

Associated Problems and Farmers' Satisfaction in the Use of Mahaweli Irrigation Water during Maha and Yala Season at Mahaweli C Zone of Sri Lanka

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Abstract

Agricultural activities are carried out in most of the dry zone Sri Lanka with the help of irrigation rather than depending on rainfall pattern. The critical concern of using channel is based on the understanding and analysing the irrigation related problems in broader context of both technical and social aspects. Therefore, this present study was carried out in order to identify the problems and satisfaction level of the Mahaweli C Zone paddy farmers in using Mahaweli water for drinking, irrigation and other utilization. The Questionnaire survey was conducted among randomly selected 150 farmers from the Mahaweli C Zone and analysed in SPSS software (version 19). Farmers' satisfaction level in various needs was identified in both *Yala* and *Maha* Season. The limited land for grazing was the major constraint for the livestock rearing farmers. And also, the major constraints of the paddy farmers were the water allocation (90%). Mahaweli C Zone mainly based on the *Maha* Season for paddy cultivation (100%) where the source of income was typically higher. The satisfaction level of the farmers regarding the drinking water scheme of the Mahaweli C Zone shows that 21% of the total was not satisfied with the drinking water. Awareness program related to community participation in the Mahaweli C Zone regarding the solution in water allocation *Yala* and *Maha* Season and the problems of kidney disease and the weed problem, etc will support for further improvement of the command area.

Keywords: Irrigation water, Kidney disease, Mahaweli C Zone, paddy farming

Introduction

Water is the important constituent of the life as the supportive system where no one can live without reliable and clean supply of drinking water to sustain their healthy life (WHO and UNICEF, 2015). Not only that, but it also support to the entire living organism presented on the Earth as well. Today, there are many cities in the world facing an acute shortage of water and nearly 40% of the world's food supply is grown under the irrigation and a wide variety of industrial processes depends on water. Further, the quality of water is affected by the human activities and is declining due to the rise of urbanization, population growth, industrial production, climate change, etc. The resulting water pollution is a serious threat to the well being of both the Earth and its population.

Sri Lanka is one of the tropical countries with the total land area of 65,610 Km² and the country's climate and pattern of agriculture is astonishingly varied with the locations. Among the total territorial area, dry zone takes part a lot for the agricultural purposes including paddy, vegetable cultivation and livestock rearing where the annual rainfall distribution varies with 750 mm to 1500 mm. Further, cultivation of paddy is highly influenced by the annual rainfall which is around 1000 mm in *Maha* Season (October to February) and 500 mm in *Yala* Season (April to July). Additionally, the agricultural productivity in the Dry Zone has been stagnated during the last few decades mainly due to a host of factors especially inadequate water which is directly contributes nearly 80% of the people living in these areas where the poverty is still in the concern.

Therefore, this study was formulated in the Mahaweli C Zone lies in the administrative districts of Badulla, Ampara and Polonnaruwa where plenty of lands are utilized for the farming activities in Sri Lanka. This zone comes under the Dry Zone sector with the temperature deviation of 28.3 °C to 32 °C where the supply of water is mainly done by the Mahaweli Irrigation System. Although, the supply of water by the Mahaweli Irrigation System is higher people those who are mainly depend on farming activities face some difficulties due to the supply of water at right time and quantity. With those concerns, present study was conducted to find the status of the farming activities and farmers' satisfaction in using water in Mahaweli C Zone of Sri Lanka.

Materials and Methods

This study was carried out in Mahaweli C Zone which consist Ampara, Badulla and Polonnaruwa Districts where the total population during the study period was 152,900. And also, the total gross area under the system C is 52,614 Hectare of which 22,551 Hectare is irrigable (Annual Mahaweli Report, 2012).

Data collection

Primary data were collected from the randomly selected 150 farming families and communities who are dwelling in the commanded area of Mahaweli C Zone by using pre tested structured questionnaire and the direct observation at the field level. Moreover, this data was gathered from the interview in order to understand their present situation for further clarification and the evaluation was focused at both field and home level. Further, secondary data was collected from the Mahaweli Authority, Water Supply and Drainage Board, Central Bank Report, Census and Statistical Report from the Ministry of Agriculture.

Sampling procedure

The stratified random sampling method was carried out to select respondents for the primary data collection from the farming families where it was divided into three major areas named as head, mid and tail according to the length and existence on the Mahaweli River.

Data analysis

The collected data was entered in the Microsoft Excel sheet for the further analysis of valid percentages in Statistical Package for Social Science (SPSS, Version 22).

Results and discussions

At the present study, farmers' problems and satisfaction level were evaluated during the *Maha* and *Yala* Season in the Mahaweli C Zone, Sri Lanka.

Socio-Economic conditions of farmers

Most of the farmers in study area fell under the range of 46-55 where these category farmers continue their farming activity for longer period and they feel discomfort to shift their sectors due to the risk that they have faced already. Further, the young farmers showed lack of interest in paddy farming due to the low and uncertainty of income which ultimately led to focus on other fields such as industrial works, business and driving, etc. According to the respondents view, male who engaged with the farming activity was higher (92.7%) while comparing with the female population (7.3%). At the present scenario, 37.3% of the respondents' family size was four and 25.3%, 20.7% and 7.3% were five, three and two, respectively.

Education is one of the important factors which accelerate the growth and development of any enterprise which results in changes in overall behavior since it is the process of acquiring knowledge and habit through learning activities. The sufficient level of education is motivating the farmers to adopt newer technologies. According to the Figure 1, around 10% of the farmers were not schooled. Around 79.3% and 8% of the respondents were with primary and intermediate education level, respectively. Only 10% of the total was with their advanced level education, in the study location.

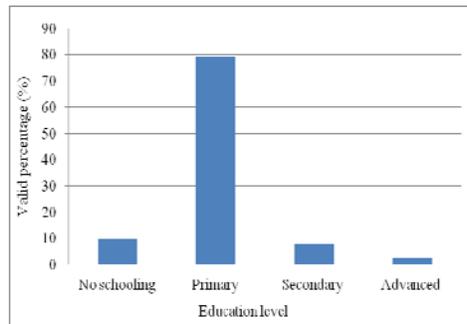


Figure 1: Education level of the respondents

Income level of the farmers is another concern which contributes a lot to the increasing living standard of the people. At the current study, 3.3%, 12%, 62.7% and 22% of the farmers represented the income range as less than Rs. 16,000, Rs. 16,000 to Rs. 26,000, Rs. 26,000 to Rs. 35,000 and Rs. 35,000 to Rs. 45,000, respectively. Only very few of the totals (3%) showed the stabled income above Rs. 45,000 which showed the positive significant ($P < 0.01$) relationship with the expenditure of the family ($r = 0.609$). At this stage, farmers were unable to satisfy their basic needs with the monthly income from their own farm. Further, monthly expenditure is also one of the indicators of economic status of the farmers. More than Rs. 20,000 was the peak expenditure mentioned by 92.7% of the respondents.

Farming system of the respondents

At the statistical analysis, whole respondents were recognized as vegetable farmers in the area where they highly depend on the surface irrigation system with the daily use of Mahaweli C Zone water. Moreover, 98.7% of the respondents practice the integrated farming system while 1.3% of the total representing both organic and integrated farming as well.

Paddy farming in Maha Season

In *Maha* Season, the availability of water is considerably higher where majority of the farmers (94%) cultivate paddy in 1 hectare while 4% of the total cultivating in 2 hectare of own land area. On the other hand, tenure land cultivation in Mahaweli C Zone is continued by only 10% of the farmers in 1 hectare and around 2% of the farmers succeeded in 2 hectare for their cultivation purposes. During this cultivation period, higher number of farmers (97.3%) used waged labor with the cost of Rs. 1,000 to Rs. 1,200 per day. The assigned labor cost of average unskilled labor was very lower compare to the skilled labors in Mahaweli C Zone. Rice is the most important food crop occupying nearly 29% of the total agricultural land in Sri Lanka and the cultivation accounts for the major part of the livelihood activities of the peasant agricultural sector (Chithranayana and Punyawardena, 2014).

Vegetable cultivation in Maha Season

In the Mahaweli C Zone, vegetable cultivation has been limited due to the lack of cultivable land which led to the imports of vegetable from the nearby location where the surplus production is in remarks.

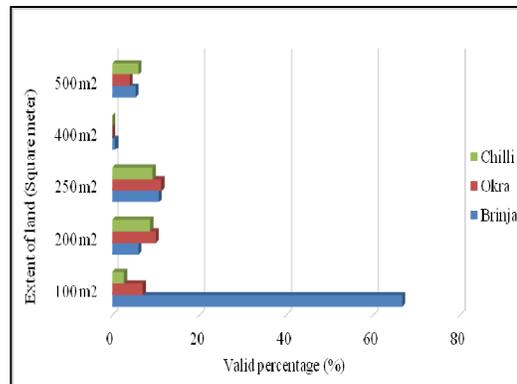


Figure 2: Vegetable cultivation in *Maha* Season

In *Maha* Season, Brinjal cultivation was done in 100 m², 200 m², 250 m², 400 m² and 500 m² with the supportive response of 66%, 6%, 10.7%, 5.3% and 2.7%, respectively. However, the extent of land which was used for the Okra during the *Maha* Season was considerably lower comparing with the Brinjal cultivation. It was 0.7%, 10%, 11.3% and 4% with the land utilization of 100 m², 200 m², 250 m² and 500 m², respectively. Further, the cultivation pattern of Chilli varied with the responded value of 2.7% to 9.3% where the cultivation on 250 m² area took parts the highest role in nature (Figure 2).

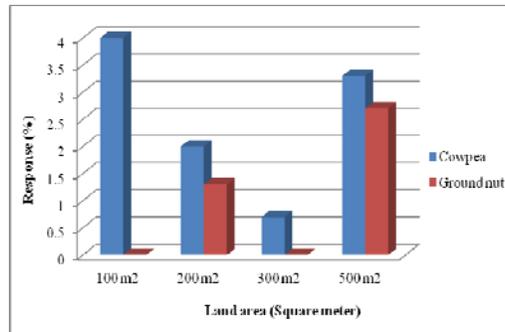


Figure 3: Cultivation of Cowpea and Ground nut

At the present status, only 4% of the respondents cultivate Cowpea at 100 m² while 3.3% of the total cultivating Cowpea in 500 m² during the *Maha* Season. And also, very few of the respondents practice Ground Nut cultivation in 200 m² and 500 m² with the supportive value of 1.3% and 2.7%, respectively.

Paddy farming in Yala Season

Most of the farmers (94.7%) in the study area continue their cultivation in *Yala* Season with the cultivation in one hectare of their own land. And also, around 3.3% of the farmers cultivate paddy only in two hectares at their own land. It was common that majority of the respondents cultivate twice per year (*Maha* and *Yala*) due to the availability of water in the area seasonally. However, significant difference between the distance from the main channel and the farm place was observed as a critical issue in the study location. Further, 10.7% of the respondents mentioned that they cultivate in 1 hectare and 2% of the total in 2 hectare which were in tenured land.

Role of Mahaweli Authority in crop farming

At the present study based on the respondents answers, 97.3% of the total population use the Mahaweli water for their farming, drinking and their routine works while a few of the total (2.7%) use this water for livestock rearing. At the deeper analysis, only paddy farming was practiced by 0.7% of the total and paddy plus vegetable were practiced by 96.7% of the farmers. Nearly 10% of the farmers reported that Mahaweli Authority were assisted at the beginning in giving farming materials, knowledge, seed and subsidies, etc. however, presently they are supporting only in giving knowledge under the Mahaweli Services where 90% of the total disagreed their statement and they mentioned that the Mahaweli Authority are continuing their supports in several aspects.

Associated problem faced by the farmers

Distance between the channel and the crop farming area caused a great part in right distribution of water at the right time where the increased distance of channel caused the reduction in quantity of water. According to the study, 14%, 28%, 20% and 10.7% of the farmers mentioned that their farm land are located at <50 m, 51-100 m, 101-200 m and 201-300 m distance from the water source. Around 27.3% of the fields were located far away from the water source (>400 m).

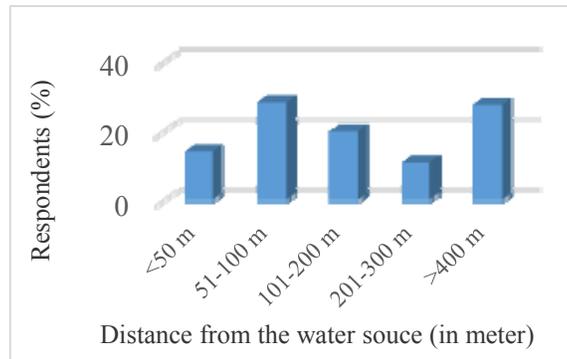


Figure 5: Distance of the farming area from the water supply

On the other hand, minority of the respondents involved only livestock rearing. Among them, majority of the people who rear livestock mainly raise cattle and chicken in the study area. A field survey along with the review of primary data was conducted to improve the understanding on cattle production system in Mahaweli C Zone. The extent of own land for livestock farming in the particular zone is very lower with the population of indigenous Zebu, Zebu crosses, Exotics Taurus and Taurus crosses, etc. Conducted survey revealed that 80% of the respondents were under the satisfactory level of the service from the authority where lack of fodder grass and grazing land led them to take less interest regarding this. Even though, farmers have their own land for pasturing, they need to depend on natural grass and fodders to supply the rational feed for their livestock in order to gain a peak result. However, it was a great risk as the zone experienced with the prolonged dry period in the whole year.

Vegetable cultivation in Yala Season

In *Yala* Season, Brinjal cultivation was done in 100 m², 200 m², 250 m², 400 m² and 500 m² with the supportive response of 12%, 9.3%, 10%, 0.7% and 2.7%, respectively. However, the extent of land which was used for the Brinjal during the *Yala* Season was considerably lower comparing with the *Maha* cultivation. Meanwhile, okra and chilli cultivation were also low while comparing with the *Maha* Season.

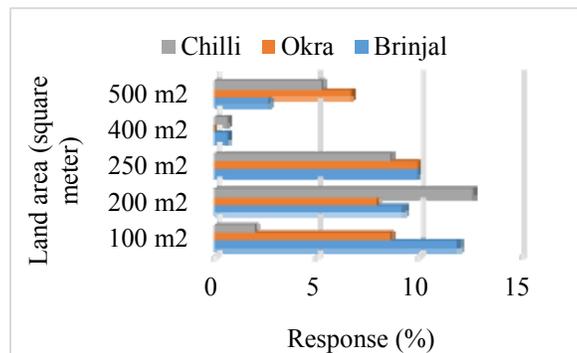


Figure 4: Vegetable cultivation in *Yala* Season

Problems associated with the Mahaweli water supply and the allocation

Disease Infection

At the present study, only about 18% of the respondents were reported the disease outbreak throughout the supply of Mahaweli C Zone water. Among the 18% of the respondents, about 14% of them reported about the kidney disease while 82% of the respondents were very calm with kidney disease. It was the evidence that the people are with lack of awareness regarding this diseases. Based on the medical evidence from the previous medical examinations and the tests (Through kidney biopsy and patients consultations and treatments), so far, it has been revealed that the CKDu confined to NCP of Sri Lanka is a disease caused by chronic tubule-intestinal disease and has very slow progression to end-stage renal failure (Chandrajith *et al.*, 2010). High incidence and prevalence of CKD of uncertain etiology (CKDue) observed in the certain geographical areas of the North Central Province of Sri Lanka namely in Medawachchiya, Girandurukotte, Kabithigollwa, Padaviya, Medirigiriya, Dehiattakandiya and Nikawewa areas.

Poor water allocation and channel distribution pattern

As the overall, farmers were not allocated fully with the required water resources in both *Maha* and *Yala* Seasons. During these seasons, availability of water was very scarce and discharge was very lower from the Mahaweli Authority. Therefore, Bethma cultivation system was developed as an alternative. However, it was unsuccessful due to the silt accumulation in the channel which ultimately led to poor water distribution. At the study, more than 82% of the respondents mentioned this issue as their major problem.

Weed problems

The weed infestation and distribution in farm field of Mahaweli C Zone was higher and it was the challenge to 80.7% of the farming population. Batadella (81.4%), *Commelina diffusa* (88.7%), and other weed such as *Salvinia* (5.3%), *Thunessa* are some of the weeds affect the cultivation practices in the zone. Removal of the weed was the task to the farmers where they highly adapt weedicide for the complete destruction of the weeds in Mahaweli C Zone. Because, it was the proof that the weeds reduced rice yield and effective management of these is a significant challenge to Asian Rice Farmers (FAO, 1996). Traditional weeding was carried out manually however the recent economic growth has caused a shift of labor from agricultural to nonagricultural enterprises for the herbicides (Naylor, 1994). Not only that, but also the optimal method of weed control in rice influenced by the economic status, agro climatic and technical problems of the farming practices.

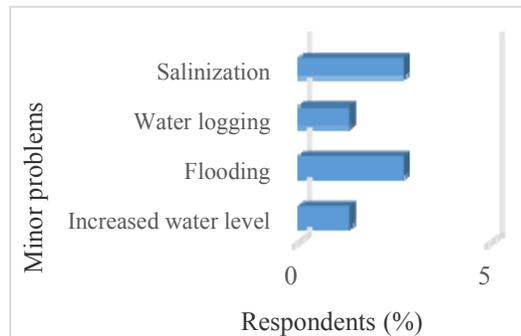


Figure 6: Minor problems faced by the farmers

At the current study, problems such as increased water level (2%), water logging (1.3%), flooding (4%) and salinization (2.7%) reported by the farmers. As the study location is in dry zone, the probability is to have minimum rainfall is higher which might be the reason for the very low responding against the flooding in the study zone.

Problems related with watershed and water quality

The small reservoirs are silted up due the various agricultural activities without proper soil conservation measures, forest degradation in slopping land due to the Chena cultivation (Slash and Burn), cultivation in steep slopes, clearing of forests for agriculture and settlements in central highlands exposed the soil to rain water which caused the intensive soil erosion in study area. Eroded soils are brought by storm water to natural water ways which ultimately led to the siltation of reservoirs (Mahaweli Development Project, 2007).

Further, excess application of pesticide and insecticide were the causes of deterioration of water quality at canal.

Farmer's satisfaction on the use of Mahaweli river water

According to the survey, allocation of water during the *Maha* Season was satisfied by 90% of the total respondents in different aspects not only for farming but also for the domestic purposes. However, 10% of the respondents mentioned that they did not satisfy with the allocated water from Mahaweli C Zone in *Maha* Season.

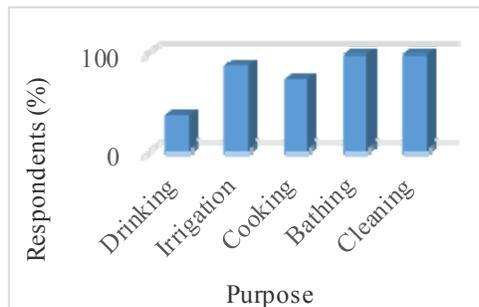


Figure 7: Satisfaction level of farmers in different aspects

Maha Season was the dominant season falls in between late September and mid-February where the amount of water is higher due to the higher seasonal rainfall. It is the reason for the 90% of the positive response of the people in study location. On the other hand, around 94% of the respondents were not satisfied with the water allocation during the *Yala* Season.

Figure 8 shows the satisfaction level of different aspects of farmers in the study zone where the usage of the Mahaweli C Zone water is higher in domestic aspects while comparing with the farming activities. In study area, farmers were satisfied (More than 80%) about the allocation and use of Mahaweli water for the irrigation purpose. Among them 88%, 8% and 4% of the farmers were satisfied at the levels of 80%, 85% and more than 90% satisfaction. It showed that the satisfaction level decreases with the increasing demand of water for irrigation purposes.

Conclusions

According to the study, socio economic condition of the farmers was influenced mainly by the season and water allocation in the Mahaweli C Zone. Mahaweli water used for various purposes like agriculture, livestock farming, drinking, cleaning, cooking, bathing etc. Paddy was the major crop cultivated in the study area and very few of the total reared livestock additionally. The quality of the canal water was affected by the accelerated silt deposition of the water. As the result, cultivation scale was higher in *Maha* Season while comparing with the *Yala* Season in the study location. As far as the health is concerned, farmers are more concern about kidney disease due to poor quality of water therefore farmers are now depending on pipe water for their drinking purpose. However, they were not satisfied in that water supply due to the suspect on the quality of water. Therefore, proper awareness on existing water quality is important in the study area. Proper canal and water resource maintenance is to be improved through the water users, farmer's organization. Damaged canals need to be repaired to increase the water use efficiency. And farmer's awareness on the efficient water use has to be created among the farmers in the study area.

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