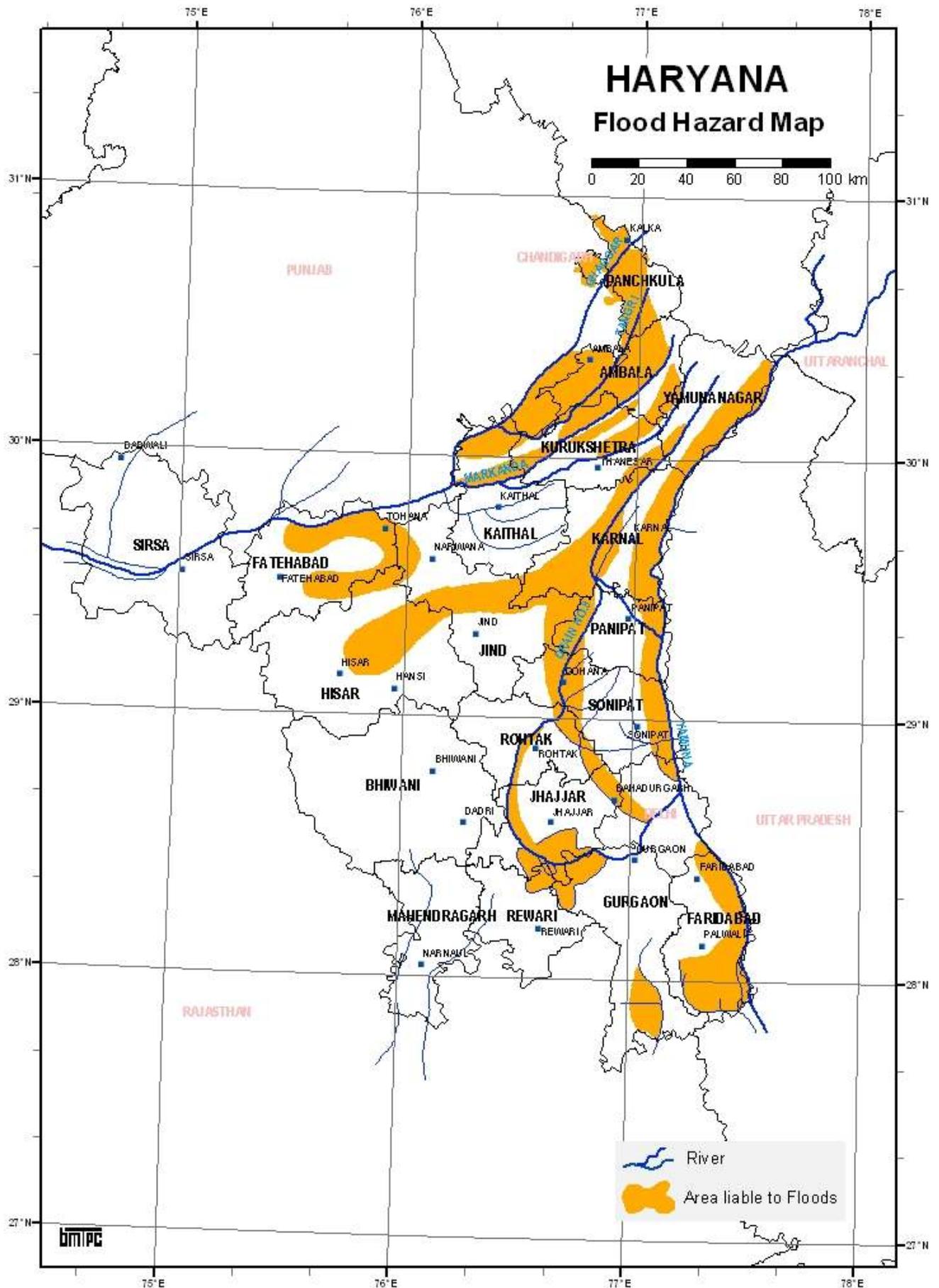


**Floods** have been a recurrent phenomenon in Haryana from time immemorial. Many part of the state of Haryana are prone to flooding. The devastating floods hit Haryana many times. In 1977, 78, 80, 83, 88,93and 1995, 1996 floods occurred in Haryana. Floods have been causing extensive damage not only to standing crops but also loss of lives and cattle. The floods in Haryana can occur because of some natural reasons such as its physiographic situation which makes a depressionalsaucer shape zone around the Delhi-Rohtak-Hisar-Sirsa axis and it has a poor natural drainage system and sometimes the heavy precipitation becomes a major contributing factor in causing flood as such in case of Rohtak flood, 1995. The state receives an average rainfall of about 650 mm. The average annual rainfall varies from less than 300mm in the western and south western parts of Sirsa, Hisar and Bhiwani districts along the Rajasthan border to over 1100mm in the north-eastern Shivalik hilly tracts of Panchkula and Yamunanagar districts along Himachal Pradesh border The problem of floods is further accentuated by the existence of human-made barriers like the networks of roads and canals, which obstruct the natural flow of water and sometimes Drainage systems back up because they cannot cope up with the volume of water or are blocked by rubbish and garbage. On the other hand indiscriminate use of water for irrigation and development of low-lying areas and depressions has also created problem of drainage congestion and water logging which create a havoc of flooding.

According to assessment of RashtriyaBarhAyog and as reported by states to the 11<sup>th</sup> plan working group, **flood prone area in Haryana is 23.50 lakh hectares.** In flood manual of Haryana, there are 102 vulnerable points in Haryana which need special attention during monsoon.'



BMTPC : Vulnerability Atlas - 2nd Edition; Peer Group, MoH&UPA; Map is Based on digitised data of SOI, GOI; Flood Atlas, Task Force Report, C.W.C., G.O.I.

Where some parts of Haryana state is prone to flood, its some parts have been prone to **drought** also. According to the October 1994 guidelines, 9 Blocks of Districts Mahendergarh and Rewari and 28 Blocks of another 4 districts ( Bhiwani, Rohtak, Hisar and Sirsa) all falling on the western and south-western side, and in all constituting **about 1/3 of the state, fall in the DDAP/DDP region**. The reason behind this is that topography of the state is such that the districts of Gurgaon, Mahendergarh, Rewari and part of Bhiwani and Jhajjar cannot be brought under gravity canal commands. To overcome this difficulty, lift canal system with a total length of 1665 km, has been developed. The draught affected South-Western parts of the state occupied sand dunes and Aravalli hills and not suitable for gravity flow irrigation, are provided with lift irrigation system namely the Jui, Indira Gandhi, Jawaharlal Nehru, Birendra Narayan Chakarvarti, Sahlawas and Jhajjar lift canals.

There are four irrigation systems in the state, namely Western Yamuna Canal, Bhakra Canal, Agra Canal and Ghaggar Canal. The Western Yamuna Canal and Bhakra Canal system irrigate the major part of the state.

**Hailstorms** are also common phenomena in Haryana.

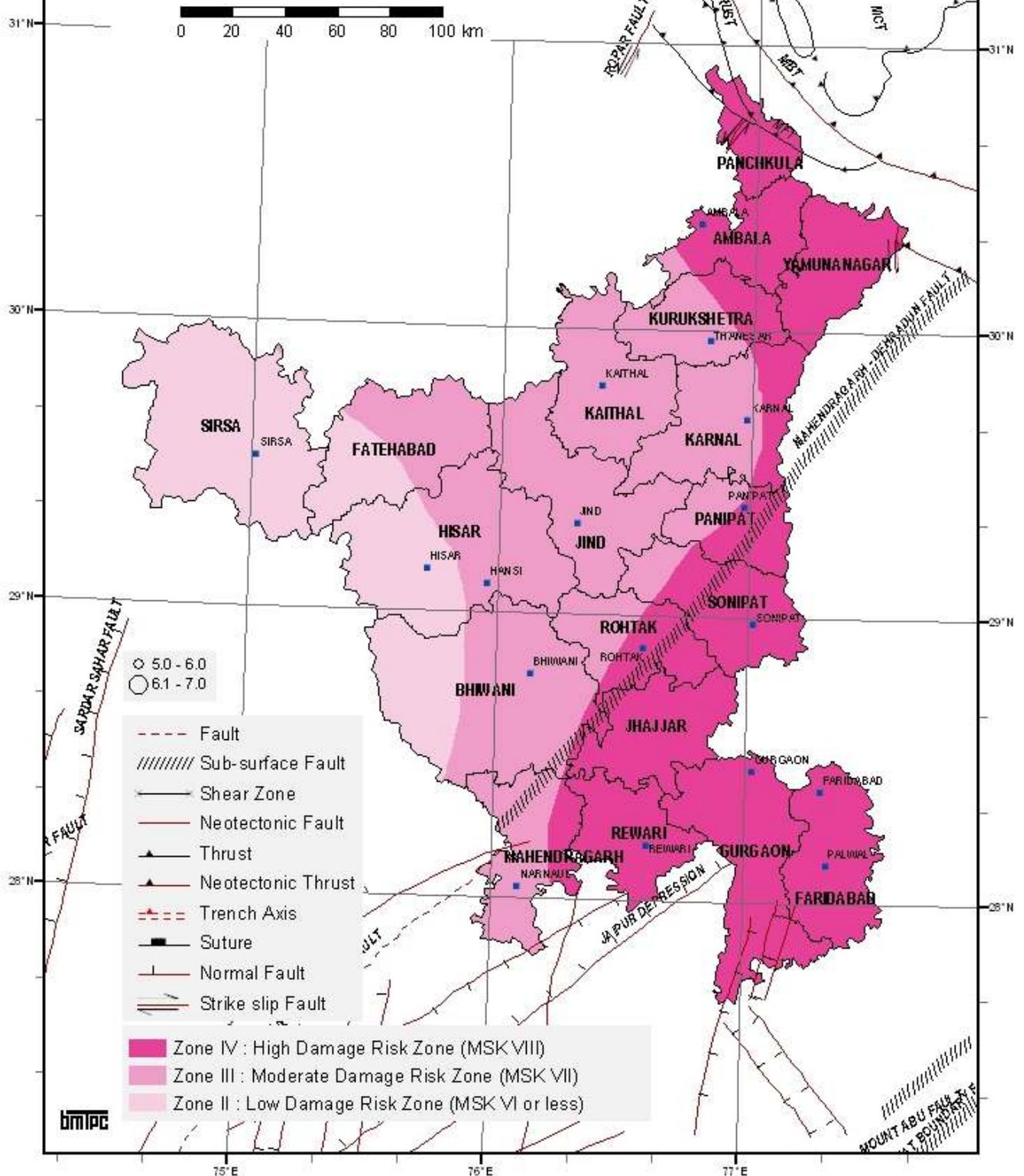
The **Haryana falls in the seismic zone IV, III, & II** and therefore, the region is vulnerable to **earthquakes**. Although, in recent past, no major earthquakes have occurred in Haryana, yet tremors have been felt whenever there is an earthquake in the Himalayan foot-hills. The feet remains that the 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

Earthquakes which have occurred during 1820-1988 with their epicentre between latitude 26.00 to 33.00 North and longitude 73.00 to 79.00 East with in which the state of Haryana falls are around 125 of magnitude varying between 4.0 – 8.0 on Richer Scale. In the last decade, towns of Faridabad and Gurgaon being its proximity of Delhi have grown up in the major residential-industrial towns whereas the town of Panchkula has emerged as a major residential city of the state. And all of them are falling in earthquake zone IV. As a result of this, an unplanned development which is not corrected and mainstreamed by means of preparedness /prevention/mitigation measures will pose a greater challenge if an event occurs. The combination of moderate to high hazard, high vulnerability and high exposure results in high level of disaster risk. It is understood that a majority of inhabitants in Haryana and sectoral agencies involved in mainstream development are not aware of the existing studies, hazards, risk and vulnerability and therefore are not in a position to undertake suitable measures for preparedness and mitigation. In addition there is a lack of sharing of information amongst stakeholders and at times the existing maps are not available for public use.

# HARYANA

## Earthquake Hazard Map (showing faults, thrusts and earthquakes of magnitude $\geq 5$ )



BMIPC : Vulnerability Atlas - 2nd Edition; Peer Group, MoHSUPA; Map is Based on digitised data of SOI, GOI;  
Seismic Zones of India Map IS:1893 : 2002; Seismotectonic Atlas of India, GSI, GOI

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.

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.

<b>state irrigation commission(1972)</b>	<b>6.5 lakh hectares land under Drainage congestion/ water logging</b>
<b>National commission on agriculture (1976), ministry of agriculture(1984-85), and latest figure reported by states</b>	<b>6.20 lakh hectares area under Drainage congestion/ water logging</b>



High pollution levels, Contamination of ground water and surface water, and heavy metals and pesticide contamination of soil etc. are emerging classes of man-made and environmental hazards. About **3766 sq km area in Haryana is underlain by saline groundwater**. Hisar, Kaithal, Gurgaon have been identified as endemic to flurosis due to abundance in natural occurring fluoride bearing minerals.

Haryana has also a history of **industrial and road/rail/air accidents**Such as Air Accident (Charkhi-Dadri 1995), Rail Accident at Ballabgarh, Dabwali Fire (1995), Sonipat Fire (1998), and recent Bomb explosion caused fire in Samjhota Express 2007.

In addition to this the threat **of Global Warming and its resultant climatic variations**such as inter seasonal variations in rainfall; environmental issues and effect on wheat and rice production increase the vulnerability of the state. Issues related to rapid urbanization and waste disposal are assuming a gigantic proportion.