

Importance of Rainwater Harvesting in Sri Lankan Agriculture

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Sri Lanka is an agricultural country. Around 18% of the GDP comes from the agricultural sector. The main source of income of nearly 90 % of the rural population is agriculture and animal husbandry. They cultivate around 2 million small holdings with an average holding size of approximately 1 hectare. Almost all the food crops such as rice and other cereals, legumes, field crops, fruits, and livestock produced in the country, valued at around Rs. 100 billion, come from the rural agricultural sector.

The economy and the society of Sri Lanka had been dependent on water since time immemorial. In spite of a bimodal pattern of rainfall, efficient use of water has made it possible for our forefathers to cultivate large extents of lands and achieve food security.

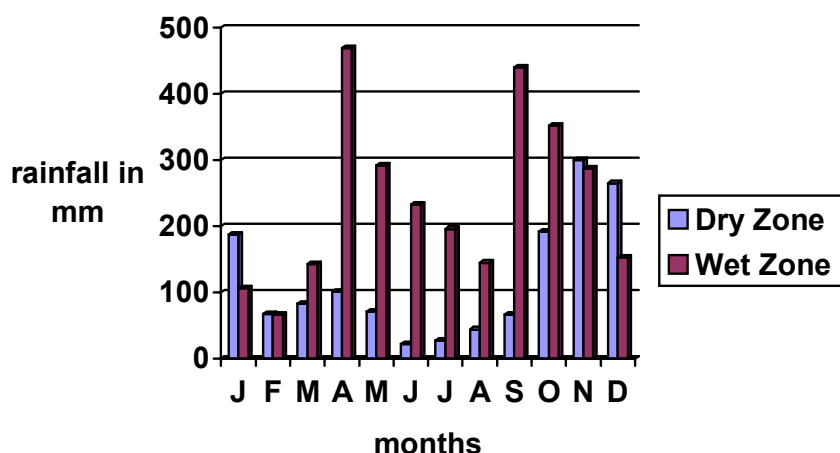
In Sri Lanka, rain is the primary source of water. Sri Lanka receives mainly monsoonal and convectional types of rain. Monsoonal rains contribute to most of the annual precipitation, and are experienced in May to August (south - west monsoon (SW), Yala season) and October to late January (north - east (NE) monsoon, Maha season). The mean annual rainfall in the southwest of the island varies from 2,500 – 5,000 mm and in the northwest and southeast, it is around 1,250 mm. Rainfall during NE monsoon or Maha season is more widespread than that during SW monsoon. It is mostly experienced in the North and East and spreads to the south-west part of the island as well. In addition, convectional rains are experienced during inter-monsoon periods i.e March-April and October-November, mainly in the afternoons and/or evenings. Rains due to depressions in southwest Bay of Bengal and also in the southeast Arabian Sea, also occur during inter-monsoons.

The annual average rainfall varies from about 500 mm in the arid parts of the northwest and south-east of the island to around 5000 mm in some areas of the south-western slopes of the central hills. The average monthly distribution of rainfall in mm is indicated in fig.1

The total amount of rain water received by the island is around 100 billion cubic meters, and around 40% of it runs-off. A total catchment area of nearly 60,000 sq. km., each varying from 10-10,000 sq. km , catches the run-off water emptying it to the 103 rivers and major reservoirs and the tanks in the country. Water thus collected (around 35% of the run-off) is used for irrigation and generation of hydro-power and the balance i.e about 65% of the run-off escapes to the sea. Thus, nearly 26 billion cubic meters of water is wasted.

Figure 1

Rainfall pattern in the Dry and Wet Zones



Climatic Zones:

Based on the rainfall, the country could be broadly divided to wet zone, intermediate zone and dry zone. The wet zone comprises the south - west part of the country covering around 23% of the total land extent i.e around 1.5 million ha. . It has two peak periods of rainfall corresponding with the monsoons. The intermediate zone covers about 13% of the country i.e around 0.8 million ha. and includes most of the Kurunegala, Matale and Badulla Districts and some parts of Kandy and Nuwara Eliya Districts. The remaining portion of the country, covering nearly 64% of the land is categorized into the dry zone, which gets most of the north east monsoonal rains.

Dry Zone:

Dry zone covers a land area of about 4.5 million ha i.e nearly two-thirds of the country. . The average annual rainfall of this climatic zone is 1,250-2,000 m, and as indicated in Fig. 1, about 65% of the annual rainfall is received during Maha season (October- January). This zone can be considered as the main food growing area of the country, for it is in this zone that most of the paddy and other cereal crops, lentils, fruits and vegetables are cultivated. Of the 4.5 million hectares in the Dry Zone, only about 2 million hectares are effectively used. Thus, there is a large extent of potentially cultivable land, in the dry zone where most of the soils are relatively more fertile than those in the wet zone.

Non-availability of adequate rainfall during the yala season is one of the limiting factors of crop production in the dry zone. Although numerous irrigation projects such as Mahaveli, Kirindioya, Muthukandiya and Inginimitiya provide irrigation to about 200,000 hectares in the dry zone a large extent of land in the dry zone does not get adequate water for crop production. As a result it has not been possible to realize the full agricultural potential of this area.

During the 3-6th century, the dry zone was studded with thousands of tanks of varying capacities to collect rain water. King Mahasena (274-301) was involved in the construction of the first giant reservoir, the Minneriya tank which covers nearly 1,900 ha. Other large tanks such as Parakrama Samudraya, Mahakandarawa tank, Kalawewa etc. were constructed to collect rainwater for crop and animal production and various domestic uses. The storage reservoirs, swimming pools etc in the 5th century rock fortress of Sigiriya were dependent on rainwater.

There are around 12,000 small tanks distributed across the undulating landscape in the dry zone. These tanks are not randomly located but occur in the form of distinct cascades each made up of 4-10 small tanks situated within a single small catchment (meso-catchment) varying in extent from 100-1000 ha, and impound surface relief water of a watershed for irrigation and domestic purposes. These small tanks were an integral part of the eco-system and played a dominant role in the socio-economic and cultural aspects of the village leading to a prosperous rural sector by providing irrigation to about 185,000 ha. However, cultivable extent from these small tanks have decreased gradually with siltation .

In the Dry Zone rain- fed cropping is practiced mainly during Maha season. These farmers are at a risk, as if rain fails their crops will be affected. In the last few years, in the Dry Zone, agrowells have been constructed under numerous projects. These are used to lift irrigate high value cash crops during the off season, which enable farmers to earn higher profits. Agrowells are supplied by ground water which is limited. Hence, extensive use of ground water would result in development of saline soils.

Use of rainwater

Any attempt to develop the economy of the country needs to take cognizance of the rural sector which constitutes around 80% of the population. Most of those in the rural sector depend on rainfall-based sources of income, such as agriculture, livestock production and inland fisheries. Freshwater availability is a key limiting factor in food production and other livelihood improvement in the rural sector. With increase in pressures of population growth, development aspirations, water is increasingly playing a key factor in socio-economic development. This will require an effective integrated management of water resources.

Lack of a regular and dependable water supply to increase the area and intensity of cultivation is a major limiting factor in our attempts to develop the rural sector. From the total rainfall, around 25% of rain water is lost in the form of surface run-off and conserving this water will promote crop growth in areas where water is limiting. The most effective and economical method of conserving this water is storing it in surface tanks which are abundant in the Dry Zone. However, most of the small tanks are dilapidated and/or silted and needs rehabilitation.

If the run-off water is stored in the land itself, it would be available to plants when there is water shortage. In some parts of the dry zone, small ponds called “Pathahas” have been used to collect and store rain water. Such a water collecting system on farm would enable farmers to cultivate crops during the dry seasons. A study conducted in Nikaweratiya on the use of pathahas (Shanthi de Silva, 2005). These are small ponds

of area ..sq. m. (picture 1) Pathahas also tend to increase the ground water level, thereby making plant growth possible even during the dry season.



Picture 1: “Pathaha” at Nikawaratiya



Picture 2: Run off tank at Kurundamkulama

A study was carried out in Kurundamkulama(a village in Mihintale in Anuradhapura District) to harvest/collect rainwater in tanks. The maha rains were collected in 5 cubic meter tanks (Picture 2). Water collected was used during Yala for crop production. As a result the incomes of the families in the study increased by almost 180% (Weerasinghe P.A etal. 2005)

As indicated elsewhere, a considerable portion of the rainwater runs-off, which tends to erode soils resulting in degradation of the land. Collection of this run-off water in small ponds/tanks in the field itself is an effective way of using rainwater for crop production.

Reference

Shanthi de Silva, 2005 Impact of Artificial Recharging of Groundwater with Rainwater: a case Study in Kotewehera of Sri Lanka, LRWHF

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