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DROUGHT, WATER SCARCITY AND HUMAN PROSPERITY: AN EMPIRICAL ANALYSIS OF UP-BUNDELKHAND

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ABSTRACT

Water is increasingly becoming scarce resource in many parts of the world including India. Certain regions in India like Bundelkhand are chronically drought prone due to erratic precipitation, dropping water levels and consecutive monsoon failure. Bundelkhand is documented as one of the poorest regions of India. It is facing huge scarcity of water since few years due to recurrence of drought despite presence of rivers like Betwa, Ken, Shahzad, Mandakini, Yamuna, Jamni and Sajnam. The region is disreputably known for the last couple of decades due to suicides committed by farmers under the wrath of famine and drought.

The region is agriculture based and most of the locals are engaged in agriculture activities for survival of livelihood. Since last decade, the region has gone through the recurrence of water scarcity, drought, crop failure, scanty rain and poor irrigation facilities, which have substantially retarded the development and growth of the locale and adversely affected the prosperity of residents. It is proving curse for the locals and continuously sweeping the happiness of Bundelkhand region. The findings of this paper highlight that the frequent environmental catastrophe in the form of famine and draught has lessened the ecological dependence and further reduced the poor to the level of hand to mouth existence leading many health related problems. Chronic water shortage, declining agriculture productivity, loss of livestock, poverty and indebtedness, hunger and malnutrition, food and job insecurity have pushed the villagers to migrate from the Bundelkhand Region. The policies and programs enacted by government related to water management to combat drought in Bundelkhand Region is not effective enough to sort out the problem of water scarcity.

Key Words: Drought, Scarcity, Water Management, Catastrophe, Environment, Water.

INTRODUCTION

Water is essential resource for human survival and well-being and more importantly it is earnestly required for agriculture sector. Agriculture is the main sources of livelihood for many people and approximately

70% of the population directly rely on agronomy as a means of living (Sentlinger, 2016). Agricultural productivity is highly dependent on the availability of water but regular drought and scanty rains have reduced the production and lessened the ecological dependence. Drought primarily causes water scarcity due to failure of rainfall, deficiency of reservoirs and water resources eventually resulting into failure of crops and consequently evolving serious socio-economic distress. It affects large geographical areas for shorter or longer periods and thus, has serious impact on life, ecosystems, livelihoods, economy, environment and the overall human well-being. In recent years, large-scale intensive droughts have been witnessed in all continents leading to huge economic losses, destruction of ecological resources, food shortages and starvation of millions of people (Gupta, 2014). As a direct consequence of all these, the impoverishment stricken poor farmers have further marginalized to the level of hand to mouth existence.

The incidence of drought in symmetry to water scarcity is recurring phenomenon in India. It has resulted in millions of deaths over the course of the 18th, 19th, 20th and 21st centuries. The situation is more acute in several states of India like Maharashtra, Orissa, Uttar Pradesh, Madhya Pradesh, Rajasthan, etc. Focusing on the micro level of the issue, Uttar Pradesh Part of Bundelkhand region is notoriously known since couple of decades due to farmers' committing suicides under pressure from drought and water scarcity. The region is agriculture based and most of the people residing here are engaged in agriculture activities for their subsistence and attainment of livelihood. Since last ten years, Bundelkhand is struck by natural catastrophe in the form of occurrence of regular scarcity of water which has retarded overall development and growth of the region as well as locals residing there. Regular droughts, crop failure, meager rains, poor irrigation facilities have been sweeping the happiness and human prosperity of Bundelkhand region (Arya, 2010). The situation has adversely affected the livelihood of majority of rural population and pushed the villagers of the region into the trap of vicious circle of poverty leading food insecurity and health problems like malnutrition, anemia, T.B., etc. (Singh S. P., 2012). Many government and non-government agencies (NGOs) are working in the area through implementation of various programmes like National Watershed Development Project for Rainfed Areas (NWDPR), Drought Prone Areas Programme (DPAP), Integrated Wasteland Development Programme (IWDP), River-Link Projects (RLP), Desert Development Programme (DDP) etc. for combating drought, eradicating poverty, providing food security and ensuring healthy life in the region. Ironically, they have not proved much beneficial and accessible to the aggrieved people.

In this background, the paper has been divided into three segments. The first part provides a brief introduction of the study area. The second section of the paper highlights the state of drought and water scarcity and its impact on the lives of people of Bundelkhand region. Analysis of the implementation of various development programmes run in the region has been done in the last section of the paper.

BUNDELKHAND: A BRIEF INTRODUCTION

Geographical Profile: Bundelkhand is known for its cultural-geographic region in India which is surrounded by Vindhyan Hill in south, Yamuna River in north, Ken River in east and Betwa and Pahuj rivers in west. Bundelkhand region of central India is a semi-arid plateau that encompasses seven districts of Uttar Pradesh (Jhansi, Jalaun, Hamirpur, Lalitpur, Banda, Chitrakut and Mahoba) with total area of 29418 Sq. KM, which is 12.21% of the total geographical area of the Uttar Pradesh and six districts of Madhya Pradesh (Sagar, Panna, Damoh, Chatarpur, Tikamgarh and Datia) (Jain, 2014). In context of livelihood, agriculture and livestock rearing are the primary sources of the survival of local in the region. But since one decade, it has been in the headlines for the drought and dearth of livelihood circumstances and distress that has plagued it (Shakeel, 2012). From the reports of various organizations and institutions, it has been noted that there is bulk of migration of aggrieved people, starvation deaths¹ and malnourishment cases and further increasing debts on farmers lead farmer's suicides over the years in the region (Arya, 2010).

Demography Profile of UP-Bundelkhand²: According to Census 20011, Bundelkhand region has total population of around 18. 2 million out of which UP-Bundelkhand districts consists population of around 9.6 million and MP-Bundelkhand districts consists around 8.6 million. The total population of seven districts of UP-Bundelkhand is 96, 59,718 (4.83% of Uttar Pradesh total population) out of which the male population is 51, 49,243 (53.31%) and female population is 45, 10,475 (46.69%). Rural population is 79, 54,680 (78.37%) and urban population is 21, 95,078 (21.63%) of which rural male and rural female are 39, 81,236 (50.05%) and 3973444 (49.95%) and urban male and urban female are 11, 63,849 (53.02%) and 10, 31,229 (46.98%) respectively showing higher population in rural areas and lower population in urban areas. Correspondingly, the literacy rate is 56, 96,314 (4.98% of Uttar Pradesh total literate population) out of which male and female literacy is 35, 06,094 (61.55%) and 21, 90,220 (38.45%). The sex ratio or number of females to males is 877 women to

¹ For more details on the issue of starvation deaths and increasing problem of indebtedness see a report by Bharat Dogra (2008), "Hunger, Thrust and Indebtedness: Bundelkhand's Deepening Agro-Climatic Crisis," prepared for Hunger Monitoring Project, a study by Action-Aid India.

² For more details see the home site of Bundelkhand, www.Bundelkhand.in.

1000 men in Bundelkhand region UP that is lower than the national average of 942 for India, showing a bias against the girl child in the region. The average density of population in the UP-Bundelkhand districts is 277 per square km much lower than the state average of 830 persons /sq km. There is higher population density in the Bundelkhand Plain areas (Jalaun, Hamirpur, Banda) and Bundelkhand Intermediate region areas (Jhansi, Lalitpur) and lower population density in Bundelkhand Upland (Mahoba) (www.bundelkhandinfo.org).

Socio-Economic Profile of Bundelkhand Region: The society is highly caste stricken in Bundelkhand and Thakur, Lodhi and Yadav are the dominant castes in the region having high influences in social context. According to social stratification, particularly SC and ST often lack social capital and they are stuck up at the lower rung of social hierarchy and do not have much land (Jain, 2014). Living condition of locals in region is not good, more than 70% of families living in kutchha or kutchha-pukka houses in rural areas of bundelkhand districts and there is no toilet facility within their house. More than 90% of families were using wood, cow dung or both as a source of fuel for cooking and more than 85% of families are using India Mark-II hand pump and private hand pumps as a source drinking water in Bundelkhand (PACT, 2011).

Apart from it, the regular drought and scanty rains have affected the social structure of bundelkhand that involves safety of public, better health and conflicts between water users that have been reduced the quality of life of the locals in the study region and inequities in the distribution of impacts and disaster relief (Gupta, 2014). It has forced the villagers to either migrate from region in search of livelihood or if not able to do so leads to committing suicide in some acute instances and also reduced the poor to the level of hand to mouth existence leading to greater food insecurity, health harms and social unrest.

Beholding Economic Profile, Bundelkhand region of Uttar Pradesh rank among the least developed regions of either state with low industrialization and low urbanization. Agriculture is the predominant occupation in Bundelkhand. According to Census 2011, the percentage of main workers who engaged in agriculture as the cultivators or the labourers is higher than 60 and much higher than state and national averages in all districts of UP-Bundelkhand except Jhansi³. While agriculture is the mainstay of Bundelkhand's economy but conditions are unfavourable for growth of cash crops like sugarcane and cotton because the productivity is affected by the poor

³. Census 2011 defined a 'main worker' as one who had worked for the major part of six months or more in the year preceding the census household survey. 'Work' was defined as 'participation in any economically productive activity', with or without compensation.

water retention capability of the soil, monsoon fluctuation and large amount of wasteland (Kedia, 2009). Rising input costs and frequent incidence of drought are pushing agricultural labourers and small farmers to migrate from habitation for the search of livelihood and to work in hazardous places like stone threshing in Mahoba district and in beedi industry at Jhansi district of Bundelkhand region.

Size of operational (cultivated) land holdings is a basic factor affecting agricultural production especially in absence of advanced cultivation technologies. In all districts of Bundelkhand except Jalaun, Banda and Chitrakoot districts, the percentage of marginal holdings of land is lower than India average. In UP-Bundelkhand as a whole, marginal holdings accounted for 40% of all holdings, i.e. the percentage of small and semi medium holdings of 1-2 hectares and 2-4 hectares respectively is correspondingly higher than the India average particularly in districts; Lalitpur, Mahoba and Hamirpur. (Arya, 2010). While agriculture is the predominant occupation in Bundelkhand but the land available and used for cultivation in the region is considerably lower than in other agriculture zones of the country and depends on monsoon (Singh, 2012).

DROUGHT AND WATER SCARCITY IN BUNDELKHAND REGION: A WORSE SITUATION

Bundelkhand is the geographical heartland of India. More than 90% of the rural population depends on crop production, livestock rearing and seasonal migration for their survival of livelihood in the region (Samra, 2008). Thus, the effect of recurrent drought on this region is palpably devastating. For most of the years, the residents of Bundelkhand experience acute scarcity of water for agricultural and domestic use. The region has a long standing history of droughts and famines. The region witnessed “The Panic Famine” of 1873-74 (Loveday, 1914). The Indian famine of 1896–1897 began in Bundelkhand early in 1895 and spread across many parts of the country. According to the report on drought mitigation strategies for UP-Bundelkhand by the Inter-ministerial Central Team headed by Dr. J. S. Samra, the region experienced a major drought in every 16 years during the 18th and 19th centuries, which increased by three times during the period 1968 to 1992 (Samra, 2008)). In recent years, Inter-ministerial Central Team reported below average and erratic rainfall in most part of the region since last ten years. Drought became evident in 2004-05 with a 25% short fall in monsoon rains. The rainfall deficit increased further to 43% in 2006-07, 56% in 2007-08, leading to severe drought conditions⁴. The impacts of drought years are already visible. In the last nine to ten years, there has been news of mass migration, starvation deaths, farmer suicides and even the ‘mortgaging’ of women (Gupta, 2014).

⁴<http://www.bundelkhand.in>

Threat of climate change looms over Indian agriculture. In Bundelkhand, it is difficult to predict the weather. People of the area have to use a planned approach towards agriculture and livestock management based on a systematic analysis of climatic system because weather gets stormy in summer. In fact in monsoon, locals of the region don't get rains, it is missing and in the end of winter it is so cold that all their vegetables, wheat and other crops fail. This change causes floods and widespread harms in livestock (Khurana, 2008). Due to changing weather most of the families in the regions either losses their cattle to drought or set it free to find its own means of survival and the villagers themselves struggle to live each day. In this uncertain behavior of the climatic system, bounty rainfall does not make much positive impact on the agriculture, livestock and other livelihood systems in Bundelkhand (Kedia, 2009). The land and people of Bundelkhand are facing the crisis of drought continuously since couple of decades and it has shattered the villagers' hope of earning in the past few years because they have not any choice except waiting for rain in required time but monsoon come with water against their hope and the farmers stands with empty handed just watching the lands because they are not having enough resources to fetch seeds for farming because the rain fall is not enough to meet out the prevailing evils of hunger, water crisis, food security and livelihood crisis (Khurana, 2008).

The failure of the monsoon has severely affected the available water in river systems. The resulting diminishing water available in surface water sources as well as depletion of groundwater tables has not only decreased the availability of drinking water for people and domestic animals, but also impacted the natural vegetation and growing grasses (crucial as fodder). Most tribal population inhabiting forests areas adjacent to rivers have no choice but to continue to exploit forests for survival and cause further over exploitation of resources. The repetitive crop failures and depletion of natural resources has led to widespread and increasing trends of migration to urban areas. With the collapse of monsoons and arrival of successive dry years, the inhabitants of Bundelkhand are now facing scarcity of water in almost every season. There are several manifestations of drought like, late arrival of rains, lack of sufficient water in reservoirs and drying up of wells leading to crop failure which ultimately curtail livelihoods and lead to migration from region. Further, the reports highlight that Bundelkhand has recently become a new hotspot due to consecutive droughts amid susceptibility leading poverty, food insecurity and health problem (Gupta, 2014).

Thus, once prosperous Bundelkhand is now identified as one of India's most backward and poor regions. There is an extremely high prevalence of poverty, hunger and malnutrition in the region because of occurring regular droughts, crop failure, scanty rains and poor irrigation facilities. Deprivation of food and other necessities

of living have consistently been among the causal backgrounds of the brutishness and brevity of human life (Singh S. P., 2012). Due to all these influences the majority of rural population gets trapped into the problem of poverty and turn to have huge amount of loan on higher interest rates from local know moneylenders. By the time when they commence financial recovery, the marginalized farmers encounter pressure of losing their assets and their social and self-esteem. In this course, due to failure of coping up with the situation they either migrate from region in search of livelihood or if not able to do so lead to commit suicides in some acute instances.

DEVELOPMENT PROGRAMMES IN BUNDELKHAND REGION AND ITS IMPACT

For mitigating the impacts of drought and water scarcity in order to improve the livelihoods and overall wellbeing of the people, the Central and State Governments have implemented several programmes in the region having provision for vulnerability reduction and drought proofing. A detailed mapping of the exiting development programmes and their implications on reducing the impacts of drought has been carried out and given as following.

National Watershed Development Project for Rainfed Areas (NWDPR) was launched in 1990-91 at the block level for the benefit of areas where the assured means of irrigation is less than 30% of total cultivable area. The project was based on twin concepts of integrated watershed management and sustainable farming systems. The main guiding principles of NWDPR are; conservation of natural resources, integrated development of natural as well as social resources, in-situ moisture conservation, adoption of ridge to valley approach, production enhancement activities for land owners and livelihood support for landless families. The National Agriculture Policy seeks to promote the integrated, holistic and harmonious development of rainfed areas through the conservation of rainwater and soil and augmentation of biomass production through agro and farm forestry with the active involvement of the watershed community. The project aims at in-situ moisture conservation primarily through vegetative measures to conserve rainwater, control soil erosion and generate the green cover both on arable and non-arable lands (Kumar D. S., 2012).

The programme covers 4 districts (Sasornala, Kalapaninala, and Chirgaon Watersheds in Jhansi, Jhakora Watershed in Lalitpur, Mau Watershed in Chitrakoot and Kuthod Watershed in Jhalaun) of Utter Pradesh of Bundelkhand region. According to the survey of Inter-ministry team of UP and MP Bundelkhand, these projects brought out only 10-25% improvement in the watershed areas during the 9th and 10th plan period. The purpose of

these projects was to provide employment, increase ground water level and improve agriculture productivity in the project implemented area.

Table: 1 Percentage of people who get employment under this project

Response	Frequency	Percentage
Yes	73	18.2
No	327	81.8
Total	400	100.0

Table: 2 Source of Agriculture Irrigation

Response	Frequency	Percentage
Pumping Set	46	11.5
Tube well	51	12.8
Well	33	8.2
River/Cannel	129	32.3
No agricultural land	141	35.2
Total	400	100.0

The table 1 shows that only 18 percent of the population has got the employment under this programme and majority of the population (81%) are far from the access of this programme. Rivers and cannels are the main source of irrigation of agricultural in the parched land of Bundelkhand. From the table 2 it can be seen that about 32 percent population use the water for irrigation of agriculture land from rivers and cannels.

Table: 3 Availability of Water in Irrigation Sources after implementation of this Programme

District	Response	Frequency	Percentage
Jhansi	Yes	51	12.8
	No	349	87.2
Lalitpur	Yes	16	4.0
	No	384	95.0
Chitrakoot	Yes	33	8.2
	No	367	91.8
Jalaun	Yes	26	6.5
	No	374	93.5

Most of the benefits of this programme can be seen in Jhansi District. About 12 percent of the respondents of Jhansi admit that they get benefit under this programme. Apart from this, people of the other districts do not get

more benefit of NWDPPRA (table 3). Thus, the overall data reveals that the programme has become failure to provide the employment to the large population in the programme implemented areas. It leads to mass migration of locals from region in the search of livelihood. The agriculture production is also low due to non-availability of water for irrigation which is affected by regular drought and water scarcity.

Integrated Wasteland Development Programme (IWDP) of the Government of India was started in 1989-90 and seeks to develop government-owned wastelands and common property resources (CPRs) on the basis of village-level or micro-watershed plans. IWPM is a modified programme of erstwhile **Drought Prone Areas Programme (DPAP)**, **Desert Development Programme (DDP)** and **Integrated Wastelands Development Programme (IWDP)** of the Department of Land Resources. The main objectives of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil erosion, regeneration of natural vegetation, rain water harvesting and recharging of the ground level water. This enables multi-cropping which helps to provide sustainable livelihoods to the people residing in the watershed area. The focus of this programme is on cultivable wastelands rather than uncultivable wastelands which are not generally considered for treatment as such lands are often so degraded that the cost of treatment is very expensive making management of projects difficult.

Table: 4 Percentage of Cultivable and Non-Cultivable Land

Response		Frequency	Percentage
Cultivable	Fertile	112	28.0
	Non-Fertile	92	23.0
Non-Cultivable		141	35.2
No agricultural land		55	13.8
Total		400	100.0

Table: 5 Distribution of Respondents as per facing the problem of Water Scarcity

Response	Frequency	Percentage
Yes	344	86.0
No	56	14.0
Total	400	100.0

Table: 6 Satisfactory Level of Programme

Response	Frequency	Percentage
Yes	344	86.0
No	56	14.0
Total	400	100.0

The table 4 shows that more than 50 percent of the respondents have cultivable land and out of which 28% respondents reported that they have fertile land. The population has been continuously facing the problem of water scarcity. 86 percent of the respondents accepted that they are facing the problem of scarcity of water (table 5) and the satisfactory level of this programme is also not good for majority of population (89%) in the study region (table 6). The people who have infertile and uncultivable lands are much far from the benefits of this programme and are dependent on other sources of livelihood.

CONCLUSION

With the above discussion it can be concluded that there are several long term structural problems in the course of development in the region which have adversely affected the human prosperity and daily life of the people in Bundelkhand area. The timely arrival of the monsoon is of crucial importance to food production but the changing patterns of monsoon have threatened agriculture and food security in study area. Due to changing weather most of the families in the region either lose their cattle to drought or set it free to find its own means of survival and the villagers themselves struggle to live each day. The output of special package in agriculture sector is only benefitting the farmers who are highly established in socio-economic power structure and thus, the marginalized farmers remain out of beneficiary list. Coupled with this, negligence of traditional water management systems has deteriorated the situation in Bundelkhand. The situation compels the people to live in poor economic condition having low income with poor purchasing power that is leading improper accessibility and absorption of food resulting in poor health and hence the vicious cycle is percolating from one generation to another. Furthermore, the frequency of falling sick among locals of the region especially those people who have less cultivated land is much higher because they lack proper nutrition and calorie intake (2400 Kcal per day). Due to lack of sufficient food intake, locals face many health related problems like tuberculosis, anemia, malnutrition and sometimes death due to prolonged hunger. Thus, the results clearly show that the individuals residing in Bundelkhand region remain deprived even under deployment of drought mitigation programmes to provide food security and ensure healthy life.

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