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Farmer's Perception on Climate Change and Coping Strategies; A Case Study in Major Irrigation Schemes of Puttlam District

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1 INTRODUCTION

Global climate change is one of the most critical challenges for food production. Climate change is expected to have serious environmental, economic, and social impacts on Sri Lanka. In particular, rural farmers, whose livelihoods depend on the use of natural resources, are likely to bear the brunt of adverse impacts. The extent to which these impacts are felt depends in large part on the extent of adaptation in response to climate change. Adaptation to climate change requires that farmers first notice that the climate has changed, and then identify useful adaptations and implement them (Maddison 2006). Agricultural change does not involve a simple linear relationship between changes in a farmer's decision making environment and farm-level change. One important issue in agricultural adaptation to climate change is the manner in which farmers update their expectations of the climate in response to unusual weather patterns.

Agriculture, especially crop production, is highly sensitive to both short and long-term changes. Agricultural production remains the main source of livelihoods for the most rural communities in Sri Lanka as it provides employment for 31 % of the population and contributes 11.1 % of Gross Domestic Production in the year 2012 (CBSL, 2012). Environmental stress is the primary cause of crop losses

worldwide, reducing average yields for most major crops by more than 50%. The climate change research community has identified different adaptation methods. The adaptation methods most commonly cited in literature include the use of new crop varieties and livestock species that are more suited to drier conditions, irrigation, crop diversification, mixed crop livestock farming systems, change of planting dates, diversification from farm to nonfarm activities, increased use of water and soil conservation techniques, changed use of capital and labour, and trees planted for shade and shelter (Bradshaw *et al*, 2004; Maddison 2006; Nhemachena and Hassan, 2007). Therefore the main objective of the study was to determine and describe the perception of farmers on climate change in the major irrigation schemes and their coping strategies. The study was conducted at Thabbowa, Sengaloya, Karawita which were categorized as major irrigation schemes in Puttlam district by the Irrigation department.

2 METHODOLOGY

Data were collected during 2015 through two complementary approaches, namely (i) focus group discussions (FGDs) and (ii) farmer interviews using semi-structured household questionnaires. An



FGD was held in each ward to collect qualitative information on the farming systems and farmer perceptions on climate variability, use of seasonal climate forecasts and on how they cope with variable climate. A total of 150 farmer households distributed in the major irrigation schemes in Puttlam district (Thabbowa, Sengaloya, Karawita) was interviewed to assess how farmers perceive the effects of changes in climatic variables, and how they have adjusted their farming practices to cope with the changes in climate. The questionnaire assessed perceptions of changes in rainfall, temperature and extreme weather events in the last 10 years, how changes in climate have affected crop production in the last 10 years. Data was entered using MS Excel for basic descriptive statistical analyses for this study; examines the farmers' perceptions of and adaptations to climate change in the Major irrigation schemes in Puttlam district (Thabbowa, Sengaloya, Karawita).

3 RESULT AND DISCUSSION

3.1 Basic Information of farmers in the study area

Average year of education in the study area is Grade 8. Higher level of education is believed to be associated with access to information on improved technologies and higher productivity (Norris and Batie 1987). The average age of the house hold in the study area is 43 years. Therefore, farmers with higher levels of education are more likely to adapt better to climate change. Male-headed households are more likely to get information about new technologies and undertake risky businesses than female-headed households (Asfaw and Admassie 2004). Age of the head of household can be used to capture farming experience. The average size of the household is 5

members. The influence of household size on use of adaptation methods can be seen from two angles. The first assumption is that households with large families may be forced to divert part of the labour force to off-farm activities in an attempt to earn income in order to ease the consumption pressure imposed by a large family (Yirga 2007).

3.2 Farmers' Perceptions about Changes in Climatic Variables

Nearly all the households (98%) interviewed had observed a change in the climate in the last 10 years. The percentage of households reporting that rain came late (52.3%) were nearly equal to those reporting rain to be coming early (46.4%). Twenty two percent reported that rain increased in amount and intensity while 18.6% perceive rain to be extreme (Figure 1). The highest proportion of farmers (41% households) perceived an increase in temperature in the last 10 years, while 16% of the households did not observe any change in temperature (Figure 2). Extreme climatic events like floods, drought/prolonged dry seasons were reported to have increased in the last 10 years (Figure 3). In general farmers feel the change in rainfall, temperature and extreme events.

3.3 Adaptation Options

The adaptation methods for this study are based on asking farmers about their perceptions of climate change especially the changes in rainfall, temperature and the occurrence of extreme events (Figure 1, 2 and 3).

Further the adaptation options they take to counteract the negative impacts of climate change. The adaptation measures that farmers report may be profit driven, rather than climate change driven. Despite this missing link, we assume that their actions are driven by climatic factors, as reported



by farmers themselves in the studies by Maddison (2006) and Nhemachena and Hassan (2007).

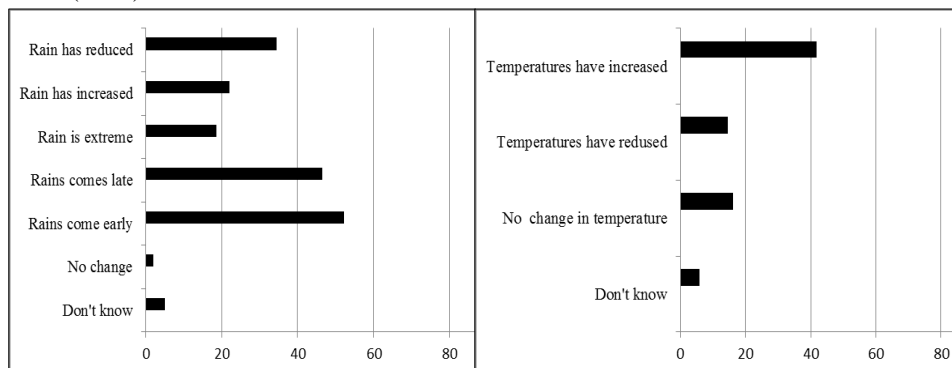


Figure 1: Changes in Rainfall in last 10 years

Figure 2: Changes in temperature in last 10 years

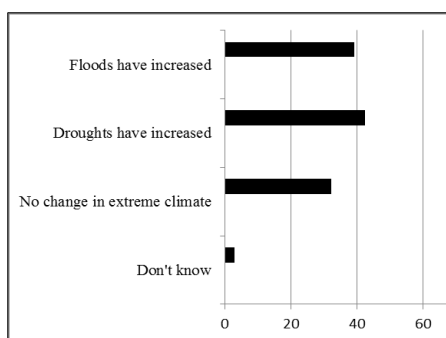


Figure 3: Occurrence of extreme events in last 10 years as a percentage

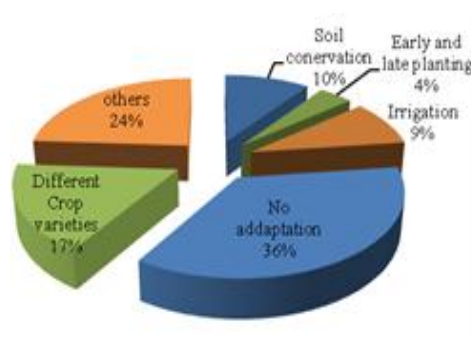


Figure 4: Farmers adapting to climate change

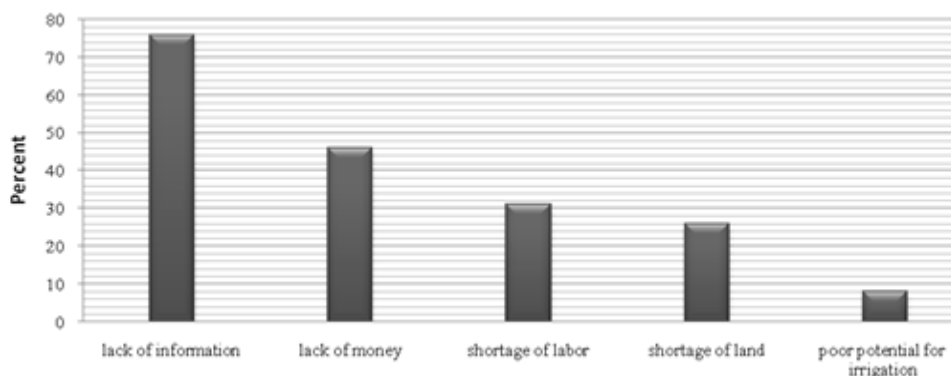


Figure 5: Barriers to adaptation

As indicated in Figure 4, use of different crop varieties (14%) is the most commonly used method, whereas using early and late planting (4%) is the adaptation least practiced among the major adaptation methods identified in major irrigation schemes. Moreover, about 36 percent of the surveyed farmers reported not to have taken any adaptation method. About 24 percent of the surveyed farmers reported any other adaptation method.

3.4 Barriers to Adaptation

The analysis of barriers to adaptation to climate change in the major irrigation schemes indicates that there are five major constraints to adaptation. These are lack of information, lack of money, shortage of labour, shortage of land, and poor potential for irrigation (Figure 5). For instance, lack of information on appropriate adaptation options could be attributed to the dearth of research on climate change and adaptation options in the country.

3.5 Coping Mechanisms

To escape climatically bad years the farming community has been using a wide range of inbuilt coping mechanisms (Figure 6). All climate hazards end up either in eroding the asset of the farmers, or the natural base on which their livelihood depends. Hence, coping strategies adopted are not specific to the climate hazard. Inter household transfers and loans (31.1%), reducing household consumption (26.5%), store grains (12.4%), rent tools/ animals (16.3%), Wage labour (42.8%), sale of household assets (22.3%) were the main coping mechanisms experienced by the farming community in the study area. These are the various adjustments those farmers in the survey area made in their farming activities in response to climate change and variability.

3.6 Changes made in non-Farm Income Sources

Information on the non-farm activities which farmers had taken on to diversify their income sources and therefore to spread the risk associated with farming like total crop failure was analysed (Figure 7). A number of activities had been started to increase household cash income and included stone quarrying, retail business, working as a casual worker at another farm and securing salaried employment. No household had any new additional cash income activity in the Puttlam district. Retail business was the most common type of activity started by households (14%) across the Puttlam district.

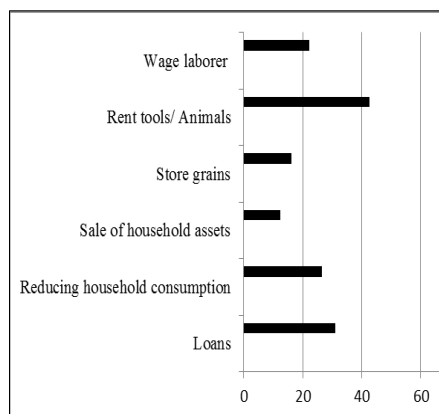


Figure 1: Coping Mechanisms in Percentage

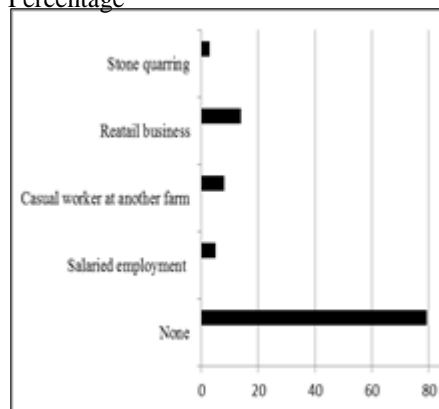


Figure 2: Changes made in non-Farm Income Sources (% households)



4 CONCLUSION AND RECOMMENDATIONS

Farmers experience the change in climatic factors. Farmers adapted to climate change by using different methods, of which the major ones are included in this study. Those who did not use any of the methods considered described lack of information on adaptation methods and lack of money as major constraints to adaptation.

These analyses of the constraints to adaptation and the factors that influence farmers' perceptions of adaptation to climate change in the major irrigation schemes suggest a number of different options. These options include raising awareness of climate change and the appropriate adaptation methods, facilitating the availability of credit, investing in yield-increasing technology packages to increase farm income, creating opportunities for off-farm employment, conducting research on use of new crop varieties and livestock species that are better suited to drier conditions, encouraging informal social networks, and investing in irrigation.

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