Community Based Adaptation and Mitigation Strategies in Relation to Water and Crop Management in Batticaloa District

M. Rajendran* and R. Thivyatharsan

Department of Agricultural Engineering, Faculty of Agriculture, Eastern University Sri Lanka

Abstract

Changes in climate affect livelihood of the people through changes in water availability, water quality and temperature. Agriculture and climate change are inextricably linked, and thereby changes in climate threaten agricultural production. Since climate change is inevitable, proper adaptation and mitigation measures are vital for gradual reduction of the adverse effects of climate changes. Hence, the study was carried out in the areas of Ayithyamalai, Mankeni, and Selvapuram of Batticaloa District to investigate the prevailing community based adaptation and mitigation measures to tackle the problems in water and crop management. Data were collected through field visits and questionnaire survey. The study showed that 23.6% of the households have rainwater harvesting tanks to rectify the problems of water scarcity in dry season. Water purification was practiced by 54.5% of population to get clean water. Moreover, 8.70% of the farmers grow vegetable crops in both *Yala* and *Maha* seasons instead of paddy. However, 32.7% of the farmers cultivate paddy in *Maha* season and grow vegetables in *Yala* season while 58.5% of them are cultivate paddy in *Maha* season only. Since people are not well aware of climate change adaptation and mitigation strategies in these study areas, many motivational works and ideas from government and NGO sides would help to improve their awareness level on climate change adaptation and mitigation strategies.

Key words: Climate change, Rain water harvesting, Water purification

Introduction

Climate change has emerged as the most prominent of the global environmental issues. It threatens agricultural production through higher and more variable temperatures, changes in precipitation patterns and increased occurrence of extreme events such as droughts and floods. In addition, short duration extreme rainfall leads to unexpected flooding even in dry season of the year.

Batticaloa belongs to dry zone of Sri Lanka. Hence, water shortage during dry period is the main concern. Agriculture is the predominant sector of the region's economies and most people depend directly or indirectly upon agriculture. However, precipitation is insufficient to meet crop water requirement. In addition, quantity and quality of drinking water is not adequate in these areas. The greatest impact will continue to be felt by the poor who have limited access to water resources. Seasonal variability in available water is also critical for agriculture. Types of crop grown and extent of cultivation depend largely on water availability. Due to inadequate drinking water sources, most of the people are getting drinking water from canals which are already polluted with agro chemicals and animal wastes. Vaheesar (2000) has shown that as a consequence of the heavy fertilizer applications, the risk of leaching significant quantities of nitrate, phosphate, potassium and heavy metals to ground water from permeable soil can be considered high. In the recent past, most farmers lost their investment due to unpredicted heavy floods and severe droughts. Hence, appropriate crop selection and decision making are therefore vital to escape from the impacts of extreme weather conditions. There are many potential adaptation and mitigation strategies that can be used effectively to reduce the effects of climate change. Therefore, this study was conducted to identify

**Corresponding author:* rajanv.puram@yahoo.com

community based adaptation and mitigation strategies which are currently practiced to challenge the impacts of climate change in relation to water and crop management in Batticaloa District.

Materials and Methods

This study was aimed to identify the prevailing community based adaptation and mitigation strategies on water and crop management. Hence, it focused on the areas where water problem affects severely. Main source of this study was primary data. In this context, three most vulnerable regions, namely Ayithyamalai, Mankeni, and Selvapuram in Batticaloa district, were considered. About 250 households were selected in these areas, which accounts 120, 70 and 60, respectively based on the population density of these areas. However, these samples are not exactly proportionate to the population and this is a limitation of this study. Further, these area based samples of this study were selected with convenience random sampling method, where the respondents were basically considered in the sampling if he/she has been applying any of adaptation and mitigation strategies.

Field visits and questionnaires survey were conducted to collect the data. The questionnaire consists of structured open ended statements, which are evaluated from every respondent's perspective point of view. The data entry and analysis were performed using the Microsoft Excel Software package to present the results with appropriate figures.

Results and Discussion

Rainwater harvesting and Water Purification

Most of the regions of Batticaloa District encounter water shortage during dry spells. Government and NGOs are trying to solve this problem in many ways. NGOs promoted roof water harvesting system in some selected regions. As a consequence of this effort, 23.6% of population has roof rainwater harvesting system (Figure1). People collect and store roof falling water during rainy season for future use. However, stored water is not adequate for the entire dry spell. In addition, population growth leads to increased demands for water, expanded drilling of tube wells, and thus increased exploitation of groundwater resources. Since agriculture employs the greatest portion of the population in this district, increase in agricultural productivity would help to alleviate poverty in these areas. With the increase of population, use of land for non-farm and commercial activities as well as for housing and other purposes are increasing, thus gradually reducing availability of the cultivable land. Hence, efficient rainwater harvesting is vital to promote home garden in these areas to rectify the above land issues.Many Asian countries have made efforts to design and develop a wide variety of techniques to collect, store and use natural precipitation for agricultural purposes. Agarwal and Narain (1997) have shown that in some countries, development of rainwater harvesting systems is being promoted by the authorities as an alternative to the high cost large dams and water development projects.

Study also revealed that 54. % of the households purify water using different filters before drinking (Figure1). Several studies in the dry zone of Sri Lanka showed that fluoride content in the ground water is generally higher than the acceptable limit for drinking water. Moreover, majority of the population In Sri Lanka depends on untreated groundwater for their domestic water supplies. Hence, rainwater harvesting is a better option to provide safe water in a cost-effective and accessible manner, particularly for drinking and food preparation. However, treatment of harvested rain water in areas where pollution is rampant is essential to ensure its quality. Der Bruggen and Vandecasteele (2003) have shown that nano filtration is the efficient technique for

the removal of hardness, natural organic material, micropollutants such as pesticides, viruses and bacteria, salinity, nitrates and arsenic.

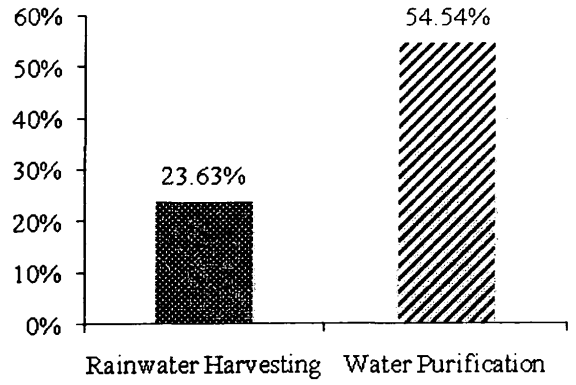

Figure 1. Rainwater harvesting and Water purification

Crop management in relation to climate change

Selection of crops and extent of cultivation vary from season to season and depend largely on water availability and seasonal variation in climate. Study revealed that 8.7% of the farmers grow vegetables in both *Maha* and *Yala* seasons while 32.7% of them cultivate paddy in *Maha* and growing vegetables in *Yala* (Figure 2). However, majority of the farmers (58.5%) cultivate paddy in *Maha* season only. People get more income from field crops. However, vegetable cultivation is being affected by water shortage and extreme climate change. Due to high pests and disease attacks and frequent flooding, farmers are not willing to grow vegetables in *Maha* season. In addition, climate change is likely to bring down the production of key food crops like rice and other cereals due to inadequate water supply and extreme weather conditions. Increase in average temperature reduces rice yield. Saseendran *et al.* (2004) have shown that for every one degree increment the decline in yield is about 6%.Appropriate water and crop management practices are therefore essential to sustain the crop production. Luis *et al.* (2002) have shown that the use of water for agricultural production in water scarcity regions requires innovative and sustainable research and an appropriate transfer of technologies

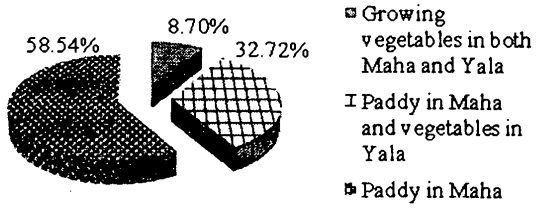

Figure 2. Cropping pattern

Although people are practicing various strategies in relation to water and crop management, they are not well aware about its effectiveness and suitability. Furthermore, these facilities are limited for some households. Since water shortage is common problem in many areas of the Batticaloa district, collection, conservation and proper storage of rainwater are essential. The solution to this problem depends largely on the development of more effective water management practices. Rainwater harvesting is effective and inexpensive approach to manage rainwater efficiently. However, to be successful, the rainwater harvesting system should be maintained regularly and it needs to be combined with other agricultural technologies and practices including water conservation measures, crop management,and soil fertility management, as well as the selection of suitable crop types such as drought-tolerant crops and salinity tolerant crops. In addition, other non conventional water resources including saline/brackish water and treated wastewater can be used as potential water sources for agricultural purposes.

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