IRRIGATION EFFICIENCY IN THE DRY ZONE IN SRI LANKA

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Abstract

Water resource economists and policy makers have suggested that by 2030 one third of the world population will be based along river basins and the scarcity of the water for agriculture will have a tremendous impact on their livelihood. In many parts of the country, productivity of paddy is below the potential level due to insufficient irrigation water and in the *Yala* season (Dry season) only 30 percent of cultivable irrigated paddy land could be used for growing due to lack of water. This study attempts to determine the actual usage of irrigation water at different water risk in the dry and wet seasons in large scale irrigation schemes in the dry-zone of Sri Lanka. Primary data were obtained from 360 paddy farm plots from *Rajanganaya, Nachchaduwa* and *Huruluwewa* irrigation schemes covering upstream and downstream farmers. Daily actual water usage at plot level measured by volumetric method. Under this method water is collected in a container of known volume and the time taken to fill the container is recorded. According to our study, on average, in the wet (*Maha*) season upstream farmers of *Rajanganaya* have used 4.8-acre feet (5921 cubic meter) and *Huruluwewa* upstream farmers 4.2-acre feet (5181 cubic meter) for paddy farming. Though water usage of Raganganaya farmers were 14% higher than that of *Huruluwewa* farmers in the wet season, the productivity variation was insignificant between two farmer groups. However, the downstream disparity of water usage in the dry season (*Yala* season) is much higher than the wet season. In the dry season, downstream farmers of *Rajanganaya* have recorded 5.7-acre feet and Huruluwewa downstream farmers have managed with 3.2-acre feet due to scarcity of water in the dry season. The present study suggests that collectivism is the most suitable way of common pool resource management rather than individualism, which is incorporated with the market mechanism.

Keywords: *Irrigation, Water Management, Paddy, Dry-Zone, Common Pool Resources*

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Introduction

In Sri Lanka, around two million farmer families are engaged in paddy farming island-wide as their main occupation. High water-intensive paddy is grown as 34% of total cultivated area and consume more than 70 % of total water allocation for food production in the country (Shantha & Alli, 2014). Irrigated agriculture, mainly paddy production used 96 percent water withdrawals in the drier areas. Around 44 percent paddy is cultivated under major irrigation schemes and another 24 percent is cultivated under minor irrigation schemes. More than 70 percent irrigated paddy land are belonging to the Dry-zone. Further, about 70 percent of paddy output drawn by small paddy farmers who own less than one hectare of land (Bandara & Weeraheewa 2003). As many as 314,000 farmers are tenant cultivators and nearly 50 percent of these tenants grow paddy on holding smaller than 0.4 ha. Monthly average consumption of rice is around 200,000 metric tons and annual additional demand is around 60,000 metric tons and that additional amount will be totally irrigation – based (Wanninayaka & Shantha 2014).

In many parts of the country, productivity is below the potential level due to insufficient irrigation water and in the *Yala* season (Dry season) only 30 percent of cultivable irrigated paddy land could be used for growing due to lack of water. In Sri Lanka, Dry-Zone is the main paddy zone and some part of this area will face an absolute scarcity of water by 2025 (Shantha & Alli 2011). Paddy farming is an exceptionally heavy consumer of water up to 3,000 liters on average used to produced one kg of rice and sixty percent of the water pumped into paddy farms goes waste.

Besides, several research studies have suggested that climate change would further aggravate water scarcity issues in irrigation system of Sri Lanka. This climate change will lead to an increase in the *Maha* (wet) season irrigation water requirement for paddy by 13-23 percent by 2050 compared to that of 1961-1990. The climate change map indicates that typical farming district under Dry-Zone are more sensitive to climate change than the rest of the country due to their heavy reliance on primary agriculture. According to the water vision 2025, IWMI indicator of water scarcity in 2025 shows absolute water scarcity in the dry zone, if the irrigation sector efficiency is not doubled by 2025. The past, present and future predictions on rainfall indicate that there will be drastic reductions in rain fall during *Maha* and *Yala* seasons and therefore, additional irrigation water must be developed for sustainable paddy and other cash crop cultivation in the dry zone. Reduction in rainfall in the Dry-Zone would significantly impact on livelihood implication of Dry-Zone paddy farming households.

Farmers in Sri Lanka generally enjoy free-of-charge irrigation facilities that are often provided by the government at zero -price mainly for water intensive paddy production. These free-of-charge water, eventually combine with subsidized fertilizer and land for cultivating paddy. Hence, practically it is impossible to expect economically efficient way of factor usage among paddy cultivation and this zero-price policy leads to uneconomic use of irrigation water, water inequality and mismanagement of water. In the country, there are more than 20 Acts and Ordinances and other form of Enactment for water allocation, regulation, usage and management of water resource. Many of them are either outdated or far too limited to address the issues and problem in the current context of the irrigation sector in Sri Lanka.

Material and Methods

This study attempts to determine the actual usage of irrigation water at different water risk in the dry and wet seasons in large scale irrigation schemes in the dry-zone of Sri Lanka. Primary data were obtained from 360 paddy farm plots from *Rajanganaya*, *Nachchaduwa* and *Huruluwewa* irrigation schemes covering upstream and downstream farmers. The study applied multistage sampling procedure for selecting the sample. Daily actual water usage at plot level measured by volumetric method. Under this method water is collected in a container of known volume and the time taken to fill the container is recorded.

Results and Discussion

It is evident that the present water use of the dry-zone farmers is not in an efficient manner resulting it is wasteful. Inter disparity (between the tanks) and intra disparity (Within the tank) of water usage are significantly high. According to our study, on average, in the wet (*Maha*) season upstream farmers of *Rajanganaya* have used 4.8-acre feet (5921 cubic meter) and *Huruluwewa* upstream farmers 4.2-acre feet (5181 cubic meter) for paddy farming. Though water usage of Raganganaya farmers were 14% higher than that of *Huruluwewa* farmers in the wet season, the productivity variation was insignificant between two farmer groups. However, the downstream disparity of water usage in the dry season (*Yala* season) is much higher than the wet season. In the dry season, downstream farmers of *Rajanganaya* have recorded 5.7 acre feet and *Huruluwewa* downstream farmers have managed with 3.2 acre feet due to scarcity of water in the dry season. Even though water usage of Rajanganaya farmers were 78% higher than that of the *Huruluwewa* farmers, the productivity of paddy in *Rajanganaya* farmers were only 20%

higher than the *Huruluwewa* farmers in the dry season. In the dry season, *Rajanganaya* farmers and *Huruluwewa f*armers have used 2950 liters and 2485 liters respectively for producing one kg of paddy. It is very clear that free provision of irrigation water leads to over exploitation and irrigation scarcity leads to efficient utilization of irrigation water.

Conclusions and Recommendations

Much economic literature has treated irrigation water as an economic good and that should be allocated through a competitive market price. However, some have treated irrigation water as sociological aspect that should be largely exempted from competitive pricing and allocation. This study concluded that irrigation water should be treated as a common pool resource under the economic good category. Substantial literature has proposed market mechanism to better allocate irrigation water. Water is no longer a ubiquitous commodity; it is fast becoming a scarce resource even in the more humid regions. Hence, first of all, farmers have to pay adequately for its use, which would sufficiently motivate them to conserve it. However, the study questioned the notion that market forces can guide common pool resources. In the Sri Lankan context, market forces may be an inappropriate mechanism for irrigation management because most Sri Lankan farmers believe that it is the responsibility of the government to provide water to irrigable land. On the other hand, classical economist has looked at ways of common pool resource optimization. The present study as suggested that the collectivism is the most suitable way of common pool resource management rather than individualism, which is incorporated with the market mechanism.

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