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Community Based Disaster Risk Analysis (CBDRA): Case Studies from Uttarakhand, India

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Community Based Disaster Risk Analysis (CBDRA): Case Studies from Uttarakhand, India

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I. Introduction

Disaster, when anyone heard about that utterance, the first trounce of consideration is damage, pain fatality and other negative reflections on the mind thought process, all these comes in mind because directly or indirectly they are related to community. Community is always in the nucleus of any learning. For example when any disaster strikes in the uninhabitated zone the amount of natural or human allied losses are less counted and on the other hand, with the same intensity, when it strikes at the populated zone the amount of loss it counts a lot. Impact on community makes disasters more prominent. Risk of damage is high in populated zone in comparison to uninhabitated zone. In simple words "Disaster risk is the probability of a hazard occurring and creating a loss." Disaster Risk is the actual exposure or threat of hazard on humans and is often referred as the product of probability of loss.

II. Objectives

The main objectives of this paper are:

1. To study the region in reference to different hazards.
2. To find the exposure, resistance, resilience, vulnerability, hazard and management status with the help of PRA (Participatory Rural Appraisal) tools.
3. To investigate the major causes of disasters in the area and,
4. Finally suggesting a management plan for the region.

III. Research Methodology

To make the work effective and factual, authors have used both the primary and secondary data:

1. Collection of primary data by using PRA tools and conducting interviews for ground reality,
2. Study the region and assess different disasters.
3. Collection of secondary data for analyzing, explaining, and combining the information from the primary source with additional information.
4. Using Ilwis 3.7, Arc 9, Statistica 8 for mapping and clustering and other purposes,

IV. About Cbdm and Cbdra

Community Based Disaster Management Planning (CBDMP) is an assertion which involves the local community perception and participation in disaster management planning. CBDMP involves communities in identifying, assessing and acting jointly to reduce disaster risks. In the same time when we engage the local communities in diverse disaster risk scenarios, e.g. exposure, resistance, resilience, vulnerability, hazards, management etc, it is known as Community Based Disaster Risk Analysis (CBDRA).

V. Uttarakhand and Disasters

Uttarakhand, located in the northern part of India, extending from 28° 43' N to 31° 27' N latitude and 77° 34' east to 81° 02' E longitude, is the 27th state of the Republic of India and was carved out of Uttar Pradesh on 9th Nov 2000. The state is bordering, Nepal in the East, Himachal Pradesh in the west, China in the North, Uttar Pradesh in the South.

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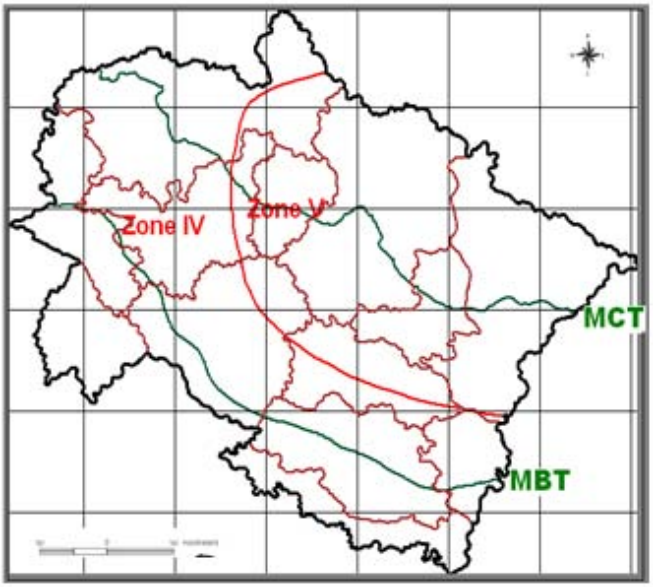

Fig 1 : Uttarakhand map with MCT, MBT and seismic zones V (Very High Damage Risk Zone) and IV(High Damage Risk Zone).

Almost every year Uttarakhand experiences various disasters e.g. earthquake, landslides, forest fire, cloud burst etc.

a) Landslides

Landslide disaster in the state of Uttarakhand in India has a very long and old history. Landslide and mass movements are recurring phenomena in Himalayan region. The consequences in recent times have become more severe in terms of casualties and extensive damage to the roads, buildings, forests, plantation, and agriculture fields. Some of the infamous major landslides of the region are 'The Karmi landslide', 'Landslides in Alaknanda Valley', 'Berinag Landslide'. 'Malpa Landslide', 'Ukhimath Landslide' and 'Varunavat Landslide'.

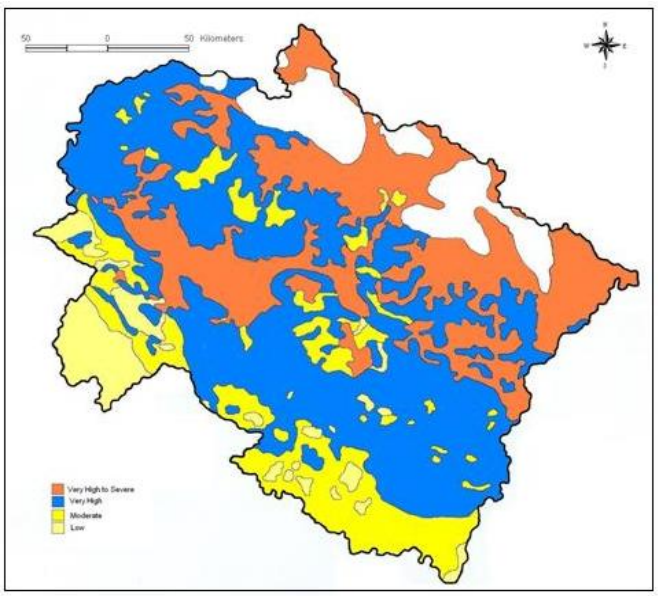

Fig 2 : Uttarakhand landslides zonation map (About 70 percent of total geographical area is registered under High to Severe category)

b) Earthquake

This is evident from geotectonic activities exhibited by almost the entire Himalayan province, but more conspicuously by the belts of intracrustal boundary thrusts and tear faults. Recurrent seismicity in the faulted areas indicates tectonic restlessness of the Himalaya. The north-eastern part of the U.P. Himalaya (Dharchula-Kapkot belt) and adjoining north-western Nepal (Bajang) are frequently rocked by earthquakes of minor to moderate magnitudes.

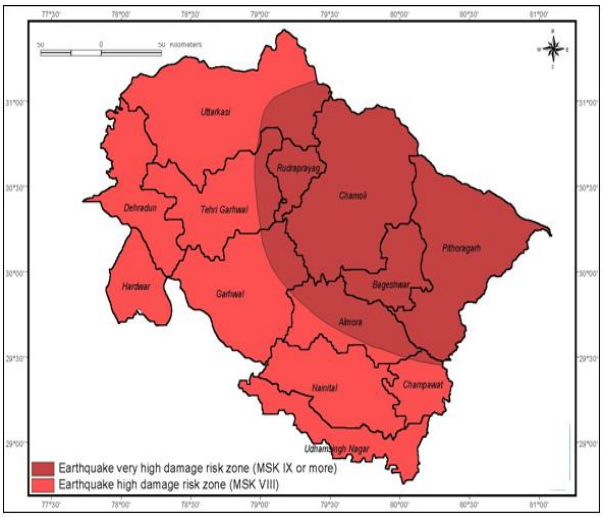

Fig 3 : Uttarakhand seismic damage risk zonation map

c) Forest Fire

Forest plays a vital role in the economy of Uttarakhand. All the hilly districts of Uttarakhand have more than 60 percent of the area under forest. However, forest fire, natural or manmade, has always remained a cause of concern for the people as well as for the government. Every year, in summers, the state is losing precious forest due to fire.

d) Other Disasters

Besides these other disasters of Uttarakhand are flash Flood, cloud burst, drought, avalanches, Hailstorms etc

VI. Case Studies

a) Selection Of Villages

For the present study authors have selected the Main Central Thrust (MCT) zone of Uttarakhand. The MCT is an imaginary line which separates greater and lesser Himalayas. Uttarakhand's five districts fall in the MCT zone. Authors have taken all the five districts (Pithoragarh, Bageshwar, Uttarkashi, Rudraprayag, Chamoli), and with the help of Statistica 8 have prepared the clusters and selected five blocks from every district (Dharchula, Kapkot, Naugaun, Ukhimath and Dhasoli) and five village from each block (Lumti, Pothing, Dhari, Barsundhi and Mandal). The selected villages and their locations are shown in Table 1 and their basic information in Table 2:

Table 1: Selected villages and their geo references

S.No	Village Name	Block Name	District Name	Lat/Long of the Village
1	LUMTI	Dharchula	Pithoragarh	80°19'27.023"E 29°53'01.792"N
2	POTHING	Kapkot	Bageshwar	79°51'54.803"E 29°58'36.135"N
3	DHARI	Naugaun	Uttarkashi	78°08'51.777"E 30°44'28.158"N
4	BARSUNDHI	Agastyamuni	Rudraprayag	79°07'08.746"E 30°26'05.232"N
5	MANDAL	Dhasoli	Chamoli	79°16'13.922"E 30°27'51.743"N

Table 2 : Basic information of the selected villages.

Village Name	Total Population	Household Number	Transportation Medium	Main Crops	Hazards
LUMTI	355	76	Private Jeeps	Paddy, Wheat	Landslide, Earthquake, Forest fire.
POTHING	5439	578	Bus, Private Jeeps	Wheat, Paddy, Barley, Maize, Maduva	Landslide, Earthquake, Forest fire.
DHARI	102	22	Bridle path to village only	Wheat, Paddy	Landslide, Earthquake, Forest fire, Flash Flood.
BARSUNDHI	120	25	Bridle path to village only	Wheat, Paddy, Maduva, Soybean	Landslide, Earthquake.
MANDAL	630	135	Private Jeeps	Wheat, Paddy, Maduva	Landslide, Earthquake, Forest Fire, Drought.

b) Village Data Analysis

Date related to vulnerability (exposure, resistance, and resilience), Hazard (Frequency and severity), Management echelon (prevention, preparedness, mitigation, search, rescue and evacuation) of the selected villages have been calculated from the data collected through PRA (Participatory Rural Appraisal) and interviews (Table 3).

Table 3 : Vulnerability, Hazard and Management scores of the selected villages

Village Name	Exposure (a)	Resistance (b)	Resilience (c)	Vulnerability (a + b + c) /3	Hazard	Management
LUMTI	76.92	73.68	56.81	69.13	22.16	10
POTHING	84.61	84.21	45.45	71.42	20.16	10
DHARI	84.61	84.73	72.72	80.68	19.83	10
BARSUNDHI	76.92	100	84.09	87	20	10
MANDAL	69.23	78.94	34.09	60.75	24.16	10

Vulnerability is a product of three dimensions: (i) Exposure, which is a largely a product of physical location and the character of the surrounding built and natural environment. (ii) Resistance, which reflects socio-economic, psychological and physical health and their systems of maintenance, and represents the capacity of an individual or group to withstand the impact of a hazard.(iii) Resilience, to natural hazard is the ability of an actor to cope with or adapt to hazard stress. The above table show that the exposure (69.23) and resilience (34.09) level of the Mandal village is low amongst all, with the score of 73.68 and resistance level of Lumti village is low. In total vulnerability of Mandal village with 60.75 score is the lowest and Barsundhi village with 87 score is the highest.

Disaster Risk Analysis: Disaster Risk Analysis of the selected villages is done using the following formula:

$$R = (H*V) / M$$

Where:

R = Risk
H = Hazard
V = Vulnerability
M = Management

Table 4 : Village risk analysis

Village Name	R = (H*V)/M
LUMTI	153.19
POTHING	143.98
DHARI	159.98
BARSUNDHI	174
MANDAL	146.77

The above table shows that the risk level of Mandal village is the lowest (146.77) and the Barsundhi village is highest (174). With the help of this risk result we can easily prepare the disaster management plan for the region.

c) Household Management Analysis:

The household management analysis principally needs three categories of data i.e. Pre-disaster data, during disaster data, post disaster data. For the present study selected villages household data has been collected through PRA during field visit (Table 5).

Table 5: Household management analysis

Village Name	Pre-Disaster Data (In %)			During Disaster Data (In %)			Post Disaster Data (In %)		
	Prevention	Preparedness.	Mitigation	Response.	Community Participation	Rescue & Relief.	Damage Assessment	Community Health	Rehabilitation & Restructuring
LUMTI	38.94	12.76	30.30	24	13	41.42	29.99	33.22	22.85
POTHING	29.46	21.27	23.74	24	17	59.99	56.66	33.84	21.90
DHARI	56.83	21.27	29.99	0	68	35.71	100	30.76	47.61
BARSUNDHI	24.20	4.25	37.50	0	5	21.42	100	12.30	19.04
MANDAL	78.94	19.14	15.62	20	80	50	100	32.30	42.85

The above table shows that the prevention level of all the villages fluctuates from 78.94% of Mandal village to 24.20% of Barsundhi village. It is because Mandal is connected with a town. Preparedness level of all the villages is below 22 % and the mitigation conditions are also very poor below 40%.Therefore it can be assessed that pre disaster scenario of all the selected villages is very gloomy. In during disaster section response level varies from 0 to 24% means, community participation level varies from 5 to 80%, and rescue and relief scores between 21.42% to 59.99%. In post disaster section damage assessment is 29.99% in Lumti village because of inaccessibity while in Barsundhi and Dhari damge assessment registers 100% score. Community health related score is below 35% and rehabilitation and restructuring is also below 50%, so it can be said that disaster management planning is in a very poor condition in all the phases of disasters.

VII. Conclusion

Communities are the first to be affected by any hazard and first who respond to the disasters so it is imperative to give the community participation a proper place in disaster management and disaster risk related plans and programmes. Over the past few years "CBDRM" is gradually becoming common in the area of rural development. It is a discipline that involves preparing for disaster before it occurs or in pre disaster phase, e.g., prevention, mitigation and preparedness etc, helping in during disaster phase, e.g., response, emergency evacuation, quarantine, mass decontamination, rescue and relief etc., as well as post disaster phase e.g. damage assessment, community health, supporting, restructuring and rehabilitation of society.

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