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An assessment of hazard vulnerability of Haryana

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Abstract
Haryana's geo-climatic conditions as well as its high degree of socio-economic openness, makes it disaster prone State. The frequency and severity of natural disasters got escalated due to rapid population growth and its increased concentration in hazardous environment. The high level of urbanization, non-engineered constructions, unplanned growth proliferation increases the vulnerability of disaster-prone areas.

Keywords: socio-economic, vulnerability, disaster etc

Introduction
Disasters are broadly categorized into "natural" disasters, and "human-made" disasters. For example, disasters such as floods, droughts, tsunami, hailstorms, dust storm, cold wave, lightening and earthquakes are generally considered as "natural disasters." whereas disasters caused by human negligence such as chemical, biological, nuclear or industrial accidents, road, rail and air accidents and political unrest etc. are classified as "human-made" or "human- induced" disasters.

Definition
The Disaster Management Act, 2005 defines disaster as "a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area".

Haryana hazard vulnerability profile
Present study principally focuses on natural hazards susceptible to the State. The geographical location of Haryana makes it vulnerable to multiple hazards. State is located in the North-western part of India (between 27.5° - 31.0°N latitude and 74.0°- 7.5°E longitude) is the legendary state of Haryana created in 1966 from where the ―Bhagwad Gita is believed to have emanated. Punjab and Himachal Pradesh makes its boundaries in north, Rajasthan in west and south and the River Yamuna defines its eastern border with Uttarakhand and Uttar Pradesh. In the State, thirteen districts namely Faridabad, Gurgaon, Mewat, Rohtak, Sonipat, Rewari, Jhajjar, Panipat, Palwal, Bhiwani (including Charkhi Dadri), Mahendergarh, Jind and Karnal of Haryana State are lying in NCR region, which is constituted by around 57.2% area of the State, whereas, Hisar and Ambala are identified as counter magnet areas to NCR by NCR Planning Board.

Flood hazard profile
Rashtriya Barh Ayog (RBA) constituted in India to assess the flood Situation in the country has listed the flowing situation for flooding:-

- Streams flowing in excess of the transporting capacity
- Backing up of water in tributaries
- Heavy rainfall
- Ice jams or landslides blocking stream courses
- Heavy localized rainfall
- Cyclones and typhoons

In the alluvial plain of Punjab and Haryana, the main reason of flooding is water logging and drainage congestion. The drainage system in parts of Jind, Rohtak, Hisar and Gurgaon districts are either poorly developed or damaged causing severe flooding. The natural geomorphic structure of Haryana is like a saucer-shaped depression, along the linear axis of Delhi-Rohtak and Hisar- Sirsa. Due to heavy precipitation and poor drainage network, some times the entire area gets flooded e.g. Rohtak flood (1995). In addition, some of the recently emerged urban agglomerations are facing the problems of drainage congestion and localized urban flooding due to inadequate or faulty drainage system. (Nayan Sharma, 2016) [3].

The state receives an average rainfall of about 650 mm which varies from less than 300 mm in the western part upto 1100 mm in the north-eastern parts of the State. The problem of floods is got severe when natural flow of water got obstructed by human-made barriers like the networks of roads and canals. Sometimes, drainage systems back up as got blocked by rubbish and garbage and resultantly cannot surpass the large amount of water. On the other side, unsystematic use of water for irrigation purposes and development of low-lying areas and depressions has also created problem of drainage congestion and water logging which accentuate the problem of flooding. As per Report of working group on Flood Management and Region Specific issues for XII Plan, Planning Commission, GoI, 2011, at present, the problem in

the States of Haryana and Punjab are mostly of drainage congestion and water logging. In Haryana flooding takes place in the marginal areas along the Yamuna and the problem of poor drainage exists in some of the south western districts. Flood prone area in Haryana is 23.50 lakh hectares. In the State, maximum area affected by floods in any year during 1953-2010 is 1.000 mha. The maximum area affected was in 1977.

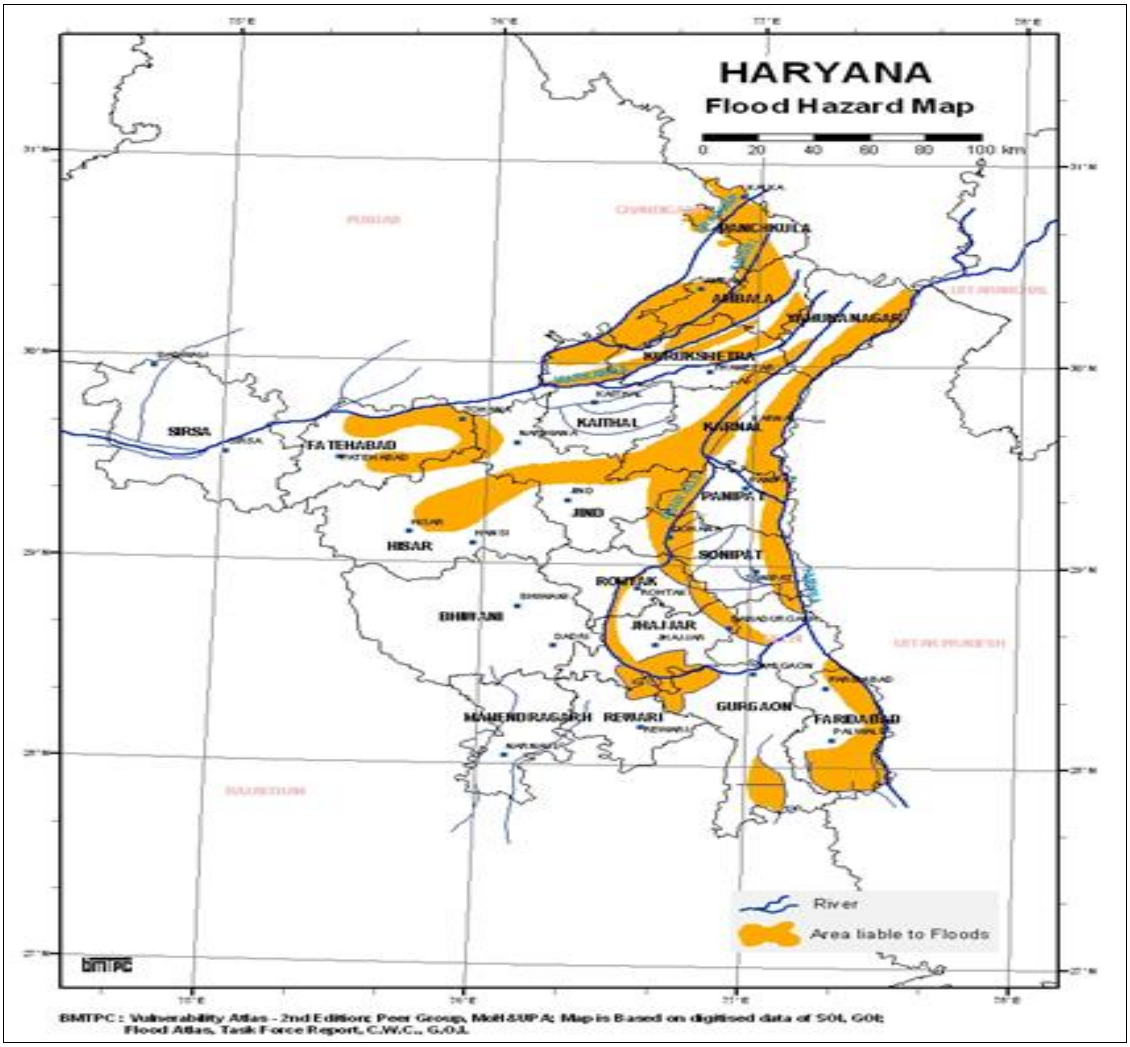

Fig 1

There are 102 vulnerable points in Haryana which need special attention during monsoon. (Haryana Flood Manual, 1986). Table 4 shows district wise Flood Prone Area percentage of area as per BMTPC 2006.

Table 1: Historical Flood Hazard Events in Haryana

Major Floods (years)	Remarks
1977, 1978, 1980, 1983, 1988,1999,1995, 1996,2000,2010 and 2011, 2016, 2017	Floods are a common phenomenon in the state and cause much damage to crop, cattle, life and property. It is also a leading cause of epidemics like malaria, cholera.

Source: Haryana State Disaster Management Plan (Draft)

Drought hazard profile

Drought is acknowledged as a phenomenon characterized by a high degree of complexity and, therefore, the challenges related to prevention, mitigation and management of this calamity require scientific appreciation of the symptoms, careful planning, concerted action and coordination on the part of the Central and State Governments.

The reason behind drought proneness of South-Western parts of the State is their topography due to which these areas cannot be brought under gravity canal commands. To overcome this difficulty, these areas are provided with lift irrigation system namely the Jui, Indira Gandhi, Jawaharlal Nehru, Birendra Narayan Chakarvarti, Sahlawas and Jhajjar lift canals. [Haryana State Disaster Management Plan (Draft)]. State has a self-sufficient irrigation system through canals, tubewells and wells. State Government have committed considerable resources in strengthening resilience to droughts through the creation of irrigation potential, promotion of conservation and efficient harvesting of water.

Table 4 shows district wise number drought years during 2000-2016.

Earthquake hazard profile

The region marks is vulnerable to earthquakes also as it falls in seismic zone IV, III, & II. Although no major earthquakes have occurred in recent past in the State, yet tremors have been felt whenever there is an earthquake in the Himalayan foot-hills. The feet remains that the region is not free from potential affecting the region are:-

1. The hidden Moradabad fault
2. The Sohna fault
3. Junction of Aravali and Alluvium near Delhi
4. Mathura fault
5. Delhi Haridwar fault

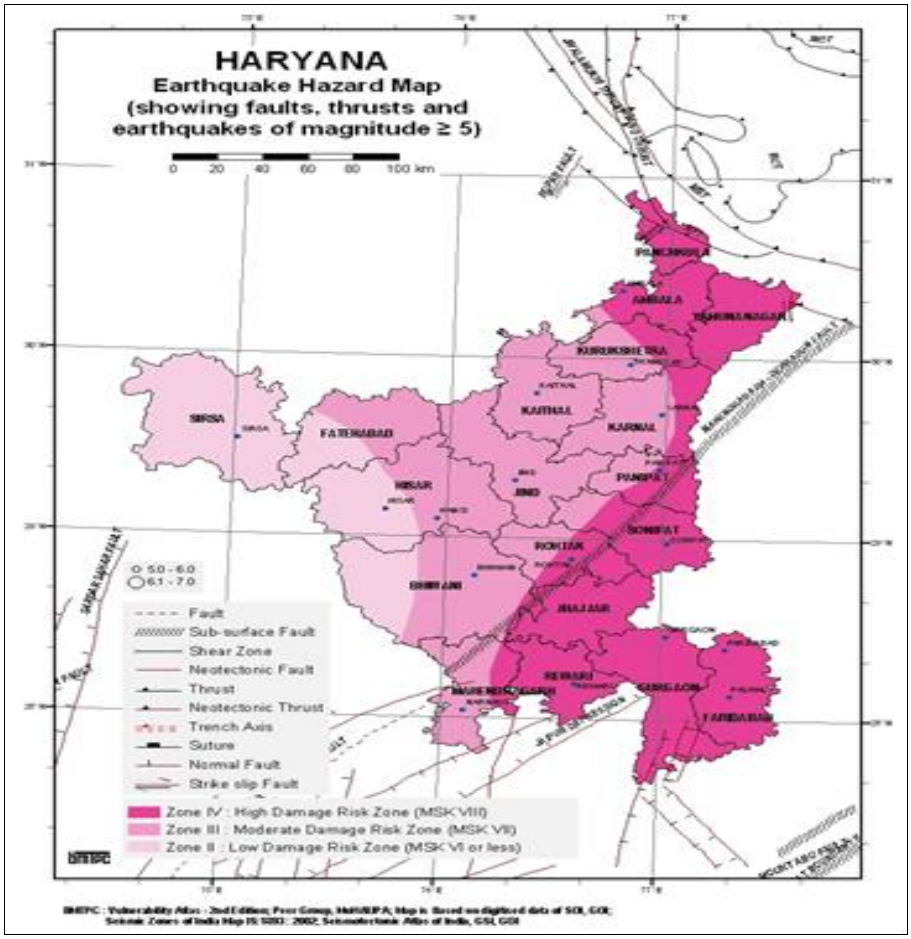

Fig 2

History

Since January, 2006 to March, 2012 there were many earthquake incidences in Haryana having magnitude from 2.3 to 4.9, a highest one on 5th March, 2012 with intensity of 4.9.

Table 2: Earthquake history of the State

Sr.	Date	Depth (Km)	Magnitude	Region
			2006	
1.	February, 15	05.0	3.2	Sonipat, Haryana
2.	March, 31	22.0	3.4	Jhajjar, Haryana
3.	April, 07	11.5	3.0	Sonipat, Haryana
4.	May, 01	10.0	3.6	Rohtak, Haryana
5.	May, 07	20.2	4.1	Jhajjar, Haryana
6.	December, 09	06	2.8	Rohtak, Haryana
			2007	
7.	April, 03	08.8	2.8	Rohtak, Haryana
8.	May, 14	05.0	3.2	Rohtak, Haryana
9.	November, 20	01.2	3.3	Rajasthan-- Haryana Border Region
			2008	
10.	February, 27	15.0	2.8	Rohtak, Haryana
11.	November, 1	10	2.7	Rohtak, Haryana
12.	October, 19	7	3.2	Sonipat, Haryana

2009				
13.	May, 10	11	3.5	Ambala, Haryana
2010				
14.	February, 24	17	2.5	Rohtak, Haryana
15.	March, 03	15	2.3	Delhi - Haryana Border Region
16.	February, 24	17	2.5	Rohtak, Haryana
17.	March, 03	15	2.3	Delhi - Haryana Border Region
18.	October, 12	6	3.5	Rajasthan (Distt-Jhunjhunun)- Haryana (Distt-Mahendergarh) Border Region
19.	September, 07	8	4.2	Delhi - Haryana (distt- Sonipat) Border Region
20.	November, 24	10	2.5	Delhi - Haryana Border Region
2012				
21.	March,05	10	4.9	Haryana - Delhi Border Region

***Source*:** http://www.imd.gov.in/section/seismo/dynamic/welcome.htm

A Regional Plan Document prepared by National Capital Region Planning Board stated that earthquakes of intensity lower than four on the Richter scale have originated from 14 epicentres located in the NCR. Earthquake in Delhi and neighbourhood areas is related to tectonic activity along the faults passes through the NCR region. Table 3 provides the list of earthquakes of 5.0 intensity and higher on Richter scale in the National Capital Region.

Table 3: Earthquake with Intensity more than 5 on Richter scale

Date	Latitude (0N)	Longitude (0E)	Focal Depth (Km)	Magnitude
1720, July,15	28.40	77.10	-	6.5
1803, September,1	27.00	77.00	-	6.8
1809	30.00	79.00	-	6.0
1842, January16	27.00	78.00	-	5.5
1842, March,5	30.00	78.00	-	5.5
1956, October,10	28.20	77.70	-	6.7
1960, August,27	28.20	77.40	109.0	6.0
1966, August,15	28.67	78.93	5.0	5.6

***Source*:** http://ncrpb.nic.in/pdf_files/19modified_ch15disastermamagement.pdf

Table 4: Flood, Earthquake and Drought vulnerability

Districts	Flood Prone Area % as per BMTPC 2006	Earthquake area %			Drought Year (2000-2016)
		Zone IV (High Risk)	Zone III (Moderate Risk)	Zone II (Low Risk)	
Ambala	83.2	6.80	93.20	0	2
Bhiwani	0	6.17	72.48	21.35	2
Faridabad	56.8	100	0	0	2
Fatehabad	44.2	0	55.50	44.50	2
Gurugram	18.3	100	0	0	2
Hisar	22.3	0	54	46	2
Jhajjar	31.8	100	0	0	2
Jind	39.6	0	100	0	2
Kaithal	21.2	0	100	0	2
Karnal	48.6	32.39	67.61	0	2
Kurukshetra	37.4	33.93	66.07	0	2
Mahendergarh	0	31.10	68.90	0	2
Mewat	18.3	100	0	0	1
Palwal	56.8	100	0	0	1
Panchkula	63.3	100	0	0	2
Panipat	22.8	51.22	48.78	0	2
Rewari	9.5	100	0	0	2
Rohtak	18.2	48.08	51.92	0	2
Sirsa	0	0	100	0	2
Sonipat	27	75.92	24.08	0	2
Yamunanagar	37.5	100	0	0	2

***Source*:** Ministry of Home Affairs

Fig 3

Out of total geographical area of 44.23 lakh hectares in the state, about 50% area is severely affected with the problems of erosion, alkalinity, salinity and water logging. Soil erosion occurs mainly due to water and wind. The soil erosion through water occurs mainly in the areas falling in Shivalik foothills and in Aravalli ranges. It is estimated that about 5.50 lakh hectare area is affected with this problem. About 12 lakh hectare area is affected with wind erosion which occurs mainly in sandy and dry belt areas of the state. An area of 2.32 lakh hectares is affected with the problem of alkalinity and 2.55 lakh hectares with salinity and water logging. Hailstorms are also common phenomena in Haryana.

The state experiences gusty winds, dust storms and thunderstorms during March to June. The wind velocity recorded at Ambala and Hisar shows that from October to September, it is higher (6.7 to 10.6 km/h) around Hisar than around Ambala (6.1 to 7.1 km/hr) but during post-monsoon and winter.

Conclusions

Natural disasters also inflict severe damage to ecology and economy of a region apart from loss of human lives. State needs to develop an operational mechanism for disaster warning, their monitoring and mitigation by installation of new technologies and by adopting space technologies.

References

1. Haryana State Disaster Management Plan (Draft) Haryana Flood Manual, 1986.
2. River System Analysis and Management, Nayan Sharma, 2016 Page no 385-386.
3. Regional Plan Document 2021, National Capital Region Planning Board. Vulnerability Atlas, Bureau of Material and Technology Promotion Council (BMTPC), New Delhi.