

SOCIO-ECONOMIC FACTORS AFFECTING THE USE OF DOMESTIC LEVEL RAINWATER HARVESTING FOR AGRICULTURAL PURPOSES IN THE DRY-ZONE OF SRI LANKA

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Introduction

Sri Lanka being a tropical country, receives a high rainfall, mainly by two monsoons and inter-monsoonal weather conditions. But due to their spatial and temporal variability, water scarcity is a common feature, especially in the Dry zone. Weeraratne & Weerasinghe (2006) have shown that in Sri Lanka 65% of the total runoff water from the received rainfall ends up in the sea. Domestic rainwater harvesting techniques (RWHT) were defined as the methods of managing, controlling and making use of rainwater in-situ (Practical Action, 2007). The indigenous rainwater harvesting techniques (RWHT) practiced in Sri Lanka include roof-water harvesting, tree trunk water harvesting and open-air water harvesting (Ariyabandu, 2005). With the technological improvements they have been promoted recently by several development agencies to improve the living conditions of resource-poor farmers. The two main techniques promoted were the runoff tanks and runoff ponds.

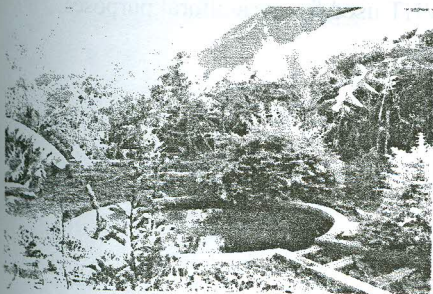


Figure 1. A runoff tank

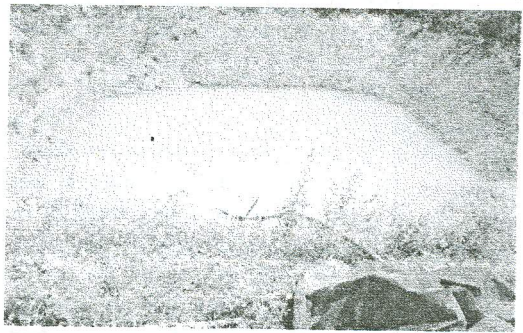


Figure 2. A runoff pond

The objectives of this study were to assess the socio-economic factors associated with the adoption, identify the limitations and to make recommendations to improve the applicability of RWHT.

Methodology

Based on the spatial distribution of RWHT in the Dry zone, namely Ambalantota, Suriyawewa and Tangalle Divisional Secretariat Divisions (DSDs) from Hambantota District and, Mahakumbukkadawela DSD from Puttlam District were selected to conduct the field investigations. Primary data were collected in early 2008, from a social survey of 62 families by using stratified random sampling based on the RWHT. In addition, field observations and key informant discussions with the officers of the organizations involved were carried-out. Data were analyzed using the Statistical Package for Social Sciences and Rank correlations and Chi-squares tests were used to test the associations between variables.

Results and discussion

The majority (81%) of respondents were engaged in farming activities as their main occupation. The average land sizes of the respondents in Puttlam and Hambantota were 1.73 ha, 0.98 ha, respectively. Majority (57%) of farmers in Mahakumbukkadawela was also involved in animal husbandry, mainly cattle and poultry. Except for one person who had constructed RWHT with his own funds, all others had received assistance from NGOs such as OXFAM GB, Caritas, ISCOS and World Vision. They had provided most of the construction materials and technical know-how in constructing the RWHT. In Mahakumbukkadawela, 'runoff ponds' were the primary water source for all respondents, while in Hambantota all respondents had 'runoff tanks'. However, in Hambantota, there were other water sources such as irrigation canals and village tanks and, only 60% of the respondents used runoff tank as their primary water source. The runoff ponds had comparatively larger capacity (108,000–324,000 liters) than the runoff tanks (10,000–15,000 liters). The average income earned by the cultivation was Rs. 42,966.00 per year. Although the capacity of runoff ponds was larger than the tanks, there was no significant difference between incomes from farming by using the two types of RWHT. A majority (90.3%) of the respondents believed that RWHT helped them to increase their farm income. Only half of them have been able to cultivate during *yala* seasons using the harvested rainwater as they had inadequate storage capacity and loss of water due to seepage and evaporation.

As shown in Figure 1, they used pond water for several purposes except for cooking and drinking, while the tank water is mainly used

for agriculture and brick making. Nearly 30% of the respondents used the collected rainwater for brick making and were able to earn an average annual income of Rs.75,417.00.

Most of the respondents from both areas (81.3% in Hambantota and 56.7% in Mahakumbukkadawela) take out water manually. A significantly higher proportion of those who had larger storage devices used water pumps to take out water (Chi square value = 9.04^a, df=3, p=<0.05). The respondents used a combination of flooding, eyebrow, furrow and pitcher irrigation methods when applying water (Table 1). In both areas the most popular irrigation method was eyebrow irrigation as it reduces waste of water by giving enough time for infiltration. Nearly 50% of the respondents in both areas used furrow irrigation as it is most convenient and labour saving technique.

Conclusions and recommendations

The promotion of RWHT has contributed to the farmer income especially in the areas where no other water sources are available. Most farmers were not totally dependent on the harvested rainwater for their cultivation. It is important to disseminate the knowledge of efficient irrigation methods to obtain maximum water use efficiency. Better to have ground liners for the ponds in the areas where the soil is sandy, to prevent the water loss through seepage. Further research is needed to evaluate the effectiveness of other traditional RWHT used for agricultural purposes.

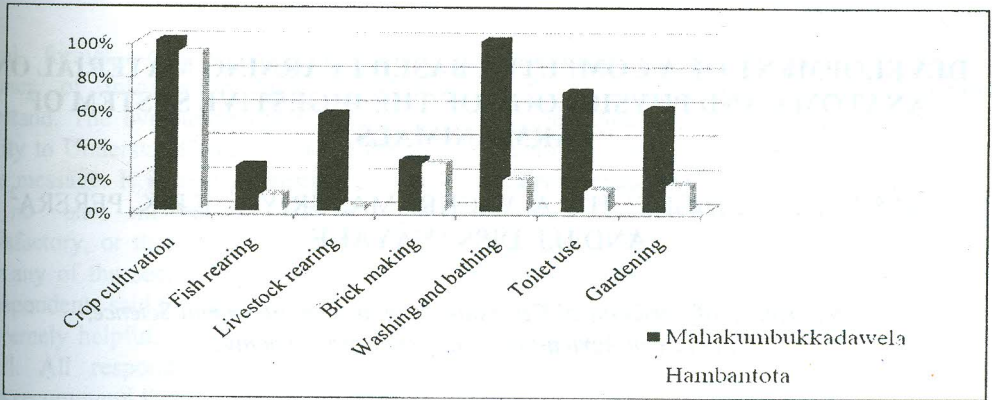


Figure 3. Distribution of respondents according to the usage of stored water

Table 1. Percentage distribution of respondents according to the method of irrigation

Irrigation method	Mahakumbukkadawela*	Hambantota*
Eyebrow	86.7	65.6
Furrow	53.4	56.5
Flooding	23.4	3.1
Pitcher	3.3	28.2

* Multiple responses

References

Ariyabandu R de S, (2005). Sri Lanka: Varieties of Water Harvesting. Pp. 58-63. In: Agrawal, A., Khurana, I. and Narain, S. (Eds). Making Water Everybody's Business Practice and Policy of Water Harvesting, Center for Science and Environment, New Delhi, India

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