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Research Article

Socio Economic Impact Due to Climate Variability on Selected Villages of Ukhrul and Thoubal Districts, Manipur

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Abstract

As global climate change continues, many of the villages are likely to become vulnerable at present. The altering of spring shed cycles, rainfall pattern, evaporation, precipitation and temperature are all subjected to climate variability and change. The present paper defined to study the socio-economic impacts due to climate variability on certain villages of Ukhrul and Thoubal districts, Manipur. Tentha and Khekman village are selected from Thoubal district where as Shirui and Hungpung village are selected from the Ukhrul district based on their vulnerable status. Socio economic and livelihoods status were conducted with the structured questionnaire interview and informal discussions. Questionnaire system was used to get responses in a standardized and cost-effective way. The one-way forward option is to reduce the socio-economic vulnerability and improve the ecological systems and services.

Keywords: Climate; Manipur; Socio economic; Selected; Villages; Vulnerable

Introduction

Directly or indirectly, global climate change is associated with the socio-economic and environmental impacts. Houghton [1], well-defined the impact of climate change on human society as well. More studies reveal that the impact of climate change depend on certain factors like demography, occupations, earnings, literacy, poverty incidence and dependency on government funds. In such cases, rural communities tend to be more vulnerable in comparison to urban counterparts. Therefore, the need of time is to delineate climate change impacts across rural and urban communities, and to develop appropriate policies to mitigate or adapt the impacts. Public awareness and capacity building will enhance more on understanding the present scenario of climate change. Moreover, facilitate assessment of climate change vulnerabilities and risk on bio-physical and socio-economy in terms of water, agriculture, forest and health sectors geared towards reducing climatic vulnerability is warranted. According to Hewitt [2], social vulnerability is the susceptibility of a given population to be harmed from exposure to a hazard, directly affecting its ability to prepare for, respond to, and recover. Furthermore, Houghton [1], calculated the temperature increase in the last hundred years and the last three decades have been successively warmer at the Earth's surface than any preceding decade since 1850 IPCC [3]**,** Moreover, climate change impacts on human health could occur through both direct (e.g., thermal stress) and indirect (e.g., disease vectors and infectious agents) pathways. Karl [4], suggested that direct impacts could result from increased exposure to temperature (heat waves, winter cold) and other extreme weather events (floods, cyclones, storm-surges, droughts) and increased production of air pollutants and aeroallergens such as spores and molds.

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Materials and Methods

Both valley and hills formed the State, Manipur. According to the Forest Survey of India FSI [5], report, the state lies between Latitude of 23°83'N-25°68'N and a Longitude of 93°03'E -94°78'E. The total area covered by the State is 22,327 sq. kms. Due to its different topographical location, terrain diversity, altitudinal variation and river system, the state experiences diverse climate variability especially in terms of ecosystem, biodiversity and livelihood, agriculture & its allied, water resources, forest, health, etc. It is therefore necessary to pay attention to climate disaster and other geo physical parameters in order to secure the future environment and also to help state build resilience for these dramatic climate and weather extremes.

Authors prepared structured type questionnaire for defining the village socio economic profile. Interview and informal discussions were conducted to overcome the poor response rates of a normal questionnaire survey. Moreover, personal interview of local youth, women's and leaders of the village community of varying ages, sexes and economic background to ensure clarity and effectiveness of the questions before use. Respondents were selected from different sex, age group, educational, social and economic classes. Secondary data were obtained from the office file, research works and published article etc (Table 1).

Study area

Thoubal district (*Khekman and Tentha*): The villages *(Khekman and Tentha)* experienced three-times floods during last year

inundating many of the agricultural fields losing different varieties of crop species. The local describe drought like situation after the floods. The worse condition is the reduction of rice production in the defined villages after post floods (Table 2).

Ukhrul district (*Hungpung* and *Shirui*): The villages *(Shirui* and *Hungpung)* reflect floods and landslides on regular interval of time. At recent times, the villages receive heavy rainfall during the pre-monsoon season causing landslides. Moreover, the destruction and degradation of surrounding forests led to the problem of water scarcity during lean season of the year. In most cases, spring is near to threatened due to the felling of trees for Livelihood purposes. Moreover, erratic rainfall, no rainfall and even heavy rainfall disturbs the agriculture and agricultural practices. The introduction of new insect species is another notable achievement in the selected villages. (Table 3)

Sample village	Khekman	Tentha	Shirui	Hungpung
Total population	8957	10659	1085	11752
Total household	1513	1890	228	2609
No. of male	4578	5543	572	6061
No. of female	4379	5116	523	5691
Sex ratio	956.53	922.96	914.33	938.95
Literacy rate	36.77	27.95	22.76	21.68

Table 1: Demographic profile of the selected villages, Census [6].

SL NO	Name of the village	Total population (2011 census)	Number of house hold (2011 census)
1	Khekman	**7157**	**1369**
2	Tentha	9087	1766
3	Hundung	10785	2036
4	Shirui	1265	284

Table 2: Population profile of the selected villages.

Villages	WATER	FOREST	AGRICULTURE	HEALTH
Khekman	Frequent flood due to erratic rainfall with high intensity. Shifting of rainfall pattern, deficit during monsoon & high intensity. Off and on of water source Decreasing of underground water recharge Mainly depend on river water. Drying up of wetlands and reservoirs.	Degradation of forest cover, urbanization	Mono crops cultivation practising there by damaging varieties of field crops due to impact of erratic rainfall. Shifting of livelihood, outmigration of youths, etc. Failure of rainfed agriculture, variability of yield. Limited adaptive capacity of farmers to new varieties of crop. New disease and pests.	Nutrient deficiency. Respiratory problems. Cardiac problem, diabetes, BP strokes problems etc. Water borne diseases.
Tentha	Frequent flood due to erratic rainfall with high intensity. Shifting of rainfall pattern, deficit during monsoon & high intensity. Off and on of water source. Decreasing of underground water recharge Mainly depend on river water. Drying up of wetlands and reservoirs.	Degradation of forest cover, urbanization	Mono crops cultivation practising there by damaging varieties of field crops due to impact of erratic rainfall. Shifting of livelihood, outmigration of youths, etc. Failure of rainfed agriculture, variability of yield. Limited adaptive capacity of farmers to new varieties of crop. New disease and pests.	Nutrient deficiency. Respiratory problems. Cardiac problem, diabetes, BP strokes problems etc. Water borne diseases.
Hundung	Very often Landslides due to erratic rainfall with high intensity. Depletion of water table. Drying up of spring heads. Limiting of water source. Shifting of rainfall pattern, deficit during monsoon & high intensity. Drying up of wetlands and reservoirs.	Decreasing/ diminishing of forest resources. Vulnerable due to fragmentation, Degradation, conservation etc.	Rich in bio-resources and traditional knowledge for conservation Limited adaptive capacity of farmers to new varieties of crop.	Nutrient deficiency. Respiratory problems. Cardiac problem, diabetes, BP strokes problems etc. Water borne diseases.
Shirui	Very often Landslides due to erratic rainfall with high intensity. Depletion of water table. Drying up of spring heads. Limiting of water source. Drying up of wetlands and reservoirs. Shifting of rainfall pattern, deficit during monsoon & high intensity.	Decreasing of forest resources. Vulnerable due to fragmentation, degradation, conservation etc.	Rich in bio-resources and traditional knowledge for conservation Limited adaptive capacity of farmers to new varieties of crop.	Nutrient deficiency. Respiratory problems. Cardiac problem, diabetes, BP strokes problems etc. Water borne diseases.

Table 3: Vulnerable sectors.

Results and Discussion

During the study period from January 2020 to December, 2020, it was difficult time for the authors as the pandemic covid-19 disturbs the whole state of Manipur. It was observed that the authors found that most people in the selected villages *(Tentha and Khekman)* of Thoubal districts depend on agriculture and agricultural practices for sustaining their livelihood. Irrigation supported horticulture and rearing of small and large livestock are other option for the secondary income. Sometimes, pisci culture works well during peak hour of the year. Out of the 7157 population in *Khekman,* numbers of farmers identified are 2654, number of governments employed reached to 156, 12 people woks on private sectors, 101 people are living with business and 1382 are unemployed as recorded in the census book, 2011 whereas number of farmers in Tentha village are 1176, 148 people works on government department, 2535 are students, 190 peoples are working under private sectors, 37 are business and 2256 are unemployed. Unfortunately, the scenario of climate variability and change are likely to exaggerate the problems of future food security by exerting pressure on agriculture. The total agricultural land calculated in Khekman is 556 Sangam while 872 Sangam is recorded in Tentha village. More importantly, Ravindranath [7], suggest that agricultural yields are more unstable in rain-fed areas than irrigated ones due to unpredictable climate changes. An estimated 3.5-million-hectare land which has under rain-fed cultivation, accounts for about 30% of the total area under cultivation. During natural calamities and hazards, the people of Khekman village faced problem like floods and droughts. Over 1368 families are frequently affected by flood and 248 families are rarely affected by drought. The same problem is faced by the Tentha village. Over 1232 families are frequently affected by flood, 150 families on occasional seasons and 137 families are rarely affected by flood. The worst case is post flood, like spreading of disease, non-availability of essential commodities and medicines and loss of dwellings etc. Besides, the villages do not face the problem of drought frequently, but over 264 families of the village faced occasionally and 230 families faced rarely.Health facilities are few and thinly in both the villages. The women in particular bear the burden of looking after the sick that fail to get modern medical attention.

While in Ukhrul *(Hundung and Shirui),* shifting cultivation is practicing in the villages for their livelihood. In addition, the villages rear livestock for supplement of household economy. Some of the important livestock are cow, chicken, boar, buffalo etc. Out of the 1265 population in *Shirui* village, 51 people are engaged in government department, 128 people on agriculture and 13 on agricultural activities, 32 as self-employed and number of students stand at 363. Whereas, out of the 10785 population in Hundung village, 80% have their own family agricultural land as many of the villagers depend on agriculture for their socio-economic livelihoods. Moreover, women play a vital role in income generating activities. They sell vegetables, fruits, fire-wood and other products Non Wood Forest Products (NWFP) found in the forest. At present, all come to a halt to the changing scenario of rainfall patterns, as little rainfall, no rainfall and heavy rainfall etc in the hills. More often, people spend little time in agricultural activities than the earlier. The reason is identified as low productivity of paddy cultivation. Many of the springs are dried up during the summer and winter months of the year leading to water scarcity in both the hill villages. According to Pimentel [8], maintaining biological diversity is essential for productive agriculture, and ecologically sustainable agriculture. Butt [9], suggests that it will be good to change to other crops that maintain forest cover and diversity, diversify the agricultural areas implementing more crops, or change the cropping pattern in warm regions shifting toward patterns used in hotter regions. Therefore, Reilly and Schimmelpfennig [10], recommend adaptation as an important component in any policy response to climate change. Furthermore Challinor [11], mentioned that farmers and producers need to have physical, agricultural, economic, and social resources to moderate, or adapt to, the impacts of climate variability. Parry and Carter and Met Office [12,13] defined, for those people depends on agriculture and cultural practices, food security is an issue of major concern, because climate change will affect crop yields and agriculture. On the other, farmers and producers need to identify the way of crop infection and the way forward option to reduce the way of infection (Table 4).

Conclusion

The study brings out suggestion in order to understand the scenario of climate variability and change in the selected villages. **Firstly,** the selected villages need to connect with various stakeholders such as farmers, line department officials, scientists, policy makers etc. to understand the present situation in terms of temperature rise, erratic rainfall, etc. **Secondly,** people depend on agriculture and agricultural practices needs to be trained with the help of the concerned department. **Thirdly,** awareness, workshop and capacity building to understand the various aspects of coping with climate variability. **Fourthly,** modern application and communication tools related to climate variability and change must utilized appropriately, for timely and proper dissemination of climate related information.

Sample village	Khekman	Tentha	Shirui	Hungpung
Agriculture & Allied sector	Rice, Pulses, Seasonal Vegetables, Maize etc.	Rice, Pulses, Seasonal Vegetables, Maize etc.	Rice, Pulses, Seasonal Vegetables, Fruits, maize, Spices etc.	Rice, Pulses, Seasonal Vegetables, Maize, Fruits, Spices etc.
Livestock	Chicken, Cow, Duck, Pisciculture, Piggery	Heifer, Cow, Poultry, Duckery, Pisciculture, Piggery	Buffalo, Cow, Chicken, Fishery, Pisciculture, Piggery	Bull, Cow, Poultry, Pisciculture, Piggery
Health	Khekman Primary Health Sub-Centre	Tentha Primary Health Sub Centre	Primary Health Sub Centre, ASHA	Primary Health Sub Centre, ASHA, District Hospital
Drinking water source	Thoubal Turel (River)	Tentha Pukhri Achouba (Ponds) Wangjing River	Shinguira Kong,Kokthi Kong, Yangui Kong (River)	Kazora, Mayora, Kaphungra, Kongrara, Kazora (Ponds)
Forest	Non-Wood Forest Products	Non-Wood Forest Products	Non-Wood Forest Products	Non-Wood Forest Products

Table 4: Questionnaire methods.

Fifthly, policies need to be framed, keeping importance on challenges posed by the changing climate. **Lastly**, the above suggestions will help in formulating positive strategies for coping up climate variability, especially in socio economic, livestock, forests, spring shed, which contributes to more than 60% of livelihoods (rural population) in the State of Manipur.

Some of the programme organised during the study

1. Development of capacity building toward self-generation of agricultural organic inputs and its management practices:

1.1 Preparation of vermin-compost to improve economic condition.

1.2 Management of kitchen waste for better environment.

2. Started methods of ICM (Integrated Crop Management) as pilot for convergence.

2.1 Farmers Interest Group (FIG) has been formed and started ICM method on their own at 4 (four) selected villages of the project site.

2.2 Sharing of knowledge among farmers.

3. Encouragement of crop rotation to increase soil health for better sustainable agricultural practices.

3.1 Preparation for analysis of soil health

3.2 Rabi crop cultivation started to improve soil quality.

4. Enhancement of Knowledge for safe and better livelihood.

4.1 Organised extension programme on capacity building development in the neighboring villages.

4.2 Construction of climate resilient model housing and community shelter home.

5. Paddy cum fish culture has been practising in Nungsangkhong, Hungpung village, Ukhrul District.

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