

## Climate Change & Food Security in North -East India: A Critical Study

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**ABSTRACT:** Sustainable development of any region can be measured as the result of a gamut of factors where food security and energy security are important indicators .These are the indices against which environmental viability of any locale could be assessed energy

No other region, in collectivity, perhaps in India has so measure of richness and or at the same, faces the trials and tribulations of the counts of sustainable development, food security and energy security indices, as has the North- India.

The existing food situation as it prevails in the North East India is studied with reference to data available as obtained from government and other sources. The likely impact of climate change on the emerging food situation in the remote region in the days to come is studied. It is revealed that though for now the problems donot seem to appear however in the years to come food security in the North East India is likely to precarious which demands action.The situation needs to be addressed before a crisis of sorts develop.

**Key words-** sustainable development, food security. Climate change, North East India

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### I. INTRODUCTION

Water and food scarcity are the biggest problem globally and it severely affects the arid and semiarid regions/countries. Climate change has resulted in increases in globally-averaged mean annual air temperature and variations in regional precipitation and these changes are expected to continue and intensify in the future (Solomon et al., 2007). The impact of climate change on the quantity and quality of a drinking water source studied by Kundzewicz and Döll, during 2009. As per the fourth IPCC assessment report the knowledge of groundwater recharge and of levels in both developed and developing countries is poor. There has been very little research on the impact of climate change on groundwater' (Kundzewicz et al., 2007).

Climate change and variability may have an impact on the occurrence of food safety hazards at various stages of the food chain, from primary production through to consumption. There are multiple pathways through which climate related factors may impact food safety including: changes in temperature and precipitation patterns, increased frequency and intensity of extreme weather events, ocean warming and acidification, and changes in contaminants' transport pathways among others. Climate change may also affect socio-economic aspects related to food systems such as agriculture, animal production, global trade, demographics and human behaviour which all influence food safety. The potential impacts of predicted changes in climate on food contamination and food safety at various stages of the food chain and identifies adaptation strategies and research priorities to address food safety implications of climate change is evident. There is a need for inter-sectoral and international cooperation to better understand the changing food safety situation and in developing and implementing adaptation strategies to address emerging risks associated with climate change.(Tirado ,Clarke et al, Climate change and food safety: A review,2010)

Climate change leaves no development priority untouched, and the most important effect is on agriculture and its long term sustainability, which is vital to cater the primary developmental need “food for mouth” and also serves as a livelihood of billions of people. Agriculture is impacted by climate change, by way of drought, heat stress, desertification, changes in rainfall patterns (quantity of rainfall, its distribution across the globe and variation in on set of monsoons) and flooding. Not only this agriculture and forestry are also major emitters of greenhouse gases. Hence there is impact of agriculture on climate change and also there is the impact of climate change on agriculture, the latter being the more cause of concern (Industries share over climate change is considerably more).

## II. OBJECTIVES OF THE CURRENT STUDY

The objectives of current study are-

- To study the existing food security scenario in the NE States
- To examine the likely impact of food security in view of impending climate change in the NE States
- To suggest possible ways & means to deal with the situation

## III. RESEARCH QUESTIONS

The research questions of the current study are-

- Are there food security concerns in North- Eastern India?
- What & how are the likely impacts of climate change on the food security concerns in North- Eastern India?
- Are there ways to mitigate food security concerns in North- Eastern India?

## IV. RESEARCH METHODOLOGY AND DATA

The type of the Research is exploratory in nature, which will explore the different facts. The Data have been gathered from different secondary sources.

**Table 1a**

State	Excess (+)/Deficiency (-)	
	2005	2006
Assam and Meghalaya	-23%	-32%
Arunachal Pradesh	Normal	-25%
Nagaland	-22%	-25%
Manipur	-22%	-25%
Mizoram	-22%	-25%
Tripura	-22%	-25%

Source: IMD, Guwahati, India

Higher levels of surface air temperature have been clearly shown for the region. Annual mean maximum temperatures are rising at the rate of +0.11°C per decade. Annual mean temperatures are also rising, at the rate of 0.04°C per decade (Das, 2004). This could well be a manifestation of the regional impact of global warming/climate change. Das made this observation in 2004, when he said: "As of now it is confirmed that the increasing trend of temperature over the northeast region is a manifestation of global warming."

**TABLE 1. STATE WISE PRODUCTION OF TOTAL FOOD GRAINS IN NORTH EAST REGION (2000-01 TO 2009-10) (IN '000 TON)**

Year/State	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Arunachal Pradesh	217.4	242.3	244.5	226.9	240.9	245.7	248.5	255.8	308.9
Assam	4023	3894	4035	3618.2	3677.8	3060	3470	4143	4481.1
Manipur	400.5	343.7	391.9	447.8	398.5	398.5	421.8	415	338.9
Meghalaya	224.7	227.1	233.8	225.2	183.1	231.5	231.8	236.3	239.1
Mizoram	126.3	129.1	139.4	124.6	129.8	56.3	19.1	58.9	62.4
Nagaland	355.4	388	409.8	403.5	424.8	436.2	473.2	514.2	354.2
Tripura	597.5	611.8	529.1	556.4	563.6	630	633.3	634.7	647.9
Sikkim	98.7	96.6	99.9	103.9	100.3	100.3	111.6	107.5	117.3
NER	6043.5	5932.6	6083.4	5706.5	5718.8	5158.5	5609.3	6365.4	6549.8
India	212851.2	174771.4	213189.4	198362.8	208601.6	217282.1	230775	234466.4	218107.7

Source: Adapted from Ministry of Agriculture, Govt. of India.

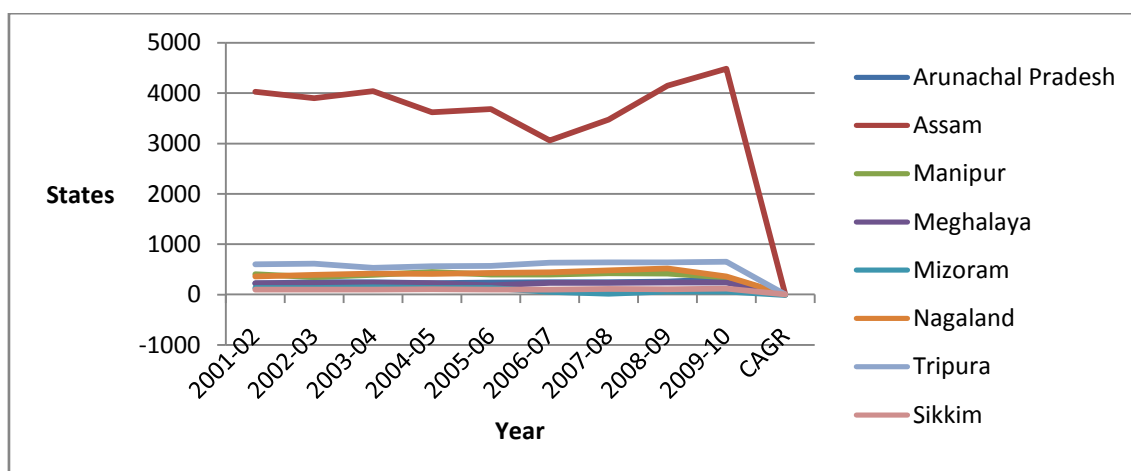


FIG 1

TABLE 2. PER CAPITA UNIT INTAKE OF AND PERCENTAGE SHARE OF FOOD AND CEREALS IN TOTAL HOUSEHOLD CONSUMER EXPENDITURE (2009-10) PER DAY MPCEMMRP

State	Per capita unit Food grain p/day (gram) (exclde imports)	Expenditure on Food (%)		Expenditure on Cereals (%)		per capita per day intake of					
		Rural	Urban	Rural	Urban	calorie	prote in	fat	calorie	protein	fat
						(Kcal)	(gm)	(gm)	(Kcal)	(gm)	(gm)
Arunachal	612	57.8	13.8	51.7	9.2	2251	65.3	27.3	2159	61.4	35.5
Assam	144	64.4	20.7	52.9	12.8	2120	54.4	28.6	2176	58.8	36.9
Manipur	344	60.1	28.7	55.9	24.3	1993	50.4	16.2	1952	47.9	17.4
Meghalaya	221	54.6	14	42.4	11.3	1801	47.5	25.7	1701	44.6	23.9
Mizoram	157	57.7	13.3	50.4	9.4	2182	55.6	29.4	2240	59.8	41.9
Nagaland	490	57.8	19.5	48.5	14.9	1983	61.1	15.3	1968	61.9	18.6
Sikkim	528	53.5	10.5	47.1	10.4	2074	53.5	41.8	2109	55.7	36.3
Tripura	482	62.4	15.4	54.1	11.8	2384	63.6	30.2	2431	66.4	39.8
India	444	57	13.7	44.4	8.1	2147	59.3	43.1	2123	58.8	53

Source: NSS 66thRound, Nutritional Intake in India, Ministry of Statistics and Programme Implementation. The projected food requirement in the North- East, based on 2001 figures for 2025-26 shall indicate the surplus/deficiency in the food security paradigm.

TABLE 4- PROJECTED FOOD REQUIREMENT IN THE NORTH- EAST

NE States	Year 2000-01 ('0000) tonnes			Year 2015-26 ('0000) tonnes		
	Production	Requirements	Surplus/ Deficit	Production	Requirements	Surplus/ Deficit
Arunachal Pradesh	274	228	46	543	503	40
Assam	4080	5448	-1368	6809	9363	-2554
Manipur	397	463	-66	583	879	-296
Meghalaya	162	458	-296	204	933	-629
Mizoram	171	186	-15	580	430	150
Nagaland	283	361	-78	608	1098	-490
Sikkim	102	108	-6	128	154	-26
Tripura	505	719	-214	733	1506	773
Total	5974	7971	-1997	10188	14866	-3032

Source: (Datta Roy,2002, NEICSSR, Mittal Publication)

With the food security situation in the N E already under stress, and more than that the scenario being grim in the future as it is projected to be ,the vulnerability index as per climate change would further add calamitous proportion to the existing or projected scenario.

**The Facts As Observed From Various Tables Are As Follows-**

- The projected deficit of food grains (Table 4) reveals that with a deficit of 3032 thousand tones, (projected for 2025-26) food security in North- East is a distant dream.
- State-wise analysis shows that in Tripura, Mizoram, Manipur, parts of Meghalaya and Nagaland, the flood magnitude is likely to increase by about 25% in the future compared to the present. Arunachal Pradesh, Assam, Sikkim and parts of Meghalaya are likely to experience floods of lower magnitude (about 5–10% less) in future compared to the present
- Overall in the North East region, higher agricultural vulnerability is observed in the northern parts and vulnerability declines towards the south. Since agricultural vulnerability is a function of crop production and input, the high vulnerability of some districts may be attributed to the lower input levels (fertilizer, irrigation). In addition, the high relative variability and inter-annual variability of rainfall have created increased occurrence of droughts and floods in the recent times, leading to uncertainty in yield and increased agricultural vulnerability

**V. SCOPE AND LIMITATIONS**

The scope of study of each individual state in the North-East for food and energy security is enormous and extensive studies on different aspects need to be undertaken .The North-East though comprises of hilly states with very similar physical and geographical features, do posses distinctive traits for different states and even for different districts of a state. Of the 78 districts of 8(eight) states the total of Agricultural, water and overall climate vulnerability are supposed to change and thereby affecting food security propositions differently which of course shall range from present bad to future worse.

**VI. CONCLUSION AND RECOMMENDATION**

The scenario of NE regarding food security is bad if not dismal in the highly climate vulnerable situation as the region is poised to enter in future. Further studies can emphasize the conclusions more objectively and in defining terms so far as different dimensions of food security was concerned.

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