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VULNERABILITY ASSESSMENT AND MEASURES OF RISK REDUCTION OF CHAR DHAM YATRA IN UTTARAKHAND

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Char Dham Yatra, Pilgrimage, Moksha Yatra, Risk Reduction, Vulnerability Assessment

ABSTRACT

'Char Dham Yatra' of Uttarakhand state is the most renowned and holy pilgrimage of Hindu culture. This consists of four pilgrimage sites i.e. Yamunotri, Gangotri, Kedarnath and Badrinath. All these holy destinations are situated in the most vulnerable areas of the State where incidences of cloudburst, flood, earthquake and forest fire are common.

Present paper attempts to analyze the impact of natural disaster on Char Dham Yatra (Chhota Char Dham Yatra). The State is divided in four zones on the bases of the intensity of vulnerability, which is derived by considering incidences of natural disaster for the past twenty years and the climatic information from NATMO. Measuring the proportion of the route passing through the different risk zones also assesses vulnerability pilgrimage route. The paper also suggests measures of risk reduction so that people of all the age groups can complete this holy pilgrimage without inconvenience.

INTRODUCTION

Uttarakhand was formed on 9th November 2000 as the 27th State of India, when it was carved out of northern Uttar Pradesh. Located at the foothills of the Himalayan mountain ranges, it is largely a hilly State, having international boundaries with China (Tibet) in the north and Nepal in the east. On its northwest lies Himachal Pradesh; while on the south is Uttar Pradesh. It is rich in natural resources especially water and forests with many glaciers, rivers, dense forests and snow-clad mountain peaks which create pro tourism environment in the State.

Char-Dham, the four most sacred and revered Hindu temples of Badrinath, Kedarnath, Gangotri and Yamunotri along with nearly 533 religious sites i.e. 183 temples, 83 religious fairs, 72 Gurukul ashram and Tapasthali, 161 Taal/ Kund, 10 pilgrimage tours, 52 Shaktipeeth, 11 caves, 12 Shilayen (holy stones) are nesteled in the mighty mountains creating a supportive environment to develop pilgrimage tourism here. Besides these some popular pilgrimage tours also contribute to create religious environment in the State. These tours are –Kailash Mansarovar Yatra,Adi Kailash Yatra, Hill Yatra, Dwavora (Devyatra), Khatling – Rudra Devi Mahayatra, Sahastra Tal – Mahasar Tal Yatra, Panvali Kantha – Kedar Yatra, Dev Yatra (Moving Daities), Kanvar Yatra, Nandadevi Raj Jat Yatra and "Char Dham Yatra". Since ages pilgrims have been visiting above-mentioned destinations. "Char Dham Yatra" has been their most preferred pilgrimage, which used to begin on foot from Hrishikesh. This tour at that time was so difficult that old people used to bid farewell finally in anticipation that they would not come back. For them this was a 'Moksha Yatra'. After the development of transportation facilities this pilgrimage has become convenient.

According to scriptures 'Char Dham Yatra' begins from Yamunotri (Western most of all the four, 3235 Mt.), passes through Gangotri (north, east of Yamunotri, 3200mt.) and Kedarnath (South East of Gangotri, 3581 mt.) and ends at Badrinath (East of Kedarnath, 3133 Mt.). In this way the direction of this tour is 'West to East'. As per the religious belief this pilgrimage is considered complete only when visits and the 'holy dips' at Panch Kedar', 'Panch Badri' and 'Panch Prayag' are done. Therefore above mentioned seven destinations are most preferred spots of every Hindu , who wants to visit there once in his lifetime. Since all these holy destinations are situated in the most vulnerable areas of the State, the life of pilgrims remain at high risk.

Uttarakhand is prone to severe earthquakes, landslides. floods, forest fire, hailstorm, lightening, road accidents, etc. This State falls in the highest seismic risk zones of the country i.e. Zone V and IV. In the disaster prone map of the country, this State has attained its position among first five states in respect of natural hazards, i.e., earthquakes, flash floods triggered by cloud burst, landslides, avalanches and forest fires etc. These disasters have caused immense loss of property, natural wealth, and human lives.

Pilgrimage tourism of Uttarakhand contributes more than 60% of the total income from over all tourism, to the State. It provides job opportunity for up to 30% , and has a potential

of generating job opportunity for 60% of the total working population. Vulnerability assessment of "Char Dham Yatra Routes" not only highlights weaknesses but also draws attention towards strengths and opportunities(SWOT analysis) in order to develop pilgrimage tourism as per the requirement of ecology . Present paper assesses vulnerability and suggests measures of risk reduction of " Char Dham Yatra Routes".

METHODOLOGY

Methodology adopted here is based on two steps i.e. (1) Identification of district wise vulnerability levels in the State, (2) Measurement of vulnerability proportions of pilgrimage (Char Dham Yatra) routes. Vulnerability levels are identified by considering district wise number of major incidences along with death toll of natural disasters (earthquake, flash floods, cloud bursts and forest fires) from 1990 to 2013 and map of "Natural Hazards",(NATMO), whereas vulnerability proportions of the" Char Dham Yatra Routes" is measured according to the vulnerability level of the district.

Sources of secondary data are: (1)Forest Research Institute, Dehradun; (2)www.iosrjournals.org, (3)UNDMT(United Nations Disaster Management Team), Situation Report-5, Uttarakhand Floods and Landslides, O1 July 2013, (4) Sphere India,Sitrep-1: 28 June 2013, (5) United way India, Uttarakhand Flash Floods, Sitrep. 2nd July 2013,(6) Sant K.M. (1996-97), "Haridwar District information office, Haridwar"

REGIONAL VARIATIONS OF NATURAL DISASTERS

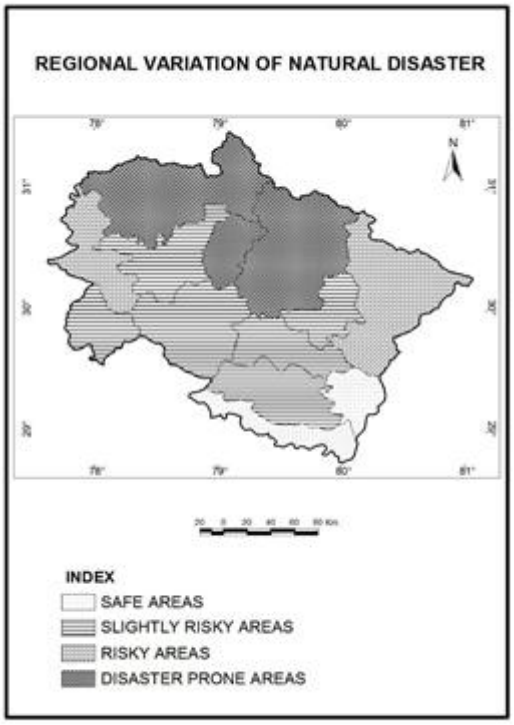
Most common natural disaster in Uttarakhand is 'forest fire' which takes place in all the thirteen districts whereas the other three are experienced in at the most five districts of the State, and of the total major incidences nearly 54% have been of forest fire, 23% of cloud burst, 12% of earthquakes and 11% flash floods during last 25 years.

Maximum incidences of cloud burst have taken place in Rudraprayag and Pithoragarh districts (61%), where as rest of the 41% incidences have disturbed life in Chamoli, Bageshwar and Almora districts. All these Districts are situated from central to north-eastern part of the State. Most of the destinations of here studied pilgrimage (12 out of 14, including Panch Badri and Panch Kedar) are situated in district Rudraprayag and Chamoli. Therefore chances of death toll due to cloud burst are highest in Rudraprayag whereas Chamoli is slightly less vulnerable in this regard. Incidences of major floods are experienced in only four districts i.e. Rudraprayag, Uttarkashi, Chamoli and Tehri Garhwal and three of these Districts are where Char Dham destinations are situated whereas T. Garhwal is en route district. Five districts out of thirteen have experienced major earthquakes (>6 Magnitude) in past 25 years and all these districts are related to the here mentioned pilgrimage and major proportion (71%) of these incidences has been in three main districts (Rudraprayag, Chamoli and Uttarkashi) of Char Dham Yatra. This is a noticeable fact that all the districts of Uttarakhand are prone for forest fire. Out of which 30% incidences have taken place in three main districts (Uttarkashi, Rudraprayag and Chamoli) and 29% in en route districts (Haridwar, Dehradun, Pauri & Tehri Garhwal) of Char Dham Yatra. So total 59% incidences of forest fire have added to the vulnerability of "Char Dham Yatra" routes.

Maximum death toll is also registered(98%) in three districts of disaster prone areas, (Rudraprayag, Chamoli and Uttarkashi) where as approximately 1 % is registered in risky areas (Pithoragarh). As per the information given by NATMO three pilgrimage centers except Yamunotri of Char Dham Yatra are declared as 'land slide prone areas'. Five out of eight epicenters of the major earthquakes are sited in disaster prone areas of the State adding more sensitivity to the vulnerability of the Pilgrimage studied in this paper.

In nutshell out of the total number of incidences approximately 69% have occurred in the districts (Uttarkashi, Rudraprayag, Chamoli, Tehri Garhwal, Pauri Garhwal, Dehradun and Haridwar) related to "Char Dham Yatra". Northern three districts(Uttarkashi, Rudraprayag and Chamoli) where all the destinations are situated have experienced almost 44% incidences. All these districts are situated in northern and central parts of Garhwal Mandal.

A composite analysis of total number of incidences , death toll and the map of "Natural Hazards" (NATMO), leads to conclude with regional variation of natural disaster (Fig: 1). As per figure southeastern districts (Uddhamsingh Nagar and Champawat) are the least (Safe Areas), central southern districts (Haridwar, Tehri & Pauri Garhwal, Bageshwar, Almora and Nainital) slightly more (Slightly Risky Areas) vulnerable whereas, out of the remaining five districts, two districts, one situated in extreme north east (Pithoragarh) and the other situated in extreme west (Dehradun) are further more (Risky Areas) and three northern districts (Uttarkashi, Rudraprayag & Chamoli) the most (Disaster Prone Areas) vulnerable areas in the State.



(Figure 1)

VULNERABILITY PROPORTION OF "CHAR DHAM YATRA ROUTES

All the destinations of "Char Dham Yatra" are situated in northern disaster prone belt and the routes to these destinations pass through either risky or slightly risky areas of the southwestern districts of Garhwal Mandal

Pilgrims to Yamunotri travel more then half of their journey through comparatively safer area and a little less than half of the journey (44.6%) through risky and disaster prone areas.

Yamunotri		
District	**Level of Vulnerability**	**Proportions(%)**
Dehradun	R.A.	0.9
Tehri Garhwal	S.R.A.	55.4
Uttarkashi	D.P.A.	43.7

(R.A.= Risky Areas, S,R.A.= Slightly Risky Areas, D.P.A.= Disaster Prone Areas)

Yamunotri is also declared as safe place regarding landslide incidences but high seismicity and high wind velocity add risk to this journey.

Gangotri		
District	**Level of Vulnerability**	**Proportions** (%)
Haridwar	S.R.A.	0.5
Dehradun	R.A.	6.6
Tehri Garhwal	S.R.A	50
Uttarkashi	D.P.A	42.9

Similar proportions are there of Gangotri route where almost half of the journey is done in unfavorable conditions as 49.5% of the route to Gangotri passes through risky and disaster prone areas where as 50.5% is a little safer route. Gangotri is declared as land slide prone area with high seismicity, high wind velocity and moderate flood magnitude which make this pilgrimage comparatively more vulnerable than the previous one.

Vulnerability scenario of 'Kedarnath route' slightly different then the previous ones as 41.4% of this route is situated in highly vulnerable areas and rest of the route is comparatively less risky yet other climatic conditions enhance vulnerability of this Pilgrimage as Kedarnath is land slide prone area with high seismicity, moderate wind velocity and low flood magnitude, yet a major incidence of cloud burst has caused more than 10000 death toll in 2013.

Kedarnath		
District	**Level of Vulnerability**	**Proportions (%)**
Dehradun	R.A.	0.9
Tehri Garhwal	S.R.A.	33.9
Pauri Garhwal	S.R.A.	24.8
Rudraprayag	D.P.A.	40.5

The route to Badrinath passes through maximum number of districts, with highest proportion(56.5%) of highly vulnerable areas (Dehradun, Rudraprayag and Chamoli).

Badrinath is also declared as landslide prone area with very high seismicity, moderate wind velocity and low flood magnitude.

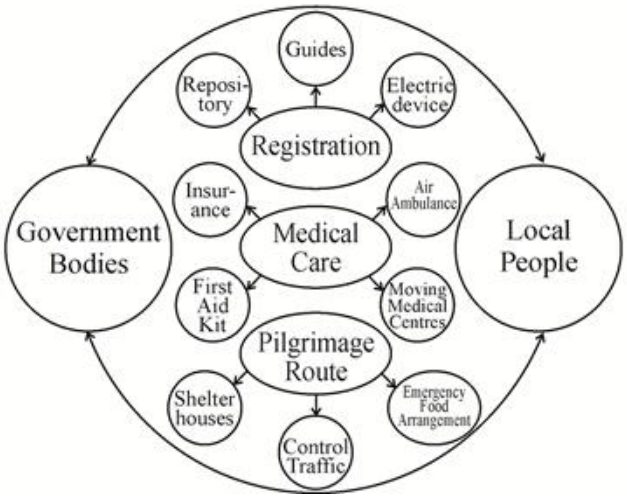
Badrinath		
District	**Level of Vulnerability**	**Proportions**
Dehradun	R.A.	0.6
Tehri Garhwal	S.R.A.	25
Pauri Garhwal	S.R.A.	18.5
Rudraprayag	D.P.A.	8.3
Chamoli	D.P.A.	47.6

Here mentioned almost all the routes indicate towards more or less fifty-fifty proportions of highly and moderately vulnerable routes which indicates towards the fact that this pilgrimage is highly vulnerable in its more than fifty percent course. Enabling visitors to complete this journey safely not only opens many options of earning for the local population but also decreases the fear of being trapped in a disaster among pilgrims, which again increase the possibility of earning much more revenue and improving living standard of the residents of the State. In order to ensure safer journey the paper suggests measures of risk reduction so that people of all the age groups can complete this holy pilgrimage without inconvenience.

MEASURES OF RISK REDUCTIONS

Risks of here studied "Char Dham Yatra" can be reduced by following few measures related to the 'Pilgrims' registration', 'Medical care' and the 'Pilgrimage routes'. These measures are to be applied with coordination between Government bodies and local people. Participation of local people will ensure not only the job opportunities of the residents but the safety of 'Pilgrims' also as local service providers are acquainted with the local landscape and are well equipped with the skill of surviving against frequent disasters.(Figure: 2)

Measures of Pilgrimage Risk Reduction



Here mentioned model suggests measures at three focus areas, i.e. (1) Registration, (2) Medical Care and (3) Pilgrimage Routes. First of all, registration of the pilgrims in the beginning of pilgrimage is suggested with three important measures (personal details of pilgrim such as name, height, caste, religion, identification mark, etc; allotment of guide and an electronic device based on GPS can be issued which would be returned in the end of the journey) These measures would help to ensure safety of the pilgrims by locating them when trapped somewhere and develop a repository to study trends of tourist arrival.

Second focus area is 'Medical Care' in which again four measures (medical insurance, air ambulance, first aid kit and moving medical centers) are suggested. Insurance and first aid kit facility is to be provided at the time of registration where as air ambulance facility would be used at the time of emergency. The facility of 'moving medical centers' or clinics would attend people in need of medical care during their pilgrimage. Such preparedness will help to deal with disaster effectively.

Some measures are suggested to be applied on the 'Pilgrimage routes' and in the 'en route villages' such as building of shelter homes, controlled traffic on the roads and the emergency food arrangements. Shelter homes would be built in safer places either on roadside or in a village near road with all security measures. Distance (between two shelter homes) and number of shelter homes would be based on regional variation of natural disaster (closer in high disaster and farther in low disaster areas) (fig. 1). Controlled traffic on roads is an important measure to control and avoid the severity of disaster. Traffic can be controlled through checkpoints at places. Number of pilgrims would be decided according to the bearing capacity of the 'pilgrimage centre'. Emergency food arrangements are done by the Government but its proper distribution would be handled by the task force (group of people) built at village level. This group of people is advised to be formed at the level of every village. People willing to serve for the religious cause would be included in this group. Some employment schemes could also be introduced to these people in order to maintain their livelihood.

CONCLUSIONS

Finally this may be concluded that vulnerability of 'Char Dham Yatra' can be reduced to an extent by introducing here suggested measures of risk reduction. This pilgrimage can be made more approachable and systematic as well, for a major section of population in the country. Since 'Char Dham Yatra' of this State is one of the most preferred pilgrimage of Hindu population, well planned safety arrangements will help to earn a good deal of revenue to the State. Participation of villagers in the safer management of this 'Yatra' will not only ease the Government in ensuring safety of the pilgrims but raise the living standards at grass root level and support sustainable development of the State.

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