

## SEASONAL SHIFTING AND ITS IMPACT ON CROP PRODUCTION: LOCAL COMMUNITY PERCEPTION OF SATKHIRA DISTRICT

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### ABSTRACT

In Bangladesh, climate change apparently has started to affect the climatic parameters which cause seasonal shifting and the behavior of different seasons. This kind of phenomenon is currently posing a serious threat to the agricultural crop production and food security of the country. Participatory Rural Appraisal method was applied to investigate the perception of the local community of Satkhira district. The study primarily identified the thinking of the local people about the shifting of seasons due to changes in the climatic parameters and its impact on crop production. Moreover, a number of literatures were reviewed to conceptualize the real scenario of climate change. Presently, only three seasons are perceived by the local community instead of the traditional six seasons. These seasonal fluctuations (starting and ending) and seasonal absences are resulting in high uncertainty in crop production. New agricultural plan along with climate resilient agricultural extension services need to be introduced to overcome such uncertainty.

**Keywords:** Climate change, Seasonal shifting, Agricultural Crop Production, Food Security, Uncertainty and Resilient

### Introduction

Bangladesh is an agrarian country and agriculture is always vulnerable to unfavorable climatic conditions and events. Though the Government of Bangladesh has earned tremendous technological progress (such as improved crop varieties and irrigation potentialities), Climate is still key determinants for agricultural productivity and sustainability (Ahmed & Shibasaki, 2000). In Bangladesh, climate change is a looming reality, and the sign of climate change has already begun to appear in many locations or sectors like crop production of the country (MoEF, 2009). Studies show that climate change has a noticeable impact on the climatic parameters like temperature and rainfall pattern and also the seasonal pattern of the country (Basak, Titumir, & Dey, 2013). Over the last three decades, the country has been facing higher temperatures over the last three decades (Sarker, Alam, & Gow, 2012). Moreover, it is projected that the annual mean temperature will rise by 1.0 °C, 1.4 °C, and 2.4 °C by 2030, 2050 and 2100 respectively. The average temperature for the winter season (December, January, and February)

is likely to increase by 1.1 °C by 2030, 1.6 °C by 2050 and 2.7 °C by 2100. The prediction for the monsoon months is 0.8 °C, 1.1 °C and 1.9 °C by 2013, 2050 and 2100 respectively (Agrawala, Ota, Ahmed, Smith, & Aalst, 2003) (Ahmed A. U., 2006). According to the above projections the country is likely to face more hot days and heat waves, longer dry spells and higher drought risk which will adversely affect the production of different crops. Similarly, monsoonal rainfall is projected to increase, and the rainfall variability may significantly increase causing more intense rainfall and longer dry spells. Based on the estimation of climate models, the precipitation will increase during the season of summer monsoon (Mirza, 1997) (Ahmed, A. U., & Alam, M, 1999). This erratic and unevenly distributed pattern of the climatic parameters frequently produces extreme events, i.e. floods and droughts, which have significant harmful effects on main crops especially on Aman rice (Amin, Zhang, & Yang, 2015).

It is observed that arbitrary changes in the climatic parameters resulting in seasonal shifts or variations poses a serious threat to the country's agricultural

crop production as well as food security. This research gives an overview of how the seasons are changing over time and what is the implication of it on the crop production of Satkhira district. Participatory Rural Appraisal method (Chambers, 1994) was applied to the study area to identify the local community perception about seasonal shift, variations and its impacts. In this research, several literatures were reviewed to conceptualize the real scenario of climate change and its impact on crop production in Bangladesh.

**Climatic Trend in Satkhira District**

The local community of three upazilas of Satkhira district revealed that some climatic parameters or elements are changing very randomly due to changes in the climate over the last 20 years. They mentioned that the average temperature of Satkhira district represents an increasing trend. Therefore, the number of hot summer days in a year has increased in all the selected upazilas of the study area. On the other hand, the rainfall pattern in Satkhira has become erratic and shows a decreasing trend in Shyamnagar and Kaliganj upazila. Figure 1 shows the climatic trend (Temperature and Rainfall) of Satkhira district in last 20 years.

Indicators	Trend (in last 20 years)		
	Shyamnagar	Kaliganj	Kolaroa
Temperature	↑	↑	↑
Rainfall	↓	↓	→

Indicators	Increase	Decrease	Moderate
	↑	↓	→

Figure 1: Climatic Trend of Satkhira District  
 Note: Based on local people perception

**Shifting of Seasons: Local Community Perception**

The shifting of seasons is now a major concern for the local community people, particularly the farmers. According to them, the changing behavior of climatic parameters is mainly responsible for the shifting of seasons. The local population of Satkhira district reported that they have started to perceive only three seasons instead of six seasons in a year from the last couple of years. Figure 2 shows the change in the seasonal pattern of Satkhira district.

The local community reported that the duration of summer is increasing along with overall temperature of the locality. Presently, the season starts from mid-March and lasts to mid-September. Though, the traditional summer period was mid-April to mid-June. The frequent occurrence of a heat wave in the summer season is also a common hazard in Satkhira district.

Erratic rainfall pattern is seen during the current rainy season period and the season starts from mid-July to mid-October, which indicates the seasonal shifting. The duration of the rainy season in the study area is increasing along with late monsoonal rainfall. The community has also started to experience sudden occurrence of short duration heavy rainfall resulting in the loss of crop production.

The local community also observes the shrink of the winter season. They mentioned that currently the winter season lasts for shorter period than the traditional period. The present time range of winter season is November to February, whereas the regular winter time used to be from mid-October to mid-March. The people also pointed out that the incidence of the cold wave along with heavy fog is increasing in the winter season.

Additionally, the seasonal absence is also monitored by the local people. They mentioned that autumn, late autumn and spring season is almost wiped out from Satkhira district.

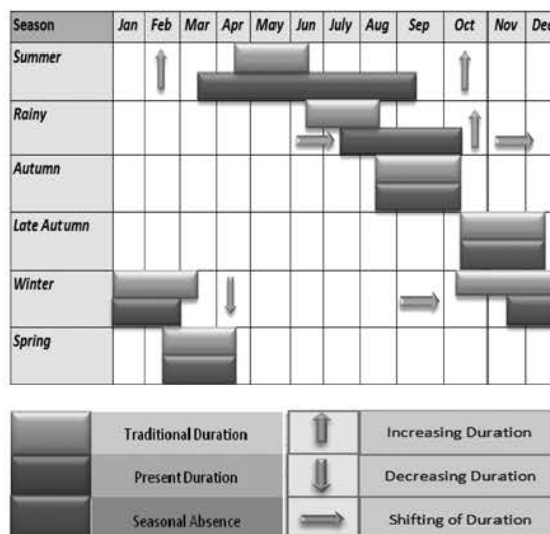


Figure 2: Seasonal Calendar of Satkhira District  
 Note: Based on local people perception  
 (Source: Field Survey, 2012-2013)

### Seasonal Shifting and its Impact on Crop Production

Seasonal shifting causes disarray to the traditional agricultural calendar that has long been followed by the farmers of the study area. Figure 3 represents the impact of seasonal shifting and variations on the crop production of Satkhira district.

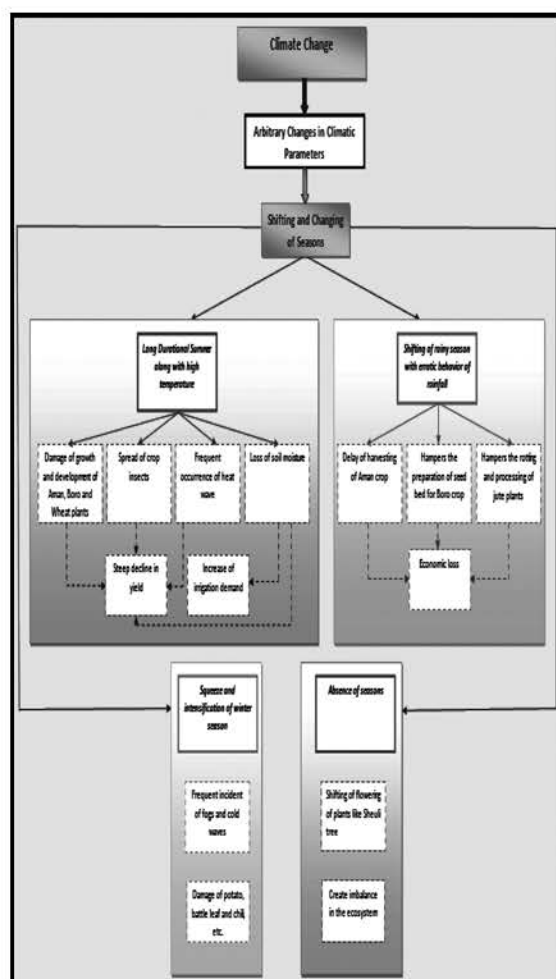


Figure 3: Seasonal shifting and variations and its Impact on Crop Production in Satkhira District (Source: Authors)

Temperature is increasing in all the selected Upazilas of Satkhira district along with the shifting of summer seasons, according to the Figures 1 and 2. It is identified from the respondents that the high temperature has caused detrimental effects on the growth and development of crop plants. For example, the growing seasons of rice, wheat and maize is severely affected by long durational

summer along with high temperature, resulting in steep decline in the net growth as well as yield of these crops. Moreover, loss of soil moisture (subsequently increases irrigation water requirements) due to extreme temperature is also seen, which reduces the crop production. On the other hand, the occurrence of frequent heat wave also damages the crops in the study area. The rigorous spread of crop insects also started to damage the crop production because it is evident that increased temperature stimulates the breeding of harmful insects, pests, etc.

Significant reduction in crop production due to the erratic behavior of rainfall is also an emerging problem in the study area. Figure 2 shows that the traditional duration of the rainy season has started to shift along with increase of duration. Due to the shifting of the rainy season, they are experiencing late monsoon at the harvesting time of Aman rice. Sometimes late monsoon creates water logged condition in the Aman field especially on the day of harvesting. Consequently, the farmers have to delay the collection of Aman resulting in an economic loss. Also, the agricultural fields remain underwater for a longer period due to late monsoon. This situation ultimately hampers the preparation of seed bed for Boro rice. Moreover, Satkhira district is prone to cyclone (late September-mid October) and associated hazards, i.e. heavy rainfall, storm surge, saline water intrusion and etc. Farmers added that the delayed harvesting of Aman is more vulnerable due to cyclone and associated hazards, which results crop loss/damage. Farmers are also facing problems in rotting and processing of jute plants due to insufficient rainwater in the rivers or water bodies due to the shifting of season.

Though the winter is getting shorter in Satkhira district, the changing behavior of winter season has started to affect the crop production. The local people added that the incident of more fogs and cold waves affects the crop like potato, bottle leaf, chilli (red or green) and etc. adversely. On the other hand, fog is also observed by the farmers in the month of April or May, and this uncertainty also damages the crops of the summer season.

Apart from that, seasonal absence is also observed by the local community. They mentioned the absence of three distinct seasons like autumn, late autumn and spring affects the production of mustard and pulse, etc.

## Conclusion

The local community people of Satkhira district mentioned the existence of three seasons instead of six seasons due to climate change induced seasonal shifting. They are also facing the problem of seasonal fluctuation (starting and ending) and seasonal absence resulting in high uncertainty in crop production and flowering of other plants. In this regard, the new agricultural plan will play a vital role to overcome the problems of such uncertainty. On the other hand, climate resilient agricultural extension services including adjustment of crop calendar with existing seasons, short durational climate resilient crop varieties, region particular cropping pattern and etc. will also be helpful in adapting to the impact of seasonal shifting. Besides, early and easily understandable weather forecasting needs to be disseminated among the local people. Moreover, what types of activities the farmers need to perform is also needed to be provided by the respective authorities of Bangladesh Government. The adoption of local varieties and indigenous knowledge of local farmers also need to be emphasized.

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