

# A Case Study of Drought and its Impact on Rural Livelihood in Meghalaya

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**ABSTRACT :** Both male and female counterparts of the household contribute to farming activities and livelihood. Drought affects both men and women but with different consequences according to their roles and responsibilities. Targeting interventions according to the gender roles is deemed imperative. Farmers are aware about the drought, and its negative impact on pests and disease incidence in crops, weed infestation and decrease in number of livestock, decrease in yield of meat and milk, decrease in yield of rice and other crops. Farmers are unaware of the coping strategies and mechanisms which they could adopt to reduce the risks and effects of drought due to lesser accessibility to external inputs and technologies. Site specific research and study is required to find out the suitable technology for prevailing cropping pattern and other means of livelihoods such as livestock, poultry, piggery etc.

**Key Word :** Drought, Impact, Rural, Livelihood and Meghalaya

## Introduction

Climate change impacts on agriculture are likely to be negative. It has been observed that women are more vulnerable than men to negative consequences of climate change due to persistent gender inequalities in access to resource and opportunities (Kelkar, 2009). Extreme climate variability (ECV) increases pest and disease incidence on crop, human and livestock; decreases number of livestock, fodder availability, milk and meat production and reduce income generation of farming households. Thus, households are vulnerable to ECV such as severe drought and floods which pose a threat to food security and sustainable livelihoods. Traditionally, women in NER (North-Eastern Region) particularly in Meghalaya, contribute significantly in rice and other crop production activities in the lowlands and hills. Women spend more time in agricultural production, fire wood collection, water collection from longer distances for drinking, washing and even for livestock and they are more susceptible to communicable diseases due to malnutrition and undernourished diets. This is largely because men and women are bound by distinct socio-economic roles and responsibilities that give rise to differences in

vulnerability and ability to cope with these climate change consequences. Unprecedented drought like situations adversely affected the whole Northeastern region recently. The annual mean maximum temperature is also increasing at a rate of 0.04°C per decade in the region (Das, 2009). Meghalaya is one of the seven states in the NER of India and is known as 'abode of clouds'. It is located at 25°41'21" North latitude and 91°55'25" East longitude. The irregular pattern of rainfall with quite early in the region, extreme rainfall events, less rain in June-August and summer monsoon rainfall is found to be decreasing over this region significantly during the last century at an approximate rate of 11 mm per decade. Rice is the staple crop of the state and accounts for 79.74 per cent of the total cropped area under food grain (District Statistical Officer-09). Rice production is mainly at subsistence level and farming households are entirely dependent on natural resources for their food, shelter and other income. Hailstorm, thunder and cyclone impact 16 per cent of the villages where most of the damages are associated with the orchards (Anonymous, 2011).

In rural areas of Garo Hills, men and women are highly dependent on biomass such as wood, agricultural crops

wastes and forest resources for their energy and livelihood. However, in the face of drought, the ability of women and men to obtain these indispensable resources is reduced. Women are particularly vulnerable to drought because they have less access to and control of resources compared to men. Furthermore, it usually impacts on sectors that are traditionally associated with women, such as paddy cultivation, plantation, fishing *etc.* (Parikh, 2011). In view of the above, a detailed study was carried out to assess the impacts of drought and list the mitigation measures as suggested by rice growing farmers of Meghalaya.

### Material and methods

The study was conducted in two districts viz, West and South Garo Hills of Meghalaya. One block from each district and five villages from each selected block were selected for the study. To collect first hand information on drought and its impact, Participatory Rural Appraisal (PRA) and Focus Group Discussion (FGDs) approaches were used. FGD consisted of at least 30 farmers (15 male and 15 female). Three PRA and two FGDs were conducted randomly for the study. Primary data were collected through FGDs for the year 2010-11 on the basis of farmers' memory. Under PRA different methods viz, Timeline, Daily routine, Farm seasonal calendar, Problem ranking were followed. The scores assigned and problems were ranked according to the scores (1 to 10; 1 = most severe; 10 = least severe).

### Results and discussion

#### Effect of drought on livelihood

**Off farm activities:** When agricultural operations were not at all possible due to severe drought/ flood, farmers go for off farm activities like selling firewood collected from the forests, working as construction labours, agricultural wage laborers, etc. as alternatives to farming.

**Migration:** Under both drought and flood conditions, out-migration was not commonly.

**Cropping pattern:** Usually farmers follow mono-cropping and there was no change in cropping pattern during drought/flood. There was no crop replacement when major crop fails in a season.

**Water availability:** Water scarcity hampers timely performance of agricultural operation during drought conditions. River and stream water also dry up and water for household purpose was scarce. Women spend more time in collecting water as they have to travel four to five kilometers.

**Fuel availability:** Fuel availability was not a problem since both men and women gather them from the nearby forests and orchards during drought.

**Food availability :** Food grains was less during drought but was manageable. Scarcity of food was more severe during drought than in flood.

**Fodder availability :** The decline in the number of cattle and milk yield is also becoming common in a villages due to unavailability of fodder and free grazing land.

**Government schemes:** Until now the villagers have not received any aid from the government.

#### Time lines and climate change

Time lines have been recorded for the period of 1950 to 2010 to observe the changes in agricultural crops, technologies and climate (Fig. 1). Traditional crops and cropping pattern were used during 1950 to 1980. No change was observed in crops grown and technologies used over the years. Average annual rainfall and average temperature were 2000mm and 23 to 25°C, respectively during the period of 1950s to 1970s. Fluctuation in normal temperature (14 to 30°C) and uneven distribution of rainfall have been observed since 1990 onward.

#### Daily routine and climate change

Daily routine was noted for both male and female separately (Fig. 2 and Fig. 3). It has been found that there were no changes in women's routine during *jhum* and main rice season. Activities during off season and *jhum* were similar for male members of the family. It was observed that the physical strain for women of Garo Hills was so high that they generally suffered from various health problems. Malnutrition continued to be an important problem in the village and most of the women are anaemic. Hence, Women contributed most of their time for farming activities apart from household chores and child care.

TIME LINE			
DOKAGRE VILLAGE - SELSELA BLOCK			
APPROXIMATE YEAR.	AGRICULTURAL CROPS	TECHNOLOGY	CLIMATE
1950'S	RICE, MAIZE, JILLETTS, CONPEA, PUMPKIN, TAPIOCA, ASHGOURD, COLOCASIA, YAM, MESTA, COTTON, GINGER. ETC.	TRADITIONAL	NORMAL
1960'S	- do -	- do -	NORMAL
1970'S	- do -	- do -	NORMAL
1980'S	- do -	- do -	Rainfall decrease, temperature increase.
1990'S	Areca nut and Cashew production and introduction of Rubber	- do -	There is decrease in rainfall, increase in temperature, Drought and Flood.
2000-11 <sup>th</sup>	RUBBER PRODUCTION.	- do -	There is rainfall and increase in temperature.

Fig. 1 : Timeline and climate change

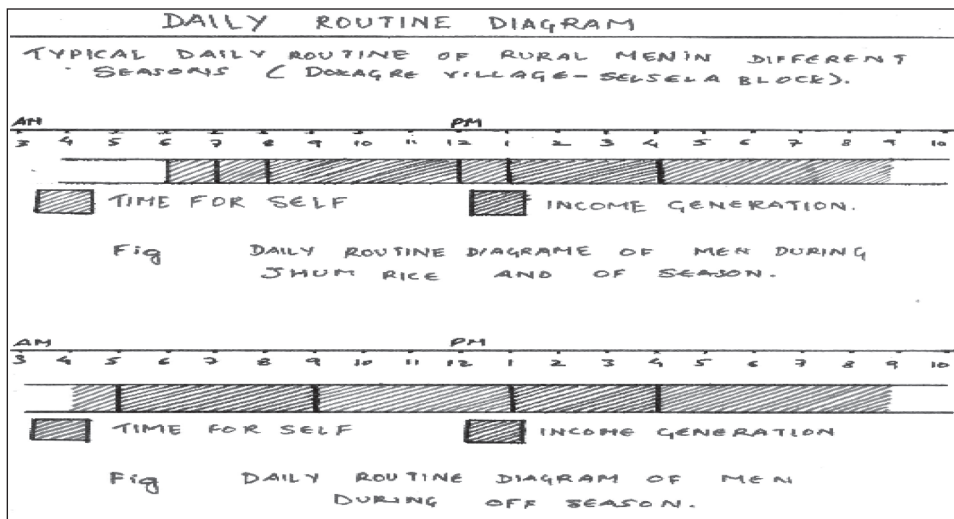


Fig. 2 : Daily routine activities of men

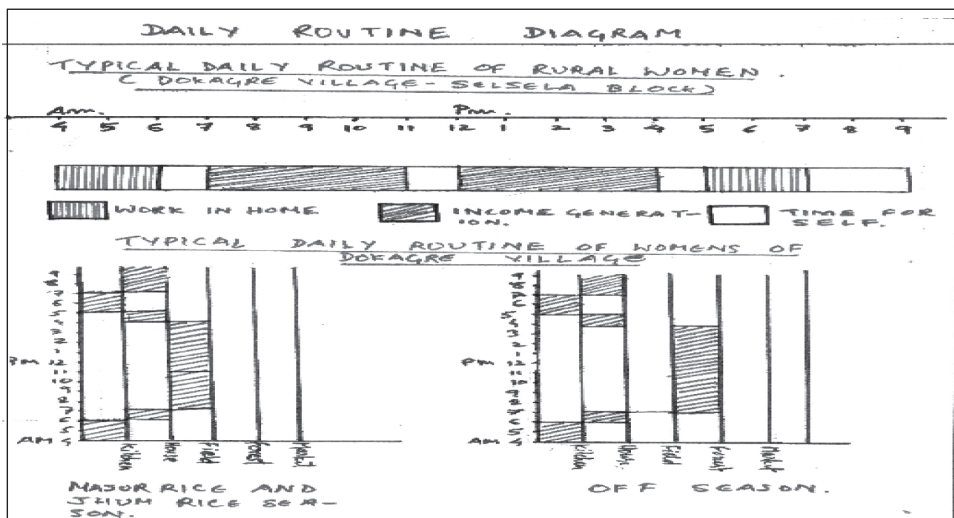


Fig. 3 : Daily routine activities of women

### Farm seasonal calendar

Farm seasonal calendars were prepared to know different farming activities in different months of the year (Tables 1 and 2). Farmers face problem in assuring irrigation water for land preparation in case of late onset of rainfall. Once a particular activity is hindered due to unfavorable weather conditions especially late onset or untimely rainfall, then the whole seasonal calendar is altered and in some months there is heavy workload for the farmers.

**Table 1 : Month-wise farm activities for *jhum***

Months	Activities
January	Farmers select their <i>jhum</i> land, cut the trees, and clear the jungles
February	Cleaned forests are left for drying
March	Cleared forests are dried and they are ready for burning
April	Once burning is done, sowing of crops like rice, maize, millets, tapioca, yam, cotton, ginger, mesta, cowpea, pumpkin, ash gourd etc is done. All the crops are sown simultaneously
May to June	Intercultural operations like weeding, soil raking and turning is done during these months
July	After finishing all the intercultural operations there are no activities in <i>jhum</i> fields
August	Harvesting of rice and other minor crops from <i>jhum</i> fields

**Table 2 : Rice planting activities**

Months	Activities
May	When there is timely onset of rainfall farmers start land preparation by plowing their fields
June	Sowing seeds in the nursery
July	Transplanting 30 days old seedlings
August to October	Weeding, thinning, irrigating the fields and other intercultural operations
November to December	Pre-harvest activity like draining of standing water in the field and harvesting

### Problem ranking and scoring

Farmers identified nine major problems, assigned a score (1 to 10; 1 = most severe; 10 = least severe) (Table 3). Water scarcity, infertile soils, disease and pests etc. are the major causes of yield loss of the crops. Decline in water table is one of the major problems faced by the farmers due to drought, insects such as gundhi bug, termites, shoot borer and grass hoppers as well as diseases like blast, leaf blight and brown spots, rice yields are affected.

**Table 3 : Major problems identified by farmers**

Problem	Score	Rank
Poverty	10	I
Decline in water table	10	I
Insect infestation	10	I
Decline in land fertility	9	II
Disease incidence	9	II
Inaccessibility to farm inputs	9	II
Decrease in rice yields	8	III
Unavailability of High Yielding Varieties's	7	IV
Extreme climate variability	6	V

### Focus Group Discussion

Specific issues on drought and its impact on agriculture and livelihood were discussed and found that severe drought occurred during 1970s which resulted in famine. Continuous rainfall for several days hampers timely cultivation of paddy. Transplanted paddy was destroyed due to late onset of rainfall since there was no irrigation facility other than the monsoon rains. Irrigation is given six to seven times during drought period and four times during normal time, it increased the labor and fuel costs. Productivity of rice declined from 1200 kg ha<sup>-1</sup> to 800 kg ha<sup>-1</sup>. Weed infestation was reported more during drought. Farmers have been using traditional rice varieties (Ranjit, Mahsuri and Aijong). Production of fodder has decreased due to drought and affected the milk production from dairy cattle.

### Adaptation strategies

**Land preparation:** Ploughing is done during heavy rainfall but the number of ploughings is increased from five to six times or more during drought condition. This increases labor requirement for land preparation.

**Nursery:** Seeds are sown manually in the nursery. More seed rate is required during low rainfall when seeds do not properly germinate due to lack of moisture in the soil, even if the seed is germinated they dry up after a few days.

**Transplanting:** During low rainfall three to four seedlings (25-35 days old) per hills are used., Transplanting is delayed during heavy rainfall.

**Intercultural operations:** Weed infestation in the field is high during the periods of low rainfall. More labor is required when there is low or no rainfall as to facilitate irrigation.

**Insect pests and diseases:** Occurrence of diseases like brown spot and leaf blight occurrence are high in the area during drought situation. Insects like shoot borer and gundhi bug are the major pests that attack rice in the field.

**Management of pests and diseases:** Annual shrub locally known as 'Kasi' is placed in the middle of the field to control termites. Rotten crab is used against gundhi bug. Grape fruit and phenyl are used against insect pests.

## Conclusion

The livelihood of the rural population depends on the timely and sufficient amount of rainfall. From the above study, it was found that drought affects both men and women but with different consequences according to their roles and responsibilities. Both male and female counterparts of the household contribute to farming activities and livelihood. Targeting interventions according to the gender roles is deemed imperative.

Farmers are unaware of the coping strategies and mechanisms which they could adopt to reduce the risks and effects of drought due to lower level of education and lesser accessibility to external inputs and technologies. Extensive research and study is required to find out the suitable cropping pattern and coping strategies to reduce the effects of drought in studied area.

## Acknowledgement

The authors are thankful to the IFAD for funding this study and to anonymous referee for giving his valuable comments to improve this article.

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