LEH DISTRICT DISASTER MANAGEMENT PLAN: A ROAD MAP FOR SUSTAINABLE AND EFFECTIVE DEVELOPMENT

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ABSTRACT

This paper aims to increase the feasibility aspect of the existing District Disaster Management of Leh. Ladakh region which consists of two districts Leh and Kargil lies in Zone IV of Damage Risk Zone as strike slip fault is running along Zanskar and Ladakh ranges of the area (Sharma et al., 2013). A detailed analysis of the plan is undertaken and a stepwise decoding of certain areas is done, emphasizing on the need to increase the ex-ante aspect of the plan. This aspect focuses on improvement of preparedness phase of the disaster plan rather than focusing on the rehabilitation phase. Also inculcating the innovative and unique needs of this fragile ecosystem and site-specific improvements suggested for making this plan user friendly and inclusive in true sense and not just on paper.

Key words: District Disaster Management, Fault, Flash Floods, Preparedness.

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1. Introduction

Ladakh region lying in the northernmost part of India is vulnerable to various natural disasters like earthquakes (Fig.1), flash-floods, droughts and man-made disasters like anthropogenic pollution of groundwater, land submergence, shelling in border areas. The **Disaster Management Cycle** consists of three main aspects *prevention*, *mitigation* and *preparedness* for **capacity building** which should be carried out before the disaster strikes and after the disaster, *response*, *rehabilitation* and *reconstruction* activities should be carried out during the **recovery phase.** The pre and post phases are attributed as *ex-ante* and *ex-post* respectively in existing standard disaster studies literature.

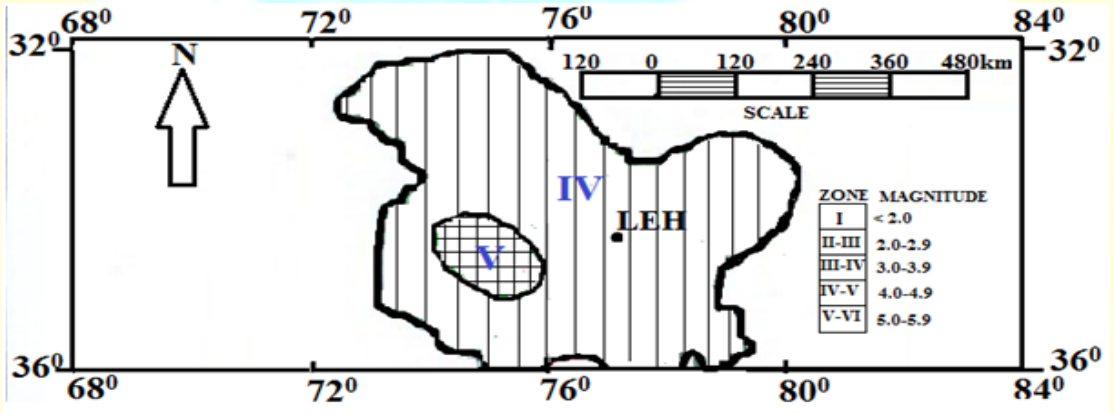

Figure 1: Seismic Hazard Map of Jammu and Kashmir

2. District Disaster Management Plan and its ex-post inclination

Leh District Disaster Management Plan, 2011 in the opening lines by the District Commissioner says that it is for the first time a full-fledged Disaster Management Plan is prepared for Leh. So it is evident that after the August, 2010 cloud burst disaster, the Leh plan was drafted and before that no such detailed plan existed. This clearly shows the post disaster emphasis but still better late than never, thus the plan aims to increase preparedness during future such calamities. The existing plan is quite recent and not much can be expected of the outcomes so soon in disaster mitigation process but an attempt is made by the author to break it in a user friendly manner and suggestions given, wherever needed. During the reconnaissance survey, out of the 37 doctors enlisted in the district hospital (Statistical Handbook, 2011-12), 30% that is 11 were interviewed

about their knowledge of various colour codes and none of them knew about it due to lack of awareness about it. The plan has a separate subset part for the District Hospital (SNM) describing the colour coding and there is colour coding for priority location code, same for triage tags code colour, colour coded codes for each of treatment areas and patient arm bands colours which are moreover same but needs to be put in a streamlined manner or a tabulated form which is given in **table. 1** for the major disaster but still work needs to be done for the hospital coding separately as coding is the keypoint in saving lives when a disaster strucks. In the event of a mass casualty incidents that overwhelms the available medical resources, coding should be followed, the goal being to save as many lives as possible (Delney and Drummond, 2002).

Table 1: Various Codes and their Interpretation

CODE	EMERGENCY CODE	AVALANCHE INTENSITY CODE	HOSPITAL CODE VICTIMS
10	DISASTER	-	-
RED	FIRE	MOST FREQUENT AND IMPACT PRESSURE OF >3 TONNES/M^2	EMERGENCY DEPARTMENT
BLUE	CARDIAC ARREST	AVALANCHE FORCE <3 TONNES/M^2	-
BLACK	BOMB THREAT	-	MORGUE
WHITE	SECURITY THREAT		
YELLOW	-	OCCURS OCCASIONALY	POST ANESTHESIA RECOVERY UNIT
GREEN	ALL CLEAR	-	CLINIC

The disaster plan is undoubtedly based on standard guidelines of national and state templates already present with all the inputs of any standard disaster management plan but it seems to be lacking in the unique regional specifications of the region. Thus suggestions which are feasible

on ground and not just in-sync with the standardization aspect are given by the author as we definitely know that improved knowledge may not predict improved performance in a real disaster response (Williams et al., 2008).

3. Ex-ante preparedness measures boosting the plan feasibility

- Vulnerability map of the sub-division, block, tehsil and causes mentioned in the plan but no data available till now, so GIS (Geographical Information System) digitization of the map or imageries needs to be done as the 2015, Phuktal disaster in Ladakh which was tackled through GIS and early warning. GIS will undoubtedly play a central role in the development of intelligent emergency preparedness and response systems (Cova, 1999).
- During the reconnaissance survey it was found that village level task force and disaster committee was still in formulating phase and that too in few of the villages.
- Identification on map and increasing the suitability of the community halls in each locality with first-aid kits, sound systems and basic necessities is needed.
- There is a huge gap between policy and practice. To fulfill this gap training centers should be established.
- Starting of a short term course to train the nurses, students and general public.
- Coordination among the NGOs and other stakeholders as the plan enlists only a list of NGOs which contributed in many spheres during the 2010 flash floods. The success of humanitarian aid operations ultimately depends on the ability of organizations to work together (Moore et al., 2003). Also a need for classification and field of expertise needs to be mentioned which is absent in the original district disaster management plan.
- Mass mock drills needs to be conducted on the ground with coordination among various stakeholders. As only mock drills can improve the relationship and better coordination among the local community and academia (Wise, 2007).

4. Water, Health and Tourists preparedness: what more can be done

- People should be educated about the current water scenario especially in Leh town where drinking water source is fully dependent on groundwater whether in the form of springs, tubewells and even the water supplied by PHE (Public Health Engineering) is from groundwater. Groundwater contamination is generally irreversible that is once contaminated, it is difficult to restore the original water quality of the aquifer (Parmer and Priya, 2013). The groundwater scenario in this fast developing town is facing an acute

stress both qualitatively and quantitatively thus need for diversification of drinking water source is required especially to increase our resiliency in disaster preparedness.

- Groundwater excess areas like Chubi in Leh town where unconfined or semi-unconfined aquifer exists, need to practice the age old traditional sanitation practices more vividly in order to prevent pollution of water resources especially groundwater resources. For disposal of grey water and black water, soak pits are used where the water table is below 20-30m bgl in Chubi area of Leh town which are tapped through hand pumps and chances of pollution more as the WHO (World Health Organization) recommends that freshwater extraction source should be a minimum of 30m away from wastewater locations (Ghondhalekar et al., 2013). It was already noted that the Chubi handpump water was contaminated with fecal coliform and E. coli in month of july while in January it was absent in year 2014-15 thus emphasizing the need in creating awareness among locals of the groundwater-sanitation nexus. The drinking water source was tapped from the gyalung spring high up near the Gangles village through a underground pipeline supply so it was very ironic to see that a spring rich area like Chubi is drinking water of the Gyalung spring as they have contaminated their own source and using that handpump for washing purpose only. Tourism infrastructure should be discouraged in such pollution vulnerable areas and the people should be made aware about the threat of groundwater from available soak-pits. The PHE needs to put a sign on such water sources indicating the unsuitability for consumption and continuous quality monitoring should be carried out at regular intervals.
- The drinking water and sewerage project timeframe is of three years for completion as per the PHE department (Balkhang, 2014). The success of this project would be a truely engineering marvel because the STP (Sewage Treatment Plant) needs to be either underground or with some wide insulation to make it functional throughout the year thus shooting up the costs. Also there is a requirement of steady supply of electricity for running this plant and electricity supply is still lacking in this area especially during the long winter months. Most appropriate technology of wastewater treatment should be site-specific, affordable, environmentally sustainable and finally socially acceptable (Massoud et al., 2009).

- The disaster plan speaks of importance of disinfection of drinking water to prevent water-borne diseases where chlorine is used but Cl^- ions in water above 250 mg/l according to BIS standards is not suitable for consumption. Also organic byproducts of chlorination are the chemicals of greatest concern in assessment of the carcinogenic potential of drinking water (Dumick and Melnick, 1993). So priority should be preserving the pristine water quality already available in the form of groundwater rather than disinfection which mainly focuses on surface water quality control. Also the sewerage pipe laying should run parallel in areas like Chubi and Karzoo areas where groundwater is more susceptible to pollution due to shallow aquifers in these parts along with main market area where grey water runs from the old town in form of open drains and reaches the market area. We should not be in an ostrich syndrome as pollution is also below the ground as it is above the ground.
- Another aspect of the plan speaks of vulnerability of Leh *Nallah* and it suggests settlements to be away from this stream but another aspect needs to be incorporated in the plan which locals know from their experience is to discourage riverside tree plantation. The riverside trees blocks the uprooted trees eventually causing more banking and flooding in both sides of the *nallah.* While popular literature and as per the study (Kafle, 2013) speaks of effectiveness of agro-forestry practices in the riverside areas of the middle hills region in reclaiming the flood-damaged lands.
- Health aspect also needs some incorporation in the disaster plans as Ladakh is noting a rise in the lifestyle diseases (Bhalkhang, 2013) and being a cold desert, the people are already deficient in many nutrients and health facilities are limited. The more complicated cases are sent for further consultations in big hospitals outside the district and only a fraction of the upper income groups can afford it. More emphasis in health areas like promoting healthy, organic and home grown foods among the locals especially the villagers is needed. During the reconnaissance survey in Sakti village in july 2013, author also noticed villagers consuming maximum aerated drinks, even taking to their fieldwork instead of traditional *chaang*, serving in homes and eventhough it is a milk rich area, little or no milk and milk products are consumed by the villagers themselves due to the cooperative milk movement. This indicates a shifting trend in the lifestyle, especially food habits among the locals of the area. There is need to educate the villagers about the

value of health over money and encourage them to keep some portion for self consumption. Further warn them about the rampant use of aerated drinks as USA where most of these companies belong itself has banned these drinks in their schools. Soft drink intake associated with increased risk of several medical problems and recommendations to reduce population soft drink consumption are strongly supported by the available science (Vartanian, 2007).

- The plan itself marks nil, in front of the district hospital list for stock in godowns, so this area needs to be taken care of due to the area becoming blocked via both land routes in winter and air routes functionality also depends on weather factors and carrying capacity is limited for both defence and civilian population.
- Khardung and Changla are the most avalanche prone areas as per the plan and maximum tourist frequented areas. So it would be good if the colour coding of various avalanche intensity as mentioned but not depicted in the original plan to come up in tourist guidelines and brochures. Colour coding enforcement routinely through a diligent site inspection and review process has led to effective hazard reduction in the Town of Vail, Colorado (Oaks and Dexter, 2015).

5. Conclusion

The District Disaster Management plan still needs to go a long way in improving its performance in ground reality. Still we have put our first foot forward towards prevention, mitigation and finally preparedness in any disaster situation by the drafting of this plan. It needs to be followed up with drafting of standard training manuals, separate subsets for different major disasters and finally emphasis on mock drills. Thus hoping for a region free of disasters or nonetheless a region ready to cope any disaster hands on eventually making the development of the area truly sustainable.

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