81 % from 87 % after the renovation. The reason for that is the use of highlands for the paddy cultivation on the efficiency of the tank water. Here, the data range of highland crop cultivation includes paddy cultivation areas and other annual cultivations. Accordingly, 6 % of farmers who used their land for annual crops before have changed to cultivate paddy after the tank renovation.

When considering fishery community of tanks it is revealed that 25 % of them have used the tank for fishery before the renovation. It has grown to 33 % after the renovation. The main reason for that is the direct use of Madawachchiya tank for fishery after the renovation. It can be seen that all the people of fishing community connected with the tank participate to the process of fishery.

Selling of lily, lotus, and manel for money can be seen in less in tank surrounding area. Especially more flower can be sold on full moon poyadays. On other days they have, the ability to supply flowers to Anuradapura pilgrim site through flower collectors .but very less people is doing this. The percentage of flowers have reduced from nine %(before) to 6 % after the renovation. Limitation of flowers by removing the vegetation cover in renovation process can be identified as one reason for that.

Although flower sellers live in the tank surrounding area in dry zone, they do not possess to the farmers community of tank villages. It should be mentioned that they are not connected to the economy of the tank community.

The selling of lotus roots happens in dry periods. Six% has involved in that before the renovation and 5% after the renovation. It could be confirmed by field visits that much of tank community takes lotus roots for their consumption and not for a financial gain. As mentioned before the economic activities of small tank villages happens by taking the tank as the base.There,various economic activities happen by using resources of the tank. Paddy cultivation is the main activity of that. Annual crop cultivation, flower selling, lotus root selling, and fishery are the other main activities among the other activities of income generating.

Income of Paddy cultivation Depending Small Tanks

Paddy cultivation is mainly done by using the supply of tank water. The rainy water that collected in to the tank within 4 to 5 months of rainy period is removed in regular manner to the paddy cultivation areas. In some cultivation terms, (Kanna) rainy water can be used for basic field preparing. The table 6 below shows the ideas of the farmers about the paddy cultivation income.

Table 6 Income generation types Depending Small Tanks

Income generation types	Steps of Renovation	Farmers idea				
		1 Very good	2 Good	3 No change	4 Decrease	5 Not attend
		Per cent				
Paddy Cultivation	Before Renovation	1	85	4	9	1
	After Renovation	**75**	**13**	**10**	**0**	**1**
Highland crop Cultivation	Before Renovation	1	80	1	4	14
	After Renovation	**6**	**7**	**69**	**3**	**15**
Fishery	Before Renovation	0	9	2	11	78
	After Renovation	**15**	**13**	**2**	**1**	**69**
Flower selling	Before Renovation	1	9	0	0	90
	After Renovation	**1**	**1**	**1**	**2**	**95**
lotus roots selling	Before Renovation	1	4	0	1	94
	After Renovation	**1**	**1**	**2**	**1**	**95**

As per that only 1 % of farmers said that paddy cultivation income was good before the renovation where it has increased to 75 % after the renovation. Nine% said that income was low before and no one in that idea after. It should be specially mentioned here that while the positive effects on the paddy cultivation resulted by the renovation as the ability to cultivate in both terms (Kanna) and having a good crop on the timely water supply have been the main reason for the increase of income, other external reasons too has caused to it. That is the price increase of rice in the local market 2005/2006.Although there is a price increase the relevant good condition for the increase of rice production is caused by the tank renovation. The table 7 below shows the monthly income of paddy cultivation.

Table 7 Monthly Income of Paddy Cultivation Depending Small Tanks

Income		Before Renovation		After Renovation	
		No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1	< 2500	57	38	28	19
2	2500 -5000	45	30	32	21
3	5000 - 7500	26	18	46	31
4	7500 - 10000	8	5	15	10
5	100000 <	14	9	29	19
	Total	150	100	150	100

Source -: Questioner survey 2007

As per the above table, 38% of farmers had an income below Rs.2500 and it has reduced to 19 % after the renovation. Before the renovation, 17% of farmers had an income between Rs.5000 to 7500 and it has increased to 31% after the renovation. The income group over Rs.10000 of income represented 9% before the renovation and after it was 19% as per the table. (Monthly income has reached by dividing the annual; income by 12)

Income of Highland crop Cultivation Depending Small Tanks

Other annual crops have been considered here as highland crop cultivations. Sometimes the paddy fields too have been used for this. The main annual crops are Mun, kawpi, chillies, Oil seeds, and Sorgum .the farmers have compelled to cultivate these crops, as there is no need of much water supply for that. While 21% of farmers in the sample were not involved in annual crops cultivation all the farmers involved in annual crops have done the paddy cultivation. The table 6 above shows the data relevant to the ideas of farmers on annual crops cultivation before and after the renovation.

While only 1% of farmers said that, the income from annual crops before the renovation was very good it has increased to 6% after the renovation as per the table. As per the idea of 80% of farmers, the income was good before and 69 % said no change has happened even after the renovation. Accordingly, it can be seen the tank renovation has not seriously affected on highland crops cultivation. It was further confirmed by the hypothesis test done under a 95 % of significant level. (Annexure 1)

However, 8% of farmers had an income above Rs.2500 before the renovation and it was 36% after the renovation. The income group below Rs.1000 has reduced to 1% from 5% when comparing before and after levels of renovations. The main reason for that was the price increase in the local market. (Table 8)

Table 8 Monthly Income of Highland crop Cultivation Depending Small Tanks

Income		Before Renovation		After Renovation	
		No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1	No income from this category	20	13	24	16
2	< 1000	8	5	2	1
3	1000 -1500	54	36	7	5
4	1500 - 2000	7	5	20	13
5	2000 - 2500	48	32	43	29
	2500 <	12	8	54	36
	Total	150	100	150	100

Source -: Questionnaire survey 2007

Income of Inland fishery industries Depending Small Tanks

The fish species are much suitable for the meal.Thilapia, korali and Lula are special among those.Thilapia, korali live in the tank by changing to the conditions that has been faced by tanks like siltation, water pollution, and growing of vegetation cover .there is a good demand in the local market for tank fish. Large scale of supply is done by large reservoirs and large tanks to meet the demand in the market. Small tanks are used to meet the day-to-day demand in rural areas. The fishery in the small tanks in Galgamuwa area is done by irregular manner and in small scale. The tank villagers of above area are dislike for the fishery as a policy in their life. Hence, normally the outsiders make use the fish resources. The most of anglers met in the field visits are not connected to the above tanks. The tank village community does not pay any objection for outsiders about the fishing (more often by a caching fish using sticks) in the tank. They buy fish Most of times from outsiders.

However, the fish resources are seen to be used in resent time. Especially, there is a positive trend of using fish resources associate with Mahagalkadawala & Madawachchiya tanks that are included in the study sample. Out of them, small fish are left to Madawachchiya tank in the direct involvement and supervision of the farmers' society of the tank.Afterthat the tank is defended from outside users. In dry periods fishery is done by members of the farmers' society themselves. The money generated by selling fish resources of large-scale is equally divided within members and another part is credited to the account of the society.
However, It cannot be seen such a regular procedure associate with much of tanks. However, there are some small-scale anglers in small tank areas. The table 9 shows the data on above prepared after inquiring farmers included to the sample.

Table 9 Monthly Income from Fishery Depending Small Tanks

Income		Before Renovation		After Renovation	
		No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1	No income from this category	117	78	104	69
2	< 500	2	1	0	0

3	500 -1000	22	15	22	15
4	1000 - 1500	9	6	15	10
5	1500 <	0	0	9	6
	Total	150	100	150	100

Source -: Questionnaire survey 2007

It is clarified that 78% of farmers in the sample of 150 had no income from fish resources of the tank before the renovation. After the renovation such no income holders have reduced to 69%.There are 155 of farmers within the income range from Rs.500 to Rs.1000 even after the renovation as before. After the renovation 6% of farmers has been able to gain a monthly income, exceeding Rs.1500.the table 6 reveals the attitudes of tank fishing community on the income from fishing.

The table 6 above clarifies that the farmers have been able to gain a better income from fishery after the renovation than before. While there was no one to say that income to be very good the percentage of farmers that possess above idea have been 15% after the renovation. It was further confirmed by the hypothesis test done with a 95% significant level that there was a growth of income from fishery after the renovation. (Annexure 1)

Income of Flower selling depending small tanks

As mentioned before in this chapter it have to be mentioned that the most of families selling flowers don't possess to the tank village farmers community although they live in associate with tanks in the dry zone. However, some people in tank villages gain some monthly income from flower selling as per the table 6.

Income generating from flower selling has been weakened after the renovation as per the table. The removal of vegetation cover has caused to it. Above fact was further confirmed by the hypothesis test done under a 95% of significant level (Annexure 1).

Income of lotus roots selling depending small tanks

It was mentioned earlier that selling of lotus roots happens in dry periods.6% of farmers has involved in that before the renovation and it has reduced to 5% after the renovation as per the table 6. There is no change has happened in the income generating from lotus roots selling after the renovation as per the hypothesis test done under a 95% of significant level.(Annexure 1)However there are lot of people in tank villages who cut down monthly expenses by having lotus roots for their meals when the tank is gone dry.

Cost of living of small tank community

It is discussed from here that how the small tank renovation has affected on the expenditure of above tank community. As per the changes of spending is analyzed on before and after the renovation basis. Accordingly, the main attention has paid on the spending of foods. That information is shown in the table 10 that was prepared based on the questionnaire survey.

The monthly spending on foods has exceeded Rs. 1000 even after the renovation as before as per above information. There is no family who spends below Rs. 2000 for their meals after the renovation, as there were 18% of them before the renovation.58percentage of families has spended over Rs.3000 for their meals before the renovation and it has increased to 88% after the renovation. As the main reason for that is the price increase of the foods in daily basis, the positive changes of the living status resulted by the tank

renovation too affected for this. It was further confirmed by the T-test done under a 95% of significant level. (Annexure 2).

Table 10: Types of monthly cost

Types of monthly cost	Steps of Renovation	Farmers idea						
		Less than 1000	1000 - 1500	1500 - 2000	2000 - 2500	2500 - 3000	3000 or more	There was no cost
		Per cent						
Food	Before Renovation	0	1	17	5	19	58	0
	After Renovation	**0**	**0**	**0**	**2**	**10**	**88**	**0**
Clothes	Before Renovation	51	46	1	1	0	1	0
	After Renovation	**21**	**60**	**15**	**2**	**1**	**1**	**0**
Agriculture activities	Before Renovation	13	28	25	5	11	18	0
	After Renovation	**1**	**18**	**17**	**12**	**10**	**42**	**0**
Education	Before Renovation	48	22	8	1	0	2	19
	After Renovation	**25**	**29**	**9**	**0**	**5**	**1**	**31**
Money deposits	Before Renovation	21	15	6	0	1	2	55
	After Renovation	**13**	**14**	**13**	**0**	**4**	**3**	**53**
traveling	Before Renovation	78	17	3	1	1	0	0
	After Renovation	**36**	**42**	**10**	**9**	**3**	**0**	**0**
Other activities	Before Renovation	19	45	4	26	4	1	0
	After Renovation	**15**	**7**	**13**	**33**	**26**	**6**	**0**

The monthly cost for cloths is represented in the table 10 prepared from dividing the annual expense of tank community for cloths by 12.As per that 51% of tank village families has spended below Rs.1000 for cloths. However, after the renovation 15% of farmers have been able to spend Rs. 1500 to 2000 monthly for cloths while 2% of them spend over Rs. 2500 for that purpose. As per that, it is shown that there has been a positive economic change of families to spend for cloths more than before. As The price, increase of commodities caused to the increase of expenses on cloths there is not a serious price increase of cloths in the local market over the past 10 years. Further, the T-test has confirmed above facts on a 95% of significant level. (Annexure 1)

Much of tank villagers are farmers. Hence, they have to spend some money for agricultural needs. Although those expenses are investment, nature these are considered as expenses in the normal course here. These investment nature expenses has increased with the ability to involve more than before after the renovation. Here, the monthly expense is prepared from dividing the total expense of both cultivation season (YALA & MAHA Season) by 12 and that data has been included in the table 10.

It is natural that more expenditure has to be spend for preparing agro lands, seeds and chemicals when the prices of commodities going up. However, with the governments higher subsidy on chemical fertilizer, which is the highest expense in agro activities from 2005 agro expenditure, controlled hard. It is shown by the percentage of farmers being 42% who spends more than Rs.3000 per month for agriculture after the renovation that there is a growth of agricultural activities after the renovation Recultivation of abandoned paddy lands and cultivate both season without abandon are the main reasons for that. The t-test done under a

95% of significant level has further confirmed that there is a growth in the expenses on agricultural needs after the renovation. (Annexure 1)

When analyzing the education status of Sri Lanka by 2000 C.E. it can be seen that the educational level of dry zone districts is relatively weaker than other districts of the island. The situation of lonely tank villages is much worse. However there can be identified some positive changes of this situation in resent years. The communication growth, knowledge of the community and extra attention of the government are the main factors for that. However, the education expenses of the tank village people are relative to their monthly income. Before the renovation 48% of them have monthly spend below Rs.1000.(table 10) After the renovation 44% of families spend more than Rs.1000 monthly and more than half of others have no educational expenses.

The above facts were further confirmed by the T-test performed under 95% of significant level that there is a growth of educational expenditure after the renovation. (Annexure 2)
Although it is an investment, that saving money at banks or other financial institutions it has been considered as an expense category in this study. Most of farmers in tank villages have no ability to save money, as they are low-income holders. It can be understood by analyzing the table 10 below.55% of farmers have not invested in deposits before the renovation and that rate has reduced to 53% marginally after the renovation. Before the renovation, there were 9% of families who have invested over Rs. 1500 on deposits and their portion has increased to 20% after the renovation. That means the saving ability of them has grown compared to before. This is caused by the high paddy crop gained through cultivating both cultivation seasons having a good price for rice than before.

The above facts were further confirmed by the T-test performed under 95% of significant level that there is a growth of saving money after the renovation. (Annexure 1)

Bus fares for traveling purposes, fuel charges of motor bikes, three wheels and such kind of vehicles used for traveling purposes have been considered as traveling cost .78% of families have monthly spend over Rs. 1000 for traveling before the renovation. After the renovation 42% of families have spend Rs. 1000 to 1500 and 10% of them have spend Rs.1500 to 2000 as traveling cost. Although only 2% have spend over Rs.2000 for traveling before the renovation it has increased to 12 % after the renovation.(Table 10)This increase has been caused by no only by the growth of quality of life as a result of positive changes of tank renovation but also the price increase of the fuel in resent time.

The above facts were further confirmed by the T-test performed under 95% of significant level that there is a growth of traveling cost after the renovation. (Annexure 1)

Except the main needs clarified above the monthly expenses of all the other wants has been included under the category of other expenses. As per that 68% of families have spend less than Rs. 2000 for other wants before the renovation.65% of families have spend more than Rs. 2000 for that purposes after the renovation. This situation has been caused by compelling to buy bikes, TVs, refrigerators etc.from the money gained by selling products including rice at once. (Table 10)
The above facts were further confirmed by the T-test performed under 95% of significant level that there is a growth of other cost after the renovation. (Annexure 1)

6.12 The impact of the tank renovation on the changes of the living status.

The basic attention is paid on the nature of the houses of tan village families. As per that, it has been analyzed by paying concern for the condition of the house and changes and conditions of the roof, floor area, and walls before and after the renovation. Details of the roof condition before & after the renovation are presented in the table 6.44. 12% of families have lived in houses with coconut leave shelters before the renovation & it has decreased to 3% after the renovation. 68% of families have lived in tiled roof houses before the renovation & it has increased to 75% after the renovation. As per the data in the table 6.44, the condition of the roofs has gained some improvement after the renovation. However, when considering the result of the hypothesis test done under a 95% of significant level there is no significant improvement of the condition of house roofs after the renovation of tanks. (Anexthre2).

Table 11 Condition of Houses Before an After Small tanks renovation

Parts of house	materials	Before renovation	After renovation
		House presentage	
Roof	Coconut leaves	12	3
	Shelter (Takaran)	15	15
	Tiles	68	75
	Asbestos	5	7
Wall	Mud (Warichchi)	28	17
	Wood (Lali)	0	0
	Bricks	72	83
	Block bricks	0	0
floor	Mud and cow done	41	23
	Cement	58	76
	Terraso	0	0
	Flow tiles	1	1

Before the renovation, 28% of houses were made of mud walls. It has reduced to 17% after the renovation. The percentage of brick wall houses that consisted 72% has increased to 83% after the renovation (table 11). However, when considering the result of the hypothesis test done under a 95% of significant level there is no significant improvement of the condition of house walls after the renovation of tanks. (Anexthre1).

Forty one per cent of houses was floored by mud & cow done before the renovation.it has reduced to 23% after the renovation. The percentage of cement floored houses that consisted of 58% has increased to 76% after the renovation(table 11).However, when considering the result of the hypothesis test done under a 95% of significant level there is no significant improvement of the condition of house floors after the renovation of tanks. (Anexthre1).

Although there is, no significant improvement has happened in the condition of roof, wall and floor area of the houses after the renovation as clarified above there is a significant increase in square feet of houses after renovation of tanks as per the table 12. The floor area of 27% of houses was more than 1000 squire feet before the renovation. It has reduced to 31% after the renovation. In addition, the result of the hypothesis

test done under a 95% of significant level further confirms that there is a significant increase in square feet of houses after renovation of tanks. (Anexthre2).

Table 12 Floor area of Houses

Floor area	Before renovation		After renovation	
	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
<500 square feet	27	18	20	13
500 - 1000 square feet	82	54	84	56
1000 - 1500 square feet	38	25	42	28
1500 square feet <	3	2	4	3
Total	150	100	150	100

Source -: Questionnaire survey 2007

There arise some advantages by the tank renovation such as ability to supply water efficiently into the cultivation lands because of increasing the water capacity of the tank, zero wastage of the water. As a result, both terms can be cultivated. In addition, there was a good price for rice in resent past. The farmers have the ability to make some changes of their houses as they have received lot of money by selling paddy crop at once. They have almost tried to build a house larger than their existed small house. That small house was a bricks made one as the price of the bricks in Galgamuwa area is low and their ability to make bricks themselves. That was the reason to differ the new house from old one only by squire feet and not by the quality.

Although 9% of tank villagers used temporary dug as the lavatory before the renovation it was not existed after the renovation. However, as per the data received (table 13) and as the result of the hypothesis test done under a 95% of significant level there is no significant change in lavatory use after the renovation of tanks. (Anexthre1).

Table 13 Lavatory Condition

Types of lavatory	Before renovation		After renovation	
	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1 Temporary dug	13	9	0	0
2 Permanent dug	79	52	31	21
3 Water seal(inside)	58	39	119	79
4 Water seal(inside)	0	0	0	0

5 common Lavatory	0	0	0	0
6 Forest	0	0	0	0
7 Upper side of tank (Thaulla)	0	0	0	0
Total	150	100	150	100

Source -: Questionnaire survey 2007

The impact of the tank renovation over the development of infrastructures.

When renovating the tanks attention is paid on the development of rural roads. Much of rural roads have made on the tank bund. That has been one of the reasons for the development of the roads. Reconstruction of roads is done by farmer's societies in connection with annual tank bund reconstruction organized by them. Hence, the tank renovation has a direct impact on the development of access roads to the village. The condition of the access roads of tank villages before and after the renovation is shown in the tables 14 and 15.

Table 14 Road condition (Major roads)

Road condition	Before renovation		After renovation	
	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1 Carport	0	0	0	0
2 Tar	86	58	86	58
3 concrete	0	0	5	3
4 Gravel	25	16	51	33
5 Without gravel	39	26	8	6
6 Foot roads	0	0	0	0
Total	150	100	150	100

Source -: Questionnaire survey 2007

The table 14 above shows the condition of main roads in the area. As per 3% of roads has been concreted after the renovation and gravel road percentage has grown up to 33% from 16%.

Table 15 Road condition (Minor roads)

Road condition	Before renovation		After renovation	
	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
1 Carport	0	0	0	0
2 Tar	1	1	1	1
3 concrete	0	0	6	4
4 Gravel	40	27	74	49
5 Without gravel	104	69	65	43
6 Foot roads	5	3	4	3
Total	150	100	150	100

Source -: Questionnaire survey 2007

Four% of minor roads have been concreted after the renovation and gravel roads have increased to 49% from 27%.

Service centers development

Table 16 Service centers

	Before renovation				After renovation			
	Yes		No		Yes		No	
	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent	No of farmers attend to the survey	Per cent
Agro selling centers	53	35	97	65	66	44	84	56
Garment selling centers	8	5	142	95	11	7	139	93
Education training centers	3	2	147	98	4	3	146	97
Week fair	13	9	137	91	13	9	137	91
Vocational training centers	3	2	147	98	4	3	146	97
Barber/Tailor	43	29	107	71	53	35	97	65

Source -: Questionnaire survey 2007

When inquiring the development of service centers, which supply day-to-day needs of the people of the area, it could be seen that no significant change has happened of them. (Table 16) The use of Galgamuwa town by much of the people to get fulfilled the needs has been the reason for that. Hence, there is no space to start or operation service centers successfully.

The trend of use of the tank for various tasks.

There is lot of uses of the tank not only the water supply to the paddy cultivation. A study is shown below done with the use of Matrix ranking method, which is a PRA Tool to measure the trend of use the tank for various tasks before and after the renovation. As per that, the tasks, which can be done efficiently, and effectively using the tank have been ranked in the priority basis. (Tables 17.and 18)

Table 17 Name of selected tanks using random table and no of selected farmers for sample

In no	Random No	Name of The Tank	No of Farmers	Command area (Acres)	no of selected farmers for sample
01	118	Pahala Pulanchiya wewa	58	08	15
02	87	Ihalagama wewa	13	08	3
03	41	Pahala koon wewa	31	34	8
04	05	Ihala Palukendawa wewa	40	12	10
05	11	Ottukulama wewa	18	18	5

06	83	Dullawa wewa	49	30	13
07	16	Kurundankulama wewa	35	35	9
08	10	Monnankulama wewa	46	27	12
09	02	Pahala Palukendawa wewa	35	35	9
10	29	Bulnewa wewa	59	54	16
11	90	Medawachchiya wewa	105	71	27
12	93	Mahagalkadawala wewa	90	75	23
		Total	579		150

Source -: PRA survey 2007

Table 18 Tank Usage Capacity (Before Renovation)

Tank use activity / Tank Name	Paddy Cultivation	Seasonal crop Cultivation	Highland Perennial crop cultivation	Fishery	Lotus flower	Lotus roots	Bathing	Drinking Water	Other Domestic Use	Ground water level Development	Recreation	Animal Bathing	Vehicle Washing	Total Marks	Rank For Tank
Pahala Pulanchiya wewa	4	3	3	3	4	4	4	1	4	3	3	3	4	43	2
Ihalagama wewa	1	2	2	1	2	3	1	1	2	3	1	2	2	23	10
Pahala koon wewa	3	3	3	3	3	3	3	2	3	3	2	3	2	36	7
Ihala Palukendawa wewa	2	3	2	2	3	3	2	1	3	2	2	3	3	31	9
Ottukulama wewa	3	4	3	2	3	4	2	1	3	2	3	3	2	35	6
Dullawa wewa	3	3	3	2	4	3	3	1	4	2	4	3	4	39	4
Kurundankulama wewa	2	3	2	2	3	3	3	1	3	2	3	3	3	33	8
Monnankulama wewa	4	3	3	3	3	3	3	1	4	3	4	3	3	40	3
Pahala Palukendawa wewa	3	3	3	2	3	4	3	1	3	2	2	3	2	34	7
Bulnewa wewa	3	3	4	3	3	3	3	2	3	3	3	3	2	38	5
Medawachchiya wewa	4	4	3	4	2	3	4	2	4	3	4	3	3	43	2
Mahagalkadawala wewa	4	4	4	3	3	3	4	2	4	3	4	3	4	45	1
Total Marks	36	38	35	30	35	39	35	16	40	31	35	35	34	439	
Rank for Activity	4	3	5	7	5	2	5	8	1	5	5	5	6		

Rank

5 Very high 4 High 3 Median 2 Week 1 Very week

The trend of use the tank for various tasks before the renovation has been analyzed by the table 18 .Accordingly the most priority task is the use of the tank for domestic needs. The second is the collecting lotus roots and third is the water supply for annual crop cultivation. Water supply for paddy cultivation grabs fourth place and fishery takes the seventh place. When considering the effectiveness of tanks the most useful tank was Mahagalkadawala tank before the renovation. Second is Pahala pulanchiya tank and Madawachchiya tank. As Madawachchiya, tank and Pahala pulanchiya tank are located close to the Kurunagala-Anuradapura main road they are potential to use for other tasks so that they possessed the priority of all tanks. However, it is clarified that the main purpose of a tank that is water supply for paddy cultivation has not been successful before the renovation.

Table 19 Tank Usage Capacity (After Renovation)

Tank use activity / Tank Name	Paddy Cultivation	Seasonal crop Cultivation	Highland Perennial crop cultivation	Fishery	Lotus flower	Lotus roots	Bathing	Drinking Water	Other Domestic Use	Ground water level Development	Recreation	Animal Bathing	Vehicle Washing	Total Marks	Rank For Tank
Pahala Pulanchiya wewa	4	4	3	3	3	3	4	1	4	3	4	4	4	44	3
Ihalagama wewa	2	2	2	2	3	2	2	1	3	3	2	2	2	28	12
Pahala koon wewa	4	3	4	3	3	3	4	1	4	3	4	3	3	42	5
Ihala Palukendawa wewa	3	3	3	3	4	4	3	2	3	3	3	3	4	41	6
Ottukulama wewa	3	3	3	3	4	4	3	1	3	3	4	3	3	40	9
Dullawa wewa	4	3	4	3	3	3	4	2	4	3	4	3	4	44	4
Kurundankulama wewa	3	3	3	3	3	3	2	2	3	3	3	3	3	37	11
Monnankulama wewa	4	4	3	3	2	2	4	2	3	3	4	3	3	40	10
Pahala Palukendawa wewa	3	3	3	3	4	4	3	2	3	3	3	3	4	41	7
Bulnewa wewa	4	4	4	3	3	3	3	1	3	3	4	3	3	41	8
Medawachchiya wewa	5	4	4	5	2	2	5	2	5	4	5	3	3	49	1
Mahagalkadawala wewa	5	4	4	4	2	2	5	2	5	4	5	3	3	48	2
Total Marks	44	40	40	38	36	35	42	19	43	38	45	36	39	495	
Rank for Activity	2	5	6	8	10	12	4	13	3	9	1	11	7		

Rank

5 Very high 4 High 3 Median 2 Week 1 Very week

It can be understood by referring the table 19 that when analyzing the situation after the tank renovation lot of changes has happened. Accordingly, the priority has received to the tourism industry as per the potentiality of the use of the tank. The second place has taken by the water supply to the paddy cultivation. Domestic activities and fishery have taken the third and eighth place respectively. As per the above analysis, it can be confirmed that there has happened a positive change of the potentiality of the tank use for economic needs after the renovation. The aggregated rank marks have been increased from 439 before to 495 after the renovation.

Other industrial and economic activities connected with small tanks.

As have clarified above some other economic activities happen associated with the tank except the main economic activities. Facts of that have been exposed by PRA methods and field studies as a predication to the questionnaire survey. Bricks making and the live stock industry are the main things among those. Alternative methods have been used to collect information on bricks making industry, as there were no bricks makers in the random sample although Galgamuwa area is renowned to bricks making industry. Bricks making is done specially in close with ruined small tanks. Although the Upper areas of some tanks selected to renovate (ex: Monnankulama and Ottukulama tanks) have been used for bricks making that is abandoned after the renovation. The objection of farmers' societies and the ban of the government have caused to that.

Although there cannot be seen a large-scale live stock industry one or few cows are there to see in some houses. Upper areas of tanks are used to feed them by grass within paddy cultivation periods. In addition, collected (PIDURU) and (PUNNAKKU) are given as foods to cows. Although the tank renovation has some impact over the bricks, making industry no impact is there happened on the live stock industry as per the farmers.

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