

The State Disaster Management Plan

Section -I

PERSPECTIVE

**“It is not enough to be a man, one must be a system.
It is not enough to think and feel, one must think and
feel from a definite point of view”**

— Aldous Huxley

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1. The Basis

The fundamentals of existence lie in the struggle one has fought, the instruments one has used and the lessons one has learnt to survive. In this respect, Bihar's struggle for existence is far more grim than most of the states. It has undergone mitosis for as many as four times and has suffered through disasters of the worst kind many a time.

1.1 The Vision :

Right from the days following the battle of Buxar in 1764 after which Bihar was passed on to East India Company as a part of the Bengal Presidency, to 1912 when Bihar and Orissa were separated as one State, to 1936 when both Bihar and Orissa were made independent States, to 1956 when some key areas of Bihar was included in West Bengal, to 2000 when Bihar was divided to form the state of Jharkhand, the State has went on losing its natural resource base and got pushed to confine within an area prone to all sort of hazard: earthquake, flood, cyclonic storm/**Gale /Hail Storm**, drought, fire, extreme cold and heat waves etc.

For such a state of hazards which Bihar is, the VISION of Disaster Management is :

"To attain a position where people are ready to help themselves, local bodies to extend mutual help, the administration to organize public help and the government to facilitate the helping of helpers."

For the attainment of the vision the MISSION of the Plan is :

"To minimize the loss of life and property by having an appropriate prevention, mitigation & preparedness measures meticulously implemented and a well-rehearsed response, by both government and non-government stakeholders in undertaking search, rescue, relief and rehabilitation operations."

1.2 The Objectives:

In order to achieve the Mission, the objectives of the plan have been set as :

- i. Treating community as the primary stakeholder and first respondent in the Disaster Management Plan, focusing on disaster risk reduction, prevention, mitigation and preparedness measures.
- ii. Emphasizing preparedness at the community level and readiness at the local bodies level.

- iii. Facilitating the role play by the administration and government departments and other stakeholders through institutional mechanism.
- iv. Creation of specialized institutions to make disaster management an inclusive exercise and to wed it to development initiatives.
- v. To create a dependable early warning system to warn the people and activate other stakeholders.
- vi. Ensuring quick response and providing relief with care and attention to those belonging to the marginalized section.
- vii. To undertake rehabilitation with "Build Back Better" motif.

1.3 The Approach :

The process adopted for the formulation of the Plan has been

- i. Holistic : Covering all the hazards the state is vulnerable to.
- ii. Integrative : Covering prevention, mitigation, preparedness & response measures.
- iii. Participative : Including the affected people, the Panchayati Raj Institutions, the local bodies, the district administration, the government departments & expert institutions.
- iv. Associative : Creating space for the support and help from the corporate bodies, civil societies, NGOs, CBOs and others and solicit their participation in disaster management.

1.3.1 Holistic : Area wise the whole of the State of Bihar is in V, IV and III seismic zone. Being the courtyard of as many as twelve major rivers flowing down the Himalayas and over half a dozen rivers from Chhotanagpur Plateau meandering through its backyard, the state suffers from flood in varying proportions every year. As it depends heavily on rainfall for its agricultural activities, the state suffers from drought as well. Cyclonic Storm/High wind visits the three fourth of the state approximately every year many a time. And, having a large part of its population living below poverty line and in hutments, fire occurrences at the slightest pretence of a spark is a usual phenomenon.

In the above perspective, the Plan has to be compulsorily holistic covering all major hazards, natural as well as man-made.

1.3.2 Integrative : The prevention, mitigation, preparedness and response measures have been included in the Plan in order to make it comprehensive and effective in reducing loss of life and property. The Plan had to be

inclusive also because first, the Act and the Guidelines have given directions in this regard and second, it is a dire necessity to make people of Bihar aware of hazards, the mitigation measures being taken and to make them participate in preparedness so that they may copingly live with the incidence of unpredictable & unavoidable disasters. In order to substantiate the point the occurrence of incidence like earthquake provides an apt example. The incident of earthquake is so spaced that the grim memory of havoc created by it gets completely diluted with the passing of generations. As such, there is a pressing need to keep each generation reminding of the kind of disaster an earthquake brings about and enliven their awareness about such a disaster and induce them to keep preparing for responding to such an event with best of readiness..

1.3.3 Participative: The edifice of the State Disaster Management Plan has been built with rich inputs that participation of major stakeholders provided during events organized for the same.

Right from the stage of methodology to be adopted for the preparation of the Plan in which senior officers from the govt. departments, the central govt. organizations, the corporate sector, the civil societies and the multilateral agencies participated, to the finalization of the draft plan in which 21 professionals from as many areas of expertise contributed the exercise is the result of the coming together of many minds.

Besides, a team of research associates visited as many as nine districts, one in each division, to have Gram Panchayat level interaction with community leaders, Panchayat representatives, social workers and local NGOs on incidents of disaster, the responses etc. Another team of senior level programme officers went to another nine districts, one from each division to have district level interaction on disaster related issues with the members of District Disaster Management Authority, Nodal Officers from the district level line departments and local NGOs.

Apart from these, representatives from all the 44 government departments, industry associations and professional bodies were invited for interaction on the proposed State Disaster Management Plan. As a result of the interaction, the plan has virtually become an outcome of the joint efforts of the officers from NDMA, NIDM, SDMA, & DMD. The officers also, from time to time, helped with valuable suggestions in the proper shaping of the plan. The representatives of Corporate & professional bodies also provided valuable suggestions in system engineering.

1.3.4 Associative: In the Plan the association of government as well as non-government organizations has been ascertained in an appropriate manner. The non-government organizations have been given key roles to play at the Preparedness, the Response and the Rehabilitation stages.

Besides, enough options have been left for the government to associate NGOs & CBOs in capacity building activity as well.

1.4 The Strategy :

The strategy adopted to draw the State Disaster Management Plan began with the study of the National Disaster Management Act, 2005, the State Disaster Management Policy, the Guideline for making of the State Plan and the Report of the High Powered Committee. It was followed by chalking out of the methodology to be adopted for the preparation of the plan which subsequently got finalized in a workshop in which major stockholders participated.

The exercise to know the basics of the existing Disaster Management System in the state, to gather the available data and details of action taken from various damage assessment reports, and to collect experience and observations of the related government functionaries provided a clear picture of the perspective for working out the plan.

Based on the findings from the study of the Act, Guidelines, Reports and Publications the framework of the State Disaster Management Plan has been prepared and shared with competent authorities and after having incorporated their valuable suggestions and observations the plan framework has been finally drafted.

1.5 The Methodology :

The methodology adopted for detailing the finalized framework of the plan consisted of three constituents – steps, instruments and sources. In all, 12 steps, 6 instruments and 12 major sources were used to prepare the plan.

The twelve steps were:

- i) study of documents,
- ii) interaction with stakeholders
- iii) study of the hazards happening in the state
- iv) the existing disaster management system and traditional practices
- v) analyzing the gaps in the practices
- vi) identifying the preparedness needs

- vii) working out disaster wise mitigation measures
- viii) formulating institutional framework
- ix) chapterisation and drafting of the plan
- x) sharing the same with authorities
- xi) sharing the same with stakeholders and
- xii) finalization of the plan.

The six instruments used were survey & study, workshops, structured interviews, small group discussions, personal interviews and district and community level interactive meetings.

The twelve major sources used were

- i) documents
- ii) publications
- iii) nodal officers of the government departments
- iv) professional bodies
- v) corporate
- vi) academicians
- vii) non-government organizations
- viii) district administration
- ix) local bodies
- x) Panchayati Raj Institutions
- xi) community leaders
- xii) technical institutions etc.

1.6 The State Disaster Management Plan :

The edifice of the State Disaster Management Plan built with bricks of experience, available data and suggestions drawn from all segment of expertise and stakeholders has been placed on four pillars:

- i. The Disaster Management Act, 2005 and NDMA Guidelines
- ii. The State and the Govt. Departments
- iii. Disaster Management related specialized institutions and other organizations/UN agencies/NGOs and
- iv. The Primary Stakeholders and the Panchayati Raj.

1.6.1 The Disaster Management Act, 2005 and NDMA Guidelines :

The DM Act, 2005 and NDMA Guidelines provided the framework for disaster management exercise as a whole and in part including the making of State Disaster Management Plan.

The DM Act, 2005

The Disaster Management Act 2005 has defined “disaster” and “disaster management” in detail as well as in design. It has also specified the disaster management institutions that are required to be setup. The Act also describes in details the roles and responsibilities of Key Government Officials/Stakeholders.

- i) *“ disaster” means 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 areas.*
- ii) *“ disaster management” a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary or expedient for:*
 - *prevention of danger or threat of any disaster*
 - *mitigation or reduction of risk of any disaster or its severity or consequences*
 - *Capacity building*
 - *Preparedness to deal with any disaster.*
 - *prompt response to any threatening disaster situation or disaster*
 - *assessing the severity or magnitude of effects of any disaster*
 - *evacuation rescue and relief*
 - *rehabilitation and reconstruction*

Apart from well defined roles and responsibilities, the Act provides some overriding powers for disaster management in a desired manner. Some of the important ones are:

63. Powers to be made available for rescue operations.- *Any officer or authority of the Union or a State, when requested by the National Executive Committee, any State Executive Committee or District Authority or any person authorised by such Committee or Authority in this behalf, shall make available to that Committee or authority or*

person, such officers and employees as requested for, to perform any of the functions in connection with the prevention of disaster or mitigation or rescue or relief work.

64. Making or amending rules, etc., in certain circumstances.-

Subject to the provisions of this Act, if it appears to the National Executive Committee, State Executive Committee or the District Authority, as the case may be, that provisions of any rule, regulation, notification, guideline, instruction, order, scheme or bye-laws, as the case may be, are required to be made or amended for the purposes of prevention of disasters or the mitigation thereof,..... the appropriate department or authority shall take necessary action to comply with the requirements.

65. Power of requisition of resources, provisions, vehicles, etc., for rescue operations, etc.- (1) *If it appears to the National Executive Committee, State Executive Committee or District Authority or any officer as may be authorised by it in this behalf that-*

- (a) any resources with any authority or person are needed for the purpose of prompt response;*
- (b) any premises are needed or likely to be needed for the purpose of rescue operations; or*
- (c) any vehicle is needed or is likely to be needed for the purposes of transport of' resources from disaster affected areas or transport of resources to the affected area or transport in connection with rescue, rehabilitation or reconstruction, such authority may, by order in writing, requisition such resources or premises or such vehicle, as the case may be, and may make such further orders as may appear to it to be necessary or expedient in connection with the requisitioning.*

71. Bar of jurisdiction of court.- *No court (except the Supreme Court or a High Court) shall have jurisdiction to entertain any suit or proceeding in respect of anything done, action taken, orders made, direction, instruction or guidelines issued by the Central Government, National Authority, State Government, State Authority or District Authority in pursuance of any power conferred by, or in relation to its functions, by this Act.*

72. Act to have overriding effect.- *The provisions of this Act, shall have effect, notwithstanding anything inconsistent therewith contained in any other law for the time being in force or in any instrument having effect by virtue of any law other than this Act.*

NDMA Guidelines:

The National Disaster Management Authority (NDMA) has worked out Guidelines for the preparation of State Disaster Management Plan.

The Guidelines categorize the levels of disasters into L₀, L₁, L₂, & L₃ based on the ability of various authorities to deal with them.

L₀ : denotes normal times which are expected to be utilised for close monitoring, documentation, prevention, mitigation and preparatory activities. This is the planning stage where plans at all levels from community to the State shall be put in place. Training on search and rescue, rehearsals, evaluation and inventory updation for response activities will be carried out during this time.

L₁ : specifies disasters that can be managed at the district level, however, the state and centre will remain in readiness to provide assistance if needed.

L₂ : specifies disaster situations that may require assistance and active participation of the state, and the mobilisation of resources at the state level.

L₃ : disaster situations arise from large scale disasters where districts and the state may not have the capacity to respond adequately and require assistance from the central government for reinstating the state and district machinery.

The objectives of the DM Plan have been put as :

- Promoting a culture of prevention and preparedness by ensuring that DM receives the highest priority at all levels.
- Ensuring that community is the most important stakeholder in the DM process.
- Encouraging mitigation measures based on state-of-the-art technology and environmental sustainability.
- Mainstreaming DM concerns into the developmental planning process.
- Putting in place a streamlined and institutional techno-legal framework for the creation of an enabling regulatory environment and a compliance regime.
- Developing contemporary forecasting and early warning systems backed by responsive and fail-safe communications and Information Technology (IT) support.

- *Promoting a productive partnership with the media to create awareness and contributing towards capacity development.*
- *Ensuring efficient response and relief with a caring approach towards the needs of the vulnerable sections of the society.*
- *undertaking reconstruction as an opportunity to build disaster resilient structures and habitat.*
- *Undertaking recovery to bring back the community to a better and safer level than the pre-disaster stage.*

The guiding principles for the preparation of State DM Plan have been stated as:

i) *Participatory Approach*

ii) *Community Based DM*

iii) *Themes Underpinning the Plan*

- *The vulnerability of different parts of the state to different kinds of disasters.*
- *The measures to be adopted for prevention and mitigation of disasters.*
- *The manner in which mitigation measures shall be integrated with development plans and projects.*
- *The capacity building and preparedness measures to be taken.*
- *The roles and responsibilities of each department of the government of the state in relation to the measures specified above.*
- *The roles and responsibilities of different departments of the government of the state in responding to any threatening disaster situation or disaster.*
- *The state plan will be reviewed and updated annually.*

The framework will comprise sections that deal with :

- *Operational.*
- *Administrative.*
- *Financial.*
- *Legal Aspects.*
- *Process*

The suggested outline consists of three part

Part I.

- *General*
- *Vulnerability Assessment & Risk Analysis*
- *Preventive measures*
- *Mainstreaming DM concerns into Development Plan/Programmes/Projects*
- *Preparedness measures*
- *Response*
- *Partnership with other stakeholders*
- *Financial Arrangements*

Part II. Disaster specific Action Plan

Part III. Cross cutting issues

1.6.2. The State and the Government Departments.

The State and the government departments have been presented as two entities—the State where disasters happen and the government departments as the ultimate stakeholders.

The State

The State has been depicted in terms of five factors:

- *Its geography*
- *Its history*
- *Its people*
- *Its material resources and*
- *Its environment*

The Govt. Depts.

Out of 44 Govt. Depts. in the State, 26 depts play major role in the disaster management have been included in the Plan. These departments are:

1. *Dept. of Disaster Management*
2. *Dept. of Home*

3. *Dept. of Water Resource*
4. *Dept. of Minor Water Resources*
5. *Dept. of Agriculture*
6. *Dept. of Food & Consumer Protection*
7. *Dept. of Panchayati Raj*
8. *Dept. of Health*
9. *Dept. of Education*
10. *Dept. of Labour Resources*
11. *Dept. of Public Health Engineering*
12. *Dept. of Transport*
13. *Dept. of Social Welfare/Backward Classes Welfare/SC & ST Welfare*
14. *Dept. of Building Construction*
15. *Dept. of Energy*
16. *Dept. of Environment & Forest*
17. *Dept. of Industries*
18. *Dept. of Animal Husbandry*
19. *Dept. of Finance*
20. *Dept. of Road Construction*
21. *Dept. of Rural Development*
22. *Dept. of Urban Development*
23. *Dept. of Cabinet Coordination (Civil Aviation)*
24. *Dept. of Rural Works*
25. *Dept. of Information and Public Relations*
26. *Dept. of Planning & Development*

1.6.3 Disaster Management Related Specialized Institutions/Authoritie & other Organizations:

In the framework of disaster management the specialized institutions created by the DM Act, 2005 at the State level and major stakeholders in the form of National level institutions, expert bodies and multi later / bilateral agencies and corporate bodies play key roles.

The Specialized Institutions/Authorities

The following specialized institutions created by the DM Act 2005 are:

- *National Disaster Management Authority(NDMA)*
- *National Executive Committee (NEC)*
- *State Disaster Management Authority (SDMA)*
- *State Executive Committee (SEC)*
- *District Disaster Management Authority (DDMA)*
- *National Institute of Disaster Management(NIDM)*
- *National Disaster Response Force(NDRF)*
- *State Disaster Response Force(SDRF)*

The State Government of Bihar has established a battalion of Bihar State Disaster Response Force (SDRF) on the pattern of NDRF. The State Government is also considering establishing an institution on the pattern of NIDM. The government has also planned to establish SEOC, DEOC etc with the state of the art facilities in a phased manner.

Other Organizations:

Some organizations/UN bodies that play major roles in managing disaster specifically during Response period are:

- UNDP*
- UNICEF*
- WHO*
- ACTION Aid*
- Oxfam*
- Save the Children*
- Bihar Inter Agency Group (BIAG) etc.*

1.6.4 The Primary Stakeholders & Panchayati Raj:

In the DM Act as well as in NDMA Guidelines due emphasis has been laid on community based DM Plan. The communities are the main stakeholders as they are the victims as well as the first respondent to any disaster. The focus on community participation has been maintained in the Plan.

Panchayati Raj being the prime local body in the rural areas having its linkages ranging from the district administration to the communities, is by its very

placement the first public respondent and main player in the implementation of all disaster management related initiatives

1.7 The Implementation of the Plan :

The authority for implementation of the State Disaster Management Plan vests with the respective line departments of the State Government with Department of Disaster Management being a nodal and coordinating department for this purpose. The SDMA would monitor the implementation.

The State Disaster Management Plan also includes an exercise in system engineering aimed not only at disaster risk reduction but also motivating people, the functionaries and the system with confidence in themselves and trust in one another. It is not only aimed at disaster risk reduction but also at developing in people a culture of preparedness and disaster resilience and building institutions so that developmental initiatives are freighted and not fettered with disaster risk reduction measures.

1.8 The Role of the State Govt. Depts. & the Prime disaster management agencies:

The formulation of the State Disaster Management Plan has been based on the following postulates:

- i) The perspective in which the Disaster Management Act, 2005 was formulated
- ii) The mould in which the State may have to cast itself to implement the plan, and
- iii) The designated and desirable role SDMA may have to play in bringing about the pre-requisites for the realization of the goal, the disaster resilient system and society.

As such, in the implementation of the plan the roles of the State government and the prime agencies for the disaster management, the State Disaster Management Authority and Disaster Management Department become crucial and require some elaborations which are as follows:

1.8.1. The Perspective of the Act:

In May 1994 at the World Conference of Natural Disaster Reduction convened by the UN at Yokohama, Japan, a tectonic shift took place which shook the very foundation of thinking about Disaster. It brought about a paradigm shift from disaster as a calamity calling for relief and rehabilitation to a catastrophe which not only destroyed lives and property *en masse* but also undid years of *socio economic* developmental gains and momentum. The Conference also brought home to the participating countries the economic rationale behind going beyond relief and

rehabilitation to disaster mitigation and preparedness and stressed that it made economic sense to work for prevention and mitigation of disaster and prepare people to live copingly with vulnerability. In fine, the shift in emphasis from post -disaster relief to pre-disaster risk reduction was a life and property saving as well as cost saving exercise.

Keeping the spirit of the Act intact, the eight forms of disaster specified in the State Policy in focus and the directions given in the Guidelines in view, this State Disaster Management Plan has been made inclusive of Lo, L₁, L₂ & L₃ level of disaster and has been based on the worst case scenario for each form of disaster.

1.8.2. The Role of the State:

The State Disaster Management Plan has been formulated by visualising the State in a particular mould (role) which normally varies from stage to stage in the socio-economic development process.

There are four stages in the socio-economic development of a society: formative, normative, developing and developed. Corresponding to each of

*In a Different Mould:
Doer; Provider;
Facilitator & Monitor*

the four stages the State has to cast itself in four different moulds. The mould corresponding to the formative stage is that of a *Doer*, to the normative stage, is that of a *Provider*; to the developing stage, is that of a *Facilitator* and to the developed stage, is that of a *Monitor*.

In formulating the State Disaster Management Plan, the State has been taken in all the four moulds: although, presently, it is perceived more in the mould of a Doer and a Provider, even when the state economy has moved from normative to the developing stage in the socio-economic development process.

In this regard, the 15th report of the Second Administrative Reforms Commission (SARC) on state and district administration in 2009 has made certain important recommendations which need to be looked into. It says that:-

- i. Disaster/Crisis management should continue to be the primary responsibility of the State Governments and the Union Government should play a supportive role.
- ii. The law should create a uniform structure at the apex level to handle all crises. Such a structure may be headed by the Prime Minister at the National level and the Chief Minister at the State level. At the administrative level, the structure is appropriately headed by the Cabinet Secretary and the Chief Secretary respectively.

- iii. The role of the local governments should be brought to the forefront for crisis/ disaster management.
- iv. The National Executive Committee as stipulated under the Disaster Management Act need not be constituted, and the National Crisis Management Committee (NCMC) should continue to be the apex coordination body. At the State level, the existing coordination mechanism under the Chief Secretary should continue.
- v. In larger cities (say, with population exceeding 2.5 million), the Mayor, assisted by the Commissioner of the Municipal Corporation and the Police Commissioner should be directly responsible for Crisis Management.
- vi. Empowering the Relief Commissioners/Disaster Management Departments to effectively discharge disaster related responsibilities.
- vii. The district emergency response plan should be prepared in consultation with all concerned. The plan should be known and accepted by all the role players. (This should be a part of the District Disaster Management Plan).
- viii. Effective coordination is essential at the district and sub-district levels for rescue/ relief operations and to ensure proper receipt and provision of relief. During rescue and relief operations, unity of command should be ensured with the Collector in total command.

1.8.3. The Role of SDMA:

The State Disaster Management Authority is the apex state level body for disaster management having power and functions ranging from formulation of State Policy to approval and monitoring the implementation of Plan, to review the measures being taken for mitigation, capacity building and preparedness.

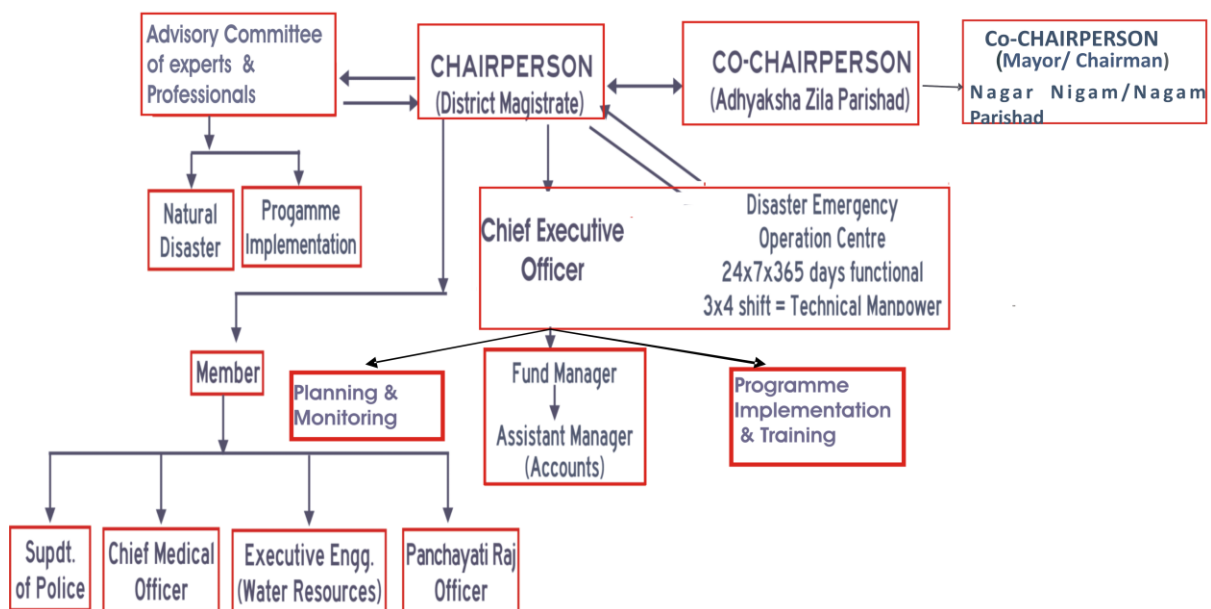
1.8.4. The Role of State Government (DMD):

The Disaster Management Department (DMD) is face of the State Government: it is responsible for all aspects of disaster management including prevention, mitigation, preparedness, capacity building, response and relief, and has been positioned as a *coordinating centre* for the implementation of the all programs of disaster management at the State and district level, for coordinating the efforts of all stakeholders during pre, during and post disaster days and for interacting with govt. departments and organizations, on the one hand, and with Corporate, Non Government Organizations (NGOs) and Media, on the other.

1.8.5. The Role of DDMA:

The District Disaster Management Authority shall be the implementing agency for all disaster management related programme and activities be it prevention, mitigation and preparedness related or disaster response, relief or post-disaster rehabilitation and reconstruction measures. During disaster response period the District Magistrate shall be the Incident Commander and shall have adequate power and authority to provide required support and services. Since, the DDMA is the authority which has been envisaged to be integrated; it has been suggested under the state plan that both planning & monitoring and programme implementation & training have to be manned by professionals & experts. The organizational structure of DDMA has been drawn as:

Organisational Structure of



District Disaster Management Authority (DDMA) *

- ❖ In order to make the DDMA structure more inclusive, it has been suggested that in addition to Adhyaksha Zila Parishad, Head of Urban Local Bodies also be made co-chairperson of the Authority.

2. The State of Bihar

The geography of a state, its history, its people, its natural resources and environment for growth & development pervading are the five elements that constitute the profile of a state, create its socio-economic complexion & condition its development.

The **geography** of a State provides it with its boundaries, its area consisting of land, water bodies, mountains and its climatic conditions to nurture and develop lives, living and livelihood. Its **history** consolidates the perspective and the inclinations for a state to perceive, act and behave. Its **people** provide a state with strength to converge and create. Its **natural resources** contain the potentialities and permutations to promote and produce. And the **environment for growth & development** gives a state the sensitivity and sustainability to grow, garner & generate.

2.1 The Geographical Complexion:

The state of Bihar is located in the eastern part of the country between 24°–20'–10" to 27°–31'–15" North latitude and 82°–19'–50" to 88°–17'–40" East longitude. It is an entirely land locked state and lies mid-way between the humid West Bengal in the east and sub-humid Uttar Pradesh in the West. It is bounded by Nepal in the North and Jharkhand in the South. It is divided into two unequal halves by the river Ganga which flows through the state from West to East.

Map: - Physical Map of Bihar



2.1.1 The Land:

The total area of the state is 94,163.00 Sq.km. out of which 92,251.49 Sq.km.(97.97%) are rural areas and 01,911.51 Sq.km. (2.03%) are urban areas.

The state is divided into three agro-ecological zones: first, North West Alluvial plains (Zone-I) consisting of 12 districts—West and East Champarans, Gopalganj, Sheohar, Sitamarhi, Madhubani, Darbhanga, Muzaffarpur, Siwan, Saran, Vaishali, Samastipur; second, the North-East Alluvial Plains (Zone-II) consisting of 9 districts—Begusaria, Khagaria, Saharsa, Madhepura, Supaul, Araria, Kishanganj, Purnia, Katihar, and third, the South Bihar Alluvial (Zone-III) consisting of 17 districts—Buxar, Bhojpur, Bhabhua, Rohtas, Aurangabad, Gaya, Jehanabad, Patna, Nalanda, Sheikpura, Nawada, Jamui, Banka, Lakhisarai, Munger, Bhagalpur and Banka

Out of the total geographical area of 94.163 lakh ha the land use is as given below:

Table: 2.1–Land Use:

Sl. No.	Category	Area (ha)
1.	Forest Land	6,76,400
2.	Land under misc trees, groves	2,11,709
3.	Current fallow	2,56,783
	other fallow	6,87,570
	cultivable waste	79,319
4.	Net area under cultivation	56,05,798
5.	Barren Land & permanent pasture	5,03,381
6.	Area under non-agriculture use	13,95,340
	Total	94,16,300

Source : Directorate of Statistics & Evaluation, GoB.

2.1.2 The Water bodies:

Bihar is a land-locked state demarcated by the river Ganges into north and south and further divided into regional blocks by rivers flowing down from the Himalayas and the Chhotanagpur Plateau to find repose in the Ganges. The Northern Gangetic plain of Bihar is the courtyard of rivers flowing from the Himalyas, like the Ghaghara, the Gandak the Burhi Gandak, the Bagmati, the Kamla, the Kosi and the Mahananda. And the Southern Gangetic plain is the backyard to the rivers that descend down the Chotangapur Plateau like the Karmansa, the Sone, the Punpun, the Phalgu, the Kiul and the Sakri. Altogether more than a dosen major rivers flow through the state dividing it in **seven "geo-cultural zones"**.

These seven geo-cultural zones correspond to what Ms. Manosi Lahiri in her book, "The Bihar Geographic Information System" called "Special Purpose Area" (SPA).

Map: - Seven River Zones:



- i) **Ghaghara-Gandak Zone** consisting of East and West Champarans, Gopalganj, Siwan and Saran District.
- ii) **Gandak-Bagmati zone** consisting of Sheohar, Sitamarhi, Muzaffarpur, Vaishali, Samastipur & Begusarai districts.
- iii) **Bagmati-Kosi Zone** consisting of Darbhanga, Madhubani Supaul, Saharsa & Khagaria districts
- iv) **Kosi-Mahananda Zone** consisting of Madhepura, Araria, Purnia, Kishanganj and Katihar districts.
- v) **Karmnasa—Sone Zone** consisting of Buxar, Kaimur, Bhojpur and Rohtas districts.
- vi) **Sone—Punpun Zone** consisting of Patna, Jehanabad, Arwal, Gaya, Nalanda, Aurangabad and Nawada districts and
- vii) **Punpun-Sakri zone** consisting of Sheikpura, Lakhisarai, Jamui, Banka, Munger and Bhagalpur districts.

These broadly divided river zones also roughly correspond to some specific cultural zones such as Bhojpur, Tirhut, Mithila, Magadh, Anga etc.

In the past, North Bihar were also known as a zone of ponds and South Bihar as a zone of tals and *ahar & pyne*s. These ponds, ahar and pyne were used to store water during rainy season and during scheduled overflowing of rivers and subsequently used for irrigation purpose during non-rainy days. It also helped, to a very large extent, in maintaining the water table in the area.

2.1.3 The Mountains:

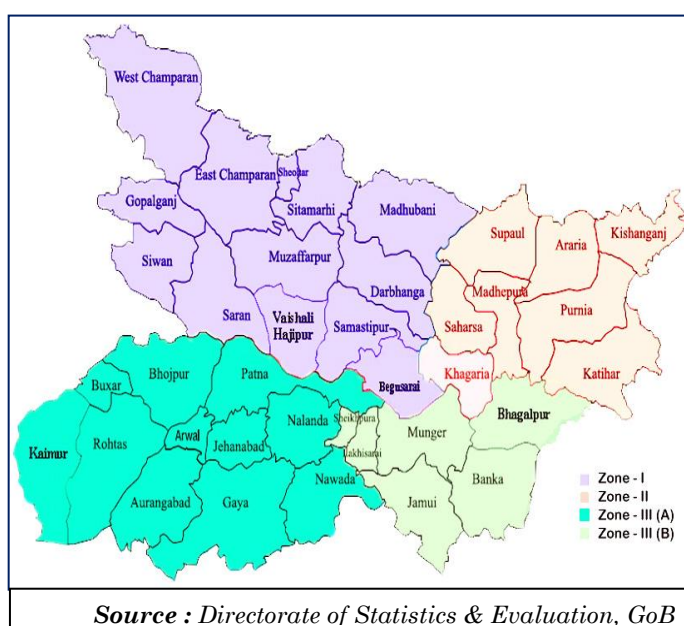
Although the area of the state consists largely of the Gangetic plains, it is dotted with historically/mythological famous hills : Rajgir hills in Nalanda known for the excurmises of Jarasandh of Mahabharat days; the Barabar & Kawakola hills of Gaya known for caves where Buddhist monks resided; Mandar hills of Bhagalpur known for its mythological use in the famous churning of ocean by Gods and demons and Makar hills of Rohtas known for ancient temples of Gods & Goddesses.

The Himalaya and the Chhotangapur hills are beyond the boundaries of the state but the rivers that descend down theses hills very much make or mar the socio-economic fortune of Bihar.

2.1.4. The Climate & Rainfall:

Map:- Climate

Bihar is situated at 173 feet 52.73 meter above sea level. It has a tropical climate with hot summers and cold winters. The summer temperature shoots upto 45°C and in winter drops even below 5°C. The hot summer months are from April to mid June and the cold winter months are between mid- November to mid- February. And in between lies the period of flood, fire and cyclonic winds.



Rainfall is largely due to South-West Monsoon in the State. It accounts for about 85 percent of the total rainfall. The average rainfall is around 1120 mm. Remaining 15 percent rainfall is from winter rain, hot weather rain and north-west monsoon.

The average rainfall of 1120 mm would have been sufficient for carrying out normal agricultural activities in the state. But the year to year variations cause problems and bring about floods/droughts resulting in grim variations in income of farmers from agriculture. This is more so because more than 50% of the cultivated land are still dependent on rain or some conventional modes of irrigation which also somehow fail during low rainfall years.

Table: 2.2– Annual Rainfall for Different Seasons

Year	Winter Rain	Summer Rain	South-west Monsoon	North-west Monsoon	Total (Rainfall in mm)
2000	0.40	101.70	994.10	10.00	1106.20
2001	20.90	86.70	908.20	192.20	1208.00
2002	48.90	66.80	896.90	33.20	1045.80
2003	19.20	93.00	767.60	128.90	1008.70
2004	23.70	41.40	906.10	60.10	1031.30
2005	0.10	89.50	777.60	30.20	897.40
2006	0.10	88.97	925.86	27.77	1042.69
2007	28.34	76.40	1360.85	40.49	1506.08
2008	30.61	61.78	1084.27	19.31	1195.97
2009	0.09	98.22	699.17	71.13	868.61
Average	17.23	80.45	932.06	61.33	1091.08

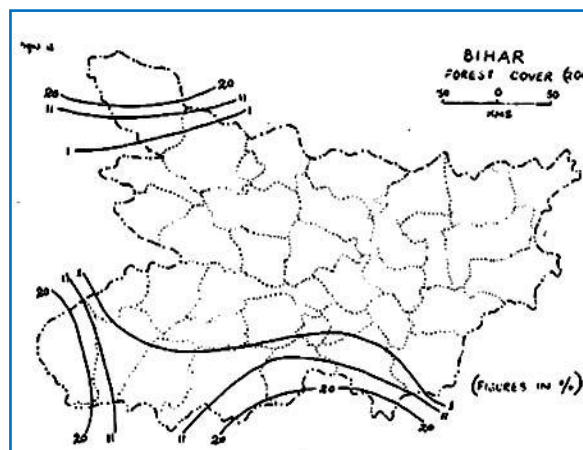
Source: Directorate of Statistics & Evaluation, GoB.

During the period beginning with 2000 to 2009 the annual rainfall has varied between 897 mms in 2005 (82.2 percent of the average rainfall) to 1506 mm in 2007 (138 percent of the average rainfall). In 2005, the rainfall from the south west monsoon, the major source of rainfall in the state, was 16.5 percent less than the average. On the contrary, in 2007 the rainfall from south western monsoon was 45.9 percent more than the average.

2.1.5. The Forest:

Bihar has 6.87 percent of its area clothed with forest and woodlands. It is the last remnants of the dense extensive Sal forests occupying the Supaul, Purnia, Araria, Kishanganj and West Champaran and Jamui, Nalanda, Gaya, Aurangabad

Map: - Forest Cover in the State



Source : *Environment & Forest Dept , GoB.*

and Rohtas in the Southern part. This natural vegetation of Bihar plains, outside the cultivated areas is of a savannah or parkland type. It is characterized mostly by extensive meadows and grasslands punctuated by trees.

Table : 2.3 Bihar Forests - At a Glance:

SL	Description	Area (in km ²)	%age
1	Geographical Area	94,163	100
2	Forest Area	6,473	6.87
3	Very Dense Forest	76	0.08
4	Dense Forest	2,951	3.13
5	Open Forest	2,531	2.69

Source : Environment & Forest Dept , GoB.

Out of 6.87%, 0.08% is very dense forest, 3.13% dense forest and 2.69% open forest. Vigorous effects are being put in to increase the forest area to 15% of the total area of the State.

2.2 The Historical Perspective:

Historically, Bihar dates back to the days of Mahabharat and shown as directly instrumental in the building of Dwarka: if Jarasandh the mighty king of Magadh, would not have scorched with repeated attacks the people of Mathura, they would not have built Dwarka to resettle themselves away from the reach of Jarasandh. And if Karna, the King of Ang would not have stood by Duryodhana there would have been no Mahabharata.

Because of the historically proven rules that the state has played in the growth & development of the sub-continent — from the crucial battle fought between a monarchy and a republic when Ajatshatru waged war on Licchivies to the

battle of Buxar in the year 1764 between Mir Kasim and the British—Bihar holds the distinction of being the cradle of both the people-centred power (Republic) and power centred people (monarchy). It has been the seat of conquerors of battle where blood flowed like water (Kalinga War), the builders of great empire and mighty armies (Chandragupta Maurya), of grand infrastructure and superb system (Shershah Suri), of movers of faith beyond the material boundaries and shakers of mind within the territories of faith (Lord Buddha, Lord Mahavir and Guru Govind Singh).

In the midst of these 'firsts' and the greatest in the world the contributions of the only system-engineer king of the world, the one and only Shershah Suri of Bihar stand apart. He founded not only the modern city of Patna with hope that it "would become one of the greatest towns of the country", but also, during his five years of rule (1540-1545), gave systems on which the edifice of modern governance :

- i) Infrastructure as an instrument of development as well as control: the Grand Trunk Road.
- ii) Revenue based administrative system which later on Raja Todar Mal, also from Bihar, improved for Akbar and Lord Cornwallis further improved for the British.
- iii) The system of Annual Budget based expenditure and taxation noted by Shri P. Chidambaram as the Union Finance Minister in his Budget Speech.

These events, world renowned figures and path breaking initiatives *clearly indicate that the future of the State of Bihar lies in innovating, improvising and leading by setting examples.*

2.3 The People :

The people of Bihar have witnessed more extension or narrowing of boundaries, more aggression and internal dissensions than people of any other state in the country. But all these happened at the circumference. Even after the battle of Buxar in 1764 when the Diwani of Bengal, Bihar and Orissa went in the hands of East India Company, till the year when Lord Cornwallis proclaimed the permanent settlement, the centres of life of common people in Bihar remained similar: traditional, caste based, agri-oriented, community linked and vocation bound. But after 1793, when the whole presidency got divided into settlement and non-settlement areas, the very centre of life got shaken. Consequently, from 1850 till 1947, people of the region remained merged and mired in movements, repressions,

exploitations, protests and rallies, sometimes in the interest of the nation and sometimes for their own individual identity. **They did not and could not find time to get socially settled in order** to work for their own economic betterment. And, after 1947 till date, how people of Bihar have suffered at the hands of the policy makers at the Centre is so well known that to restate them would be an unpleasant repetition.

With the dwindling of vocation based and community-linked life on the one hand and continued neglect by the policy makers at the Centre, on the other, people of Bihar menacingly clung to caste base as they found in it a ready-made, easy instrument to do permutations and combinations to be in a position to socially and politically dictate. As a result, the social capital and moral economy, that are woof and warp of all economic structure, whether of an ant or elephant size, got eroded and compromised. The very edifice on which growth and development could be built was made an altar to offer scarifices for personal or caste gains. As a result the people of Bihar, in spite of having physical and mental attributes that more than match the best of people of the most advanced regions, remained sulking in the dwarfing environment within the state and imposing environment outside.

Living through these trying conditions, people of Bihar, over the years, on the one hand, have developed a double edged personality- native and migrant. As a native, they look upon hard work as a painful necessity. And as migrant, they work harder than others to justify themselves which either opens them up to all sorts of exploitations or blossoms their dormant virtues to achieve in the face of all odds.

On the other hand, around two and a half decade of their living and being yoked together by feudalism, has made the people of Bihar excessively dependent on the system. They have developed a fascination for getting cattered even for petty needs. In the process, they as individuals have become lethargic, passive and isolated as social beings, highly compromising and tolerant to the extent of being unresponsive and as economic being unenterprising, unambitions and idle. They remain merged and mired in caste and creed and refuge to grow as citizens.

2.3.1 Demography :

Another dimension which, after independence has started having a bearing on the people of the state is its demography. Over the years after independence its geographical area has shrunk from 1,74,083 sq.kms to

94,163.00 Sq.kms in 2000. And population has increased from 829.99 lakh in 2001 to 1038.05 lakh in 2011.

Table : 2.4– Decadal Growth of Population in Bihar

Sl. No.		2001	2011	Percentage decadal group
1.	Population	8,29,98,509	10,38,04,637	25.07
2.	Male		5,41,85,347	Sex-ratio 933
3.	Female		4,96,19,290	
4.	Child Population (0-6yrs.)	1,68,06,063	1,85,82,229	
	– Male Child	86,52,705	96,15,280	
	– Female Child	81,53,358	89,66,949	
5.	Population aged (7yrs & above)	8,52,22,408		
	– Male Child	4,45,70,067		
	– Female Child	4,06,52,34		
6.	Literacy		5,43,90,254	36.82%
	– Male		3,27,11,975	73.39%
	– Female		2,16,78,279	53.33%
7.	Density	880 per Sq. Km.	1102 per Sq. Km.	

Source: Census 2011

2.3.2 Health :

The health scenario in the State of Bihar remained dismal till the other day. It suffered from the classical health problems related to underdevelopment and social deprivation, namely, nutritional deficiencies and communicable diseases. It required, therefore, social development approach addressing the needs for maternal care, child health, contraceptive services, education of girls, ensuring a minimum age of marriage of girls, reducing infant mortality and MMR through better health care and immunization, nutrition support to women and children.

Bihar has shown signs of improvement in vaccination coverage, institutional deliveries and infant mortality and child health indicators. According to SRS 2011, the Infant Mortality Rate (IMR) has dropped from 56 in 2008 to 52 in 2009. The corresponding all India figure for the same period is 53 & 50 respectively. Similarly, the crude birth rate fell from 28.9 in 2008 to 28.5 in 2009. All India figure is 22.8 & 22.5 respectively. The crude death rate fell from 7.3 in 2008 to 7.0 in 2009. The corresponding all India figure is 7.4 & 7.3 respectively.

Table: 2.5– Health Indicators in Bihar:

Indicators	DLHS III (2007-08)		
	Total	Rural	Urban
Antenatal Care			
Mother who received any antenatal check-up (%)	59.3	58.5	70.8
Mother who had antenatal check-up in first trimester (%)	24.2	22.9	40.7
Mothers who has three or more ANC (%)	26.4	25.4	39.8
Mothers who has full antenatal check-up (%)	4.6	4	11.7
Reproductive Health			
Institutional delivery (%)	27.7	25.6	54.3
Delivery at home (%)	71.5	73.5	45.3
Safe Delivery (%)	31.9	29.7	59.9
Mothers who received post-natal care within two weeks of delivery (%)	26.2	24.9	42.6
Mothers who received financial assistance for delivery under JSY (%)	9.7	9.4	14.1
Child Immunization			
Children 12-13 months fully immunized (%)	41.4	41.4	41.2
Children 12-23 months not received any vaccination (%)	1.6	1.5	2.7
Children 12-23 months who have received BCG vaccine (%)	81.5	81.6	80.4
Children 12-23 months who have received 3 doses of DPT vaccine (%)	54.4	54.5	53.8
Children 12-23 months who have received 3 doses of polio vaccine (%)	53.1	53	54
Children 12-23 months who have received measles vaccine (%)	54.2	54.1	55.8

Source : Economic Survey 2010-11

2.3.2.1 Burden of Diseases:

The burden of fatal diseases that the people in Bihar specifically marginalized section, have to suffer are largely five : Kalazar, Malaria, Japanese encephalitis, TB & HIV. The first three ones are largely due to unhygienic conditions in which they live and the later two because of malnutrition and migration. Out of 38 large parts of 30 districts suffer from Kalazar, 7 from Malaria, 5 from Japanese encephalitis, 13 from TB & 28 from HIV.

Table : 2.6–Major Diseases in Bihar

Sl. No	District	Kalazar	Malaria	Japanese encephalitis	TB	HIV prevalence in the district
1	Araria					
2	Arwal	Y			Y	
3	Aurangabad		Y	Y		Y
4	Banka	Y				Y
5	Begusarai	Y			Y	Y
6	Bhagalpur	Y			Y	Y
7	Bhojpur	Y				Y
8	Buxar	Y				Y
9	Darbhanga	Y				Y
10	East Champaran	Y				Y
11	Gaya		Y	Y		Y
12	Gopalganj	Y			Y	Y
13	Jamui		Y		Y	Y
14	Jehanabad	Y			Y	Y
15	Kaimur (Bhabua)		Y			
16	Katihar	Y				Y

17	Khagaria	Y				
18	Kishanganj	Y				
19	Lakhisarai	Y				Y
20	Madhepura	Y				Y
21	Madhubani	Y			Y	
22	Munger		Y		Y	
23	Muzaffarpur	Y		Y		Y
24	Nalanda					Y
25	Nawada	Y	Y			Y
26	Patna	Y				Y
27	Purnia	Y			Y	Y
28	Rohtas		Y			Y
29	Samastipur	Y			Y	Y
30	Saran	Y				
31	Sheikhpura	Y				
32	Saharsa	Y				Y
33	Sheohar	Y				
34	Sitamarhi	Y			Y	Y
35	Siwan	Y		Y	Y	Y
36	Supaul	Y				Y
37	Vaishali	Y				Y
38	West Champaran	Y		Y	Y	Y

Source: NICD, Delhi, State of Health in Bihar & DMD, GoB.

Human Development Index (HDI) is a composite index representing three dimensions of human development namely, economic, health and education. The combined HDI of Bihar is 0.367 as compared to 0.472 for India. It ranks 15th in the country. In marginalized groups it is around 0.201 ranking lowest. The above sums up the stature of the people of Bihar as one of the constituents of the profile of the state.

2.4 The Natural Resources :

There are two categories of natural resources: the natural resources of the surface and the natural resources of the deep. The natural resource of the surface consists of human, land, livestock, forest, some minerals and water. The natural resources of the deep consists of minerals, metals, petroleum, gas etc. Each category of natural resources impose its own kind of preconditions upon any attempt at harvesting growth and development out of it.

The natural resources of Bihar consists of highly fertile land, abundant water resources-both surface and ground, limestone, silica sand and livestock. These are all natural resources of the surface.

These resources of the surface get adversely affected by disasters, specifically flood, which ravage the fertile land and neutralize the precious efforts put in by farmers. The extent of this damage can be envisaged by the

fact that out of 94.16 lakh ha of geographical area 68.80 lakh ha is flood prone.

2.4.1 The Land Resource:

Bihar falls in the riverine plain of the Ganga basin area. Because of this topographic nature, land put to agriculture use here is high as compared to other states.

The area under non-agricultural use has remained at 17.6 percent of the total geographical area. The net sown area is at 60.5 percent. Cropping intensity has been 1.37 which implies an additional 368 thousand hectares under cultivation.

However, the land use pattern is not uniform all over the State. Due to different agro-climatic conditions there is substantial district wise variation in the land use pattern. From the point of net sown area, in 9 out of 38 districts more than 70 percent of the land area is under cultivation. The district where irrigation facilities are minimal, the cropping intensity remains low.

2.4.1.1 Production & Productivity:

Fertility of soil, along with endowment of abundant ground water resources enable the farmers in the state to produce a variety of crops. Apart from cereals and pulses, Bihar also produces oilseeds, fibers, fruits and vegetables. Of late, the farmers have also taken to floriculture in view of the growing market both within and outside the State.

Presently, Bihar produces 50.6 lakh tones of rice, 45.1 lakh tones of wheat, 17.8 lakh tones of maize and 1.43 lakh tones of oilseeds and 47.8 lakh tones of sugarcane. Despite one of the worst drought in 2009, the total food grains production was around 105.00 lakh tones which underlines the high degree of resilience of agriculture in the State.

Apart from major cereal and pulses, the state also produces a number of vegetable crops important once of them are : potato 50.34 lakh tones, cauliflower 10.44 lakh, tomato and brinjal 11.86 lakh tones. The total area under vegetable cultivation in Bihar is 8.27 lakh hectares (2007-2008) which is approximately 10.6 percent of the gross sown area of the state.

Beside the major food-grains and vegetables, the third important component of agriculture productions in Bihar is the cultivation of fruits. The total area under fruits production was 2.9 lakh hectares (2008-09) which is approximately 5% of the net cultivated area. The production level of major fruit crops are 13.30 lakh tones of mango, 2.29 lakh tones of guava, 2.17 lakh tones of litchi 13.74 lakh tones of banana. The total area & production of fruit in Bihar in the year 2009-2010 was 290.71 thousand hectare area and production 3727.82 thousand tones.

Apart from these, sericulture and Jute are the products base on which a host of labour intensive value addition enterprises did well in the past and with the help of technologies can do in future.

2.4.1.2 The Land Holding Pattern:

The land holding pattern in Bihar is highly fragmented and its derivations having complex social overtones. 43.08% of area has 84.14% of land holdings which is less than a hectare. 19.21% of area is held by 9.23% which means up to 2 hectare, 22.88% of area by 5.12% which means up to 4 hectare 12.76% of area by 1.42% which means up to 10 hectare & 2.07% of area by 0.08% which means above 10 hectare.

The derivations of this pattern –lager the chunk lesser the no. of holding is disastrous of a state where 90% of the population live in rural area and depend, directly or indirectly, upon agriculture . This has created social imbalances and given rise to caste dominance on the one hand, and created a huge marginalized section and the grievous instance of poverty, on the other.

Table: 2.7–Land Holding Pattern :

Sl. No.	Size Class (ha)	Percentage of No. of holdings	Percent area of operational holding	Average area per holding
1.	Marginal (<1 ha)	84.14	43.08	0.31
2.	Small (1-2 ha)	9.23	19.21	1.24
3.	Semi-medium (2.4 ha)	5.12	22.88	2.67
4.	Medium (4-10 ha)	1.42	12.76	5.36
5.	Large (> 10 ha)	0.08	2.07	15.67

Source : Economic Survey: (2011-12)¹

2.4.2. The Water Resources:

The Water Resources of Bihar consist of over a dozen of large & medium rivers, sufficient average annual rainfall and ample ground water.

¹ Production figures taken from Economic Survey Report 2010-11

Availability wise these water resources are more than sufficient to harvest 'gold' from the rich fertile land of Bihar. But due to traditional harvesting practices and management of water resource the picture of agriculture in Bihar has not brightened to its full potential .

2.4.2.1 Irrigation potential and facilities in Bihar:

Optimum use of water resources is the key to enhancement of irrigation efficiency in an agrarian economy like Bihar. To maximize agriculture production and to free agriculture from the vagaries of monsoon, irrigation facilities are required to be created. Presently the irrigation facilities available in Bihar in the year 2009-10 was :

Table : 2.8–Different Irrigation Sources:

Sl. No.	Sources of Irrigation	Gross Irrigated Area (Lakh ha)	Net Irrigated Area (Lakh ha)
1.	Canal	10.63	7.98
2.	Tank	1.17	0.89
3.	Tubewell	28.87	20.53
4.	Wells	0.07	0.06
5.	Other Sources	1.23	0.87
	Total	41.97	30.33

Source : Economic Survey (2010-11)

2.4.2.2 Surface Water Scenario :

There are broadly four canal commands in Bihar (i) Sone Command (ii) Gandak Command (iii) Kosi Command (iv) Kiul-Badua-Chandan Command and ten Chief Engineer Zones (CEZ) to supply surface water to 16,42,779 ha area in various districts of Bihar

- i) The canal system under Sone command irrigates about 7,78,040 ha area spread over 12 districts.
- ii) The canal system under Gandak command irrigates about 4,01,966 ha area spread over 7 districts.
- iii) The canal system under Kosi command irrigates about 2,15,060 ha area spread over 6 districts, and
- iv) The canal system under Kiul-Badua-Chandan command irrigates about 2,04,779 ha area spread over 7 districts.

2.4.2.3 The Ground Water Scenario :

In entire Bihar the percentage of ground water development is 39.27% only. The net ground water availability in entire Bihar is 11,770,6196 ha/m. And the net groundwater availability for future irrigation for entire Bihar is 15,88,696 ha/m.

The above mentioned information put together tend to reveal that rainfall deficit and less and late release of water from canals result in drought like situations. However, it is possible and comparatively less strenuous to mitigate drought like situations with sufficient ground water resource to meet crop water demand and with appropriate land and water management strategies as well as judicious, efficient and equitable use of land water resources.

Thus, the two major natural resources—land and water—instead of strengthening, prey upon each other leaving the farmers waiting for relief and rehabilitation. From 2000 to 2009 a total of 4.34 lakh hectares cropped area and on an average 4.34 lakh hectare of cropped area per year got affected by flood bringing about a total value loss of 7835902.82 lakh of rupee, that is on an average, of Rs. 783590.25 lakh per year.

Apart from flood, drought, arising out of scanty rainfall, hits the resource base of the state. It may seem strange but in the heartland of rivers flowing down from the Himalayas and the Chhotanagpur Plateau, drought has affected all the 38 districts of the state due to 20% to 42% deficit in rainfall in consecutive year 2009 & 2010 leading to the shortfall in crop coverage more than 60 percent over the entire state.

Thus, the major natural resource base of the state, inspite of being the best of its kind is more a source of loss of life and property than a resource for socio-economic growth and development.

2.5 The Environment for Growth & Development :

The environment in a state consists of all those factors that have a bearing on the socio-economic development of the state. It has two aspects, internal & external.

The internal aspects consist of factor such as socio-economic complexion, infrastructure, administrative setup, govt. policies and local bodies etc.

The external aspects consist of factors such as central govt. policies, state in relation to the centre, corporate sector, geographical location etc.

2.5.1 Internal Aspect : *Socio-Economic Complexion*

After Independence—during 1952-'53 to 1964-'63—Bihar had a moderate rate of agriculture production of 2.97% per annum. But this rate was better than many other states like Andhra Pradesh, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Uttar Pradesh and West Bengal most of which are now taken as developing states. During the same period, the rate of food-grains production in Bihar was 3.05 percent which was higher than

the national average which was 2.05%. But due to exploitative agrarian structure, poor irrigation and water management, inadequate credit and extension service and lack of growth oriented culture in people and development oriented leadership in politics, the state of Bihar could not sustain the growth. During the period 1969-'70 to 1983-'84, the agriculture production tumbled down to 0.42% and food-grain production to (–) 0.3%.

Of late, however, the wheel has taken full circle. With the emergence of forward looking and enlightened political leadership, the growth and development in the primary sector giving impetus to the growth in the secondary sector, has taken the centre-stage. The firm indicator of these development is the creation of infrastructure and building of conducive environment through policies and promotional initiatives in the state.

2.5.2 Infrastructure:

Infrastructure is one of the key movers of socio-economic development. Physical infrastructure drives the economic growth and social infrastructure impacts human resource development. Physical infrastructure consists of power, irrigation, telecommunication, aviation and road connectivity. Social infrastructure consists of schools, hospitals, sports and recreation facilities.

2.5.2.1 Physical Infrastructure: *Power*

The power position in Bihar is depicted by the hard fact that no new generation unit has come up in the state in the last 25 years. Power being a key component in the industrial development of any region, the economic backwardness of Bihar can safely be laid at the doorstep of power shortage.

With the bifurcation of Bihar in the year 2000 major power generating units went to Jharkhand, leaving only dilapidated thermal power generating units to Bihar. As a result, the state is lagging far behind other states in terms of power availability and is forced to purchase 90 percent of its power requirements from central utilities. In the beginning of 2010, Bihar State Electricity Board had around 3 million consumers consuming 5325 gigawatt hours (GWH) of which 33 percent were to domestic, 27 percent to industrial and 15 percent to irrigation consumers.

The per capita power consumption in the state is around 122.11 KWH units as against all India average of 778.71 KWH. The total installed capacity including hydel is about 600 mw against the peak demand of 3000 mw. The deficit which was around 15 percent in 2006-2007 has increased to around 45% in 2010-11 not because the availability has gone down but because the peak demand has increased two and a half time.

Table : 2.9– Power Availability & Supply Position (MW):

Year	Peak Demand	Peak Availability	Deficit	Percentage
2006-07	1399	1162	198	15.1
2007-08	1800	1244	556	30.88
2008-09	1900	1348	552	29.05
2009-10	2500	1508	99.2	39.68
2010-11	3000	1664	1336	44.53

Source: Bihar State Electricity Board

Given this trend of increasing deficit in power supply, the Central Electricity Authority has anticipated nearly 65% deficit in peak demand on 2012 in the state.

2.5.2:2 Physical Infrastructures: *Irrigation*

Around 90% percent of Bihar population lives in rural areas which is much higher than the national average of 72 percent. Obviously, that much percent of Bihar population depends mainly on agriculture which in turn depends on rain and irrigation facilities for its productivity.

The annual rainfall of around 1120 mm in Bihar is more than sufficient for Kharif crops like paddy and maize. But it being erratic and seasonal in character, the availability of irrigation facility becomes a dire necessity for the economic development of Bihar.

Out of 53.53 lakh hectares of the ultimate irrigation potential of the state, an irrigation potential of 28.80 lakh hectares have been created through major & medium irrigation schemes. The remaining 24.73 lakh ha slated to be developed by 2015.

The minor irrigation, which includes surface and ground water facilities such as minor canal, Tanks, Ponds, Ahars & Pynes, Tubewells lift irrigation etc. covers around 32.50 lakh hectares.

The State has planned to renovate and modernize 21,000 Ahars and Pynes in 17 district of South Bihar and is also going to initiate a new scheme viz. Mukhymantri Ahar Pyne Irrigation Scheme to renovate the old Ahar and Pyne system of irrigation in the State.²

Apart from these, in the light of the National Water Policy 2002, the state government proposes to work for interlinking of state rivers and tapping of ground water resources, on the one hand, and promote the participatory

² — Based on Economic Survey Report 2010-11

irrigation management programme to have the participation and ownership of the beneficiary farmers both in maintenance of the system and distribution of water.

2.5.2.3 Physical Infrastructure: *Communication*

Communication facilities characterize the socio-economic growth and development of a State. Their convergence denotes freedom and their coverage indicates development. Half of the battle for socio-economic growth and development is fought and won through communication. In this regard Bihar has taken giant step forward in the last five years beginning with 2005-2006 during which it registered around 10 fold increase (from 42 lakh in 2005-06 to 415 lakh in 2010-11) in respect of verbal connectivity. This has been achieved mainly due to phenomenal increases in mobile connections, which registered a growth of more than 17 times during the period.

Table: 2.10– Number of Tele Connections (in Lakh)

S.N.	Connection	05-06	06-07	07-08	08-09	09-10	10-11 up to Oct.10
1.	Landline Connection	17.38	9.86	9.73	9.63	9.61	9.62
2.	Mobile Connection	23.55	46.92	81.94	151.78	283.41	402.60
3.	WLL Connection	1.3	1.53	1.88	2.38	2.82	2.81
4.	Gross Total	42.23	58.31	93.55	163.79	295.84	415.03
5.	Annual Growth %		38.08%	60.44%	75.08%	80.62%	40.29%

Source : Economic Survey 2010-11

In spite of the tremendous growth in telecommunication in the state, the tele density, (Number of telephone per 100 persons) which is an important indicator of telecom penetration in a region, Bihar is still far behind other states in the country. Besides, there exists a yawning gap between the rural and urban tele density which is around 139 as compared to paltry 16 in rural areas out of which 8% of the connections have been provided by private players in the rural areas.

Table: 2.11– Tele Density in Bihar:

S.N	Category	Rural	Urban	Total
1	Service Area wise	16.16	139.44	32.94
2	Wireless Tele density	15.17	134.37	31.86
3	Wire line Tele density	0.44	50.7	1.07

Source : Economic Survey 2010-11

In furtherance of Information Technology in rural areas, however, public sector organization, BSNL has played a pivotal role. The contributions of BSNL helped the State in creating most of the communication based facilities in rural areas.

2.5.2.4 Postal Services:

Communication can be verbal or written. In the area of written communication Post Offices have been playing a key role for the last 150 years and have become an integral part of community life. Indian Post has a network of 1.55 lakh post officers of which 1.39 lakh is in rural areas and constitutes the largest network in the world.

Table: 2.12– Postal Facilities in Bihar

S. N.	Postal Facilities	March 2010		
		Urban	Rural	Total
1.	Post Office	433	8623	9056
2.	Departments Post Offices	398	645	1043
3.	Extra Dept. Post Offices	35	7978	8013
4.	Permanent PO	411	8528	8939
5.	Temporary PO	22	95	117
6.	Night PO	6	0	6
7.	Letter Boxes	2831	22129	24960
8.	Post Boxes	904	0	904

Source : Economic Survey 2010-11

In order to utilize this vast network, 91.2% of which is located in rural areas, convergence of a host of service driven by information technology is required and is being worked out.

2.5.2.5 Roads & Bridges :

Good quality roads and bridges are not only denotive of socio-economic development but also of the aspirations of the people. In this respect Bihar has been at the lowest rung of development. It has, for every one lakh populations, road density of only 126.13 kms. as against 322.77 kms. at all India level. Similarly, for every 100 sq kms. of area there were 129 kms. of roads for the country, whereas it was only 111.17 kms. for Bihar.

Table: 2.13– Length of Roads in Bihar

SN.	Category	Pucca Roads	Kutchu Roads	Total (Road Length in km)
1	National Highway (NH)	3734.38	—	3734.38
2.	State Highway (SH)	3989.00	—	3989.00
3.	Major District Roads (MDR)	8966.04	—	8966.04
4.	Other District Roads	20190.00	—	20190.00
5.	Rural Roads	21348.00	46461.00	67810.00
	Total	58227.00	46461.00	104689.00

Source : Dept. of Road Construction, GoB(2010-11)

About half of the villages in Bihar lack all weather road connectivity. However, as a result of the speedy implementation of road construction works in the state, out of the total road length of 104689.00 kms. around 74 percent were “link routes” which were largely (86%) unpaved. The National Highways (NH) and State Highways (SH) constituted around 5

percent each of the total road length in the state. The state government has assigned the task of construction of rural roads to department of Rural works and this will certainly improve the road connectivity.

Table: 2.14– Average Length of Roads

	Average length km per lakh population		Average km per 100 sq.km	
	Bihar	India	Bihar	India
Total Road	126.13	322.77	111.17	129.00

Source : Economic Survey 2010-11

The adequacy and quality of road having increased in a very short period of five years has resulted in four fold increase in vehicles from 80,000 in 2005-06 to 3.19 Lakh in 2009-10.

2.5.2.6 Airways:

Civil aviation is indicative of, on the one hand, economic affluence and, on the other, the level of industrial and commercial activities taking place in the state. With 16 number of domestics flights per day, the position of Bihar airways connectivity is not at all impressive. However, another airport at Gaya, about 110 km. from Patna, is also operational and proving boon for pilgrims from Buddhist countries.

2.5.3. Social Infrastructure:

In human resource development social infrastructure holds the key. The advancement of literacy and education, the proximity of health services, the creation of water and sanitation facilities, the availability of employment/self-employment opportunities and the support of social welfare measures together provide a bedrock on which the edifice of human resource is built. In Bihar that bedrock is still in its formative stage.

It has been so because of the inappropriate linkages between the regional and social development. Economically better off regions have better social infrastructure and low-income areas have poor social infrastructure.

Somehow, this lopsidedness has to be corrected in order to achieve social betterment with economic improvements. The Per Capita Development Expenditure (PCDE) is not only required to be increased but is also required to be proportionately given larger allocations in socially less developed regions.

2.5.3.1 Literacy & Education:

Literacy- As per Census 2011 , with the overall literacy rate of 63.82% (Male 73.89%—Female 53.33%) Bihar still lags behind all India average of 74.04 % (Male 82.14%- Female 65.46%) by over 10 percent and has larger literacy disparity between gender; 20.06% against all India average gap of only 16.68%. *It is significant to observe that the highest level of gender gaps in literacy are concentrated in low-income districts.*

In 2001, the difference between the highest (Patna 62.9%) and the lowest (Kishanganj 31.1%) was as high as 31.8%. But in 2011, this difference got reduced to 23.1% with Rohtas (75.6%) recording the highest and Purnia (52.5%) recording the lowest literacy rate.

- ❖ Districts with overall high literacy rates are also generally the district with high rates of literacy among marginalized groups.
- ❖ Average gender gap in literacy is significantly lower among minorities across all districts compared to other social groups.

Education- The total coverage of primary and upper primary schools together for every ten thousand of population in Bihar has increased from 6.05 to 6.98. The number of senior secondary schools has also increased. But overall coverage of secondary education remained unchanged at 0.41 for every ten thousand of population between 2002 and 2009. The national average for each of these categories in 2002 were 6.33 (Primary), 2.38 (Upper Primary), 0.88 (secondary) and 0.42 (Senior secondary)³

The coverage of secondary and senior secondary level education through schools and colleges is far less and show longer inter district variations.

Table : 2.15– Availability of schools in relations to population:

Indicator	2002	2009
1) No. of Primary & Upper Primary Schools /10,000 population	6.05	6.98
a) No. of Primary Schools/10,000 population	4.88	4.68
b) No. of Upper Primary Schools/ 10,000 population	1.17	2.29
2) No. of Secondary & Senior Secondary Schools/ 10,000 population	0.41	.41
a) No. of Secondary Schools/10,000 population	0.37	0.28
b) No. of Senior Secondary Schools/ 10,000 population	0.04	0.13

Note : Calculation Based on data from 7th and 8th All India School Education Survey, NCERT; Department of Human Resource Development, GoB; Census of India 2001; Deptt. of Planning and Development, GoB.

³ Based on Economic Survey Report 2010-11

The number of students enrolled in primary and upper primary schools in Bihar has annually grown very significantly—all students (19.63%), SC (23.24%) and ST (27.87%).

The overall enrolment in the period at the primary level of all boys has increased at an annual growth rate of 7.67%, for SC boys, the growth rate is 5.7%, and for ST boys, it is 12.76%. For girls enrolment has grown for all girls at 6.92%, SC girls (8.4%) and ST girls (15.37% at the primary level.

The overall enrolment at the upper primary level for all boys increased at an annual growth rate of 20.47% SC at 24.05% and ST at 27.20%. For girls enrolment in Upper Primary has grown at 26.64%, for SC girls at 31.73% and ST girls at 33.46%.

Higher Education – In the realm of higher education Bihar did not have sufficient institutional and sufficient human resource base to hold the aspiring and intellectually brighter students within its fold. However, during last five years, the state initiatives in setting-up new institutions and in 'retrofitting' the old ones, have started showing some positive results.

In the past few years the scope for quality higher education has increased with institutions like NIT, BIT centre, Medical, Law, Management, Hospitality and Fashion opening in the state capital and nearby districts. All the technical colleges have already been placed under Aryabhatta Knowledge University for better management. Similarly the upcoming Nalanda International University is bound to create educational environment in the state. A central university and three government medical colleges are in process of being setup.

As against 11 universities in 2001, Bihar now has 13 universities. The enrolment of students has increased by 35% in technical institutions. In case of female students, the enrolment in Science/Computers and Arts segments have increased by 42.55.

Table: 2.16 – Facilities for Higher Education

Sl.No	Institutions	Nos.
1	Universities	13
2	Open University	01
3	Medical Colleges	13
4	Engineering Centres/ Technical Colleges	15
5	Colleges/Institute	815
6	Research Institutes	15
7	Education Teachers Training	23

Source: Aryabhatta Knowledge University website:

The increasing share of women's enrolment in higher education is the highest in teachers training and education, followed by Arts. The share is much lower in science and still lower in commerce. In professional courses, female enrolment is higher in medicine but low in engineering and polytechnic institutes. Thus, the pattern of higher education enrolment points to a continued gender bias. A well-strategized initiative to achieve a gender balance in higher education is essential for overall social development.

2.5.3.2 Health & Family Welfare:

Beside education, the status of health is also an important factor in the human resource development of a state. Although the status of health service in Bihar is still inadequate, the substantial improvements in recent years have led to the betterment of position.

One of the key indicators of health in a state is infant mortality Rate (IMR) which was 48 per thousand live birth in 2010, nearly equal to national average of 47 per thousand live birth.

The improved health situation in Bihar is also indicated through the data on Coude Death Rate (CDR). In 2010, the CDR in Bihar was 6.8 compared to a higher national average of 7.2. Along with IMR & CDR, Bihar has also recorded a sharp drop in Maternal Mortality Rate (MMR) from 312 in 2004-06 to 261 in 2007-09.

The Health infrastructure and Human Response position in the state, as per the Directorate of Health Services is as follows:

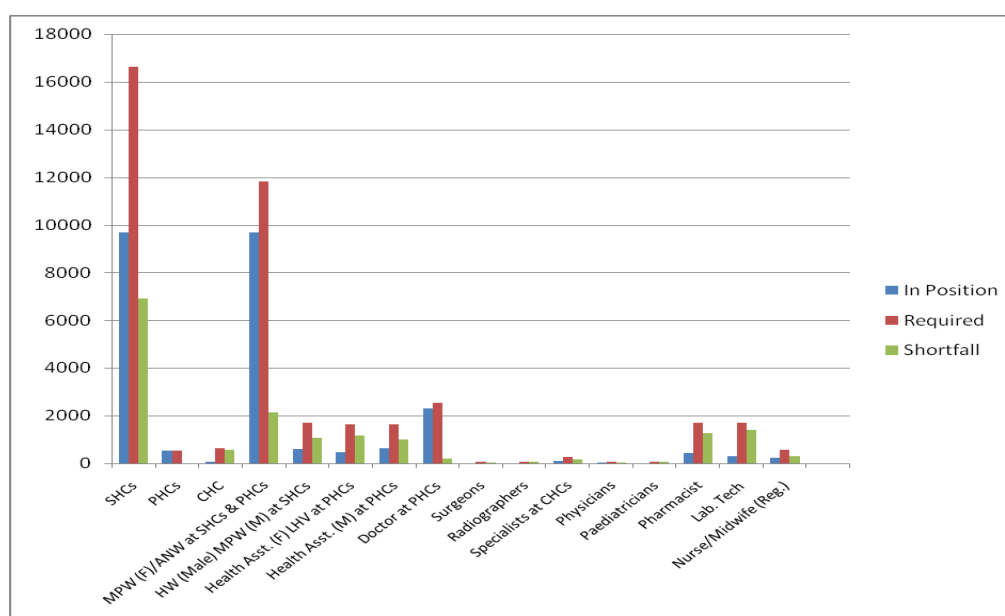
Table: 2.17 Health Service: Required & Available

Sl.No.	Item	In Position	Required	Shortfall
1	SHCs	9696	16623	6927
2	PHCs	533	534	1
3	CHC	70	622	552
4	MPW (F) ANW at SHCs & PHCs	9684	11808	2124
5	HW (Male) MPW (M) at SHCs	620	1700	1080
6	Health Asst. (F) LHV at PHCs	479	1641	1162
7	Health Asst. (M) at PHCs	634	1641	1007
8	Doctor at PHCs	2323	2528	205
9	Surgeons	28	70	42
10	Radiographers	15	70	55

11	Specialists at CHCs	104	280	176
12	Physicians	38	70	32
13	Pediatricians	17	70	53
14	Pharmacist	439	1711	1272
15	Lab. Tech	300	1711	1411
16	Nurse/Midwife (Reg.)	256	566	310

Source : Directorate, Health Services, GoB

Graphic presentation of required, present and shortfall in health infrastructure & Human Resource.



Source : Directorate, Health Services, GoB

The improvements in the functioning of health care system in Bihar has led to the large number of patients visiting government hospitals from 1819 patients in 2006 to 7950 in 2011.

As regards family welfare the position of Integrated Child Development Scheme in the state tell us all about it. The most important and corrective intervention for young children and expectant and nursing mothers. It aims at long term improvement in childcare, health and mutation, water and environmental sanitation. It, therefore, is a sure indicator of family welfare activities in a state. In Bihar the ICDS scheme encompasses a total of 86,237 Anganwadi Centre (AWC) and 5440 mini-AWCs, as 2009-'10.

Being a human capital based programme, ICDS is extremely crucial for achieving desired level of human development as a resource for the future.

In that respect, not only the number of centres but also the quality and percentage of staffing and management of the centres become crucial. In all these regards Bihar has miles to go before they rest.

2.5.3.3 Public Health Engineering & Sanitation:

Similarly, water supply and sanitation are key factors in Public Health Services that have of late considerably improved.

Table: 2.18– Financial Progress in utilization of fund for Water Supply & Sanitation:

Sl.No	Year	2007-08	2008-09	2009-10	2010-11
1	Outlay (Rs. lakh)	16027.85	42527.85	22700.00	22340.74
2	Expenditure (Rs. lakh)	14812.84	13801.8	16258.51	20785.68
3	Percentage of Expenditure	92.42	32.45	71.62	93.04

Source : Economic Survey Report 2011-12

The coverage of Rural Piped Water Supply Scheme has increased from 25% of target in 2006-2007 to 36 percent in 2009-10. The target for replacement of old hand pumps could be achieved from 25 percent in 2008-09 to 60% in 2009-10. However, the achievement against target for extension of coverage of sanitation for uncovered tolas has fallen from 80% in 2008-09 to 65% in 2009-10. Utilization of allocated fund too has shown year to year fluctuation varying from 92.4% in 2007-08 to 32.5% in 2008-09 to 71.6% in 2009 –10.

Table: 2.19 – Physical Achievements

Schemes	2007-08		2008-09		2009-10		2010-11	
	Target	Achievement (% of Achievement)	Target	Achievement (% of Achievement)	Target	Achievement (% of Achievement)	Target	Achievement (% of Achievement)
Rural Pipe Water Supply Scheme	80	20(25%)	70	17 (24%)	56	20(36%)	39	3 (8%)
Establishment of New instead of Old hand Pumps	NA	NA	2723 8	6887 (25%)	2035 1	12298 (60%)	8053	1589 (20%)
Uncovered Tolas to be covered	2000	7761	2457 9	19705 (80%)	4050 8	26285 (65%)	1874 9	4822 (26%)

Source : Economic Survey Report 2011-12

2.5.3.4 Labour Employment & Poverty:

Poverty- The evidence of poverty, as reflected in Planning Commission estimates, continues to be very high in Bihar, compared to the national average. Rural poverty in Bihar was estimated to be 55.7% 2004-05 compared to the national average of 41.8 percent. Urban poverty was estimated at 43.7 percent as compared to all-India average of 25.7%. The poverty ratio for the entire population of Bihar was at 54.4% compared to the national average of 37.2%.

Labour- The Work Participation Rate (WPR) is 32.9% in Bihar, with 14 districts having a WPR of more than 30 percent. The SC population has a higher WPR 38.2 percent with 17 districts having levels higher than 45%. Among ST WPR is even higher at 45.2%.

The gender gap in WPR is high with female WPR at 18.4% and male WPR at 46.3%. The gender gap is less in SC population, WPR female being 28.2% and for male 47.%. For ST the gap is even less at 36.9% and 52.9% respectively for female and male.

Employment/Self-Employment — Employment/self-employment opportunity locally available keep the people home state bound. Non availability of these, forces people to migrate leading to de-establisation of population.

Bihar has been suffering from de-establisation of population on this and other counts. First, the employment opportunities, for around 90% of population living in rural areas, are agriculture bound. The traditional, skill based self-employment opportunities no-more provide sustainable livelihood. The agriculture although preyed upon each year by flood or drought, remain the only source of employment. In the face of the above facts, the population in Bihar get disestablised due to migration. Most of the families left behind consist of women, children and old persons.

The two schemes, Swarnajayanti Grameen Swarozgar Yojana (SGSY) and Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGA), however, have provided some base for employment generation.

In Bihar Swarnajayanti Grameen Swarozgar Yojana (SGSY) 158061 persons were assisted through SHGs in 2009-10. About 40% beneficiaries were women. 2,38,359 SHG member trained in 2009-10 which 38% were women and 66 percent persons belonging to SC community.

Under MNREGS 124.1 lakh households were issued job-cards in 2009-10, 41.9% SC households, 33.3 demanded jobs and 33.26% were given employments.

The programme has generated about 1173.53 lakh work days of employments for 41.27 lakh households in 2009-10 of this 30% work days were for women.

Table: 2.20 – Performance of the MNREGS (2007-08 to 2010-11)

Year	Total Job Cards Issued (in lakh)	Households provided employment (in lakh)	Person days generated(in lakh)		Households completed 100 days	% of Fund utilized	Number of Completed works	Average employment per household (days)	Total accounts opened (in lakh)
			Total	% share of women					
2007-2008	81.24	39.26 (48.3)	840.58	27.3	9945 (1.3)	71.5	46436	21.4	—
2008-2009	102.99	38.42 (37.3)	991.22	29.8	100891 (2.6)	60.0	53939	25.8	48.78
2009-2010	124.06	41.27 (33.3)	1137.53	30.0	287019 (7.0)	75.8	70491	27.6	84.91
2010-2011	130.44	46.84 (35.9)	1597.49	29.6	260919 (5.6)	82.7	83593	34.1	102.57

Note : (1) Total accounts include both individual and joint account in both Bank and Post-Office
(2) Figures in parentheses denote percentages with respect to total job-cards issued.

Source : Annual Reports, Department of Rural Development, GOB

Women's Empowerment– In view of the poor sex-ratio of 916 as well as women led families of the migrant labour, women employment, specifically those belonging to marginalized section, assumes greater significance for a state like Bihar. Besides, the gender gap in the state encompasses various dimensions of discrimination, marginalization and oppression. The gender gap is inbuilt into gender relations and valuations which need to be addressed for balanced social development, economic, social and cultural empowerment.

Labour and Social Welfare – Bihar's labour force is concentrated in Agriculture, unorganized sector and engagement of Child Labour remain challenges in Bihar

- 59 general including 12 women govt. ITIs
- Atleast one ITI has been established in every district of the State. In the 12th five year plan effort will be to open ITI's in unserved subdivision/blocks.
- 455 private ITIs sanctioned sofar.

Social Welfare – Social welfare outlay in the state amounted to 1775.57 crore in 2010. 52% for social security, 34.4% child development & 12.7% women empowerment.

2.5.4 Governance & Administrative Setup:

The economy of Bihar is basically agrarian. About 90% people still live in the villages. The governance in Bihar has been an issue since 60's but of late, it is regarded as the nation's fastest growing state, with GDP logging an annual growth rate of around 12%. The socio-economic level is of a developing kind and the form of government is democratic.

Of late, the complexion of governance has started brightening. The economy has been moving from development deficit to development. The law and order position has improved. The 'speedy trial' mechanism has expedited convictions. Right to education has urged people to get educated. 'Right to employment under MNREGA' has assured poor of certain amount of livelihood. 'The Bicycle' scheme of the Chief Minister has facilitated the drastic reduction in disparity between gender literacy and the percentage of school dropouts.

The people participation in local self-governance has been wedded with gender balance by the path-breaking initiative of 50% reservation for women. The introduction of Gram Katchahri at the Gram Panchayat level has brought the justice at the doorstep for the poor and the marginalized.

The improved law and order position has charged the environment with confidence in people in general and in investor in particular. The land and water resources of the state are attracting investors. The bi-lateral and multi-lateral agencies are extending generous support to further improve its conditions.

On the whole, Bihar has taken a giant leap from poor to good governance, from excessive economic dependence to economic self dependence, from natural resource based livelihood to value-addition and tertiary sector based livelihood.

The administrative set-up which is the same in all the states in the country but not similar has better permutation and combination with the political setup, on the one hand and local bodies, on the other. It has brought about a pronounced improvement in the environment as a whole in the state.

The administrative set up of Bihar

★ Divisions	9
★ Districts	38
★ Sub Division	101
★ Blocks	534
★ Civil Thana	810
★ Panchayats	8463
▪ Panchayat Samiti	531
▪ Zila Parishad	38
▪ Nagar Nigam	05
▪ Nagar Parishad	32
▪ Nagar Panchayat	85
▪ Towns	130
★ Revenue Villages	44103
★ Urban Agglomerations	14
★ Towns	199
★ Police Stations	813
★ Police District	40

2.5.4.1 The Local Bodies:

The local bodies provide linkages between administration and the people. They constitute the delivery system for the administration and become the barometer of people's satisfaction or dissatisfaction with the governance.

The local bodies in Bihar consist of Urban and Rural local bodies.

The Urban local bodies in Bihar are :

1. Nagar Nigam (500 wards)	10
2. Nagar Parishad (1321 wards)	43
3. Nagar Panchayat (1351 wards)	86

Total 139

The Rural Local Bodies in Bihar consisting of Panchyati Raj Institutions are:

Table 2.21: Panchayati Raj: An Overview 2011

Details	No.	Details	No.
Zilla Parishad	38	Gram Kachhari Members	115542
Panchayat Samiti	531	Gram Panchayat Sarpanch	8442
Gram Panchayat	8442	Gram Panchayat Secretary	5816
Gram Kachhari	8442	Naya Mitra	6947
Gram Panchayat Members	115542	Gram Kachhari Secretary	7474
Gram Panchayat Mukhia	8442	Zilla Panchayat Raj Officers	22
Panchayat Samiti Members	11534	Panchayat Raj Officers	299
Zilla Parishad Members	1162		

Source : Department of Panchayati Raj, GOB,

The importance of local bodies lies in the fact that all the developmental programmes and schemes including disaster management related

programme and activities, have to be implemented through them. As such their proper functioning is crucial for socio-economic development of the people.

The two initiatives about Panchyati Raj Institutions taken in Bihar changed the very thinking about local self-governance in the country. First the inclusion of Gram Katchahri at the Gram Panchayat level and Second, the 50% reservation for women. One has released the pressure on police and the other has brought about gender equality. Women have gained confidence and weaned away from excessive dependence on men. Their participation in the decision taking process has also increased.

The devolution of roles and responsibilities to Panchayats has provided the rural populace with opportunities to partake of development measures. In fine, the widening gap between the rural and urban area seems to have slowed down.

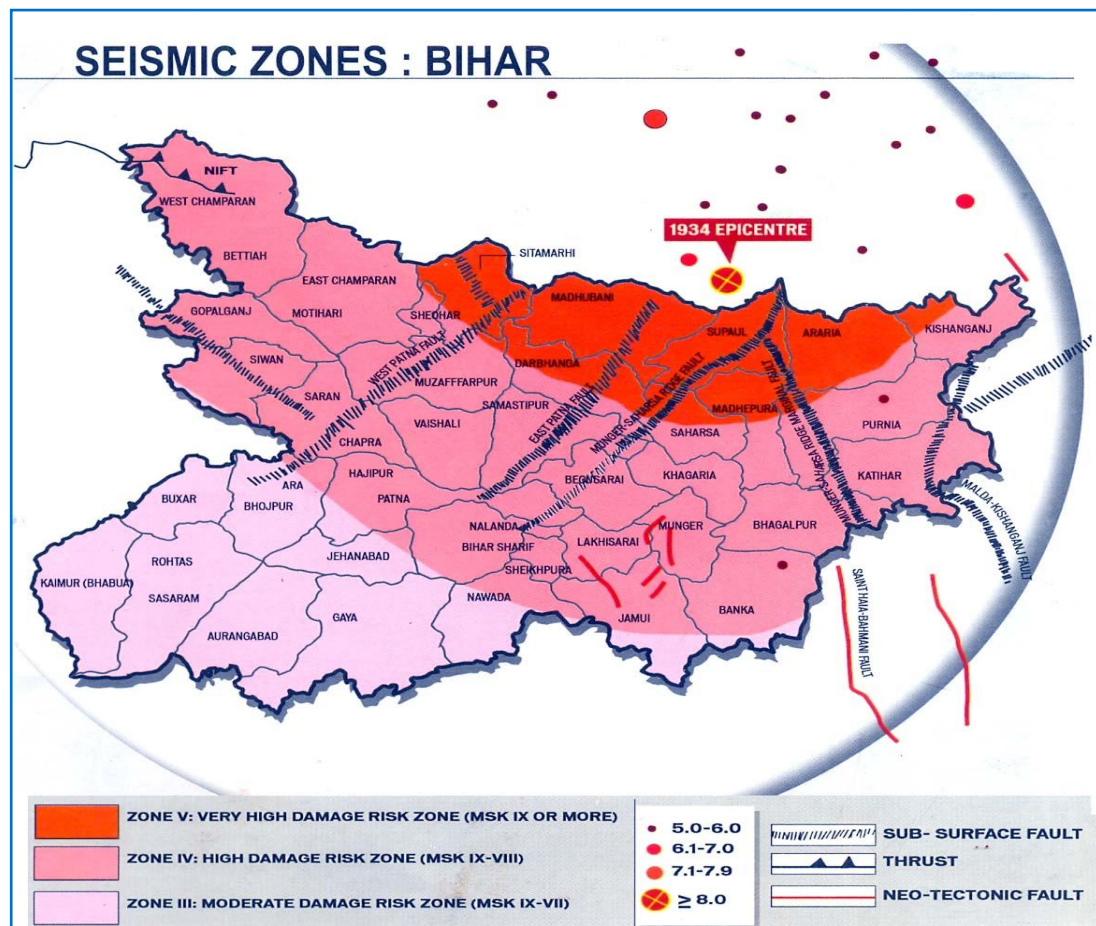
With around 12% growth rate, the GSDP has shown impressive increase. The decline in pressure on agriculture sector, the increase in tertiary sector contribution in GSDP, and the sunshine in the secondary sector has brightened the growth and development prospects in Bihar. In order to make that sustainable, the disaster management plan requires be well formulating and better implementing, because Bihar is vulnerable to all major hazards Earthquake, Flood, Cyclonic Storm, Drought and Fire.

3. Multi-Hazard Profile of the State

The geographical complexion of Bihar, its boundary, its land, its water bodies, the climate and, above all, its location makes it the **Home State of Hazards**. Almost all the districts are prone to most of the major hazards: earthquake, floods, cyclone, drought and fire. Sometimes two of the major hazards visit different parts of the state during the same period. This constitutes the multi-hazard profile of the state in true sense of the term.

3.1. The Earthquake :

Being located in the high seismic zone perched on the boundary of the tectonic plate joining the Himalayan tectonic plate near the Bihar-Nepal Border and having six sub-surface fault lines penetrating through its Gangetic planes in four directions, Bihar is vulnerable to the worst kind of disaster caused by earthquake of near maximum intensity. Out of eleven districts in Zone V two districts—Madhubani and Supaul are 100% covered; two districts—Araria and Sitamarhi, more than 85%; Dharbhanga,



Source: BSDMA, Newsletter(Nov. 2011)

Madhepura & Saharsa, above 45% and the rest four—Kishanganj, Muzaffarpur, Purnia and Sheohar, less than 10%. In all 15.2% of the total area of Bihar is covered in Zone V.

Out of 30 districts in Zone IV, 13 districts are 100% in zone IV; 8 districts are above and around 90%; and the rest of the 16 districts are below 80% in Zone IV. In all, 63.7% of the total area of Bihar fall in Zone IV.

Out of 13 districts in Zone III, 5 districts are 100% , 2 districts around 80% and the rest below 70%. In all 21.1% of the total area of Bihar falls in Zone III

Table: 3.1 – The major earthquakes in Bihar :

S. No.	Date	Place	Scale	Casualty	Districts affected
1.	4 th June 1764	Bihar-Bengal Border	6.0	—	
2.	23 rd August 1833	Nepal Border	7.7	—	
3.	23 rd May 1866	Nepal Border	7.0	—	
4.	23 rd May 1866	Jharkhand- Bihar Border	5.5	—	
5.	30 th Sept. 1868	Hazaribagh	5.7	—	
6.	07 th Oct. 1920	Bihar-UP-Bihar	5.5	—	
7.	15 th Jan. 1934	Indo-Nepal Border	8.3	10,500	Patna, Gaya, Shahabad, Saran, Muzaffarpur, Darbhanga, Bhagalpur, Munger, Purnia
8.	11 th Jan 1962	Indo-Nepal Border	6.0	—	
9.	21 st August 1988	Indo-Nepal Border	6.8	1000	Madhubani, Darghanga
10	18 th Sept. 2011	Sikkim-Nepal Border	6.8		

Source: BSDMA Calendar(2011)

Thus, Bihar has suffered ten earthquakes in a span of 247 years. Earthquakes ranging from 5.5 to 8.3 on the Richter scale has rocked and wrecked Bihar. The latest earthquake was reported on 18th Sept. 2011 at 6.12 pm on 6.8 Richter scale with epicenter being in Sikkim – Nepal region. Only 10 deaths were reported in the state.

The worst of these was in 1934, one in which more than 25,000 persons lost their lives. Bhatgaon in Nepal and Munger in Bihar were completely ruined. Large part of Patna and Kathmandu in Nepal and Motihari, Muzaffarpur and Darbhanga in Bihar were also destroyed along with innumerable villages in between. Many of the houses got sunk in the ground. The isoseismic covered an area of about 36000 sq. km with a length of about 300 km.

The earthquake happened on Monday, January 15, 1934. Its worst manifestation was in North East Bihar. Calcutta, which itself received a severe shaking, was the news centre, and news came slowly, because the area which suffered most was very isolated and normal communication were interrupted. Railway lines were twisted, bridges were broken, great fissures had append across the roads, telegraph and telephone lines were down. Patna, the capital of Bihar and then Orissa, had been badly damaged, Jamalpur where the railway stations had collapsed, an incoming

train had suffered more terribly and that there had been many deaths in Bihar. In Bengal there was bad news from Darjeeling.

The Statesman

15 Jan. 1934

Next day the Statesman's representative Captain Dalton (of India Air, Pageants Limited) flew over the stricken area and telephoned us from Patna the long message which first made the world realize the terrible nature of the tragedy which had occurred. In this message our correspondent said:—

The whole country from Muzaffarpur towards Bettiah is stricken. Muzaffarpur is in ruins and its streets are strewn with corpses. Floods accompanied the earthquake, water spouting from large fissures which appeared in the ground and inundated the countryside, which is one vast sea dotted by little islands of high ground.

From the aeroplane not a house could be seen standing. Railway lines have been swept away and no roads are visible. Everywhere is stark desertion.

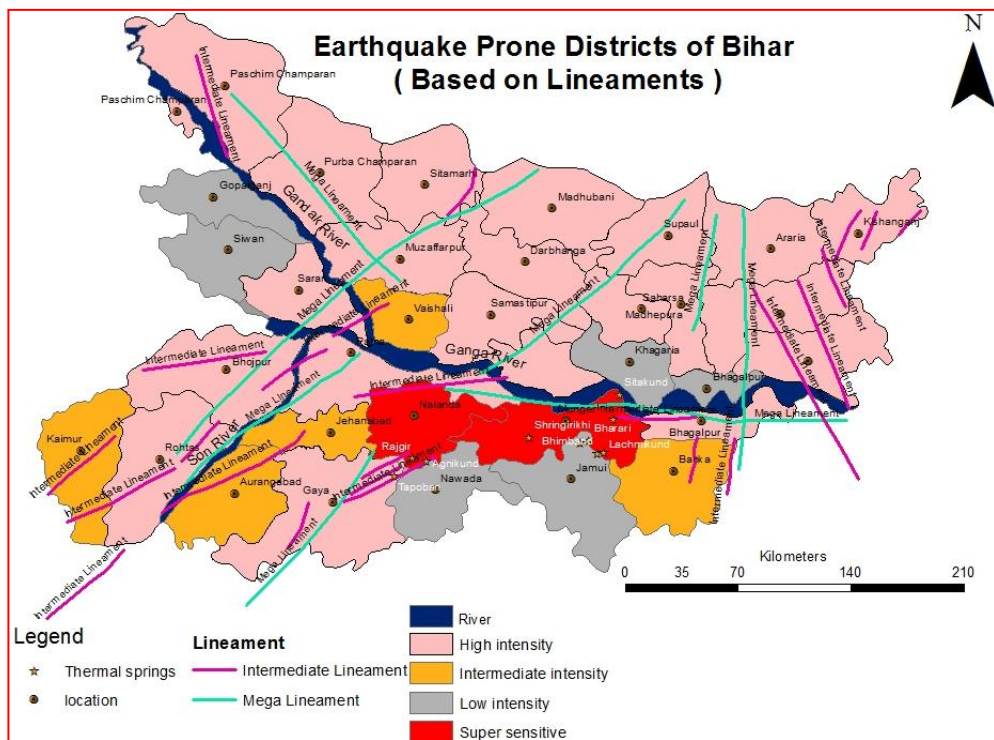
Later news, when our correspondents and photographers penetrated the area unfortunately only made the tragedy grow in size, as Monghyr, Darbhanga, and Sitamarhi came into the picture. And as the weeks have gone by and realization has grown the sense of calamity has steadily deepened.

Bihar is helping itself. The other Provinces and the Government of India are doing what they can. But many millions of pounds are needed and there is room for all the world to show sympathy. The practical way to do this is to contribute to the Viceroy's Earth-quake Relief Fund, Imperial Bank of India, Patna.

Modern India is intensely political, and Bihar is no exception. But the earthquake has produced there a marvelous truce. Politics indeed are forgotten. Officials and non-official, elected Ministers and their former opponents the leaders of the "civil disobedience" movement are working together and for years to come they will all be put to the neck of their collar to pull the province out of the abyss. May this good which has come out of evil extend itself throughout the British Empire and the rest of the world, so that stricken Bihar will become the focus for a union of hearts concerning India.

On the morning of January 15 a cynic might have said that it would take an earthquake to bring all the communities in India together. We have had the earthquake, and we are together as never before.

Map: 9 - Earthquake Vulnerability Zone wise :



Source- BSDMA

3.2. The Floods :

Bihar is endowed with rich water bodies consisting of glacial rivers, rain-fed rivulets and tals and ground water. The whole of North Bihar is a courtyard of Himalayan Rivers and the whole of South Bihar the backyard of rivers flowing from south. Together they divide the State in seven river zones as if, bracketed between two major rivers, the rich land falling in-between is held in ransom by them.

Most of these rivers namely Ghaghra, Gandak, Burhi Gandak, Bagmati, Kamla, Adhwara group of rivers, Kosi and Mahanada have Himalayan origin and have considerable portion of their catchment in the glacial region falling in Nepal and Tibet. They are, therefore, positioned to receive very copious rainfall during monsoon when discharge of these rivers is 50 to 90 times larger than fair weather flow. This causes frequent and large scale flooding of North Bihar. As such, 73.63 percent of the geographical area of North Bihar is considered to be prone to floods.

Southern part of Bihar, on the other hand, is drained by rivers that are largely rainfed, having their origins either in the Vindhyaachal Hills or in the Hills of Chotanagpur and Rajmahal. These rivers are either dry or have scanty discharges in non-monsoon months. Karmanasa, Sone, Punpun, Kiul, Badua, Chandan are the important rivers of this region.

Falling between the Ganga and Indo-Nepal border, North Bihar having a geographical area of around 50,000 sq.km. has a general slope from north-west to south-east. The geographical area of South Bihar is around 44000 sq.km and has a general slope of south to north.

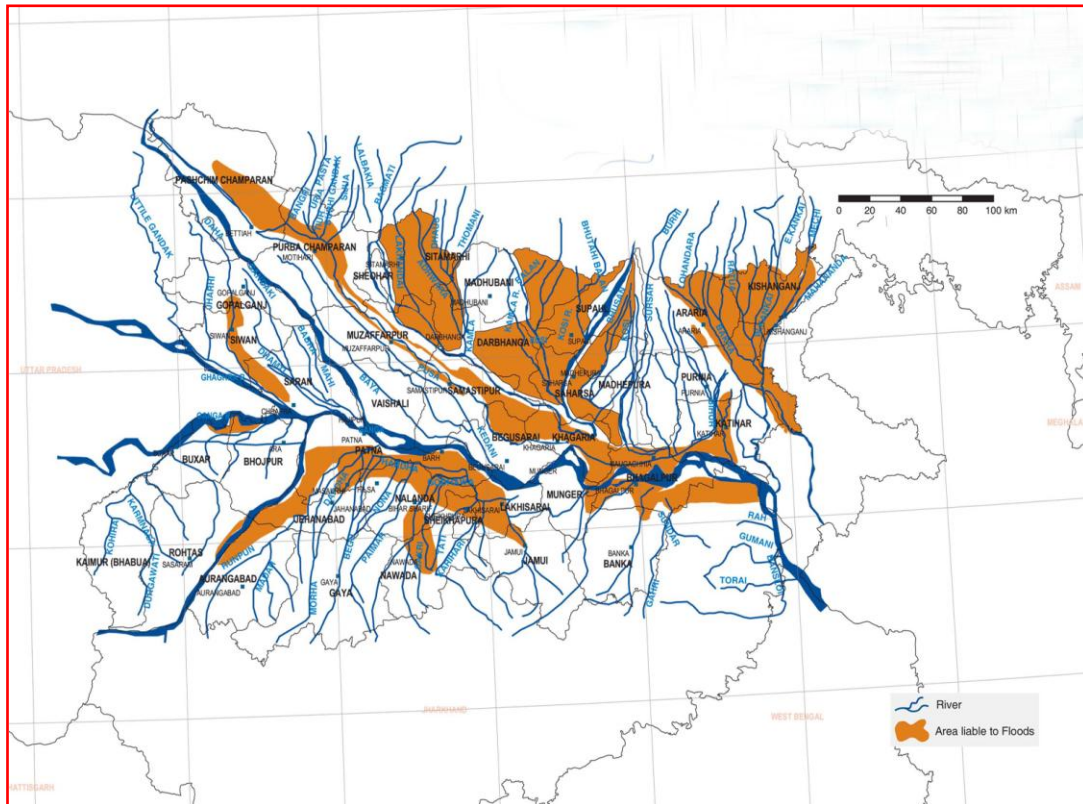
If the rivers of North Bihar, due to their large catchment area in the Himalayas, cause floods in around 74% of its geographical area, then the rivers of South Bihar drain their water of the tract and accumulate them behind the high southern Bank of the Ganges which has resulted in the formation of a number of tals viz, Fatuha Tal, Bhaktiarpur Tal, Barh Tal, More Tal, Mokamah Tal, Barahiya Tal and Singhual Tal. These tals also receive backwater of the Ganges when it is in high spate. These tals, therefore, get submerged during monsoon and affect the kharif cultivation in most of the area. The area, thus, affected by tals is around 36% of the total South Bihar area.

Thus, the total geographical area affected by flood, water logging in tals etc. amount to 56% of the total geographical area of Bihar. (*Water Resources Dept., GoB*)

Floods in large parts of the plains of Bihar, specially North Bihar, are recurring features and cause havoc destroying crops and the quality of land and threatening the conditions of life and livestock due to large-scale displacement.

Every year, almost 28 districts get flooded causing huge loss of property, lives, farmlands and infrastructure. Out of these the area of Sitamarhi, Supaul and Kishanganj are 90% affected by flood, five districts- Bhagalpur, Darbhanga, Khagaria, Madhepura, Saharsa get around 70% affected and in the rest of the districts, the flood affected areas vary from 55% to 25%. In all. 56% of the total area of Bihar is affected by flood.

Map : 11 - Flood Vulnerability Zone wise



(Source: Vulnerability Atlas of India)

A study of the flood stages in various river systems revealed that early flood takes place during the month of May-June in River Bagmati, Kosi and Kamla. Thereafter, flood generally comes in River Burhi Gandak in the month of mid July. During these months River Ganga generally remains low but by September, the master drain, the Ganges, also rise making the flood-problem very acute.

Thus, from the month of May to September, for five neat months, Bihar has to suffer through the ravages of floods of one kind or another, the impact of which was perhaps not felt to the same extent in the past as is felt now. It is so because of the ever increasing encroachments on the flood plains by the growing population to meet its requirements of food and fiber. The destruction of forests for reclaiming areas for occupation and for obtaining fuel for domestic requirements have also contributed in intensifying floods.

Table : 3.2 – Year wise district, life & area affected In Last 10 Years

Year	Number of Affected											
	District	Blocks	Panchayats			Village	(in Lac)		Area (in Lac ha.)			
			Fully	Partly	Total		Human	Animal	Agric	Non-Agric	Total	Cropped
2010	9	44	40	237	277	679	7.18	3.57	1.602	0.39	1.992	0.101
2009	16	91	150	452	602	1546	22.03	1.346	1.71	9.339	11.05	0.475
2008	18	116	341	583	924	2585	49.952	12.166	6.40495	2.11922	8.8242	3.67211
2007	22	269	2235	1581	3816	18832	244.42	27.13	13.323	5.51	18.833	10.603
2006	14	63	10	365	375	959	10.89	0.1	1.52	0.297	1.81	0.87
2005	12	81	130	432	562	1,464	21.04	5.35	3.343	1.261	4.6	1.35
2004	20	211	2,015	773	2,788	9,346	212.99	86.86	20.99	6.010	27.00	13.99
2003	24	172	646	850	1,496	5,077	76.02	11.96	9.943	5.140	15.08	6.10
2002	25	6	1,587	917	2,504	8,318	160.18	52.51	14.446	5.244	19.69	9.4
2001	22	194	838	1,154	1,992	6,405	90.91	11.7	9.042	2.91	11.95	6.5

From 2001 to 2010, the number of districts affected ranged from 9 to 25, number of blocks affected, from 6 to 269, number of panchayat fully affected, from 10 to 2235, number of panchayats partially affected from 237 to 1581 and the number of villages affected ranged from 679 to 18,832.

The number of human life affected ranged from 7.18 lac to 244.42 lac., livestock affected ranged from 0.1 lac to 86.86 lac. The total area affected ranged from 1.81 lac ha to 19.69 lac. hac out of which agriculture land ranged from 1.6 lac hac. to 14.4 lac ha, and non- agri land ranged from 0.39 lac hac to 9.3 lac hac. The total crop loss ranged from those sown in 0.1 lac hac to 10.6 lac. hac.

Table : 3.3 – Year wise Crop, Houses and Property cost in last 10 Years

Year	Crop Damaged (Rs. Lac)	House Damaged						Public Property Damaged (in Rs. Lac)	Deaths	
		Pucca		Kuccha		Total	Value (In Rs. Lac)		Human	Animal
		Fully	Partly	Fully	Partly					
2010	311.92	564	19	5623	2096	6868	704.87	169.2	32	0
2009	2182.57	250	233	6317	2517	7674	528.15	530.1	97	2
2008	3420.25	6643	39749	65825	36725	297916	8451.4	9771.96	258	878

8										
2007	7683782	6689	18889	362671	364483	784328	83144.52	64241.52	1287	2423
2006	706.63	17	228	9,201	9,191	18,637	1,225.03	8,456.17	36	31
2005	1,164.50	49	38	982	4,469	5,538	382.79	305	58	4
2004	52,205.64	17,444	37,064	3,43,573	5,31,692	9,29,773	75,809.51	1,03,049.60	885	3272
2003	6,266.13	222	136	10,748	34,156	45,262	2,032.10	1,035.16	251	108
2002	51,149.61	9,452	19,952	79,569	3,10,041	4,19,014	52,621.51	40,892.19	489	1450
2001	26,721.79	11,329	11,015	1,17,090	82,574	2,22,074	17,358.44	18,353.78	231	565

Source: Disaster Management Department, GoB

Thus, the recorded impact of flood reveals that it is not the number of districts or blocks or panchayats affected by flood that matter. It is the area covered that determines the loss of life and property. And, therefore, flood as a hazard has to be given area bound treatments.

In the year 2004, this ravage was repeated with a death toll of 885 human lives and 3272 animals. Crop damage was worth Rs. 522.06 crore and loss of public property to the tune of Rs. 1030.49 crore. 9.3 lakh houses were damaged.

In the year 2007, 650 people and 615 animals were reported to be dead. 59610 houses were damaged. 11.9 lakh hectare areas covering 10215 villages were adversely affected. Damages of crop and public property was estimated as Rs 781 and Rs 643 crore respectively.

In the year 2008 in the Eastern Afflux Embankment near Kusaha Village in Nepal at nearly 12 km upstream of Kosi Barrage a breach happened which increased to nearly two km. Through this long breach Kosi took a new course nearest to where the river flowed in 1926 and caused destruction which never happened before. Around 806 villages were washed away and about 23.13 lakh people lost their property. Around 7 lakh person had to be evacuated. In all, 16 districts, 86 blocks, 1678 village, 18.36 lakh of population, 1.139 lakh of animals were affected by flood in 2008. Crop worth ; 1704.09 lakh, houses worth ; 379 lakh and public property worth; 321.9 lakh were either lost or damaged.

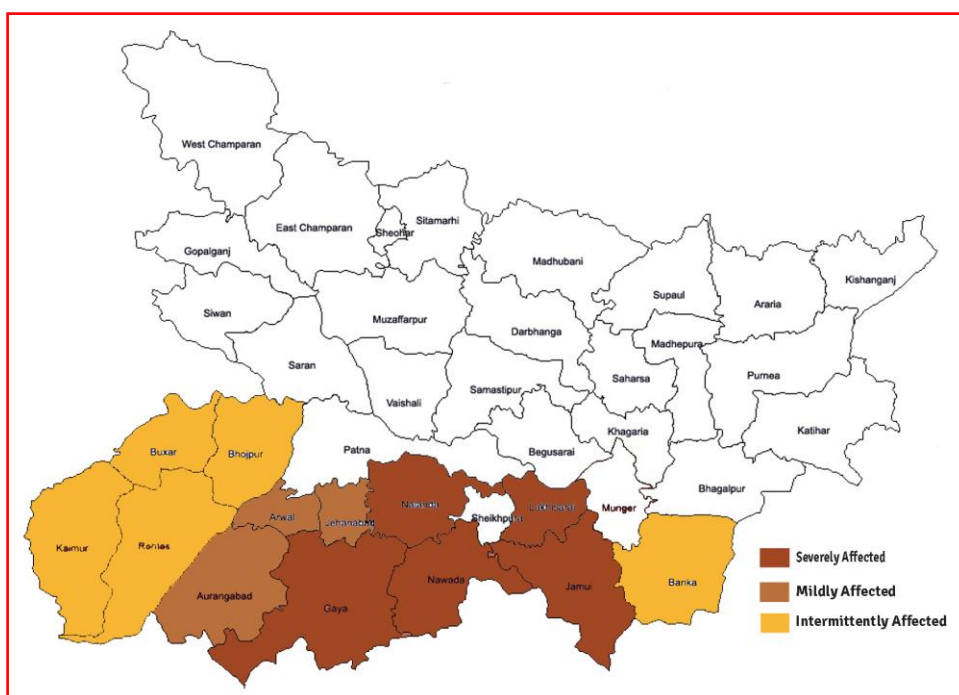
3.3 Drought :

It is an irony of situation that a state so rich in water bodies, also suffers from severe droughts. Bihar often faces drought situation of different scales/levels that intrinsically lead to famine situations. This situation

necessarily occurs when the summer monsoon gets weak and which causes percentage departure of seasonal rainfall from the normal.

Climatically, the state of Bihar lies on the cross-roads of the wet eastern coastal regions and the relatively dry continental region of the western plains. Being on the threshold of transition zone there happens regional variations in rainfall distribution as well as rainfall variability. Although, the average rainfall in Bihar is 1120 mm, but considerable variations occur with 2000 mm in the extreme eastern and northern part and less than 1000mm in the western and south-western part of the state. As a result 33% of the State receives less than 750 mm rainfall, making the southern part of Bihar vulnerable to drought. Even the 35% of north-eastern part of Bihar that receives around 1120 mm rainfall suffers drought once in four to five years due to scanty rains.

Map : 12- Drought Prone Areas



Source: Developed on Inputs from DMD, GoB

Although the North Bihar plain receives plenty of rainfall, but when the annual rainfall is even 25 percent less than the normal, drought situations prevail. Quite often the problem of drought and floods prevails simultaneously.

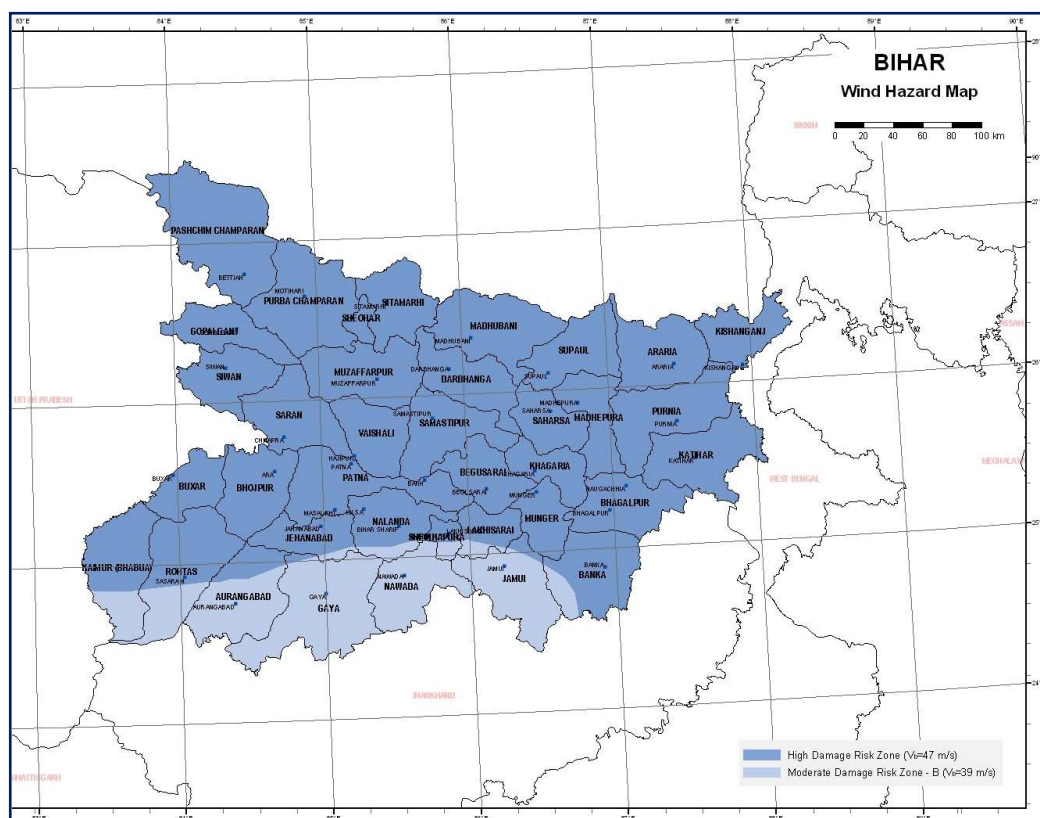
Apart from deficiency in rainfall prime reasons of recurring drought in Bihar is the nature of soil with low mineral and humus-contents besides extremely poor water holding capacity. Recurrent rainfall variability and sustained departure from the normal rainfall vis-a-vis low reliability,

fluctuating both surface and underground water resources and extremely poor water holding capacity of the major soil group appear to have clubbed together to cause frequent droughts in Bihar. Beside, there is a positive relationship between reducing forest land and the increasing rainfall variability and the phenomenon is well manifested in Bihar scenario of recurrent droughts.

3.4 High Speed Winds/Cyclonic Storm:

Among the natural hazards of the surface cyclones (High Speed Winds) are by far the most devastating both by causing loss of life as well as loss in terms of socio-economic development. Severe tropical high speed winds are responsible for large casualties and damage to life, property and agriculture. Its three constituents: wind speed, whirlings, and water, leave behind three dimensional impacts in the area. The only saving grace is that its formation can be watched right from the depression development to landfall stage.

Map:13 – Cyclonic Storm Vulnerability Zone wise



Source: Vulnerability Atlas of India

As detailed in the Vulnerability Atlas of India out of 38 districts, 27 districts are fully affected by high speed winds of 47 m/s intensity. The area of districts—Banka, Jehanabad, Arwal and Nalanda is nearly 90% affected. Other districts of South Bihar except Nawada are partly affected by high

speed winds of 44 m/s. Nawada is, however, 100% affected by high speed winds of this intensity.

Table: 3.4 Cyclonic Storm Vulnerability Zone wise

Sl. No.	District	Cyclonic Storm (wind speed mtr./sec.)			Sl. No.	District	Cyclonic Storm (wind speed mtr./sec.)		
		55 & 50	47	44 & 39			55 & 50	47	44 & 39
1	Araria	0.0	100	0.0	20	Madhubani	0.0	100	0.0
2	Aurangabad	0.0	30.0	70.0	21	Munger	0.0	100	0.0
3	Banka	0.0	87.6	12.4	22	Muzaffarpur	0.0	100	0.0
4	Begusarai	0.0	100	0.0	23	Nalanda	0.0	85.0	15.0
5	Bhagalpur	0.0	100	0.0	24	Nawada	0.0	0.0	100
6	Bhojpur	0.0	100	0.0	25	Patna	0.0	100	0.0
7	Buxar	0.0	100	0.0	26	Purnia	0.0	100	0.0
8	Darbhanga	0.0	100	0.0	27	Rohtas	0.0	58.1	41.9
9	East Champaran	0.0	100	0.0	28	Samastipur	0.0	100	0.0
10	Gaya	0.0	2.0	98.0	29	Saran	0.0	100	0.0
11	Gopalganj	0.0	100	0.0	30	Sheikhpura	0.0	52.5	47.5
12	Jamui	0.0	3.0	97.0	31	Saharsa	0.0	100	0
13	Jehanabad + Arwal	0.0	95.7	4.3	32	Sheohar	0.0	100	0.0
14	Kaimur (Bhabua)	0.0	66.9	33.1	33	Sitamarhi	0.0	100	0.0
15	Katihar	0.0	100	0.0	34	Siwan	0.0	100	0.0
16	Khagaria	0.0	100	0.0	35	Supaul	0.0	100	0.0
17	Kishanganj	0.0	100	0.0	36	Vaishali	0	100	0
18	Lakhisarai	0.0	100	0.0	37	W Champaran	0.0	100	0.0
19	Madhepura	0.0	100	0.0		State - Bihar	0.0	86.0	14.0

Source : Vulnerability Atlas of India

In all 86% of the total area of Bihar is prone to high speed winds of 47 m/s intensity and only 14% of the area prone to high speed winds of lesser intensity.

3.5 Fire:

Like earthquake & high speed winds fire hazard of varying intensity covers all the 38 districts of Bihar. In the year 2000-2001, 37 incidents of fire in 35 districts devastated 17228 houses in 2368 villages affecting 67400 population and destroying property worth Rs. 2398.729 lakh, 111 human lives and 291 animal lives were lost. In the year 2010-'11, 96 adults, 27 children, 129 animals lost their lives and 21,434 houses were destroyed. Due to changes in the roofing of the majority of hutments the evident of fire has considerably decreased in Bihar.

However, largely the concentration of fire hazard is mainly in the residential areas of the BPL families, of SC/ST, to low income group since they live in clusters of houses of Kutch wall, and straw thatched roofs etc.

In urban areas, the old government building and skyline changing apartments are causing concern as they have not provided for fire escape of water storage facilities the two essential steps to mitigate disaster from fire hazards.

3.6 Other Hazards

Among other hazards epidemics, industrial accidents and road/boat accidents are growing menacingly. The large proportion of population living below poverty line in unhygienic conditions, the growth of food-processing industry in areas not having appropriate safety measures and many-fold increase in vehicular traffic without having sufficiently wide roads and sufficient number of trained human resource to manage the traffic have increased the incidence of disaster.

Bihar has so far witnessed one air-crash in Patna and another Rajdhani Express accident near Gaya in recent times. Train burning incident also took place near Gulzarbagh Junction on main line. Roads being narrow, driving being open to all who can, sans age barrier sans license, sans checking, road accidents in Bihar kill more people than all the hazards put together.

And density of population and paucity of resources put together causes hundreds of boats capsizing midstream and resulting in the drowning of women, children and men in thousands every year.

BBB

4. Vulnerability Profile of the State

Hazard is an impending danger—natural or manmade. Loss of life and property from hazard is disaster. And the correlation between the loss of life and property on the one hand, and impending danger, on the other is vulnerability. Vulnerability, thus, requires to be seen from the hazard point of view, that is, its degree, its intensity, its frequency etc. and from the life, property and structure etc. point of view that is, lives liable to be lost, property damaged etc.. The assessment from the hazard point of view helps in formulating the mitigation measures. And, the estimation of loss of life, property etc. point of view helps in deciding about the kind of preparedness required to reduce risk.

The correlation between the loss of life and property and impending danger depends on some given factors—location, poverty, density of and threshold population and attitude and awareness of people about vulnerability.

By location is meant the nature of area from hazards point of view. By poverty is meant the percentage of poor and marginalized people living in the area. By density is meant the density of population per sq.km. By threshold population is meant women, children, elderly and differently challenged persons. By attitude and awareness is meant the knowledge and preparedness of the people to reduce risk and act accordingly.

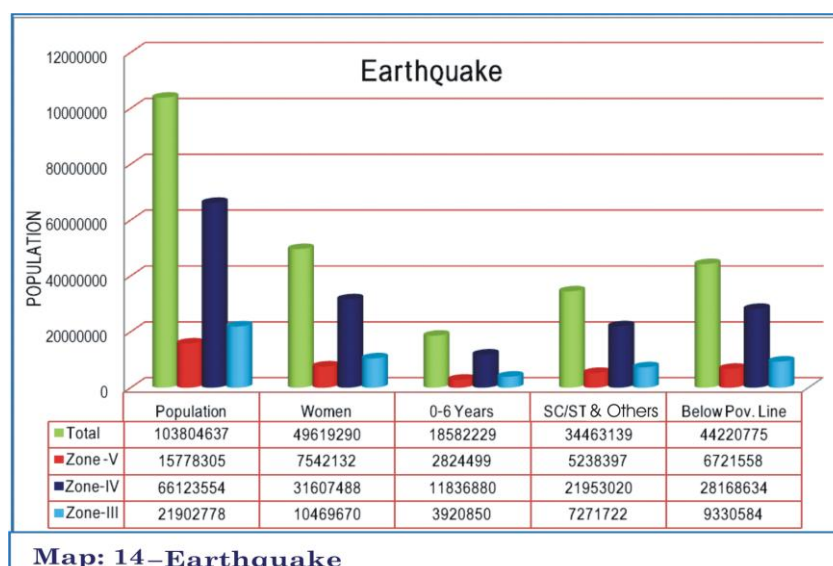
Table: 4.1 – Form of hazard wise factors most prone to vulnerability :

Sl. No.	Hazard	Area worst hit	Sector worst affected	Population	Property
1	Earthquake	All	Structure + Infrastructure	All	Livestock + structure + wealth
2	Flood	Largely	Agriculture + Infrastructure	Largely threshold & marginalized section	„
3	Cyclonic Storm	Largely Rural	Structure	„	—
4	Drought	Rural	Agriculture	„	Livestock
5	Fire	Rural+Urban	Structure	Marginalized threshold	Livestock destruction + structure
6	Man-Made	Localised	Beneficiaries	causality varying with nature of hazard	—

Source : Encyclopedia of Disaster Management

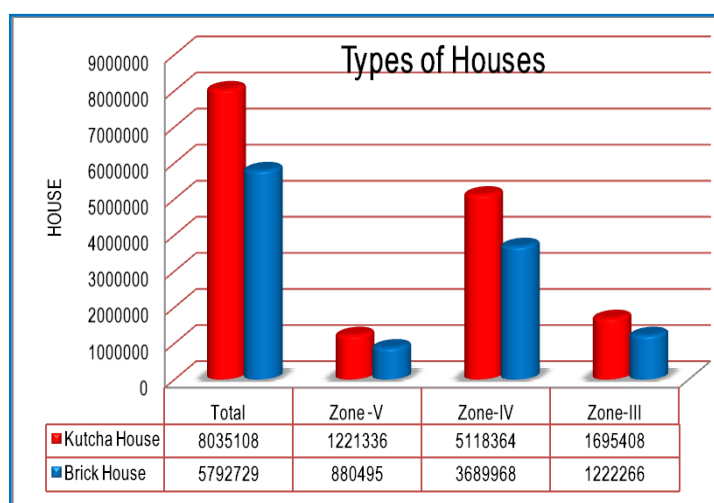
Thus, hazard wise extent of vulnerability in Bihar works out as detailed below:

4.1 Earthquake:



As per the Vulnerability Atlas of India, 15.2% area of Bihar is in V Zone which, in terms of life, property structure etc. comes to mean that the life of a population of 1,57,78,305 (Census 2011) in which 75,42,132 are women and

28,24,499 are of 0–6yrs age group 52,38,397 are SC/ST and marginalized group and 67,21,558 living below poverty line in high risk zone. And since this population is living in either 7,65,591 kutcha houses or 13,95,927 brick walled houses, and 11,18,464 in houses of other materials, and suffer loss of property including livestock to the tune of 43,67,012 and poultry to the extent of 22,69,256 numbers.



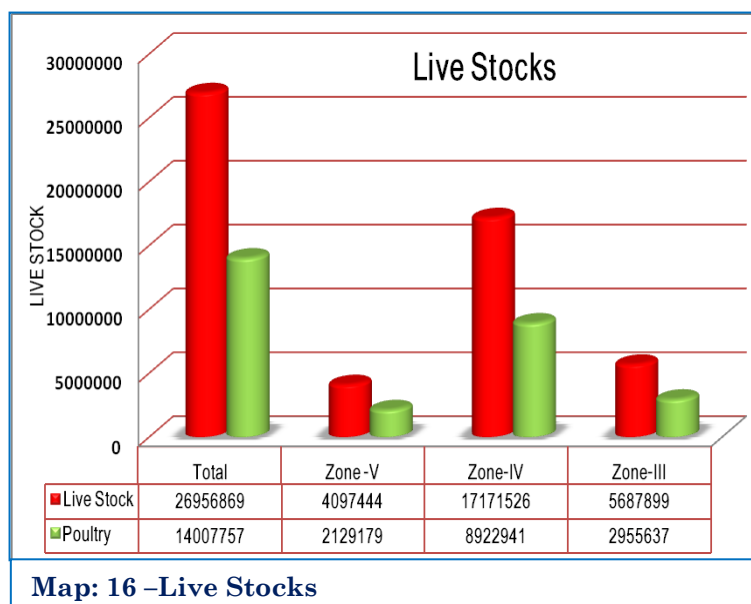
That, 63.7% of the total area of Bihar is in Zone IV which means that the life of 6,60,99,997 out of which 3,16,07,487 are women and 1,18,36,897 are of 0–6 yrs. age group and 2,19,53,019 are SC/ST and minorities and 2,81,68,633 is in danger. And since the population

is living either in 30,10,383 *kutcha* houses or in 54,88,923 brickwalled houses or in 43,97,911 houses of other materials they are in danger of losing their abode and also suffer the loss of property including livestock to the tune of 1,71,71,525 and poultry to the extent of 89,22,941 in numbers.

That, 21.1% of the total area of Bihar lies in Zone III which means the life of 2,18,94,969 people out of which 1,04,69,670 are women and 39,20,850 of 0–6 yrs. of age 72,71,722 SC/ST and minorities and 93,30,583 are living below poverty line, living either in 9,97,159 Kutchha houses in 18,18,151 brick walled houses or 14,56,765 houses of other materials are prone to losing their shelter *along with about 56,87,899 livestock's and poultry about 29,55,636 in number*

From population density point of view also the picture of vulnerability emerges as:

- i) Zone V (15.2%) = 15,254 sq.kms × 1102 persons /sq.kms
= 1,57,78,305 persons
- ii) Zone IV (63.7%) = 59,981 sq.kms × 1102 persons/ sq.kms
= 6,60,99,997 persons
- iii) Zone III (21.1%) = 19,868 sq.km × 1102 persons/ sq.kms
= 2,18,94,969 persons



Thus, keeping the sub-surface fault-line in view, the vulnerability of the districts falling in zone IV gets equally enhanced. For, the sub-surface fault lines in a way enchain the destiny of those living in Zone IV with those in

Zone V. The earthquake of 1934

amply demonstrated that the destiny of those in Zone IV is intrinsically linked with those in Zone V. The earthquake having its epicenter near Sitamarhi on Nepal border heaped worse devastations in Monger (in Zone IV) than in Madhubani & Sitamarhi.

The earthquake also indicated that it did not destroy life directly. Life and property got destroyed by the destruction of structures & infrastructure.

This indicates the fact that if structures and infrastructure are properly built, life and property to that extent shall be comparatively safer and fear of damage and destruction shall be less.

Keeping the above indications in view, the vulnerability from earthquake increases manifold on the following counts:

- i) The mushrooming growth of multi-storied buildings in urban areas—disregarding all norms.
- ii) Increase in infrastructure facilities like roads, flyovers, bridges etc.
- iii) density of population
- iv) Increase in the population of threshold and marginalized section.

4.2 Floods :

The state of Bihar, being a land of rivers descending down from the Himalayas and overflowing with water from a large catchment area beyond its boundaries having higher precipitation and steeper gradients and meandering through its plains, is destined to suffer the ravages of floods.

The area worst affected by floods in the state is 56% of its total geographical area covering 28 out of 38 districts. But the nature and causes of floods vary from one geo-cultural zone to another although the end result is the same: inundation, siltation and erosion.

From flood point of view the vulnerability of Bihar as a state is intense on all the five factors: location, poverty, density of and threshold population and awareness and preparedness of the people.

4.2.1 Population

Out of the total population 7,99,82,950 living in 28 districts out of which 3,97,23,905 are women and 1,50,14,935 children between 0–6yrs. and 93,75,555 families living below poverty line. The livestock vulnerable to flood number 31,467 thousand. The total number of habitation 1,26,32,94, of all sorts is liable to be affected. And around 27,974.47 hectare of irrigated land suffers the risk of losing crops cultivated.

In the 15 highly vulnerable to flood districts a population of 4,69,18,520 is at risk out of that 2,22,74,281 are women, 86,49,102 children of 0-6yrs. of age and 55,61,818 BPL families. Live stock wealth consisting of cows and buffalo, pig & sheep, goat and poultry to the tune of about 1,60,86,000 is liable to be lost. The population living in 70,64,729 dwellings of all sorts may mostly get washed away or partly damaged.

And the total irrigated area of 13,457.32 thousand hectares are likely to suffer loss of crop due to inundation, & cultivated land suffer from siltation and water logging.

Table: 4.2 – District-wise vulnerability Assessment:

Sl. No.	District	Population	Female	0-6yrs.	BPL Families	Livestock ('000)	Habitations	Irrigated '000 hect.
0	1	2	3	4	5	6	7	8
1	East Champaran	5082868	2408831	993569	594443	1508	739684	1793.13
2	Sitamarhi	3419622	1619181	643851	444998	1363	542581	729.99
3	Sheohar	656916	309302	124919	80569	212	101521	231.85
4	Muzaffarpur	4778610	2261110	817709	596244	1299	699025	1354.66
5	Vaishali	3495249	1648191	591634	470215	873	433964	1024.05
6	Samstipur	4254782	2026350	784203	459922	1022	665680	1210.87
7	Darbhanga	3921971	1868928	700992	371134	1102	656288	567.51
8	Madhubani	4476044	2151060	779360	662909	1265	721277	1081.54
9	Supaul	2228397	1070582	424411	305815	1026	367376	820.90
10	Saharsa	1897102	901600	377504	212465	833	284075	552.32
11	Madhepura	1994618	952245	397468	235255	967	293418	749.21
12	Khagaria	1657599	777534	347048	233715	692	249623	569.19
13	Begusarai	2954367	1394164	532382	319388	615	464310	893.27
14	Bhagalpur	3032226	1418212	532307	279170	1326	375357	621.17
15	Katihar	3068149	1466991	601745	295576	1983	470550	1257.66
Total		46918520	22274281	8649102	5561818	16086	7064729	13457.32

In the 13 vulnerable districts a population of 3,62,20,589 is at risk. Out of these 1,74,49,624 women, 73,65,833 children of 0-6 yrs, 38,13,737 BPL families living in 55,68,185 habitations of mud wall to burnt bricks, are liable to suffer most. And, a total of 13,817,12 hectare of irrigated area and 15,381 thousand live stocks consisting of cows and buffalo are open to all costs of damages.

Table: 4.3 – District-wise vulnerability Assessment

Sl. No.	District	Population	Female	0-6yrs.	BPL Families	Habitations	Irrigated	Livestock ('000)
0	1	2	3	4	5	6	7	8
1	West Champaran	3922780	1865111	753429	480386	653725	1352.19	1629
2	Gopalganj	2558037	1288360	437031	265491	389003	1573	797
3	Siwan	3318176	1646055	532868	315461	462103	1743.87	787
4	Saran	3943098	1919622	657316	405443	558264	1372.51	1200
5	Buxar	1707643	819287	286969	170332	239339	1349.28	644
6	Bhojpur	2720155	1288433	440847	256221	380182	1740.46	728
7	Patna	5772804	2721687	905708	403781	876201	1352.19	1345
8	Nalanda	2872523	1376946	501046	330943	463005	280.72	992
9	Lakhisarai	1000171	474066	182234	76706	158749	582.62	399
10	Sheikhpura	634927	305334	118228	59492	105156	246	281
11	Purnia	3273127	1577298	1644083	482114	555415	1051.98	2389
12	Araria	2806200	1345322	564131	304793	411916	666.3	2111
13	Kishanganj	1690948	822103	341943	262574	315127	506	2079
Total		36220589	17449624	7365833	3813737	5568185	13817.12	15381

Source : Census-2011-12 & Vulnerability Map of India & Rural Development Dept., GoB

4.2.2 Resource Base

The prime resource base of Bihar is agriculture. Since 60.5% of the total area is net sown area in the state out of which 33.79% area is in flood prone zones, and only 17.6% area is in non-agricultural use, it can safely be said that more than half of the net sown area is susceptible to flood.

4.3 Drought

It is an irony of situation that a state regularly ravaged by floods, is also prone to drought. It is so because first, around 59% of the net sown area is dependent on rain and second, the soil does not have water holding capacity and third, the water management practices in the state have not been planned properly. In the name of flood protection building embankments is the be-all and end-all of water management practices in the state

It is so because in our anxiety to have protection from flood, we tend to ignore the chances of aiding the factors that make a region vulnerable to drought. Those factors are:

- deficiency of monsoon which has been highly erratic in the state in the last five years.
- Insufficient irrigation facilities for the agricultural land. In Bihar only 41.97% of the agri. land is properly irrigated.
- Although rich in water resources but no proper effort for the conservation of water has been practiced.
- the alluvial soil of the state has a poor moisture retention capacity.

Table No 4.4: Districts Vulnerable to Drought

Sl. No.	District	Population	Women	0-6yrs.	BPL	Livestock ('000)	Habitation	Irrigated Area
1	Gaya	43,79,383	21,12,518	7,62,570	3,60,848	2,160	6,01,129	1,243.73
2	Nawada	22,16,653	10,71,530	3,67,231	1,93,116	1,258	3,22,513	526.25
3	Jamui	17,56,078	8,41,710	3,13,455	1,95,234	1,354	2,60,021	448.81
4	Nalanda	28,72,523	13,76,946	5,01,046	3,30,943	992	4,63,005	980.74
5	Lakhisarai	10,00,717	4,74,066	1,82,234	76,706	357	1,58,749	582.62
6	Jehanabad	11,24,176	5,37,974	1,93,946	96,258	427	2,79,050	545.15
7	Arwal	6,99,563	3,36,618	1,23,684	80,274	268	—	469.01
8	Aurangabad	25,11,243	12,00,376	4,38,065	2,26,526	1,178	3,50,284	1,624.42
9	Kaimur	16,26,900	7,79,116	2,91,785	1,87,599	612	2,42,317	1,260.81
10	Bhojpur	27,20,155	12,88,433	4,40,847	2,56,221	728	3,80,182	1,740.46
11	Buxar	17,07,643	8,19,287	2,86,969	1,70,332	644	2,39,339	1,349.28
12	Rohtas	29,62,593	14,14,737	4,93,047	2,82,017	911	4,58,736	3,660.28
13	Banka	20,29,339	9,65,032	3,62,548	2,06,944	1,335	3,09,839	1,051.73
	Total	2,76,06,966	1,32,18,343	47,57,427	26,63,018	12,224	40,65,164	15483.29

Source : Census-2011-12 & Vulnerability Map of India & Rural Development Dept., GoB

The state has all the ingredients to foster these drought nurturing factors. First, being located in the tropical zone and largely dependent on south-west monsoon, which account for 85% of the total rainfall in the state, it is susceptible to receiving less than the average rainfall. Second, of the major sources of irrigation—surface canals, ahar and pynes, tubewells, other sources of supply, surface water is not properly tapped to meet the irrigation requirements. Sinking water-table make it less cost effective to pump water for agriculture proposes. Non-availability of power make it all the more difficult to use underground water. On top of these, annual increase in deforestation owing to the pressure of population, add to the increasing threat of drought in the state.

4.4 High Speed Winds/Cyclonic Storm/Gale/Hail Storm:

High Speed Wind is one of the most disastrous hazards that civilization helplessly sees approaching and destroying everything around. It is a calamity that in the process of its visitation annihilates and uproots all that come in its way, and leaves behind rain and garbage for population to fend with.

86% of the total area of Bihar falls in high damage risk zone of cyclone of 47 m/s velocity which means that a population of 8,92,71,990 consisting of 4,26,72,589 women, 1,59,80,720 children of 0—6yrs. of age and 2,96,38,300 SC/ST and minorities living either in 40,64,253 mud houses or in 74,10,477 brick walled houses or in 59,37,526 houses of other materials out of which 68,60,143 are thatched with light weight materials; 59,72,988 with heavy weight materials and 47,21,166 have flat roofs.

Table No: 4.5 Districts Highly Vulnerable to High Velocity Wind

Sl. No.	District	Population	Women	0-6yrs.	BPL	Livestock ('000)
1	Araria	28,06,200	13,45,322	5,64,131	3,04,783	2,111
2	Kishanganj	16,90,948	8,22,103	3,41,943	2,62,574	2,077
3	Nawada	22,16,653	10,71,350	3,67,231	1,93,116	1,258
4	Katihar	30,68,149	14,66,991	6,01,746	2,95,576	1,984
5	Purnia	32,73,127	15,77,298	6,44,083	4,82,114	2,389
6	Saharsa	18,97,102	9,01,600	3,77,504	2,12,465	833
7	Supaul	22,28,397	10,70,582	4,24,411	3,05,815	1,326
8	Madhepura	19,94,618	9,52,245	3,97,468	2,35,255	967
9	Bhagalpur	30,32,226	14,18,212	5,32,307	2,79,170	1,325
10	Banka	20,29,339	9,65,032	3,62,548	2,08,944	1,203
	Total	2,42,36,759	1,15,90,735	46,13,372	27,79,812	15,473

Source : Census-2011-12 & Vulnerability Map of India & Rural Development Dept., GoB

Apart from 2,42,36,759 persons out of which 1,15,90,735 are women; 46,13,372 of 0-6 yrs. age 27,79,812 BPL families and 15,473 thousand livestock living in these 10 districts highly vulnerable to high speed wind. Out of 1,63,16,527 buildings in the state a total of 63,76,428 houses of mud and unburnt brick wall and having straw thatched lightweight roofs are highly vulnerable to High Speed Winds.

Those living in moderate damage zone consist of 1,45,32,647 persons out of which are 69,46,700 women, 26,01,519 children of 0-6yrs of age, 2,96,38,300 SC/ST and minorities and 37,75,168 BPL households living in 6,61, 622 mud houses of having light weight roofs.

4.5 Fire

Fire, as a hazard, is man-made as well as situational and incidental. It largely affects population by destroying household and property.

Habitation complexion wise all the 38 districts of the State are fire hazard prone. More so, endangered are 1,13,40,990 BPL families living in 37,58,206 houses made of mud and unburnt bricks and having straw thatched, lightweight sloping roofs. Apart from these a huge number of families living in high-rise building having no fire escape, are bound to be victims of fire hazards.

Table : 4.6 –Annual Fire Statistical Report

S.No.	Description	2011	2010	2009	2008	2007	Total
1	Total No. of Fire Stations	105	46	46	44	40	-
2	Total No. of Fire Calls	3,724	4,479	3,898	2,331	1,863	16,295
3	Total No. of Death (Persons)	94	129	82	60	21	386
4	Total No. of Injured (Persons)	109	136	108	106	49	508
5	Total No. of Death (Animals)	586	852	489	123	70	2,120
6	Total No. of Injured (Animals)	103	130	92	25	10	360
7	Total No. of Village Fire	1,693	2,078	1,925	816	446	6,958
8	Total Property Damaged (₹ in Crore)	4,109.16	109.87	62.65	74.79	17.31	4,373.78
9	Total Property Saved (₹ In Crore)	10,875.98	978.27	276.73	226.30	267.85	12,625.13

Source: Bihar Fire Service, GoB

In 2011 itself there were 3,724 fire calls, 94 deaths due to fire hazard , 109 persons were injured, 586 animal died, and Rs. 4,109.16 crore worth of property was destroyed or damaged.

Table : 4.7 – Disaster Prone Districts

Sl. No.	District	Earthquake		Flood	Drought	Fire	Cyclonic Storm
		High	Medium				
1	Araria	H		F			CY
2	Arwal				D		
3	Aurangabad				D		
4	Banka		M		D		CY
5	Begusarai		M	F	D		
6	Bhagalpur		M	F	D		CY
7	Bhojpur			F	D		CY
8	Buxar			F	D	Intensive	CY
9	Darbhanga	H		F	D	Intensive	CY
10	East Champaran		M	F	D		CY
11	Gaya		M		D		
12	Gopalganj		M	F			CY
13	Jamui				D		
14	Jehanabad				D		CY
15	Kaimur(Bhabua)				D		CY
16	Katihar		M	F		Intensive	CY
17	Khagaria			F			CY
18	Kishanganj		M	F			CY
19	Lakhisarai			F	D		CY
20	Madhepura	H		F			CY
21	Madhubani	H		F	D	Intensive	CY
22	Munger		M		D		CY
23	Muzaffarpur			F	D	Intensive	CY
24	Nalanda		M	F	D	Intensive	CY
25	Nawada				D		
26	Patna		M	F	D		CY
27	Purnia		M	F			CY
28	Rohtas				D		CY
29	Saharsa	H		F			CY
30	Samastipur		M	F	D		CY
31	Saran		M	F	D	Intensive	CY
32	Sheikhpura		M	F	D		CY
33	Sheohar			F	D		CY
34	Sitamarhi	H		F	D		CY
35	Siwan		M	F	D	Intensive	CY
36	Supaul	H	M	F			CY
37	Vaishali		M	F	D	Intensive	CY
38	West Champaran			F		Intensive	CY

Legends

EARTHQUAKE	H	DROUGHT	D
	M		Intensive
FLOOD	F	CYCLONIC STORM	CY

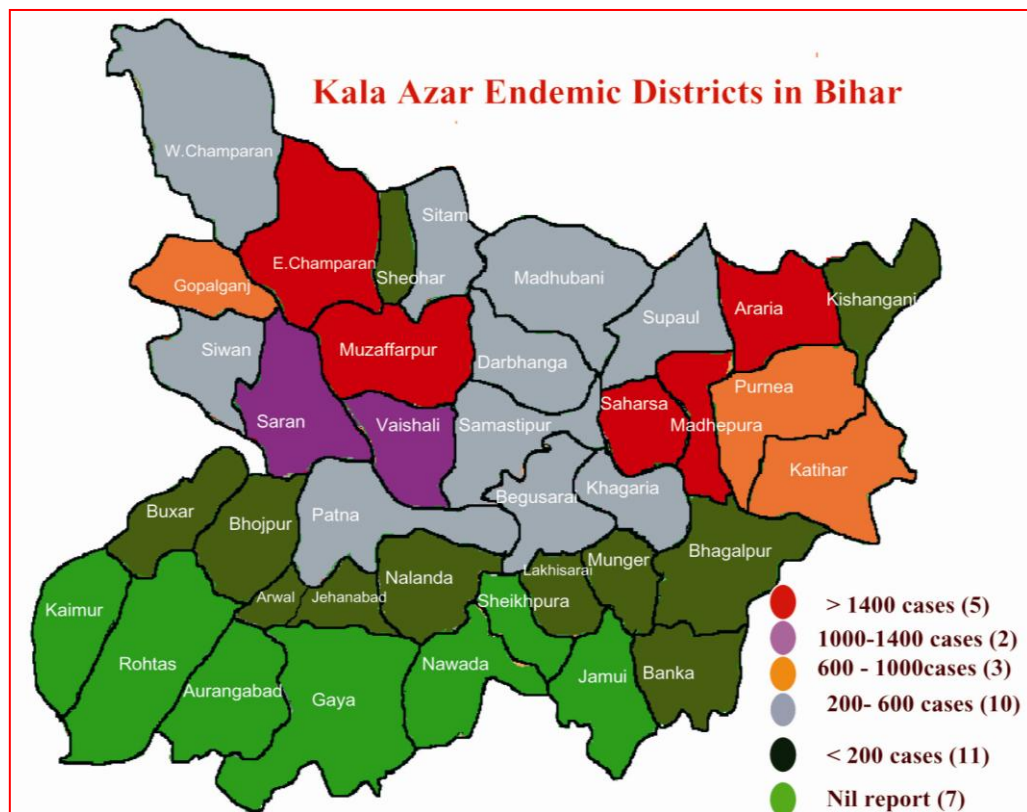
Table : 4.7 – Rainfall :

Districts Name	2008					2009					(2010 up to sep.)			
	Winter	Summer	SW Monsoon	NW Monsoon	Total	Winter	Summer	SW Monsoon	NW Monsoon	Total	Winter	Summer	SW Monsoon	NW Monsoon
Patna	60.8	47.7	1168.2	7.8	1284.5	0.0	61.4	615.6	56.8	733.8	0	58	410.6	468.6
Nalanda	60.5	7.8	1076.3	6.1	1150.7	0.0	89.9	445.3	57.7	592.9	0	15.6	537.2	552.8
Rohtas	55.9	47.0	1025.9	4.5	1133.3	0.0	28.5	710.8	71.7	811.0	5.1	36.6	374	415.7
Kaimur	11.2	1.2	890.2	0.0	902.6	0.0	1.3	451.1	38.1	490.5	6.3	32.8	518	557.1
Buxar	27.5	48.9	1266.1	13.1	1355.6	0.0	22.9	508.4	31.4	562.7	0	7.3	534.5	541.8
Bhojpur	59.9	66.4	1190.6	4.6	1321.5	0.0	58.8	577.6	46.8	683.2	0.8	4.8	561.3	566.9
Gaya	96.9	27.0	901.9	0.0	1025.8	0.2	64.9	605.4	32.3	702.8	0	0	155.8	155.8
Aurangabad	86.3	56.9	964.8	0.0	1108.0	0.0	36.7	691.0	24.3	752.0	0	4	469.3	473.3
Jehanabad	66.6	25.2	1171.2	0.0	1263.0	0.0	50.8	513.0	63.0	626.8	0	20.2	507	527.2
Arwal	50.0	61.7	1251.1	1.7	1364.5	0.0	122.8	679.0	26.8	828.6	0	21.2	336.2	357.4
Nawada	61.5	35.7	1104.1	0.0	1201.3	0.0	99.4	540.6	156.4	796.4	0	24.8	509.5	534.3
Saran	20.3	50.3	1375.5	1.9	1448.0	0.0	100.7	628.7	52.8	782.2	1.1	8	639.5	648.6
Siwan	0.0	0.0	1359.7	0.0	1359.7	0.0	79.0	343.3	56.3	478.6	0	0	189.8	189.8
Gopalgunj	0.0	50.4	1202.6	20.0	1273.0	0.0	87.6	711.5	83.5	882.6	0	59.8	734.8	794.6
Muzaffarpur	13.3	72.9	1236.7	36.8	1359.7	0.0	115.8	645.2	0.0	761.0	0	53.7	623.3	677
Sitamarhi	55.4	9.2	680.5	13.5	758.6	0.0	0.0	908.4	8.4	916.8	0	14.3	440.5	454.8
Sheohar	0.0	113.0	983.6	127.4	1224.0	0.0	170.6	491.0	0.0	661.6	0	0	267.4	267.4
W.Champaran	0.0	110.9	1408.2	15.7	1534.8	0.0	110.7	986.1	47.3	1144.1	0.8	106	1056.5	1163.3
E.Champaran	6.8	97.1	1195.3	30.8	1330.0	0.0	99.7	775.0	25.9	900.6	1.5	86.2	704.1	791.8
Vaishali	11.4	23.2	1417.0	27.7	1479.3	0.0	62.4	616.1	69.0	747.5	0	21	433.2	454.2
Darbhanga	1.3	44.8	686.1	27.2	759.4	0.0	153.0	841.9	45.1	1040.0	0	42.1	558.3	600.4
Samastipur	19.9	15.0	1041.9	46.6	1123.4	0.0	137.5	577.5	83.1	798.1	1	78	456.5	535.5
Madhubani	0.0	0.0	768.8	76.6	845.4	0.0	153.4	1049.9	36.0	1239.3	0	31.4	534.1	565.5
Saharsa	32.5	186.6	927.4	0.0	1146.5	0.0	70.3	766.6	59.7	896.6	0	53.6	468.6	522.2
Supaul	18.0	238.8	734.8	49.3	1040.9	0.0	92.8	598.6	0.0	691.4	0	332.2	182.2	514.4
Madhepura	16.	47.3	1030.	0.0	1094.	0.	213.	1054.6	88.0	1356.	0	250.	750.3	1000.5

	9		1		3	7	4			7		2		
Purnea	23. 4	122. 2	1251. 5	16.4	1413. 5	0. 0	207. 7	1109.7	178. 2	1495. 6	0	86.6	137.3	223.9
Araria	6.0	180. 6	1434. 3	36.8	1657. 7	0. 0	261. 8	957.4	78.0	1297. 2	0	107. 3	1096.7	1204
Kishanganj	26. 7	188. 4	1965. 6	12.6	2193. 3	0. 0	110. 1	1135.0	212. 4	1457. 5	0	156. 6	2310	2466.6
Katihar	19. 3	106. 4	995.2	12.9	1133. 8	2. 0	206. 8	618.0	195. 5	1022. 3	0	56.7	593.9	650.6
Bhagalpur	29. 8	46.1	807.8	31.7	915.4	0. 5	138. 6	753.3	124. 8	1017. 2	0. 5	60.6	486.2	547.3
Banka	67. 0	36.6	759.2	33.9	896.7	0. 0	65.0	632.6	99.0	796.6	1. 6	39.3	629.7	670.6
Munger	33. 7	50.6	1194. 7	18.2	1297. 2	0. 0	90.8	903.2	69.6	1063. 6	0	31.3	595.3	626.6
Lakhisarai	27. 9	62.8	1163. 1	7.5	1261. 3	0. 0	103. 4	683.5	73.0	859.9	0. 6	47.3	687.5	735.4
Begusarai	2.4	0.0	1115. 8	20.2	1138. 4	0. 0	0.0	314.8	149. 0	463.8	0	96.3	374.2	470.5
Jamui	0.0	0.0	663.7	0.0	663.7	0. 0	0.0	624.2	61.9	686.1	0	32	535	567
Khagaria	25. 5	50.8	880.8	32.4	989.5	0. 0	134. 9	710.5	79.9	925.3	0	0	0	-
Sheikhpura	68. 4	18.2	912.1	0.0	998.7	0. 0	128. 9	793.9	121. 4	1044. 2	3. 9	85.1	620.8	709.8
Bihar	30. 6	61.8	1084. 3	19.3	1196. 0	0. 1	98.2	699.2	71.1	868.6	0. 6	56.8 7	553.13	627.11

Source : Economic Survey Report- 2010-11

Map: 17- Kala Azar Endemic Districts in Bihar



Source: NVBDCP, Delhi

BBB