



## Short Communication

# Impact of rehabilitation on minor irrigation tank performance in Vavuniya district, Sri Lanka

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## Abstract

A pilot study was conducted to assess the impact of rehabilitation on minor irrigation tank performance in Vavuniya district, taking 60 rehabilitated and 55 non-rehabilitated minor irrigation tanks as sample. Tank performance index (TPI) and production performance indicator (PPI) were used as indicators of the tank performance. If the tanks were not maintained in terms of technical activities such as sluice repair and replacement, channel lining and bund strengthening within last 10 years, then those tanks were classified as non rehabilitated tanks otherwise rehabilitated tanks. Average TPI and PPI value for all agricultural seasons in three years from the year 2010 to 2012 between rehabilitated and non-rehabilitated tanks were tested using 2t- test. The average TPI and PPI values during maha season from the year 2010 to 2012 between rehabilitated and non-rehabilitated tanks were significantly different at 5% significance level. Even though the tank rehabilitation is not financially feasible and uneconomical it has lot of environmental and ecological concerns such as habitat for biodiversity, flood protection and contributing groundwater recharge. Hence, some alternate strategies focusing on community participation could improve the tank performance and the sustainable water resource management. Further an in depth investigation is essential to identify the appropriate strategies for tank rehabilitation and its management.

**Keywords:** Production performance indicator, Rehabilitation, Tank performance index.

## Introduction

An irrigation tank can be referred to a small reservoir constructed across the gentle slope of a valley in order to catch and store water during rainy seasons to use in dry seasons. Minor Irrigation tanks are those having an irrigated command area of 80 ha or less, as defined by the *Agrarian Services Act No. 58 of 1979* while medium tanks were 80-600 ha and major tanks those having an irrigated area more than 600 ha. In Sri Lanka, there are 24,199 minor tanks which include 11257 village tanks and 12942 river diversions, while major tanks are nearly 542. Total command area under these tanks are nearly 685,625 ha<sup>1</sup>.

Nearly 38% of the total land area in the Vavuniya district is used for agriculture making it the predominant economic activity of the district. Agriculture in the district is predominantly depending on irrigation tanks. There are one major, 21 medium and 674 minor irrigation tanks including 26 river diversions for storing water during rainy season. The water resources mainly depend on rainfall as there are no perennial rivers. Out of which 674 minor irrigation tanks, 41 tanks were abandoned, 64 breached and nearly 208 tanks to be renovated<sup>2</sup>.

Increasing population, displaced people, and poverty lead to encroachment of tank beds and command area. Water stored in these irrigation tanks is insufficient water storage for cultivation

for at least two seasons in a year due to poor management and negligence in tank rehabilitation. As a result declining tank performance is observed over the period.

Hence, it's necessary to take action to protect the resource like irrigation tanks to which more than 30, 900 farm families depend for their livelihood in this district<sup>2</sup>. Rehabilitation is one way of conserving the existing minor irrigation tanks.

At this juncture, it was essential to analyze whether rehabilitation of minor irrigation tanks improve their performance. The objective of this study was to assess the impact of rehabilitation on tank performance.

## Materials and methods

Vavuniya district is located in the low country dry zone of Sri Lanka. It covers of an area about 1967.00 Sq.Km. The mean temperature of this district is 28°C with an 1400 mm of annual rainfall<sup>2</sup>. Vavuniya receives rainfall in a bi-modal pattern, obtained during October to late January (*maha* season) and from late April to late May (*yala* season). It has undulated topography where broad valleys and rock ridges facilitated cascade based agriculture<sup>3</sup>.

Sixty rehabilitated and 55 non-rehabilitated tanks were randomly selected among rehabilitated and non-rehabilitated

tanks respectively in Vavuniya district, Sri Lanka. Secondary data of selected minor irrigation tank details were collected from the Department of Agrarian Development (DAD) and head of each Farmer’s Organization (FO) through the past records, documents and interviews.

If the tanks were not maintained in terms of technical activities such as sluice repair and replacement, channel lining and bund strengthening within last 10 years, then those tanks were classified as non-rehabilitated tanks otherwise rehabilitated tanks.

Performance of the irrigation tanks was determined by the quantity of water stored in the tanks and the resulted yield obtained from the particular tank. TPI (Tank performance Index) was used as an indicator of the tank performance.

Palanisami and Meinzen<sup>4</sup> defined as, Tank Performance Index (TPI) = Actual Irrigated area (ha) / Command area (ha).

Production Performance Indicator (PPI) = Yield (kg) / Command area (ha) used for assess the production performance of irrigation tanks in this study.

The p values were calculated for the average TPI and PPI value for all agricultural seasons from the year 2010 to 2012 between rehabilitated and non-rehabilitated tanks using 2t-test at 5% significance level. Statistical analysis was performed with the help of Minitab-16 and MS Excel.

## Results and discussion

Mean value of TPI among rehabilitated and non- rehabilitated tanks were shown in Table-1.

**Table-1:** Mean value of TPI and p values between rehabilitated and non rehabilitated tanks from the year 2010 to 2012.

Classification	Mean value of TPI					
	2012 maha	2012 yala	2011 maha	2011 yala	2010 maha	2010 yala
Rehabilitated tanks	0.8991	0.4233	0.8801	0.4501	0.9365	0.3542
Non-rehabilitated tanks	0.6418	0.3574	0.6703	-	0.7218	-
P value (5% significance level)	0.049	0.144	0.048	-	0.043	-

**Table-2:** Mean value of PPI and p values between rehabilitated and non rehabilitated tanks from the year 2010 to 2012.

Classification	Mean value of PPI ( kg ha <sup>-1</sup> )					
	2012 maha	2012 yala	2011 maha	2011 yala	2010 maha	2010 yala
Rehabilitated tanks	2572.36	1621.01	4393.53	1500.67	4210.67	1524.64
Non-rehabilitated tanks	1910.12	1583.94	3704.11	-	3639.86	-
p value (5% significance level)	0.012	0.769	0.008	-	0.028	-

Significant change was observed between rehabilitated and non-rehabilitated tanks for TPI during maha season at 5% significance level. Rehabilitation status was significantly influenced on the performance of the tanks in the study region. It is obvious that during yala, rehabilitation was not influenced much as there was less rainfall during that period. Hence, there was no cultivation in yala season during 2011 and 2010 in non-rehabilitated tanks.

Mean value and p values of PPI among rehabilitated and non-rehabilitated tanks were shown in Table-2.

Significant change was observed between rehabilitated and non-rehabilitated tanks for PPI during maha season at 5% significance level. It reveals that PPI significantly influenced by rehabilitation status of minor irrigation tanks in Vavuniya district.

## Conclusion

Based on the analysis carried out for the three consecutive years of assessment, the rehabilitated tanks performed better than non-rehabilitated tanks in Vavuniya district. Even though the tank rehabilitation is not financially feasible and it has lot of environmental and ecological concerns. Hence, some alternate strategies focusing on community participation could improve the tank performance and leads to sustainable water resource management.

## References

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