

Maps

VULNERABILITY MAPS

Natural and man-made hazards continue to occur in our life and if not properly managed hazards tend to become disasters. To avoid hazards turning into disasters and contain damages caused by them, a pre-disaster proactive approach consisting of prevention, reduction and mitigation is called for. After the occurrence of the disaster, a post-disaster reactive approach for relief and rehabilitation is required to be taken up speedily for reducing misery and suffering of the affected people.

Maps play a crucial role in identifying vulnerable and high-risk areas in the country. Specialised maps that can assist in the identification and planning of response activities have to be further developed. These maps, when integrated with a knowledge network with GIS (Geographic Information System) will become an important decision-making tool in the hands of disaster managers.

The planning and implementation of these works – prevention, reduction, mitigation, relief and rehabilitation require the following:

1. Precision Maps with
 - a. Spatial Data and
 - b. Non-Spatial Data
2. Identification of activities, agencies, resources and funds for carrying out the works
3. Implementation and Monitoring at all stages
(I0, I1, I2, I3)

The requirement of Topographical and Thematic Maps, Database – Spatial and Non-Spatial for various types of identified disasters have been described.

The following maps will be helpful during the response stage:

- ◆ Road maps of India along with metalled and unmetalled roads (Survey of India-Toposheets, respective ministry of each State, Ministry of Surface Transport)
- ◆ Railway map (Ministry of Railways) for location of Rescue and Relief trains
- ◆ Important Airports and Aerodromes in India (Ministry of Civil Aviation, Airport Authority of India, Ministry of Defence)
- ◆ Location of Public Sector Units (PSUs) (Ministry of Heavy Industries and Public Enterprises)
- ◆ Location of major hospitals and primary health centres
- ◆ Location of civil defence installations
- ◆ Location of the relief material storage site and the state EOC
- ◆ Advanced Information Technology installations

- ◆ Government sites that can be used as shelter points, relief camps and donation management activities

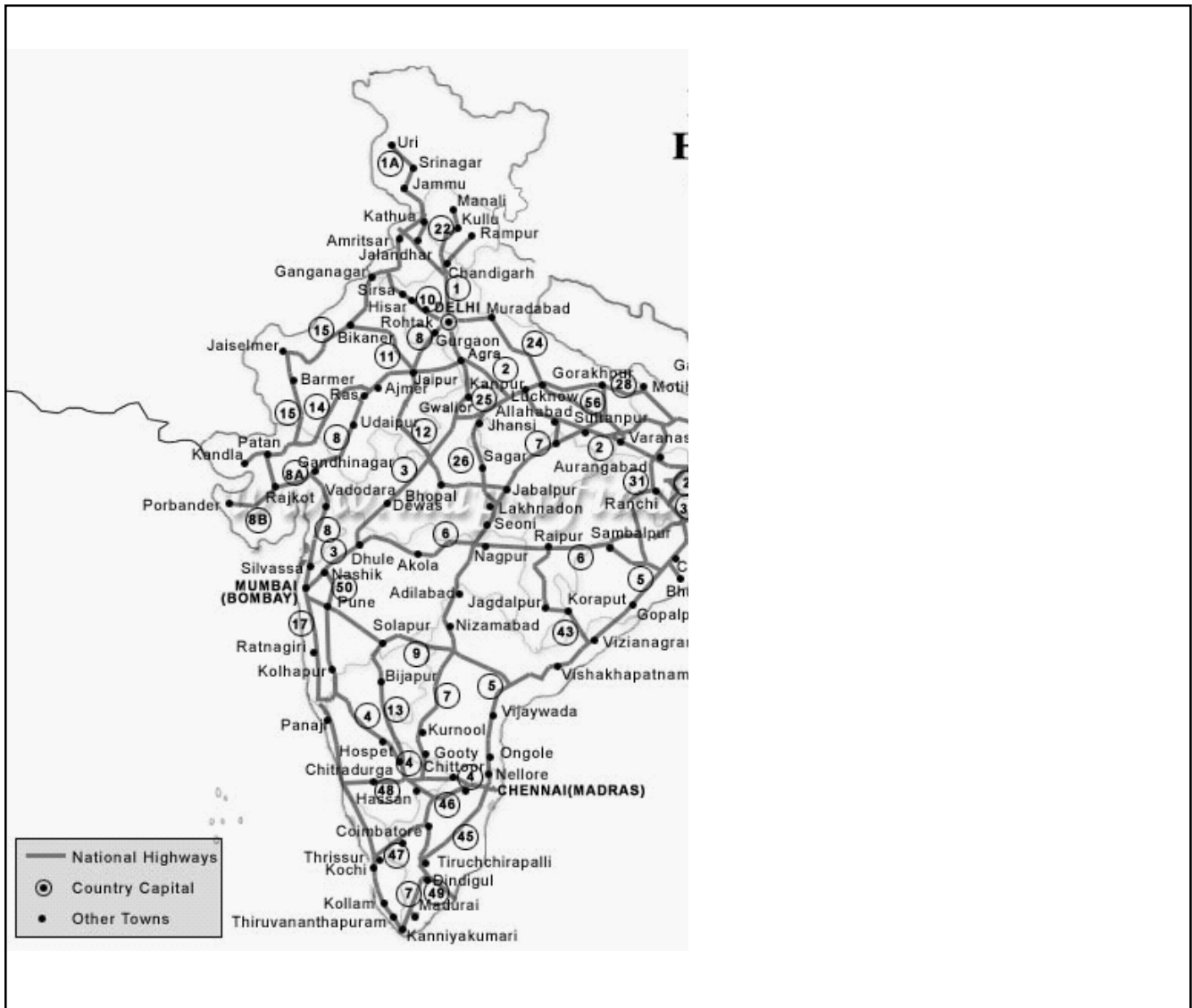
Apart from these maps, the vulnerability maps prepared by BMTPC and NATMO can provide basic maps identifying national highways and air and rail routes. These are essential to identifying key areas related to damage and the available facility for rescue and relief and accessibility during a disaster.

Currently, guidelines exist for the preparation and use of maps. All the existing maps and the new ones as recommended must be digitised so as to permit the use of GIS for planning, prevention, reduction, mitigation, relief and rehabilitation works, in addition to constant monitoring of all activities at various stages. The following maps given below can be primary base maps for disaster response. These maps can be further enriched with various theme-based layers, which can be dynamically viewed in a GIS environment.

- ◆ National Highways of India
- ◆ Railway Network of India
- ◆ Air Network of India
- ◆ Major and intermediate Ports in India
- ◆ Population Density Map of India

Base Map No.1. IV.1

This map contains country capital, other towns and national highways. This map could be added with the following theme-based layers:

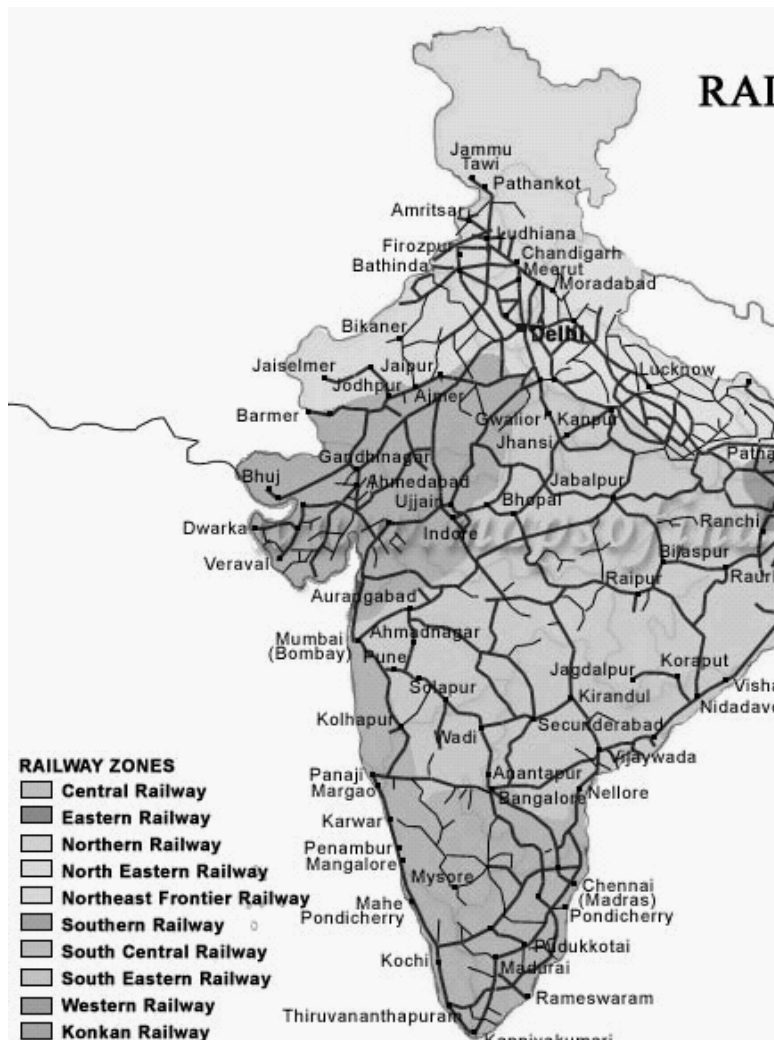


- ◆ Public sector units
- ◆ Large scale chemical factories (Ministry of Environment and Forests)
- ◆ National monuments
- ◆ Defence installations
- ◆ Locations of State bus terminals
- ◆ Inter-State road entry points
- ◆ Topologies/Hill roads
- ◆ State EOC location

* Some of the maps have been taken from the site www.mapsofindia.com. We thank them for their co-operation.

Base Map No. 2 IV.2

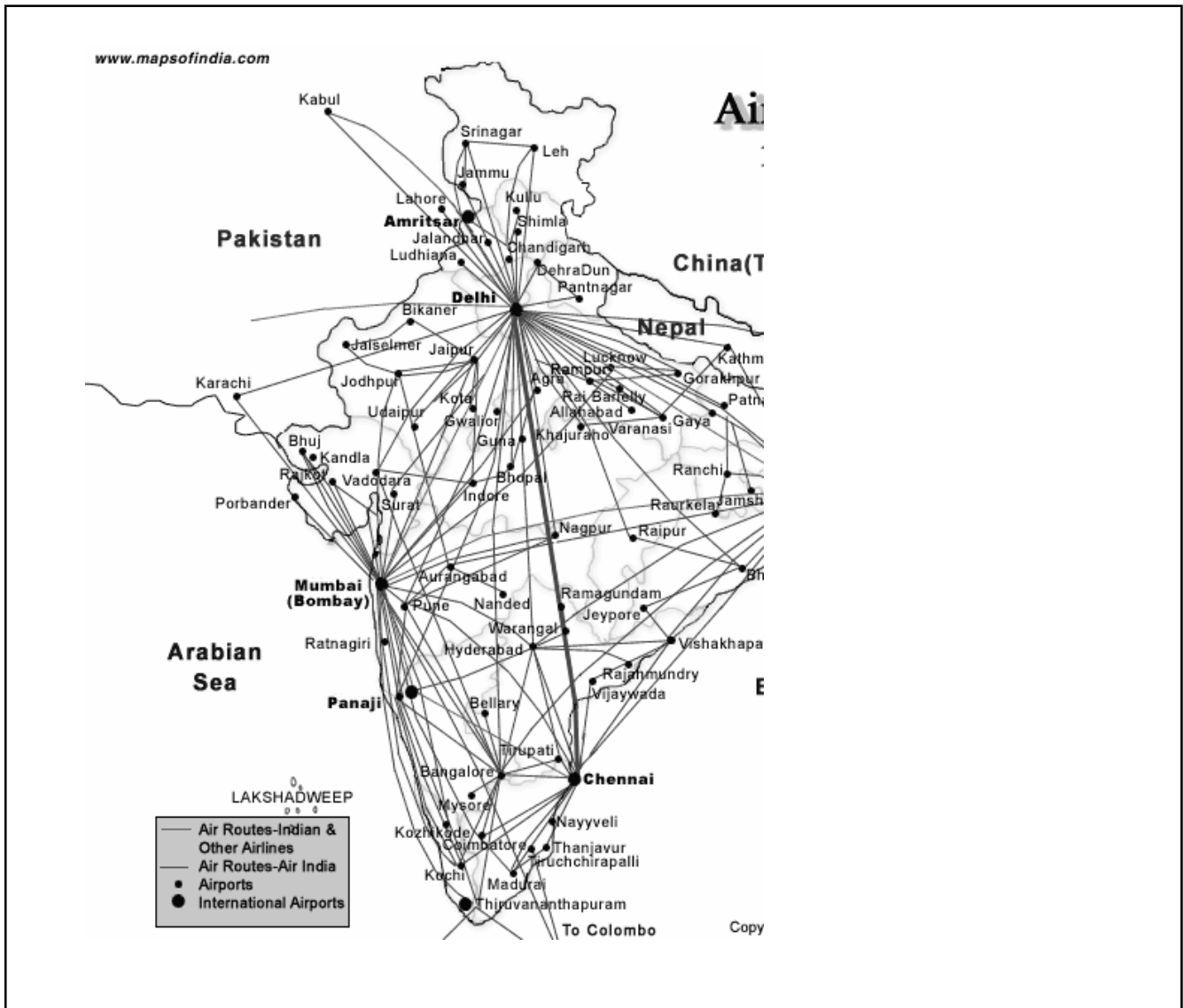
This map identifies all the zonal railway routes of India, the important railway stations and terminals. It can also identify the following:



- ◆ Location of relief trains
- ◆ Railway bridges and tunnels
- ◆ Location of Heavy Industries
- ◆ Train schedules and frequencies
- ◆ Major terminals
- ◆ Location of broad gauge and meter gauge tracks
- ◆ State EOC location

Base Map No. 3 IV.3

This map identifies air routes, airports and international airports in the country. It can also identify:



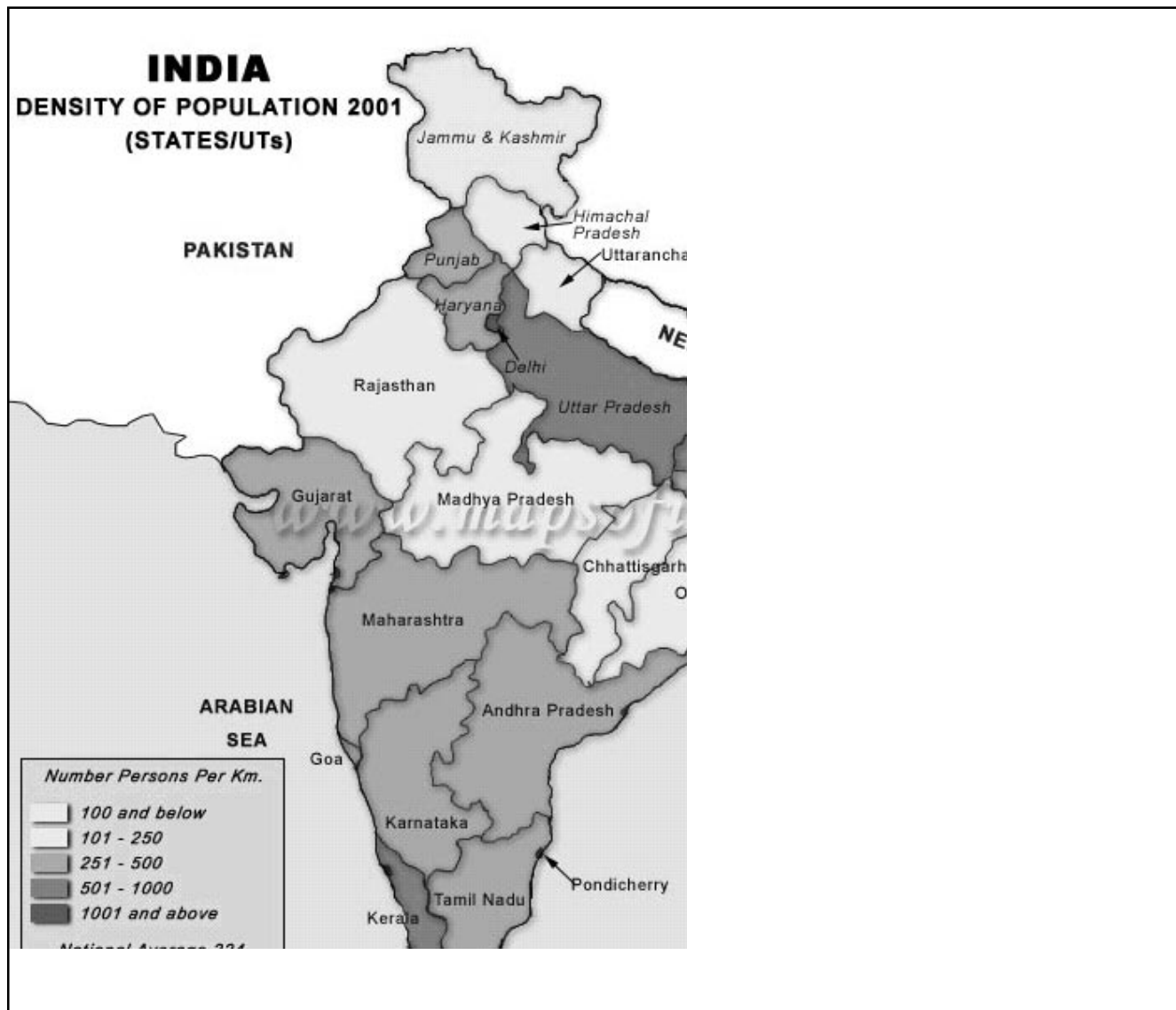
- ◆ Air force stations
- ◆ Helipads
- ◆ Defence installations
- ◆ Communication facilities (Air Traffic control rooms, etc.)
- ◆ Aircraft strengths and types
- ◆ Air control radius of each station/airport
- ◆ State EOC location

This map identifies the major seaports. It can also be used to show:



- ◆ Warehouses/Storage yards
- ◆ Dockyards and dock capacities
- ◆ Forecasting facilities
- ◆ Coastguard stations and navigation routes
- ◆ Tides
- ◆ Location of heavy industries in the vicinity of a coast
- ◆ Interlinking inland waterways
- ◆ State EOC location

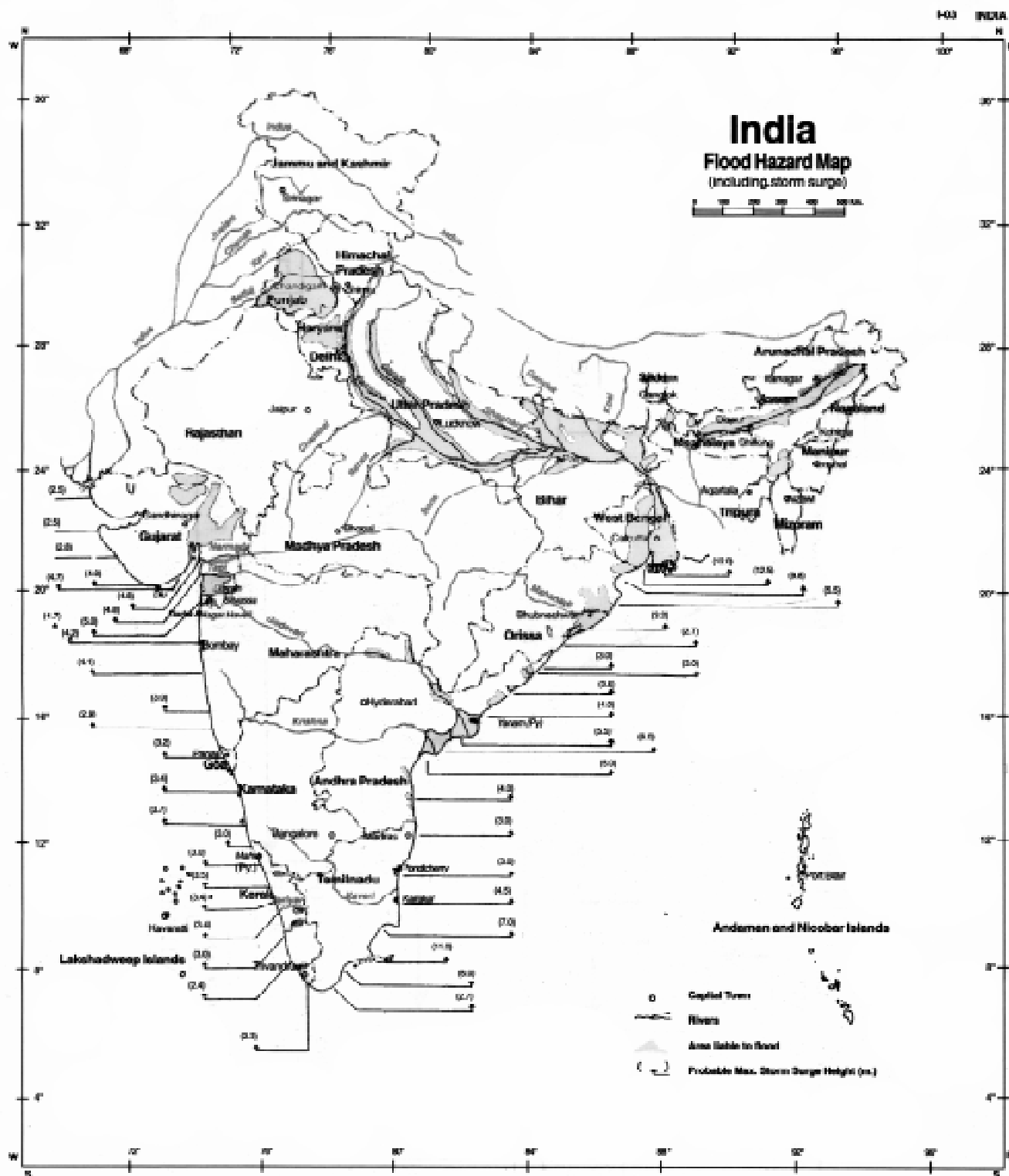
This map identifies population densities according to the 2001 census. It can also show:



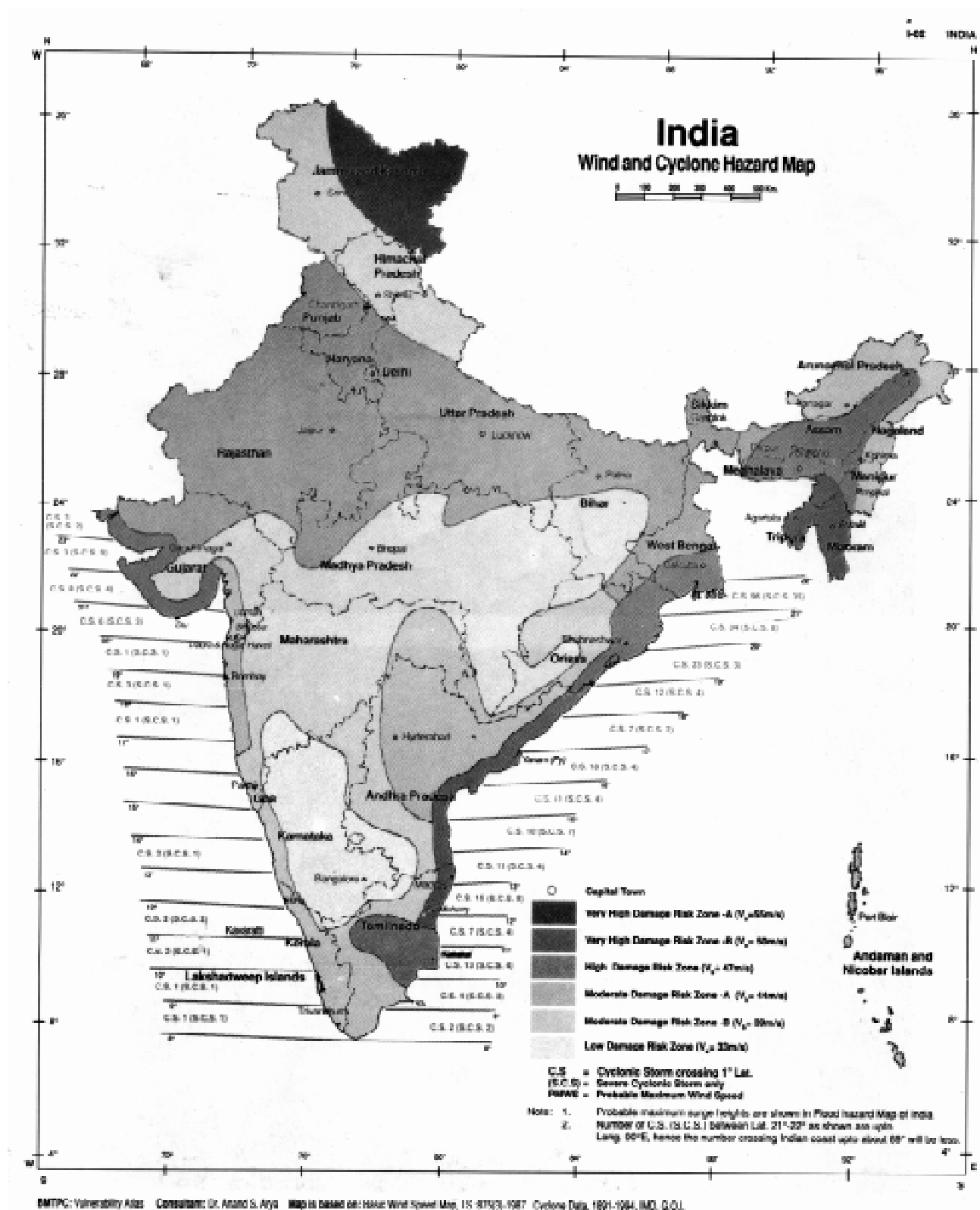
- ◆ Various languages
- ◆ Age-sex composition
- ◆ Socio-economic characteristics
- ◆ Rural-urban distribution
- ◆ State EOC location
- ◆ Education
- ◆ Percentage decadal growth
- ◆ Health Index

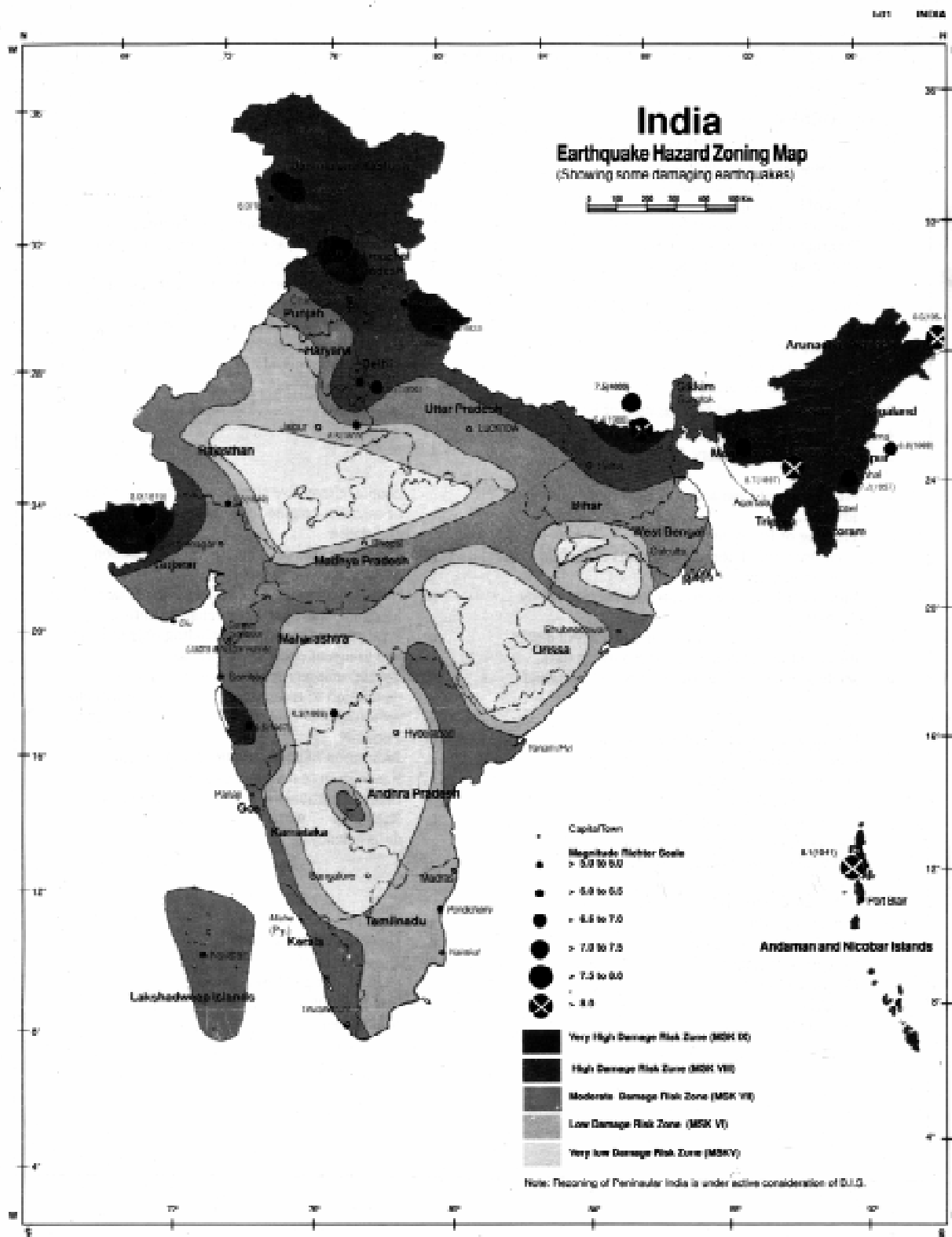
In the conventional method, maps are very precise and accurate but the time required for their preparation is more compared to the available modern methods mentioned later. While the baseline maps must be done by conventional methods, their updating and revision can be planned with the other one. This combination will

give quick results and also be cost-effective. The method to be adopted will depend upon the actual area to be surveyed and the purpose of survey, whether new map or revised map, the time required for completion and quality of the product in relation to the purpose and the availability of funds.



BMTPC: Vulnerability Atlas Consultant: Dr. Anand S. Arya Map is based on: Flood Atlas, 1967, G.W.C., G.O.I. Cyclone and PHF Atlas, 1971-1974, I.M.U. G.O.I.





BMTPC : Vulnerability Atlas

Consultant : Dr. Anand S. Arya

Map is based on : Seismic Zoning Map, I.S.:1893-1984

Earthquake Catalogue (M25), I.M.D., G.O.I.