Adaptation to climate change & Non-Timber Forest Products A Study of Forest Dependent Communities in Drought prone areas of West Bengal, India

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Abstract:

In India 700 million rural people directly depend on climate-sensitive sectors like agriculture, forest and other natural resources for their subsistence and livelihood. Of these about 300 million rural poor are dependent on forest for their livelihood and more than half of them are tribal who depend on non-timber forest products (NTFPs). It also tries to estimate the factors responsible for the decisions of adaptation to climate change using the probabilistic model of Heckman's two-step process. Both socio-economic and climatic factors play a role in this decision-making process. This paper has important policy implications for poverty, livelihood vulnerability and migration.

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JEL Codes: D43, A11

#1383

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Key words: adaptation, non-timber forest products, socio-economic factors, migration, self-help groups.

JEL code: Q58

Adaptation to climate change & Non-Timber Forest Products

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1. Introduction

Climate change is one of the major threats to sustainable development because of its effects on health, infrastructure, agriculture and food security, and forest ecosystem (IPCC, 2007a).

In India 700 million rural populations directly depend on climate-sensitive sectors like agriculture, forest and fisheries. Forest resources are vulnerable to climate change but constitute an integral part of the social life of tribal people and others communities living in and around forest areas and contribute substantially to the food supply and livelihood security (Basu 2011). Thus about 300 million rural poor are dependent on Indian forest including the availability of non-timber forest products like food, fuelwood, medicine, sal leaves, kendu leaves and mushrooms etc. The forest dwellers and farmers identified by Byron and Arnold (1999) are particularly at risk due to climate change. The impact of climate change on forest dependent communities has been documented in a range of countries such as Bhutan (Tshering, 2003), Vietnam (Trieu, 2003), India (Sharma, 2003), China (Shougong et al., 2003), Malawi (Fisher 2004), Mozambique (Lynam et al., 2004), Ethiopia (Mamo et al., 2007). The vulnerability of many communities in developing countries is immense and their capacity to adapt to the impact of future climate change is often very low (Huq et al., 2004; Mertz et al., 2009a). The presence of adaptive capacity is a necessary condition for the design and implementation of effective adaptation strategies so as to reduce the livelihood and the magnitude of harmful outcomes resulting from climate change (Brooks and Adger, 2005). Adaptive capacity is defined as capacity to take advantage of the benefits and opportunities associated with a changing climate. The Intergovernmental Panel on Climate Change (IPCC)'s Third Assessment Report (AR3) supposes that the main features of a community's adaptive capacity are economic resources, infrastructure technology, infrastructure, information and skills, institutions and equity (IPCC, 2001). Studies carried out after AR3 led the Fourth Assessment Report (AR4) to acknowledge the influence of social factors such as human capital and governance structures (IPCC, 2007b). The fundamental goal of adaptation strategies is the reduction of the vulnerabilities to climate-induced change.

In the past two decades a growing amount of literature has examined climate change as the most important issue in global environment and also analyzed vulnerability to climate change. According to the IPCC the vulnerability of a region to climate change depends on its wealth so that poverty limits adaptive capabilities (IPCC, 2001). Further more, socio-economic systems are more vulnerable in developing countries where economic and institutional circumstances are unfavorable. Vulnerability is often reflected in the condition of the economic system as well as the socioeconomic characteristics of the population living in that system. Microfinance can reduce the vulnerability of the poor and the possibility of linking this tool to climate change adaptation is of considerable importance (Hammill et.al. 2008). The Self Employed Women's Association (SEWA) in India offers housing loans to repair or replace roofs, reinforce walls, or rebuild houses to reduce vulnerability to extreme events such as floods, droughts and storms (Pantoja, 2002). Migration by the poor as a response to natural calamities and other shocks have been documented and is called distressed migration (Mukherjee 2001).

During the last ten years, a number of indices related to vulnerability, sustainability, and quality of life have gained prominence in the literature. Among them are the Environmental Vulnerability Index (Kaly et al. 1999; SOPAC 2005), Environmental Sustainability Index (Esty et al. 2005), Human Development Index (UNDP 1990; 2005), Human Well-being Index (Prescott-Allen 2001) and Prevalent Vulnerability Index (Cardona (2005). While these studies are useful for cross country comparison of vulnerability, most fail to provide critical insights into effective adaptation strategies at the micro or household level. In addition, much of the early research work on adaptation focused on identifying potential impact of future climate change using General Circulation Models (GCMs). But the models proved to be extremely limited in telling us about regional impacts of climate change and therefore did not really provide a basis for catalyzing immediate and practical action on local level adaptation.

Therefore, the objectives of this paper are to identify household adaptation strategies to reduce vulnerability and to estimate the factors responsible for decisions of adaptation to climate change in rural India.

Non-Timber Forest Products (NTFPs) play important subsistence and safety-net roles in the rural economy, but only a small subset of forest products possesses potential for significant cash income and employment generation (Wollenberg and Belcher, 2001). A study by Wills and Lipsey (1999) in British Colombia estimated that in 1997 the commercial harvest of wild mushrooms, floral greens and other products employed almost 32000 people on a seasonal or full-time basis, which generated direct business revenues of $ 280 million and overall provincial revenues in excess of $ 680 million. A study conducted by Grimes et al. (1994), showed that NTFP would contribute 77 % to the annual net returns, if dry deciduous forests are exploited sustainably. The importance of NTFPs in the Hantana forest of Sri Lanka was INR 7052 per hectare per year for fuel wood collected from the forest while the value of grass was about INR. 578 (Abeygunawardena and Wikramasinghe, 1992). A study of the Southern African Plateau in Botswana (Taylor and. Parratt, 1995) depicts that people most likely to be involved in NTFP use (namely rural communities) have very limited access to technology. Research by Sunderland et al. (1999) reconfirms that NTFPs provide sources of food, medicines, and income to many households in Central Africa. Pervaz (2002) observed that NTFPs in Dhading district of Nepal generated maximum employment (60.72 %), followed by agriculture (22.30 %), allied activities (15.83 %) and other sources (1.16 %). With regard to income generation, allied activities were the major contributor to the total household income with 34.74 % followed by NTFP (32.08 %) and agriculture (29.50 %).

Studies in India have revealed that, NTFPs provide substantial inputs to the livelihoods of forest dependent communities many of whom have limited non agricultural income opportunities (Chandrashekaran, 1994; FAO, 1991). About 70 % of the NTFP collection in India takes place in the tribal belt of the country (Mitchell et al., 2003). It would appear that the NTFP based small scale enterprises provide up to 50 % of income for 20 to 30 % of the rural labour force and 55 % of employment in forestry is attributed to the sector alone (Joshi, 2003). Rao and Singh (1996) studied the contribution of Non-wood forest products in augmenting the income of the tribal families in families of South Bihar and South West Bengal. Palit (1995) revealed that an average, each household of Raigarh forest protection committee was engaged for 63 days per year in the collection of NTFPs and earned INR. 2421 per household from the sale of NTFPs. From the above studies it is clear that non-timber forest products contribute significantly to sustenance of livelihood, income generation, poverty alleviation, and employment generation to the forest fringes communities across different states of India and across different Asian, Latin American, and African countries.

This paper presents a case study which examines how non-timber forest products act not only as supplements to the livelihood issues of forest dependent peoples but also addresses the issue of how supply of NTFPs can be adapted to climate change.

2. Materials and methods

2.1 Study area

West Bengal, one of the states of India is the study area. The total recorded forest area in West Bengal is 1.19 million hectares, which constitutes 13.38% of the geographic area (Statistical Handbook West Bengal, 2004). The study was carried out in the district of Bankura. The map for the study area is shown in figure 1. The socio-economic condition of the district of Bankura is shown in Table 1. It is observed from Table 1 that 71.1% of households use safe drinking water and 11.9% households have toilet facilities. On the other hand, the district has 27.7% electrified households and 79 per 1000 are under five mortality rate. The female literacy rate is 48.9%. Fifteen years' (1995-2009) average actual rainfall is 1285 mm but normal rainfall is 1378 mm. Fifteen years' (1995-2009) average maximum temperature is 44.4 degree Celsius and minimum temperature is 8.2 degree Celsius. Agro-climatically, the region mainly occupies red and laterite soil zone. The trend of rainfall over fifteen year is declining (see Fig.2). The trend in maximum and minimum temperature for the district of Bankura is on the rise (see Fig.3 and Fig.4).

[Insert Tale 1]

[Figure 1]

[Figure 2]

[Figure 3]

[Figure 4]

2.2 Method of data collection

Data were collected by conducting field survey in the drought prone district of Bankura, West Bengal. The field work combined interviews and discussions with the local people and interviews with local experts and school teachers and other knowledgeable elders in the village. This study was conducted in two villages- Jhunsura and Baskula which are schedule caste & tribal based villages located in Sonamukhi forest area in the district of Bankura, one of the drought prone districts of West Bengal (see Figure 5). The study selects 30% households randomly from each village. In the village of Jhunsura we have 60 households and in the village of Baskula we have 60 households selected on the basis of random sampling in 2011. A total of 120 structured household interviews were conducted.

[Figure 5]

2.3 Data collection

Data on socio-economic variables, like age, sex, education, land holdings, sources of credit, physical assets, livestock assets, income from various sources, public health facilities, adaptation measures like migration, non-timber forest products; self-help groups have been collected from the field survey. The socio-economic indicators of two villages are presented in the Appendix.

2.4 Analytical methods

The study utilized analytical techniques to analyze data; Heckman's sample selection and outcome model, Probit model whereby significant and the non-significant variables were identified.

Heckman's two step model

We have used Heckman two step model to estimate the determinants of adaptation to climate change. Adaptation to climate change is a two-stage process involving perception and adaptation stages. The first stage is whether the respondent perceived there was climate change or not, and the second stage is whether the respondent adapted to climate change on the condition that first stage that he/she had perceived climate change. To get information on their perceptions to climate change, people were asked question. The first was asking people if they have observed any change on the amount of temperature over the 10 years.

We have used maximum likelihood Heckman's two-step procedure (Heckman, 1976) to correct for the selectivity bias.

Heckman's sample selection model assumes that there exists an underlying relationship which consists of:

The latent equation given by:

$$Yj^{*} = Xj\,\beta + U_{1j} \qquad (1)$$

Such that we observe only the binary outcome given by the probit model as:

$$Yj^{\text{probit}} = (Yj^{*} > 0) \qquad (2)$$

The dependent variable is observed only if the observation *j* is observed in the selection equation:

$$Yj^{\text{select}} = (Zj\,\delta + U_{2j} > 0) \qquad (3)$$

$U_1 \sim N(0,1)$

$U_2 \sim N(0,1)$

$Corr(U_1, U_2) = \rho$

Where, x is a k- vector of explanatory variables which include different factors hypothesized to affect adaptation and z is an m vector of explanatory variables which include different factors hypothesized to affect perception; U_1 and U_2 are error terms. The first stage of the Heckman's sample selection model is the perceptions of climate change which is known as the selection model (Equation 3). The second stage is known as the outcome/ adaptation model (Equation 1).

If we apply standard Probit techniques to equation (1), this will give rise to biased results. Thus, the Heckman probit provides consistent, asymptotically efficient estimates for all parameters in such models (Van de Ven and Van Praag, 1981).

Description of the variables in the model

The variables hypothesized as affecting perceptions and adaptations to changes in climatic conditions along with their respective dependent variables are indicated below.

Dependent variables for the outcome equation

In terms of annual income generation we have chosen the income from non-timber forest products as the dependent variable for the outcome model.

Explanatory variables for the outcome equation

As indicated in Table 4 below, the explanatory variables for this study include: age of the head of the households, marital status, operational holdings, physical asset value, livestock asset value, farm income, wage income, forestry income, temperature and family size.

Dependent variable for the selection Equation

The analyses of the perception of the forest dependent communities to climate change indicate that most of them for this study are aware of the fact that temperature is increasing.

Explanatory variables for the Selection equation

For the selection equation, it is hypothesized that, education, age of head of the household, marital status, adult male in the family, operational holdings, physical asset value, livestock asset value and family size influence the awareness of the people to climate change.

3. 1 Results

The possible adaptation strategies reported by the households were distress migration, formation of self Help Groups (SHGs) in the micro finance program, animal husbandry and collection of non-timber forest products and they are presented in Table 2.

It is found from Table 2 that 56% households in the village of Jhunsura and 76% households in the village of Baskula migrate in search of job .Households usually migrate in Burdwan, Nadia and Bankura town for wage labour work .

Formation of Self help groups (SHGs) has a vital contribution to the forest dependent people to manage their livelihoods in adverse climatic situation .It offers loan which the poor villagers use to build up their assets, increase their wealth, enable for starting small business enable to fight against risks and poverty. Moreover, it has been found that women, being more credit constrained than men, are more likely to engage in making sal dish, collecting fuel wood regularly. We have found that 38% households in the village of Jhunsura and only 11% households in the village of Baskula have formed SHGs. The concepts and the advantages of forming SHGs are still unknown to the maximum number of respondents in the two villages (Table 2).

Another adaptation strategy was found to be animal husbandry (Table 2). Animal husbandry is a main source of income generation to the villagers. Animal husbandry is a way to minimize agricultural loss and for extra income generation. The major livestock products sold are cow milk, cow dung, goats, hens, eggs and pigs.

The collection of NTFPs is widespread in the two villages and a dominant role to overcome climatic risk for the forest dependent people shown in Table 2. The collected NTFPs comprises sal leaves (for making sal dish) ,*Kutchi* kathi (used for stitching sal leaves) , mushroom ,different roots of the plants(used for home medicine and sometimes for selling),fuel wood (for households' consumption and selling),*Kendu pata* (used for *bidi* making) etc. These are the main forest products collected by the household from the forest. Households sell these forest products to the local market for making income. This study shows that 100% households in the village of Jhunsura and 98% households in the village of Baskula access to NTFPs (Table 2).

[Insert Tale 2]

In terms of income generation, the most important source of income is the collection of non-timber forest products in all villages (Table 3).

[Insert Tale 3]

3.2 Model Results

The factors affecting the perception and adaptation models are shown in Table 4. The Heckman Probit model was run and tested for its appropriateness over the standard probit model. The results indicated that the likelihood function of the Heckman probit model was significant (Wald $\chi^2 = 80.75$, with $p < 0.0000$) showing strong explanatory power of the model. The results from regression indicated that most of the explanatory variables affected the probability of adaptation as expected. Variables that positively and significantly influenced the adaptation to climate change include the age of the household, farm income, forestry income, temperature and family size (Table 5).

Age is positively influences the decision to undertake adaptation because elder people are more experienced and have better access to non-timber forest products than younger ones, and hence the former have a higher probability of adopting the practice.

Family size also influences the decision to adapt. There is a possibility that the households with many family members may be forced to collect forest products to ease the consumption pressure imposed by a large family size.

Adaptation to climate change increases with increasing temperature. The increasing temperature has damaging effect on agriculture and raises food insecurity. They respond to this through the adoption of different adaptation methods.

Income from forestry has significant and positive impact on adaptation. With higher income from forestry there is a possibility to enhance adaptation in order to minimize the risk of climate change. There is a negative association between operation holdings and adaptation. This means that the low holding farms have greater adaptation compared to the large holding farms. The negative association is also true in the case of physical asset value and wage income. These findings are contrary to the case of the adaptation of agricultural farmers. Variables, say age, the numbers of adult male and operational holdings are found to have significant and positive impact on the perception of temperature increase (Table 5).

[Insert Table 4]

[Insert Table 5]

4. Discussion

This study identifies migration is one of the adaptation strategies due to climate change. In Madhya Pradesh, India, Deshingkar and Start (2003) found that more than half the households in four out of six study villages had migrating members. The proportion was as high as 75% in the most remote and hilly village with infertile soils. Similarly a study by Mosse et al (1997) of the first phase of the DFID funded Western India Rainfed Farming Project (Madhya Pradesh, Gujarat and Rajasthan) revealed that 65% of households included migrants. Another later study in the same area revealed that in many villages up to 75% of the population is absent between November and June (Virgo et al 2003). The dry areas of Bihar, Orissa, Gujarat and West Bengal are also known for high migration rates. An estimated number of 60,000 people migrated out during the 2001 drought (Wandshcneider and Mishra 2003) alone and as mentioned before, current informal estimate is in the range of 300,000. The situation in the arid Panchmahals district of Gujarat (Shylendra and Thomas 1995) is similar where seasonal migration was so high that 44% of the labour force took to migrating. Our study also shows that migration (temporary and urban areas for work) emerged as another important adaptation strategy in line with the above authors.

The formation of SHGs through microfinance program is another adaptation strategy revealed from this analysis. The micro-finance works in providing finance to the poor after organizing them into homogenous groups, commonly known as Self-help groups (SHGs), especially, among poor rural women (Sharma, 2001). The Self-help group (SHG) -bank linkage model is one of the world's largest microfinance initiatives in terms of outreach (Kropp & Suran, 2002). Microfinance services can enhance the livelihood asset base through direct income effects, indirect income effects (from education and training), and non-pecuniary effects (i.e. stronger social networks and increased confidence) (Galab *et al.* 2006). Microfinance service has the potential to help the world's poor and most vulnerable population adapt to climate change by providing them with a means of accumulating and managing the assets and capabilities (Swift 1989; Ellis 2000).

This study reveals that adaptation to climate change depends on temperature rise. The fact that adaptation to climate change increases with increasing temperature is inline with the expectation that increasing temperature is damaging to African agriculture and farmers respond to this through the adoption of different adaptation methods (Kurukulasuriya and Mendelsohn 2006).

There is a positive relation between family size and adaptation. This result is inline with the argument which assumes that large family size is normally associated with a higher labour endowment, which would enable a household to accomplish various agricultural tasks especially during peak seasons (Croppenstedt et al. 2003). Evidence from various sources indicates that there is a positive relationship between the education level of the household head and the adoption of improved technologies (Igoden et al., 1990; Lin, 1991) and adaptation to climate change (Maddison, 2006). Livestock keeping is a safety valve for smallholder farmers in Africa if drought causes their crops to fail (Sidahmed, A. 2008). Livestock has the potential to support the adaptation efforts of the poor. In general, livestock is more resistant to climate change than crops because of its mobility and access to feed (IFAD, 2009). A model has been developed to study the sensitivity of African animal husbandry decisions to climate (Seo, S. and Mendelsohn, R., 2006). According to them , 5,000 livestock farmers in ten countries shows that the selection of species, the net income per animal, and the number of animals on a farm are all highly dependent on climate. As climate warms, net income from beef cattle falls. The fall in relative income causes a shift away from beef cattle towards sheep and goats.

5. Conclusions

This paper has examined the role of different household adaptation options like migration; formation of Self-help Group (SHGs), accessibility of non-timber forest products and animal husbandry. The results of perception to climate change revealed that age of the household head; number of adult male and operational holdings have significant impact on the perception to climate change. Moreover, the analysis of factors affecting adaptation to climate change indicates that the age of the head of the households, marital status, operational holdings, physical asset value, forestry income, temperature and family size have significant impact on adaptation to climate change. For developing countries like India, adaptation requires assisting the vulnerable population during adverse climate conditions and empowering them to cope with climate risks in the long-run for better living. The Government of India implements a series of central and centrally sponsored schemes under different ministries and departments for achieving social and economic development. At present, while none of the schemes is explicitly referred to as Adaptation schemes; many contain elements (objectives and targets) that clearly relate to risks from climate variability. A recent initiative by the Department of International Development (DFID) and the World Bank in India seeks to identify how to integrate adaptation and risk reduction into their portfolio of programs. The programs include National Rural water and Sanitation Program, National Elementary Education Program (Sarva Shiksa Abhiyan), National Reproductive and Child Health Program Phase II, Kolkata Urban Services for the Poor, West Bengal Support to Rural Decentralization, West Bengal Health Systems Development Initiatives, Andra Pradesh Rural Livelihoods Program, Madhya Pradesh Rural Livelihood Program, and Madhya Pradesh Urban Services for the Poor, and Western Orissa Rural Livelihood Project. Besides, the housing scheme, Indira Awas Yojana, the Food for Work Programme, and the rural road building scheme, Pradhan Mantri Grameen Sadak Yojana. These schemes have provided relief in the aftermath of floods and cyclones, enabled recovery and rebuilding, and helped improve connectivity selling produce and finding alternative employment. This paper has important policy implications for poverty, livelihood vulnerability and migration.

Note 1 Calculation of index value

$$\text{Index value } (X_{id}) = \frac{X_{id} - \text{Min}(X_{id})}{\text{Max}(X_{id}) - \text{Min}(X_{id})}$$

Where X_{id} is the proportion of households using safe drinking water / toilet facility / connected with electricity / under-5 mortality rate / female literate rate of the dth district. The index value ranges between 1 and 0.

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Table 1: Socio-economic indicators of the district of Bankura in all India perspective

Indicators	%	Rank in India	Index value [1]
% of households using safe drinking water	71.1	373	0.69878
% of households with toilet facility	11.9	538	0.07741
% of Electrified households	27.7	451	0.25508
Under –five mortality rate per 1000	79.0	122	0.83776
% of female literacy rate	49.8	341	0.40364

Source: International Institute for population sciences, India, 2006

Table 2 Adaptation strategy by the households in the two villages of the District Bankura

Adaptation strategies	Jhunsura	Baskula
Animal husbandry	60(100.00)	59(98.33)
Formation of SHGs	23(38.33)	7(11.67)
Accessibility to NTFPs	60(100.00)	59(98.33)
Migration	34(56.67)	46(76.67)

Note**:** Figures in the parentheses represent percentage of total sample households

Source: Field Survey 2011

Table 3: Yearly Mean Income of the households from different sources (1$= Rs 50)

Income (Rs)	Jhunsura	Baskula
Mean annual income from agriculture	-	-
Mean annual income from non-timber forest products	20253	20650
Mean annual income from wage labour	6662	6537

Mean annual total income	24155	22387

Source: Field Survey 2011

Table 4: Description of model variables for the Heckman probit model

Outcome Equation (Adaptation Model)			Selection Equation (Perception Model)		
Dependent variable			Dependent variable		
Description	People reported to have adapted (%)	People reported not adapted (%)	Description	People perceived change in temperature (%)	People not perceived change in temperature (%)
Accessibility of non-timber forest products	96	04	Perception of temperature increased	93	07
Independent variables			Independent variables		
Description	Mean	Standard deviation	Description	Mean	Standard deviation
Age (in years)	42.35	13.06	Age(in years)	42.35	13.06
Education (in years)	1.33	2.1793	Education (in years)	1.33	2.1793
Maritial status (Yes=1, No=0)	.98	0.12855	Marital status (Yes=1, No=0)	.98	0.12855
Operational holdings (in acres)	0.0268	0.09607	Adult male (in number)	1.3	0.74020
Physical asset value (in rupees)	2407	1486.291	Operational holdings (in acres)	0.0268	0.09607
Livestock asset value(in rupees)	7454	6452.24	Physical asset value (in rupees)	2407	1486.291
Wage income(in rupees)	6216	2245.242	Livestock asset value (in rupees)	7454	6452.24
Forestry income (in rupees)	17055	5910.35			
Family size(in	3.44	1.1867			

number)		
Temperature (in degree centigrade)	41.36	1.4872

Source: Field survey

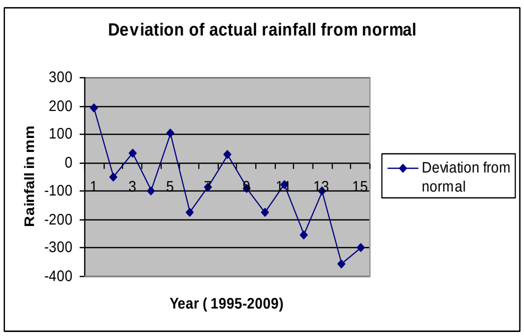
Table 5: Results of the Heckman Probit selection model

	Estimated coefficients outcome equation : adaptation model (Accessibility of non-timber forest products)		Estimated coefficients selection equation: perception model (Perception of temperature increased)	
Explanatory variables	Regression Coefficients	P-level	Regression Coefficients	P-level
Age	0.006519**	0.041	0.0063211*	0.067
Education	-0.064523	0.457	-0.135648	0.458
Marital status	-0.512364*	0.069	2.3684	0.647
Adult male			1.64782**	0.026
Operational holdings	-0.17568*	0.068	1.68241***	0.001
Physical asset value	-0.0000179**	0.019	0.000254	0.648
Livestock asset value	-4.56e-05	0.648	-0.0000897	0.237
Wage income	-0.0000478*	0.079		
Forestry income	0.0000387***	0.001		
Temperature	0.0785442**	0.018		
Family size	0.0679428**	0.041		
Cons	-3.23567*	0.054	-8.47512	0.254
Total observations	120			
Censored observations	70			
Uncensored observations	50			
Wald chi square(zero slopes)	80.75***	0.000		

Note: *** significant at 1% level, ** significant at 5% level and * significant at 10% level

Source: Field survey

Figure (1) shows the map in the district of Bankura in West Bengal, India



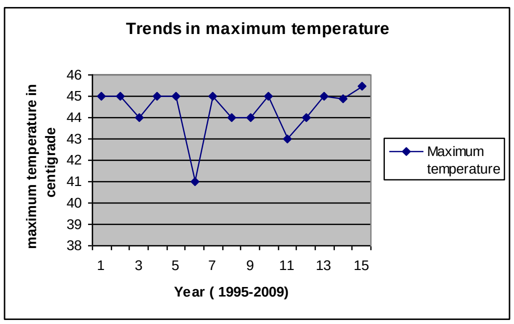


Figure 2 Trends in rainfall in the District of Bankura

Source: India Meteorological Dept.

Figure 3 Trends in max temperature

Source: India Meteorological Dept

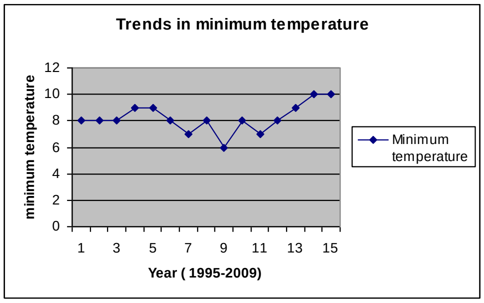


Figure 4 Trends in minimum temperature

Source: India Meteorological Dept

Figure 5 shows two villages in the district of Bankura, West Bengal

Appendix

Socio-economic indicators of the households for two villages

Table 1 Socio-economic analysis in Drought prone area in West Bengal

	Jhunsura	**Baskula**
Caste		
General	-	-
Schedule caste	60(100)	-
Schedule tribe	-	60(100)
Gender		
Male	53(88.33)	49(81.67)
Female	7(11.67)	11(18.33)
Age		
≤30	16(26.67)	12(20.00)
31-40	17(28.33)	16(26.67)
41-50	13(21.67)	14(23.33)
51-60	9(15.00)	12(20.00)
Above60	5(8.33)	6(10.00)
Education		
Upto Primary (in 4-year)	12(20)	18(30)
Upto secondary (5-10 year)	2(3.3)	5(8.3)
Illiterate	46(76.7)	37(61.7)
Literacy rate		
Male	12(20)	20(33.3)
Female	2(3.3)	3(5)
Family size	3.9	2.9
Land holdings (in acres)		
Landless	51(85)	57(95)
≤1	9(15)	3(5)

Note**:** Figures in the parentheses represent percentage
Source: Field Survey 2011

Table 2 Infrastructural facilities in the Drought Prone areas of West Bengal

Drinking facility	Jhunsura	Baskula
Tube well (Yes)	60(100)	60(100)
No	-	-
Sanitation*facilities		
Yes	21(35.00)	25(41.67)
No	39(65.00)	35(58.33)
Public health care facilities		
Yes	-	-
No	60(100)	60(100)
Loan facilities		
From Banks	9(15.00)	1(1.67)
From money lenders	39(65.00)	57(95.00)
Not from any sources	12 (20)	02(3.33)

Note**:** Figures in the parentheses represent percentage

*****Sanitation facility given by the Panchayat

Source: Field Survey 2011