बिहार सरकार

ROADMAP FOR DISASTER RISK REDUCTION

2015-2030

GOVERNMENT OF BIHAR

Draft 1 as on 2nd October 2015

Patna Declaration – 14th May 2015

As endorsed by the delegates at the 1st Bihar Conference on Disaster Risk Reduction (BCDRR), Patna (13-14 May 2015), the Government of Bihar adopts the Bihar Disaster Risk Reduction Framework (BDRRF) to achieve the vision of a Disaster Resilient Bihar. This framework for the period 2015 to 2030 comprises the following 10 commitments:

1. Disaster Risk Reduction will be institutionalised by launching a state-wide campaign in 2015 through collaborative partnerships by involving all stakeholders.
2. Disaster prone communities and regions will be guaranteed inalienable right to the state's resources for safety, prompt relief and protection.
3. Disaster Risk Reduction will be mainstreamed across Government of Bihar's planning processes addressing the requirements for strengthening preparedness, emergency response, rehabilitation, reconstruction and recovery.
4. All development planning initiatives will factor in risk avoidance, risk transfer, risk sharing and residual risk management.
5. Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs) will be empowered with financial and regulatory roles for Disaster Risk Reduction.
6. Community skills, knowledge and capacities will inform decision making about Disaster Risk Reduction at all levels through inclusive and participatory processes, with special emphasis on context-specific differential needs of social groups.
7. Resilience of critical infrastructure and delivery of essential services will be ensured, including restoration of functionality and continuity, in case of disruptions.
8. Mechanisms for gathering, analysing and disseminating targeted early warning information to key stakeholders will be established in line with the national framework
9. Lives, livestock and livelihoods will be protected from disruption due to natural and human-induced disasters and extreme events.

10. Requisite financial and human resources will be committed for fulfilling the vision of Disaster Resilient Bihar through the creation of a corpus fund.

The Bihar Disaster Risk Reduction Framework will be operationalized by the Government of Bihar by formulating a DRR Roadmap. The framework will be the guiding principle for the DRR Roadmap, which will be implemented by the state's administrative machinery, upholding multi-stakeholder engagements (including media, civil society, private sector, and academia), partnerships, accountability, transparency and establishment of a robust monitoring system. This process will be strengthened with adequate investments in capacity building, knowledge management and public awareness.

14th May 2015

Message by CM

To be added

Message by Minister DM

To be added

Message by CS

To be added

Message by PS-DMD

To be added

Message by VC-BSDMA

To be added

Acknowledgements

To be added

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To be added

Glossary

Disaster Risk Reduction (DRR) continues to be an evolving field. As disaster risks evolve, and DRR practitioners undergo cycles of learning and reflection, different concepts take prominence to understand and act on disaster risk reduction. This section provides a glossary of how terms are understood and used by this Roadmap.

Business Continuity Planning: plans that identify how the functions/ services will operate following a disaster and how it expects to regain functionality or return to 'business as usual' in the quickest possible time afterwards.

Disaster: a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or human-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, to damage to, and degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area.

Notified Disasters by GoI

Cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst and pest attack

Notified Disasters by GoB

Local Disasters: Lightning, Heat Wave, Excess Rainfall, Unseasonal Heavy Rain, Boat Tragedies, Drowning (rivers, ponds and ditches)

Human Induced Group Accidents: Road Accidents, Airplane Accidents, Rail Accidents, Gas Leakage

Disaster Management: continuous and integrated process of planning, organising, coordinating, and implementing measures which are necessary or expedient for dealing with disasters once they are imminent or have occurred, including:

- Preparedness to deal with any disaster
- Prompt response to any disaster, including assessing the severity of situation
- Evacuation, rescue and relief
- Rehabilitation and reconstruction

Disaster Risk Reduction: the policy objective of anticipating future disaster risk, reducing existing exposure, vulnerability or hazard, and strengthening resilience.

The Roadmap adopts a clear distinction between 'disaster risk reduction' and 'disaster management' with focussed attention on disaster risk reduction through strategies and actions aimed at addressing the causal factors of disaster risk. This marks a conscious shift from focus on implementation of emergency response, relief and recovery measures only. Despite the shift in focus, management of residual risks has been duly accounted for in the Roadmap through actions for 'preparedness for effective response and recovery'. This is in line with the Priority 4 of the Sendai Framework for Disaster Risk Reduction: *Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.*

Resilience: the capacity of an individual, household, community or system to anticipate, absorb (through better preparedness for effective response and mitigation) and recover from hazards and other shocks and stresses without compromising its existence and functioning in the long term.

Vulnerable Groups: Vulnerability is understood here as conditions arising from social, physical, economic and environmental factors that increase the susceptibility of individuals or communities to the impact of hazards. Children, women, older persons, pregnant and lactating mothers, People with Disabilities (PWD), people living with life threatening diseases, People Living with HIV and AIDS (PLHA), SC/ST, LGBT, and Minorities (socio-economic and religious) have been recognised as vulnerable groups in the Roadmap with the acknowledgement that vulnerable groups also possess capacities that must be considered while designing and implementing DRR actions.

Chapter 1

INTRODUCTION

1. Introduction

The disaster management landscape in Bihar has evolved considerably since the early 2000s in line with national and state level policy commitments, socio-political changes as well as frequent experiences of small and large scale disasters. 2004 along with 2007 and 2008 appear as clear markers in the state's disaster management history, with the former representing the passing of the state's Disaster Management Act (which was later repealed to adopt the national DM Act in 2005) and the latter, large-scale floods. Both the events spurred a number of actions towards institution building and system strengthening for disaster management in Bihar. Sustained political will and establishment of institutions like the Disaster Management Department, Bihar State Disaster Management Authority, State Disaster Response Force and such with clear mandates for disaster management, has ensured progress towards effective response and preparedness mechanisms.

The learning orientation and responsiveness of the disaster management system in Bihar becomes apparent upon an analysis of this progression (see, Figure 1 below). In 1977-78, a separate Department of Relief and Rehabilitation was established for better management of relief operations and distribution of relief packages. In 2004, the name and focus of this department changed from relief and rehabilitation to disaster management based on recommendations from a High Powered Committee, reflecting a shift from the relief-orientation in the past. Lessons from the large-scale floods in 2004 triggered the formation of the Bihar Inter Agency Group (B-IAG) for strengthening coordinated responses to disasters. Further, the post-2004 years witnessed initiation of community-based disaster risk reduction (CBDRR) programmes by civil society organisations, which got a further impetus after the 2008 floods. Similarly, policy instruments like the SOP on Mass Casualty Management and the Bihar Scheme for Assistance to Farmers in Farm Distress were spurred by lessons learnt from unfortunate incidents of a stampede and the first farmer suicide in the state. Also, plans like the Agriculture Roadmap, Health Roadmap, Mission Manav Vikas and the State Action Plan for Climate Change guide action towards addressing underlying disaster and climate risks in the state.

The table below provides a snapshot[1] of the DRR Initiatives and Achievements in the state.

[1] For details about the initiatives and achievements in Disaster Management in Bihar, please see GoB (2015) *Disaster Management in Bihar: Status Paper 2005-15*, as released during the 1st Bihar Conference on Disaster Risk Reduction

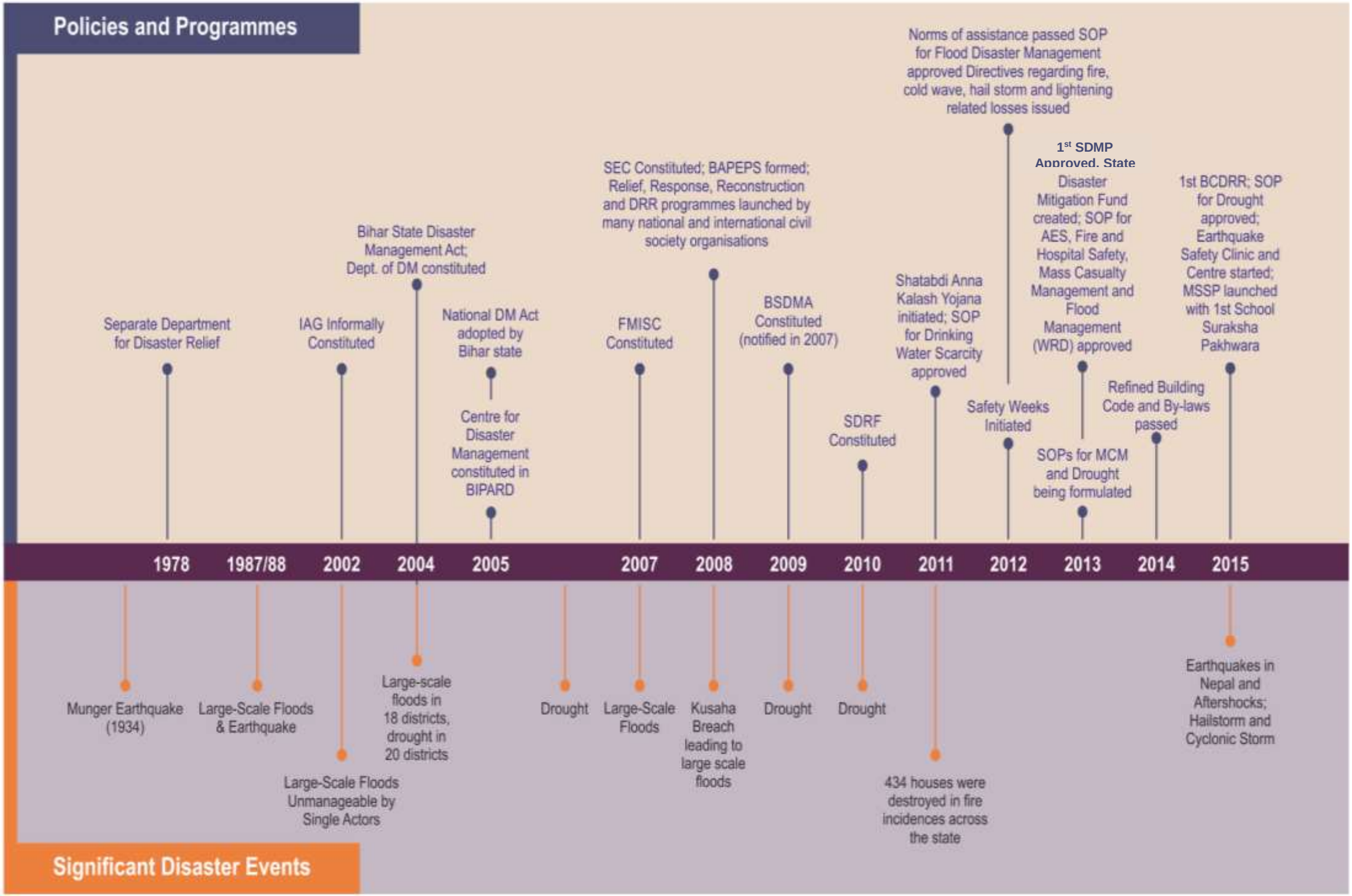
Table 1: DRR Initiatives and Achievements in Bihar

DRR Initiatives and Achievements in Bihar till 2015	
Policies	• Flood Control Policy • Kosi Rehabilitation and Reconstruction Policy • Agricultural Roadmap • Bihar Action Plan on Climate Change • *Shatabdi Anna Kalash Yojana*
Institutions	• Crisis Management Group (CMG) • State Executive Committee (SEC) • Disaster Management Department (DMD) • Bihar State Disaster Management Authority (BSDMA) • National Disaster Response Force (NDRF) • State Disaster Response Force (SDRF) • District Disaster Management Authority (DDMA) • Bihar Institute for Public Administration and Rural Development (BIPARD) • Flood Management Information System Centre (FMISC) • Bihar Aapda Punarvasan Evam Punarvikas Society (BAPEPS) • Bihar State Institute of Disaster Management (BSIDM) • Bihar Inter Agency Group (BIAG)
Policy Instruments	• State Disaster Management Plan (SDMP) • State Disaster Relief Fund • Building code and Bye-Laws • Standard Operating Procedures (SOPs) for Flood, Drought, Drinking Water Scarcity, Mass Casualty Management, Fire and Hospital Safety, AES, and Flood Management • Directives • Guidelines • District Disaster Management Plans (DDMP) • Reporting Form IX
Infrastructure, materials and equipment	• Emergency Operations Centre • District-level Disaster Management Warehouses • Communications and transportation equipment • Search and rescue equipment • SDRF Base with search and rescue equipment • Flood Shelters
Capacity Building	• Search and Rescue • Community Preparedness • Safe Construction • Mock Drills • Advance trauma and life support through QMRT • Earthquake resistant construction • Rapid Visual Screening

Public Awareness and Education	• Hazard-specific Safety Weeks • Bihar Diwas • IEC Materials
Risk Assessments	• Flood Hazard Atlas • Flood Management Information • Risk Informed Development Planning – System (RIDP-S)
DRR Programs	• Kosi Flood Recovery Project • School Safety Programmes • Community Based Disaster Risk Reduction Programmes

Even as efforts are ongoing towards capacity building, strengthening the functioning of district level institutions like the District Disaster Management Authorities or public awareness campaigns, there is an increasing realisation of the need to invest more in disaster risk reduction. Incidents like the recent earthquake in Nepal (April, 2015), with its impact in the state of Bihar, have further reinforced the need for risk-informed development planning; a commitment that was also made at the Third World Conference on Disaster Risk Reduction in Sendai in March 2015. The Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted at this conference as a successor to the Yokohama Strategy and Plan of Action for a Safer World (1994) and the Hyogo Framework for Action (2005). Drawing from lessons since 1994, the SFDRR stresses the need for "enhanced work to reduce exposure and vulnerability, thus preventing the creation of new disaster risks, and accountability for disaster risk creation are needed at all levels." It exhorts that "more dedicated action needs to be focused on tackling underlying disaster risk drivers, such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization, poor land management and compounding factors such as demographic change, weak institutional arrangements, non-risk-informed policies, lack of regulation and incentives for private disaster risk reduction investment, complex supply chains, limited availability of technology".

In light of the experiences of disaster management so far, as well as those at Sendai, Japan, the Government of Bihar decided to develop the state's Roadmap for Disaster Risk Reduction (2015-2030).


Policies and Programmes
Separate Department for Disaster Relief
IAG Informally Constituted
Bihar State Disaster Management Act; Dept. of DM constituted
National DM Act adopted by Bihar state
Centre for Disaster Management constituted in BIPARD
FMISC Constituted
SEC Constituted; BAPEPS formed; Relief, Response, Reconstruction and DRR programmes launched by many national and international civil society organisations
BSDMA Constituted (notified in 2007)
SDRF Constituted
Shatabdi Anna Kalash Yojana initiated; SOP for Drinking Water Scarcity approved
Norms of assistance passed SOP for Flood Disaster Management approved Directives regarding fire, cold wave, hail storm and lightening related losses issued
Safety Weeks Initiated
1st SDMP Approved, State Disaster Mitigation Fund created; SOP for AES, Fire and Hospital Safety, Mass Casualty Management and Flood Management (WRD) approved
SOPs for MCM and Drought being formulated
Refined Building Code and By-laws passed
1st BCDRR; SOP for Drought approved; Earthquake Safety Clinic and Centre started; MSSP launched with 1st School Suraksha Pakhwara
1978
1987/88
2002
2004
2005
2007
2008
2009
2010
2011
2012
2013
2014
2015
Munger Earthquake (1934)
Large-Scale Floods & Earthquake
Large-Scale Floods Unmanageable by Single Actors
Large-scale floods in 18 districts, drought in 20 districts
Drought
Large-Scale Floods
Kusaha Breach leading to large scale floods
Drought
Drought
434 houses were destroyed in fire incidences across the state
Earthquakes in Nepal and Aftershocks; Hailstorm and Cyclonic Storm
Significant Disaster Events

From Sendai to Patna

On 13th-14th May 2015, Government of Bihar organised the first Bihar Conference on Disaster Risk Reduction (BCDRR) towards the development of Bihar's DRR Roadmap. BCDRR was conceptualized and organised around 18 themes drawn from the Sendai Framework for Disaster Risk Reduction[2] (SFDRR), wherein SFDRR's 4 Priority Areas and recommended action points were interpreted and contextualised[3] in accordance with local realities and priorities of Bihar. This contextualisation process accounted for (1) the progress already made towards disaster risk reduction in the state, (2) the disaster risk reduction needs emerging from differential risks and (3) the priorities and expressed aspirations in this regard by the Government of Bihar (GoB).

BCDRR was inaugurated by the Hon. Chief Minister of Bihar and saw the presence of senior national and state level bureaucrats, present and former NDMA members, delegates from GSDMA and UPSDMA, UN agencies, civil society representatives from across the state, District Magistrates, district level officials of various departments, PRI representatives, private sector representatives, national and state level media houses, and community members including children from disaster-prone areas of Bihar. At this conference,

- Hon. Chief Minister released a 'Status Paper' of actions and achievements in disaster management in Bihar between 2005 and 2015.
- 84 panellists and 550 participants discussed the issues and specific actions that needed to inform Bihar's DRR roadmap in 17 thematic sessions. 10 agencies (both government and civil society) from Bihar anchored these sessions and produced 2-pagers for each session to inform the roadmap development process.
- 18 papers were submitted towards the conference themes and compiled into a compendium of papers.
- The Minister for Disaster Management released the 'Patna Declaration', comprising 10 commitments by the GoB for the time period 2015-2030, towards a Disaster Resilient Bihar.

Post-BCDRR: Roadmap Development Process

BCDRR was one of the primary sources of input for the roadmap development process. In addition to the deliberations and discussions at the conference, the following processes informed the roadmap development (for details, see *Annexure 1*)

1. Constitution of a Roadmap Drafting Committee comprising members from the DMD, BSDMA, UN Agencies, and civil society representatives.
2. Submission of 18 papers on BCDRR themes with recommendations for actions in the roadmap.

[2] See, http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf (Accessed on 15.07.15)
[3] For more details, see GoB (2015) Background Paper: Bihar Conference on Disaster Risk Reduction

3. Contributions by 19 civil society organisations from Bihar and 13 individual contributors (including contributions from the Solutions Exchange Community, the BCDRR groups of panellists and responses to the newspaper advertisement by Department of Disaster Management)
4. Review of documents, including the state's existing key policy documents like the Mission Manav Vikas, Agriculture Roadmap (2012-17), Health Roadmap, and the State Action Plan on Climate Change, SOPs, Guidelines & directives issued by DMD, Status Paper on Disaster Management in Bihar (2005-2015) as well as the Sendai Framework for Disaster Risk Reduction (2015) and other[4] policy documents on DRR. The State Disaster Management Plan was reviewed for ensuring coherence and linkages with the recommended actions in both the documents.

Figure 2: CONTRIBUTIONS TO THE DRR ROADMAP

[4] See Annex 1 for details.

Chapter 2

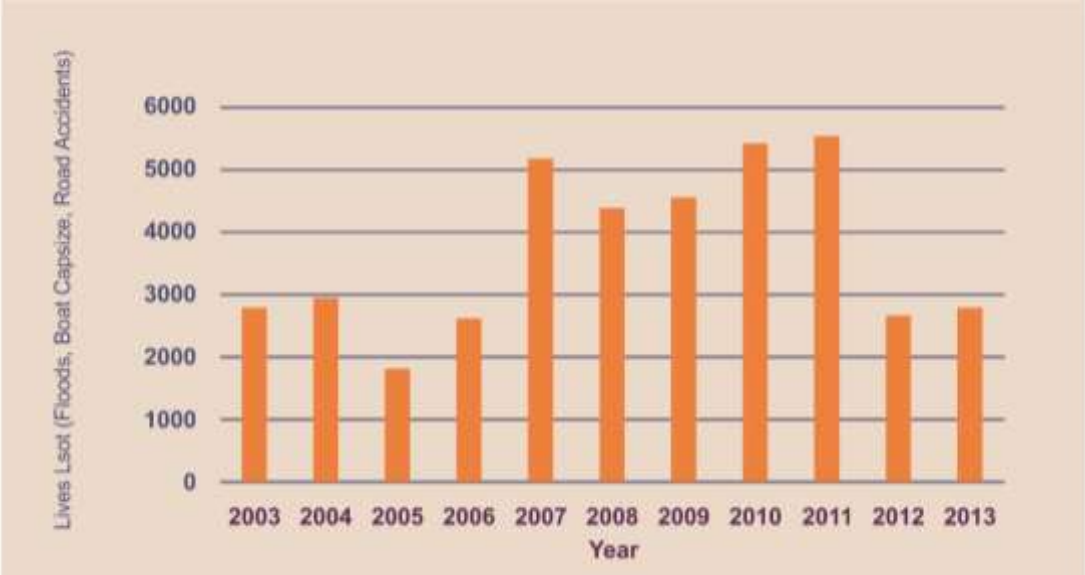
DISASTER RISK PROFILE OF BIHAR A SNAPSHOT

2. Disaster Risk Profile of Bihar: A Snapshot

Nature of disaster risks

Disaster risks in Bihar emanate from the interplay of multiple contributing factors. The state is prone to natural hazards, including floods, earthquakes, drought, cyclonic storms, fire, hailstorms, lightning, heat wave, and cold wave. The prevalence, frequency and severity of these hazards varies across the 38 districts[5]. 28 districts have been recognised by the Government of Bihar as being flood prone, and 13 as being drought prone. 11 districts fall in seismic zone V of which 2 districts (Madhubani and Supaul) fall entirely in seismic zone V; 30 districts fall in seismic zone IV and 13 districts in seismic zone III, with most districts falling under multiple seismic zones[6]. Apart from the natural hazards, boat capsizing, road accidents and stampedes have emerged as major causes of life loss in the recent past. 514[7] lives have been lost in the state because of lightning between 2010 and 2015; 2204[8] because of boat capsizing incidents and 34,914[9] because of road accidents between 2003 and 2013.

Figure 3: DISASTER MORTALITY IN BIHAR- 2003-13



Source: Disaster Management Department, GoB, Database

[5] See for example, the multi-hazard map of the state: Department of Disaster Management, Government of Bihar, http://disastermgmt.bih.nic.in/Map/Maps.htm

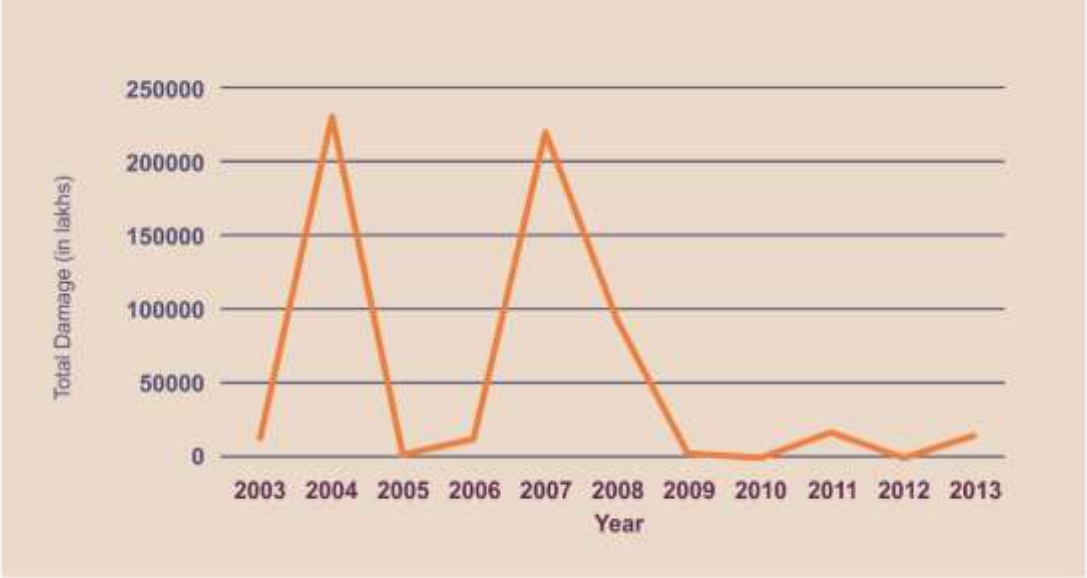
[6] GoB (2013) State Disaster Management Plan, Pp. 47 and 48

[7] DMD; INR 770.49 lakhs were expended as ex-gratia from 2010 and 2015 for lightning related deaths. INR 1 Lakh was provided from 2010 to 2011-12 while INR 1.5 lakh was provided from 2012-13 to 2014-15 and INR 4 Lakh is provided from 2014-15 onwards to the families of the deceased in case of lightning related deaths.

[8] National Crime Records Bureau, Accidental Deaths and Suicides in India (ADSI) Reports

[9] GoI, Ministry of Road Transport and Highways, Road Accidents in India (http://morth.nic.in/index2.asp?slid=311&sublinkid=141&lang=1 Accessed on 01.07.15)

Figure 4: FLOOD RELATED FINANCIAL LOSSES (INR) IN BIHAR-2003-13



Source: Disaster Management Department, GoB, Database

While the earlier cited twelve hazards[10] are the currently known hazards in Bihar, extreme weather events, changes in temperature and precipitation[11] and uncertain weather patterns are also increasingly being witnessed, with reported[12] impacts on agricultural produce and increased incidents of localised droughts and floods. The State Action Plan for Climate Change lays down the analysis and strategies for addressing climate change impacts; yet, tracking these changes will remain critical for disaster risk reduction as well, especially from the perspective of emerging hazards in the future.

A detailed analysis of the existing hazards in Bihar has been presented in the State Disaster Management Plan (2013). This section presents a snapshot of the disaster risk profile of the state to guide and contextualise the actions in the DRR Roadmap. This has been done by grouping the 38 districts into three groups, with their hazard profiles as the primary criteria for grouping. Group A comprises 10 districts that are highly prone to floods and fall under Earthquake Seismic Zone V; Group B comprises 15 districts that are flood prone and fall under Earthquake Seismic Zone IV; Group C comprises the 13 drought prone districts. Additionally, Group A and Group B districts witness incidents of boat capsizing. **Proneness to fire, cyclonic storm, hail storm, heat wave, cold wave, lightning, road accidents and stampede is assumed for all three groups**, with the recognition that their frequency and severity may vary between districts but not as significantly that of floods, droughts and earthquakes.

[10] Flood, Earthquake, Cyclonic Storm, Hail Storm, Drought, Heat Wave, Cold Wave, Lightning, Road Accidents, Boat Capsize, Fire, and Stampede

[11] GoB (2012) State Action Plan on Climate Change

[12] See for example, Impact of climate change on wheat and winter maize over a sub-humid climatic environment, A.V.A Haris et al., Current Science, Volume104, NO. 2, January 2013

The group-wise districts are presented in the Table 1 below:

Table 2: District grouping as per hazard profile

Group	Profile	Constituent Districts
Group A Districts	Flood Prone and Earthquake Zone V Boat Capsize	10 viz. Araria, Drabhanga, East Champaran, Kishanhanj, Madhepura, Madhubani, Saharsa, Sheohar, Sitamarhi and Supaul
Group B Districts	Flood Prone and Earthquake Zone IV Boat Capsize	15 viz. Begusarai, Bhagalpur, Gopalganj, Katihar, Khagariya, Muzaffarpur, Nalanda, Patna, Purnia, Samastipur, Saran, Sheikhpura, Siwan, Vaishali and West Champaran
Group C Districts	Drought Prone and Earthquake Zone III	13 viz. Arwal, Aurangabad, Banka, Bhojpur, Buxar, Gaya, Jamui, Jehanabad, Kaimur, Lakhisarai, Munger, Nawada and Rohtas
All Districts in Groups A, B and C prone to fire, cyclonic storm, hail storm, heat wave, cold wave, lightning, road accidents and stampede.		

In addition to hazard-proneness, disaster risks in the districts are a function of the existing vulnerabilities and capacities of communities and governance systems. For example, districts like Araria or Madhepura, with high flood and earthquake proneness as well as comparatively poorer performance on human development indicators (like high rates of malnutrition) face a very high level of disaster risk. Given this, a second layer of analysis was undertaken for the three groups to present a brief snapshot of the existing disaster risks. All the districts within Groups A, B and C were analysed for their performance on 14 selected[13] human development indicators, as reflected in the state's Manav Vikas Mission Roadmap[14] as well as three additional indicators for housing, urbanisation and exposure to hazards. The districts' performance on these indicators was analysed in comparison with the state's average.

[13] Indicators for Health, Education, Nutrition, WASH were selected. For a list of all 17 indicators, *Annex 2*

[14] GoB, Planning Department, Roadmap to Mission Manav Vikas (http://planning.bih.nic.in/Documents/DOC-01-01-01-2014.pdf Accessed 01.07.15)

This preliminary[15] analysis[16] of disaster risks highlighted the following salient points about the three groups:

Group A

Exposed to high flood and earthquake proneness, Group A districts experience a range of other human development challenges. For more than half of the indicators selected (9 indicators), the poorest performing districts lie in Group A. For example, of the 10 districts with the highest IMR in the state, 6 lie in Group A. The two districts (Madhepura and Araria) with the highest prevalence of underweight children in the state lie in this group. Araria, Kishanganj and Supaul have the lowest access to sanitation facilities in the state (less than 10% of households in the district having latrines in their premises). Similarly, Sitamarhi, Madhepura and Saharsa have the lowest availability of toilets in schools.

Further, all 10 districts in Group A have less than 20% institutional births; all but one district have poor access to sanitation facilities; and 7 out of 10 districts in the Group have higher percentage of diarrhoeal cases than the state average, with Saharsa having the highest percentage in the state. All the 10 districts score lower than the state average on secondary school attendance, with Kishanganj having the lowest literacy rate in the state.

5 out of 10 districts in this group have been identified as having water source with iron contamination and 8 out of 10 districts in the group have vulnerable material of wall in houses.

It emerges from this analysis that Araria, Sitmarhi, Supaul and Madhepura have the highest level of disaster risk in Group A, with Araria and Sitamarhi having high health related disaster risks (performing worse than the state average on all the chosen health indicators).

Group B

Group B districts not only face a medium level proneness to floods and earthquakes, but also emerge as performing better on the selected human development indicators than Group A. Siwan, Sheikhpura, Saran, and Nalanda emerge as the comparatively lower risk districts in this group, performing better than the state averages on many of the selected indicators. While Patna also performs better on the human development indices, its significantly high urban population density and unsafe urban landscape coupled with earthquake proneness (Zone IV) make Patna city a high disaster risk area.

Despite the comparatively lower level of risks, more than half of the districts in this group have IMR's higher than the state average, have less than 20% institutional deliveries, higher prevalence of

[15] As opposed to an exhaustive one, wherein many more indicators can be analysed, including mortality and damage trends about past disasters. Requiring both- consensus about the indicators as well availability of data- such an analysis is yet to be conducted in Bihar. A pilot initiative along these lines by UNICEF, called Risk Informed Development Planning System (RISP-S), is currently ongoing.

[16] Data sources for the analysis have been provided in Annexure 2.

underweight children, high percentage of anaemic adolescent girls and high percentage of households without access to latrines within their premises. 11 out of 15 districts have water sources with either arsenic, fluoride or iron contamination.

It is also notable that the districts in this group perform comparatively better on the selected education indicators and that only 3 out of the 15 districts in this group have a high percentage of houses with vulnerable materials of walls.

Finally, Purnia, Katihar, East Champaran and Bhagalpur emerge as having the highest disaster risk in Group B, with Purnia having poorer performance than the state average on most of the indicators, increasing urban agglomerations, second highest percentage of houses with vulnerable material of walls in the state as well as recent history of experiencing cyclonic storms.

Group C

The nature of disaster risks in this group emerge as qualitatively different from those of Groups A and B. In comparison to the districts in the other groups, Group C has the maximum (58%) districts without access to improved drinking water sources. This is notable because, unlike other human development indicators, only 29% of the state's 38 districts have lesser access to improved drinking water sources than the state's average, and a large part of this is classified in Group C. Further, almost all districts in this group have habitats with either arsenic or fluoride contamination in the water sources.

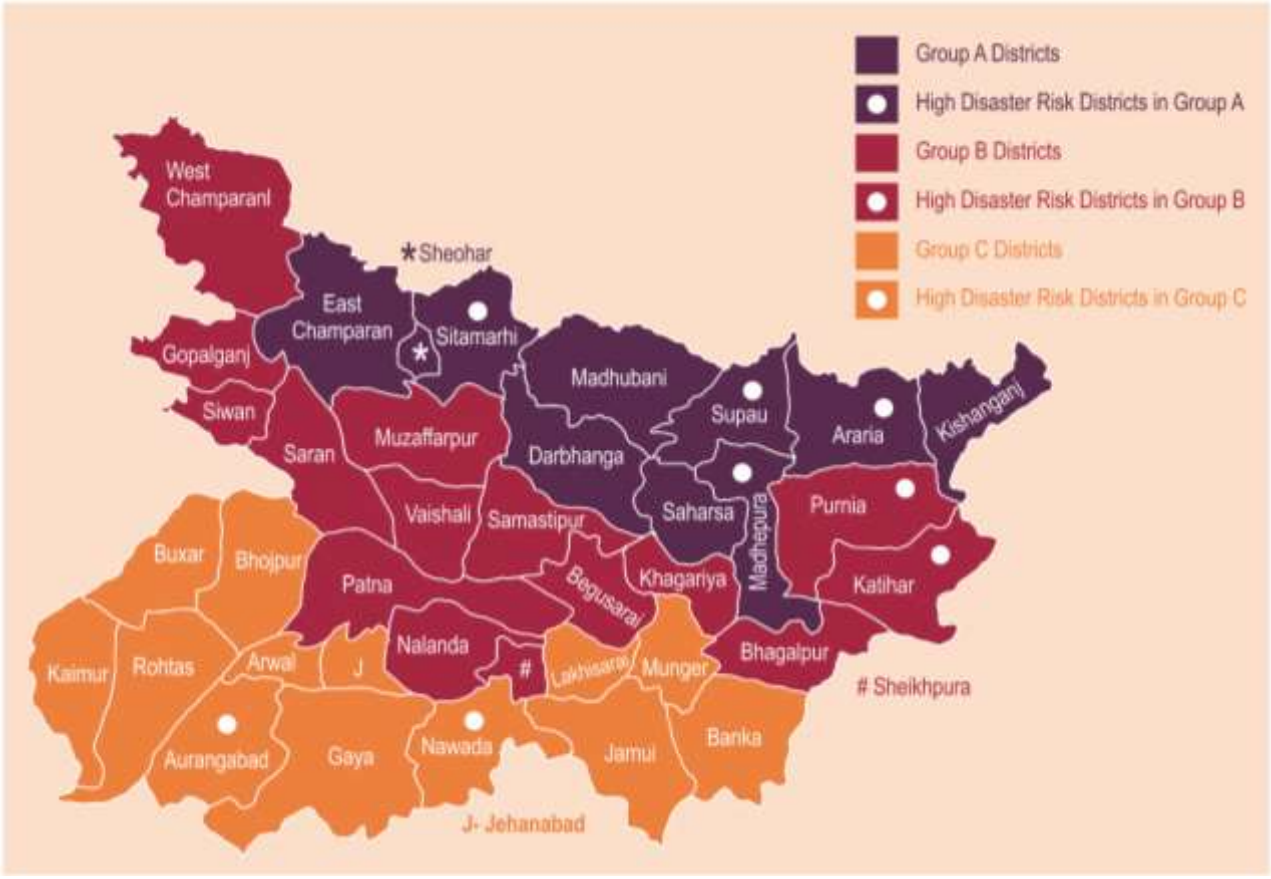
The districts in Group C also display significantly lesser rates of immunization in comparison to the districts in the other groups.

In contrast, this group also has some of the better performing districts in the state on institutional deliveries, prevalence of underweight children, percentage of anaemic adolescent girls, percentage of secondary school attendance as well as material of walls in houses.

Overall, Nawada, Aurangabad and Banka have the highest disaster risk in Group C, with Nawada scoring higher than the state average on all the chosen health indicators and the lowest percentage of immunization the state.

Figure 5 below, depicts the three groups along with the high risk districts within these groups.

Figure 5: DISASTER RISK BASED GROUPING OF DISTRICTS IN BIHAR



Chapter 3

FOUNDATIONAL ELEMENTS OF THE ROADMAP

3. Foundational Elements of the Roadmap

This section provides the foundational principles of the roadmap in the form of the guiding principles, approach to implementation and the framework for organising specific actions within the roadmap.

3.1 GUIDING PRINCIPLES FOR THE DRR ROADMAP

Principles, by definition, implicitly emphasise fundamental truths or general rules to be adhered to. The DRR Roadmap will be grounded in the following sixteen principles as the ethical base for action. Offering a mix of the feasible and the desirable, these principles seek to provide direction to the interpreters and implementers of the DRR Roadmap for decision making and for guiding practical action for advancing DRR.

These draw from the spirit of the National Disaster Management Act (2005) and Policy (2009), the Sendai Framework for Disaster Risk Reduction (2015) and the enduring lessons from the practice of disaster risk reduction in Bihar as also reflected in the Patna Declaration (2015). In essence, they are based in the inherent social contract between the citizens of Bihar and the state government wherein the government's actions are directed towards the well-being and safety of the citizens, and for which, the citizens agree to be governed. The fulfilment of this social contract means the realization of rights and the practice of responsibilities by both the right-holders and duty-holders. This not only includes the duties of the state and citizens to each other but also the duties of the citizens towards themselves and other citizens for ensuring disaster risk reduction.

The Principles:

1. **Primacy of rights of at-risk people and communities:** Governance-related decision making processes including agenda setting, gathering information, opinion forming, taking and implementing decisions at all levels will prioritise the well-being, protection and safety of at-risk communities through risk-informed development action. This will be undertaken with the realisation that 'at-risk' is not a homogenous group and some communities and groups (including those who are not community members like travellers, migrants and temporary residents) are more at-risk than others.

2. **Participation of and action by at-risk communities:** At-risk Communities, including children, women and men, and other primary stakeholders will have the right to participate in decisions influencing the level of disaster risk to their lives, communities and regions.

3. **Risk Realisation:** Disaster risk reduction actions will be carried out with the recognition that disaster risks can be created because of development actions, and that risk reduction has to be done within the development paradigm through risk-informed policy formulation, development planning, resource allocation, targeting, implementation, monitoring-review, and communication.

4. **Polycentric Governance:** Disaster risk reduction is the primary responsibility of the government; yet, it will not rest with any one governance institution (like the DMD) alone. Given that DRR is multi-stakeholder and multi-level, the governance of the same will be undertaken by all the line departments as well as non-government institutions like civil society organisations, citizen's groups, village committees, farmers groups, and such who may sometimes be better poised to take decisions about localized risks. Multiple actors will be connected by the vision and direction agreed in this roadmap and will prioritise coordination, flexibility and responsiveness to achieve this.

5. **Partnership:** Disaster risk reduction actions will be undertaken with the recognition that reduction of risk creation and management of created risks requires collective and inclusive action. The contribution of skills, resources and capacities by multiple stakeholders including government, UN Agencies, civil society organizations, private sector, and at-risk communities will be nurtured through collaborative actions.

6. **Coherence and consistency across policies, programs and plans:** Resource allocation and implementation of actions will be undertaken in coherence with other actions seeking to address underlying drivers of disaster risk like climate change adaptation and environmental sustainability, for e.g. the Agricultural Roadmap, Mission Manav Vikas, State Action Plan for Climate Change, and such.

7. **Transparency and Accountability:** The citizens of Bihar will have a right to timely information about disaster risks and the risk reduction actions being undertaken to address them. The actions in the roadmap will be undertaken against an agreed upon baseline against which progress will be measured, and citizens will have the right to information about this progress.

8. **Resilience in Development (*Vikas aisaho jo aafat se bachaye, vikas aisa naho jo aafat ban jaaye*[17])**: Disaster risk reduction actions will be undertaken towards resilience building within development (as opposed to resilience to disasters), with the recognition that resilience is not a fixed end state but a dynamic set of conditions and processes. Underpinning resilience is the need for better analysis of risk at different spatial and temporal levels and for this analysis to inform development planning processes and goals.

9. **Praxis:** Given that neither disaster risks nor the state of resilience is static, disaster risk reduction actions will be undertaken through continuous cycles of action, reflection, learning, and planned action.

[17] Slogan coined by BSDMA translated as: "Development should be such that it safeguards from disaster and not such becomes a disaster".

10. **Inclusive DRR:** Disaster risk reduction actions will account for the fact that disaster risks are experienced differently by different sections of the population, including children, women, the elderly, people with disabilities, and other traditionally marginalised groups[18]. Additionally, in conjunction with the principle of partnership, disaster risk reduction actions will be inclusive of the different kinds of disaster risk reducers, including government, civil society, community institutions at all levels.

11. **Right to safe and secure environment:** All the citizens of Bihar have the right to inhabit in a safe and secure environment. This will not only entail the duty of the state to provide this right to the citizens of Bihar but also the duties of citizens towards ensuring a safe and secure environment for other citizens, with special attention to vulnerable groups.
12. **Do No Harm:** Risk reduction actions will be undertaken in such a way so as to not create environmental harm or exacerbate any existing or potential conflict.
13. **Investing in the future through focus on schools:** Disaster risk reduction actions will be undertaken with the recognition that investing in children and young people not only reduces risk in the present but also secures the future by bringing about a culture of risk reduction. This will be done through an intensive focus on the schools of Bihar through the *Mukhya Mantri School Safety Programme*.
14. **Culture of preparedness (*Aapda Nahi Ho Bhaari Yadi Poori Ho Tayyari*[19]*):*** Disaster risk reduction actions will be undertaken with the recognition that there will always be a chance of residual risks translating into disasters, in which case, timely and adequate actions will be taken through the organised capacity of Government to alleviate suffering because of disasters. Actions in the roadmap will seek to strengthen preparedness for response and recovery such that these are undertaken within the development functions as carried out by the line departments.
15. **Build back better:** Post-disaster recovery and reconstruction will be undertaken as opportunities to rebuild infrastructure, capacities and systems in such a way that they reduce disaster risk in the long term.

[18] Vulnerability is understood here as conditions arising from social, physical, economic and environmental factors that increase the susceptibility of individuals or communities to the impact of hazards. Children, women, older persons, pregnant and lactating mothers, People with Disabilities (PWD), people living with life threatening diseases, People Living with HIV and AIDS (PLHA), SC/ST, LGBT, and Minorities (socio-economic and religious) have been recognised as vulnerable groups in the Roadmap with the acknowledgement that vulnerable groups also possess capacities that must be considered while designing and implementing DRR actions.

[19] Slogan coined by BSDMA translated as: “Disaster impact would be less if preparedness is apt”.

3.2 APPROACH TO IMPLEMENTING THE ROADMAP

The implementation of the DRR Roadmap will be undertaken with the following approach.

- **Multi-hazard focus:** Actions will account for multiple hazards affecting Bihar, including but not limited to, floods, droughts, earthquakes, fire, cyclonic storms, hailstorms, cold wave, heat wave, road accidents, boat capsize, stampede and lightning. The multi-hazard approach will not only mean that different hazards will require hazard-specific actions to be undertaken, but also that any action should consider the impact of more than one hazard during planning and implementation.
- **Phasing and temporal implementation:** The 15 year roadmap will be implemented in three phases: short (5 years), medium (10 years) and long term (15 years). Some actions may be implemented in the short term only, while others may begin immediately but reach completion only in the medium or long term. Similarly, there may be actions that need to be undertaken throughout. This phasing will be informed by the following considerations:
    - **Feasibility:** The low-hanging fruits will be sought in the short term, including actions that already have buy-in, have been proven for efficacy through pilots and/ or have already been initiated.
    - **Emergency Support Functions:** The DRR roadmap will account for the possibility of disasters necessitating response and recovery actions. Towards this, strengthening of emergency support functions of the line departments for improved response and recovery planning will get adequate attention in the phasing of actions.
- **Geographical diversity:** Given that disaster risks manifest differently across different geographies, the same disaster risk reduction action may have different practical manifestations across different geographies.
- **Enabling policy environment will be essential but not conditional:** It would be sought that disaster risk reduction actions are rooted in a robust policy context. At the same time, with the recognition that policy changes take time, actions will not be conditional on the policy change. Whatever is doable will be undertaken as soon as possible.
- **Project-approach for few selected actions:** While most actions will be undertaken so as to be mainstreamed into ongoing development activities, some actions or group of actions in the roadmap will be undertaken as time and budget-bound projects or pilots to ensure that scaling up into development activities is informed by cycles of action-reflection-action.
- **Implementation arrangements:** Implementation of the roadmap will be backed by appropriate institutional arrangements. Partnerships with civil society organisations and UN Agencies will be critical element of the implementation arrangements, as is embodied in the roadmap development process as well. All actions will be supported by appropriate monitoring and evaluation mechanisms.

3.3 DRR ROADMAP FRAMEWORK

One of the guiding principles for this roadmap emphasises 'resilience in development'. This principle has also been chosen as the organising principle for the actions within this roadmap. With conceptual origins in understanding the properties of building materials, and application in diverse fields like ecology and psychology in the 1970s, the concept of resilience has increasingly gained prominence within the disaster risk reduction discourse in the past decade. Despite this prominence, interpretations about its definition, manifestations and practical application continue to be diverse and varied.

What, then, is the space and utility of this concept in Bihar's DRR roadmap?

Understood simply as, "the capacity of an individual, household, community or system to **anticipate, absorb (through effective preparedness, response and mitigation) and recover from** hazards and other shocks and stresses without compromising its existence and functioning in the long term", resilience provides clarity about both the 'end' and the 'means' for disaster risk reduction actions in this roadmap. Providing the 'desired state' of communities and systems in Bihar, **resilience, becomes the goal** that the disaster risk reduction actions in this roadmap should lead Bihar towards…"A Resilient Bihar". It will also underpin the targets and milestones that are set towards the fulfilment of this goal. As for the 'means', resilience is helpful as an organising principle by raising the question: what are the components of a resilient Bihar? This has been unpacked through five components or **building-blocks**:

1. Resilient Villages
2. Resilient Livelihoods
3. Resilient Critical infrastructure
4. Resilient Basic Services, and
5. Resilient Cities

The desired state of communities in Bihar is framed within 'Resilient Villages' and 'Resilient Cities' components, keeping in mind the two distinct demographic and governance profiles of Bihar (rural and urban) and to ensure that the DRR actions approach each one as a composite administrative unit of risk-informed planning.

The desired state of systems is reflected in 'Resilient Livelihoods', 'Resilient Critical Infrastructure' and 'Resilient Basic Services' in order to emphasize actions towards the three essential areas (critical infrastructure, basic services and livelihoods) that get hampered due to shocks and stressors and planning for which needs to be risk-informed.

Specific actions within this roadmap have been organised such that targets, milestones and hazard-specific action points have been identified for each one of the five components. Subsequently, the accountability, monitoring and evaluation aspects have also been developed within this framework.

The specific actions have been detailed with cognisance of the fact that these building-blocks or components are not mutually exclusive, and neither is there resilience.

In summation, the framework for this DRR roadmap is grounded in resilience because of the following key reasons:

- It has the potential to motivate and galvanise actions and energies towards a **collectively envisioned goal**,
- It widens the pitch of disaster risk reduction actions in the roadmap towards safeguarding development gains from **multiple shocks and stressors** (as opposed to only known hazards), while at the same time, retaining their hazard-specificity for clarity of action,
- It enables the framing of a seemingly intractable problem within **coherent** (albeit interconnected) **building blocks**, which unlike the earlier framing of sector-specific, department-specific or vulnerable group-specific actions, take a more holistic view of people's lives, struggles and solutions.

The DRR Roadmap Framework is presented in Figure 6 below.


Vision
Disaster Resilient Bihar
Resilient Villages
Resilient Livelihoods
Resilient Basic Services
Resilient Critical Infra-structure
Resilient Cities
Targets
1.
2.
3.
Milestones (2015-30)
1.
to
10.
Specific Actions, Responsible Actor And Timeline
Overarching
Hazard-specific: w.r.t. hazards relevant to this component
Specific Actions, Responsible Actor And Timeline
Overarching
Hazard-specific: w.r.t. hazards relevant to this component
Specific Actions, Responsible Actor And Timeline
Overarching
Hazard-specific: w.r.t. hazards relevant to this component
Specific Actions, Responsible Actor And Timeline
Overarching
Hazard-specific: w.r.t. hazards relevant to this component
Specific Actions, Responsible Actor And Timeline
Overarching
Hazard-specific: w.r.t. hazards relevant to this component
Roadmap Monitoring And Evaluation Plan

Chapter 4

TARGETS AND MILESTONES

4. Targets and Milestones

The Sendai Framework for Disaster Risk Reduction (2015) sets 7 global targets (See Annexure 4) to support the assessment of progress in achievement of the goal set by the framework for disaster risk reduction. Bihar's Roadmap for Disaster Risk Reduction adapts three targets contextualised for Bihar to meet the goal of a 'Disaster Resilient Bihar'. These targets have been set with the recognition that baselines for the same currently do not exist and will be developed as an immediate next step in the implementation of this Roadmap. This has been detailed in Section 9: Monitoring and Evaluation Framework.

Milestones have also been identified towards the achievement of these targets for three time markers – 2020, 2025 and 2030. These are presented below:

Targets

1. Disaster induced mortality in Bihar would be reduced by 75% of the baseline level by 2030.
2. People affected by disasters in Bihar would be reduced by 50% of the baseline level by 2030.
3. Economic loss due to disasters in Bihar would be reduced by 50% of the baseline level by 2030.

Milestones

Milestone	SFDRR Priority
BY 2020:	
1. Baseline status for each of the three targets is developed.	2
2. Structural safety audits of all government offices and social infrastructure (such as Anganwadi Centers, Schools, Hospitals, Panchayat Bhawans) is completed and corrective measures initiated.	3
3. Emergency Support Functions are notified and made operational with fully-functional Emergency Operations Centers (EOCs) at state and district levels.	4
4. Structural resilience of all commercial buildings (such as malls, cinema halls and other public places of mass gathering) is ensured.	3
5. Annual plans and PIPs of all line departments and annual plans of local self government (LSG) institutions (PRIs and ULBs) account for current and emerging disaster risks from a comprehensive multi-hazard risk	2

analysis point of view through participation of women, youth, adolescents, children, and men, particularly from the at-risk communities.	
6. All the line departments mandated to provide basic services and critical infrastructure have operational Business Continuity Plans –BCPs - (plans to ensure department functions return to 'business as usual' in the quickest time)	2
7. DDMAs are notified and strengthened with resources, mandates and capacities for playing an integral role in disaster risk reduction decision making at the district level.	2
8. An effective Early Warning System (EWS) is established, wherein all villages and cities in Bihar have systems for early warning information reception, dissemination and taking up immediate good enough pertinent action.	4
9. Communities understand and practice 'do's and don'ts' during disaster situations as a result of a state-wide public awareness and education campaign launched at all levels	1
BY 2025:	
10. Corrective measures, including retrofitting, for ensuring structural resilience of all government offices and social infrastructure are completed.	3
11. A system for Risk Informed Development Planning (RIDP) in adopted and operational in the state at all levels of planning.	1
12. All PRIs and ULBs are adequately empowered through funds, functions and functionaries to ensure resilience.	2
13. Communities in all villages and cities regularly monitor current and emerging disaster risks, including underlying risks, and assert for measures to be taken to address the same.	2
14. Platforms and mechanisms are institutionalized across Bihar for effective learning and sharing on DRR planning, implementing and drawing learning.	1
BY 2030:	
15. Policies and practices for livelihood related risk avoidance, transfer, sharing, and compensation are adopted by agriculture and small industry based livelihoods systems in Bihar.	3

16. Rural and urban habitat planning processes like land zoning, town and city development planning take into account existing and emerging disaster risks	2
17. All existing and new public and private buildings in Bihar are structurally safe from a multi-hazard perspective.	3

Chapter 5

SPECIFIC ACTIONS

5. Specific Actions

Each one of the 5 identified components of resilience has been unpacked in this section. Additionally, specific actions have been listed towards achieving the identified state of resilience. As a part of the roadmap development process, detailed actions have been identified along with the responsible actors, level of action (State, District, Block or Gram Panchayat) and the timeline for each component. The actions have been presented in brief in this section, while the detailed actions for each component are available as Annexure 3.

5.1 Component 1: RESILIENT VILLAGES

What is a resilient village?

A resilient village in the Bihar context is envisaged as a dynamic and proactive social unit wherein all individuals, households and the community as a whole are capable to:

- **Assess** through effective risk analysis and early warning systems,
- **Address** through risk informed development planning – including preparedness, response and mitigation actions, and
- **Recover** through effective planning for building back better,

from disasters without compromising its existence and functioning in the long term.

Characteristics of Resilient Village

1. Individuals, groups and communities recognise and act upon their rights and duties for a safe and secure environment.
2. Communities practice safe behaviours like constructing safe houses, safe cooking practices, timely relocation to safe spaces, construction and usage of toilets, practising safe hygiene practices, safe handling and storage of drinking water, sustainable livelihood choices and life practices.
3. The village is able to meet small-scale disasters on its own.
4. DRR is mainstreamed in GP level plans by undertaking regular multi-hazard risk analysis.
5. Vibrant community institutions drive the process of risk analysis, risk communication, preparedness and risk reduction actions:
    a. The village has a GP-level standing committee on DRR for supporting risk analysis and mainstreaming DRR in GP planning.
    b. The village has Community Emergency Response Teams (CERTs) for leading preparedness and response actions.
6. Communities have timely access to early warning information and emergency services like evacuation, safe spaces, search and rescue as well as other essential services.

7. Continuity of basic services such as health, education, nutrition, WASH, and housing, fodder and critical infrastructure like power, bridges, roads, telecommunications and irrigation is ensured in the village, with either no disruptions or rapid regaining of functionality in case of disruptions.
8. There is availability of and uninterrupted access to pre-positioned essential items and life-saving equipment for communities.
9. Risk analysis, planning, communication, preparedness and reduction measures are undertaken in an inclusive and participatory manner, accounting for differential needs and capacities of children, adolescents, women, men, differently -abled, and traditionally marginalized or minority groups.

Villages in Bihar

88.70%[21] of the population in Bihar is rural with 8874 Gram Panchayats and 44935 revenue villages[22]. Villages in Bihar vary in their size, demographic composition and nature of disaster risks, and thus, so does their level of resilience. While the sizes of villages vary (see Table 2) considerably, as many as 18.43% villages have more than 10,000 population with multiple constituent hamlets. This diversity and scale has informed the nature of actions for resilient villages in Bihar.

Table 2: Population Size of Villages in Bihar[20]

Population Size	Percentage of villages in Bihar
Less than 200	0.27 %
200-499	1.76 %
500-999	6.04 %
1000-1999	15.86 %
2000-4999	34.00 %
5000-9999	23.64 %
More than 10000	18.43 %

Actions for Resilient Villages

The above-mentioned characteristics of resilient villages will be achieved through focussed actions of different types, including targeted and planned capacity building of different actors, communication and awareness activities aimed at attitudinal and behaviour changes, and creating an enabling policy and risk governance environment. Additionally, actions to achieve the resilience of villages **will not be limited to actions at the village-level itself, but also include actions at the state, district and Panchayat / block levels**. Key nodal departments responsible for undertaking actions for resilient villages are DMD, PRD, Planning Dept., WRD, RDD, and Fire Dept. Mobilization of community based

[20] Census of India, 2011, http://www.censusindia.gov.in/2011census/A-3_Vill/Statements%201-1.pdf (Accessed 10.07.15)
[21] Census of India, 2011
[22] Socio Economic Caste Census 2011 (See, http://www.secc.gov.in/staticReportData?getReportId=S_1); These numbers are 8471 and 45103 respectively according to the Census of India, 2011 (See, http://www.planning.bih.nic.in/)

institutions and volunteer groups such as Anganwadi workers, Accredited Social Health Activists (ASHA), Red Cross/Crescent volunteers, Youth Club, women's groups, etc. will be one of the main strategies for enhanced resilience at the community levels.

Resilient Village Programme (RVP)

Mukhya Mantri Aapda Surakshit Gram Karyakram

A 'Resilient Village Programme', on the lines of Community Based DRR Programmes (CBDRR), will be initiated in partnership with civil society organizations and UN Agencies. This will be undertaken in a phased manner across all districts of Bihar over the course of fifteen years (2015-30), starting with an intensive pilot programme (2015-20) in all Group A districts and then scaled up (2020-2030) in all Group B and C districts. RVP will broadly focus on:

- Disaster risks recognition, understanding and analysis;
- Disaster risk informed Gram Panchayat level development planning, using participatory, comprehensive and scientific risk analysis;
- Risk reduction actions based on this planning, with a focus on vulnerable sections and areas
- Capacity building measures for risk analysis, risk-informed planning and risk reduction actions;
- Actions for targeted and planned communication for DRR.

Selected broad actions are presented below. Some of these will be undertaken as a part of the Resilient Village Programme, while others will be stand-alone actions. Some of these will be undertaken by the GPs while other will have to be at the district and state levels. A detailed list of specific actions is available in Annexure 3.

Disaster Risk Recognition, Analysis and Risk Informed GP Planning

1. Prepare a guideline for multi-hazard risk analysis to be used by the PRIs for regular risk analysis at village level and for risk-informed development planning.
2. Ensure risk analysis is undertaken by GP with participation of village level stakeholders, before the annual planning related Gram Sabha. This risk analyses will be consolidated at block level and annual reports including risk mitigation measures undertaken will be developed for the same.
3. Develop a "resilient village checklist" to guide efforts of all stakeholders towards resilient villages and assess all villages, on the basis of this checklist, to create a baseline status for the Resilient Village Programme.
4. Integrate in Gram Panchayat level development plans, the emerging actions (for preparedness, response, recovery, and risk reduction and mitigation) from the village level risk analysis and the assessment on resilient village checklist.
5. Ensure that DDMPs (i) account for the GP & block level risk analyses, (ii) include the multi-hazard preparedness, response and recovery actions by respective line departments as well as the district

-level emergency support function (ESF) systems and the Community Emergency Response Teams (CERTs), (iii) are reviewed and updated on an annual basis, and (iv) are audited once in five years.

6. Include application of technology and GIS mapping in the formulation, real-time monitoring and review of DDMPs.
7. Further, towards enhanced risk understanding and analysis:
    a. Complete the river behaviour analysis study.
    b. Conduct a Rapid Visual Survey (RVS) of existing public and community buildings (initial phase) and private buildings (second phase) from a multi-hazard perspective (including earthquake, floods and fire) in all the villages of Bihar. This can be undertaken through a campaign using a mix of methods -Self-Assessment by house-owners, field work as part of Masons' Training, deploying engineers from the Rural Engineering Service, GP level risk analysis, and participatory exercises in partnership with Civil Society Organizations.
    c. Undertake drought pattern analysis in the state.
    d. Identify the vulnerable areas (Dangerous *Ghats* and large grounds) as well as occasions (religious, socio-political gatherings, functions, protests, and such) having potential to cause stampede, analyse the reasons for possible causes of stampede at these vulnerable areas and develop a guideline of preparatory tasks to be undertaken before the function/ occasion.
    e. Undertake a comprehensive study to analyse the causes of road accidents and the changing nature of the same in Bihar.

Risk Reduction Measures

8. **Flood-specific:**
    a. Construct and/or identify flood-shelters at Gram Panchayat level in all Group A and B districts and fast-track the construction of remaining Flood Shelters under the *Kosi* Recovery Project.
    b. Construct high rise storage spaces for grains and fodder.
    c. Undertake measures to ensure effective drainage in water-logging areas, especially adjacent to the embankments as part of GP planning and MGNREGA Gram Sabhas.
    d. Undertake de-siltation of river beds.
    e. Ensure that construction of private and public buildings is in line with the natural drainage patterns and not inside the flood-line and in all villages and establish no-construction zones based on the flood vulnerability mapping.
9. **Earthquake-specific:**
    a. Ensure retrofitting of public and community buildings identified based on RVS and risk analysis in a phased manner.
    b. Ensure all the new construction of private, public and community buildings is as per the seismic zone-wise construction norms in all villages.

10. **Drought-specific:**
    a. Ensure timely release of water into irrigation canals.
    b. Research, develop and promote drought-resilient crop types and cropping techniques for rain-fed areas.
    c. Promote measures for rain water harvesting and soil water conservation through techniques like in situ water conservation, check dams, restoration of ponds, wells and canals.
    d. Ensure timely and effective dissemination of weather information.
11. **Fire-specific:**
    a. Research and development of low cost rural fire-resilient house designs and promotion of these designs.
    b. Undertake a fire-preparedness drive at the village level before the fire season in summer.
    c. Promote insurance seeking for private buildings and other assets for fire incidents.
12. **Road Accidents specific:**
    a. Put up appropriate signage pertaining to road safety on all village access roads and highways, especially in vulnerable stretches as well as undertake regular maintenance of the same.
    b. Create Quick Medical Response Team (QMRT) at the PHC level with an ambulance equipped with Advanced Life Saving (ALS) equipment for provision of quick medical support in case of road accidents.
    c. Set up a Road Safety Committee including women and youth at village level to promote road safety related behaviour amongst the residents of village and road safety related actions at the village level with special attention to the safety and security of girls and women, children, elderly and PWDs.
    d. Action against drunken driving and removal of liquor shops on village and connecting roads by the Road Safety Committee at village level.
    e. Include road safety related lessons in school curriculum.
    f. Provide first aid kits at village level.

13. **Stampede specific:**
    a. Undertake preparatory tasks like repairs of roads and related structures (*Ghats*), construction of Pontoon bridges, cleaning of drains, setting up of temporary barricades, identification of exit routes, signage, electricity provision, and such at vulnerable areas before occasions having potential to cause stampedes.
    b. Assess public buildings (school, colleges, offices, and religious places) from stampede safety point of view and take up corrective structural (like alternate staircases, signage) and non-structural measures.
14. **Heat-wave specific:**

a. Ensure flexibility in office and school timings as per predicted periods of heat wave.
b. Provide for sun-shelters at work sites for daily wage labourers, especially in south Bihar.

15. Lightning specific:

a. Promote the installation of lightning conductors in community and public buildings like temples, mosques, Gram Panchayats, community centres, schools, Anganwadi Centers (AWCs), and mobile towers.

16. Boat capsize specific:

a. Ensure implementation of the Model Rules for Boat Safety Act, 2011, GoB
b. Ensure registration and licensing of all boats and boat drivers as well as annual fitness checking of the boats and its equipment before the monsoon season.
c. Ensure that all boats have a load-line marked and the same is adhered to.
d. Ensure availability of safety equipment (like life jacket, lifebuoy, and such) on the boats.
e. Ensure home guard deployment for ensuring compliance of boat safety rules, especially in the monsoon months.

Preparedness for Effective Response

17. Develop and/or finalize SOPs for earthquake, drought, cyclonic storm, stampede, and early warning.
18. Develop and/or finalize do's and don'ts pertaining to fire, heat-wave, cold-wave, and hailstorm.
19. Ensure the effective implementation of the various SOPs and guidelines through:
    a. Conducting regular mock drills;
    b. Developing a real-time and online monitoring system, data of which is openly available;
    c. Reviewing the SOPs and guidelines based on the usage till date.
20. Form village level Community Emergency Response Teams (CERT) comprising select community members, frontline workers and GP members including women and youth, volunteers and for preparedness and response actions.
21. Finalize the Early Warning protocols and mechanisms for the state and develop a SOP for the early warning information flow from EOC to the village level stakeholders and last mile connectivity.

Capacity Building

22. Build the capacities of:

a. GP level standing committees on DRR for undertaking disaster risk analysis and incorporating it into GP annual plans.
b. CERTs for preparedness and response actions.
c. District and block level officials and members of CERTs and PRIs on the relevant SOPs and guidelines.

23. Hazard-specific:

a. **Multi-hazard**: Prepare barefoot engineers for conducting Rapid Visual Survey (RVS) of public and community buildings and submit report to the concerned Gram Panchayat for necessary action.
b. **Flood**: Develop a cadre of divers and search and rescuers with at least 5 trained personnel for each (including women divers) in each Gram Panchayat.
c. **Earthquake:** Train engineers and masons on retrofitting and seismic-zone wise building codes and construction norms.
d. **Road Accidents**: Train community members, youth club members, college students, teachers, shop keepers, police personnel on (i) first aid, (ii) traffic rules, (iii) safe driving in all conditions including wet and foggy, (iv) maintaining vehicle fitness, (v) communication to trauma and police centres in case of accident events.
e. **Stampede**: Train volunteers and other personnel at the vulnerable areas, through mock drills, workshops, demonstrations, simulations, table-top exercises, and other such methods on crowd and movement management, communication, and other topics pertaining crowd management and stampede.
f. **Boat Capsize**: Sensitize boat drivers and community members on the model boat safety rules, norms, load line, search and rescue, and first aid.

24. Initiate a **Chief Minister's Resilience Fellowship Program** (on lines of the PMRDF) wherein fellows will be deployed at blocks to support village level risk-informed planning for a period of five years.
25. Initiate '***Mukhya Mantri Aapda Surakshit Gram Puraskar***' for promoting village level resilience related actions and motivating village level stakeholders through public recognition and cash award to be awarded to the best village at block, district, division and state level on an annual basis based on resilience checklist.

Communications and Awareness

26. Develop pre-agreed 'communication plans' for disaster preparedness and emergency response with media agencies and civil society organisations.
27. Develop a basket of communication tools to support the Resilient Villages Programme in the short, medium and long term using different media like TV, Radio, Newspapers, *Nukkad Nataks*, *Vichaar Sabhas*, and Demonstration Exercises.
28. Promote 'Community Radio' for enhancing resilience of villages, including targeted programmes for different social groups including women, children, and the elderly amongst others.
29. Develop a disaster related database (with information about annual risk analysis, disaster losses, position of CERT teams, pre-positioned resources etc.) at block and district level and make it openly available in the public domain.

5.2 Component 2: Resilient Livelihoods

Impact of disasters on livelihoods in Bihar

Over 80%[23] of Bihar's population is engaged in agriculture or allied activities for their livelihood. For 18.42% of the rural households, cultivation is the primary source of income while for 70.59%, manual/ casual labour is the primary source of income[24]. In fact, Bihar has the highest percentage of rural households in India where the main source of income is manual/ casual labour. Only 35% of rural households in Bihar own land, making the small and marginal farmers and sharecroppers even more vulnerable to the impact of shocks and stressors. These groups have been kept in mind while designing actions for resilient livelihoods.

Additionally, farm and non-farm based livelihood clusters like *Litchi*, Cotton, Silk, *Agarbatti*, Vegetable, Maize, *Makhana*, Dairy, Madhubani Painting, Leather, Fishery, Poultry, Weaving, Pottery, Bamboo-based work, and Bakery have been considered. Comparatively, large-scale industrial or service sector related actions are fewer and more futuristic, given the current contextual realities of the state. Urban livelihoods have also been considered, especially small vendors and traders who are impacted by disruptions in urban areas.

Changing climatic patterns and recurring events of disasters in Bihar are resulting in immediate impact as well as accumulation of stresses on livelihood resources, especially for almost 80% of the workforce which is dependent on the agriculture and allied livelihood activities. **The 2007 and 2008 floods impacted[25] agriculture, crop and animal husbandry, fisheries, agro-forestry and agro-processing,** which comprise the backbone of livelihood security systems in the region**. Thousands of hectares of land is still sand-casted and rendered unusable for agriculture**, impacting the socio-economic fabric of communities even now. Migration for labour work to other states continues to be reality in north and south Bihar even now. With recent experiences of climate variability, changing weather patterns – increased degradation, desertification and water-stress on land in south Bihar - and the fact that 6.5 million poor households are engaged in agriculture and allied activities in Bihar, food security may emerge as a key concern in the near future if steps are not taken to ensure the resilience of livelihoods.

At the same time, Bihar has a vibrant pool of programs and resources investing in livelihood promotion. The state is in the second phase of implementing its Agricultural Roadmap; Jeevika, Bihar's Rural Livelihood Programme has taken significant efforts in vulnerability reduction by promoting rural livelihoods; the Bihar Innovation Forum has been launched as a platform to showcase and scale up innovations in livelihood. Given the impact of disasters on livelihoods, **it is imperative that these**

[23] Jeevika, BRLPS, http://www.brlp.in/livelihood_promotion.php, as accessed on 17.04.15
[24] Socio-Economic Caste Census, 2011 (See, http://www.secc.gov.in/staticReportData?getReportId=S_20 Accessed 10th July 2015)
[25] GoB, 2010 Bihar Kosi Flood (2010) Needs Assessment Report

livelihood investments be disaster risk-informed, and aim to promote resilient livelihoods in the state. This section presents the actions that can be taken to ensure disaster risk reduction for livelihood systems and preparedness for response and recovery in case of a disaster event.

What is a resilient livelihood?

Resilient livelihood in the Bihar context is envisaged as interplay of means, activities and entitlements by which people making a living are able to:

- **Anticipate and Cope** from shocks and stresses through risk analysis, early warning, risk reduction, risk transfer/sharing and compensation,
- **Recover** with enhanced capabilities, assets and opportunities through effective planning for building back better,
- **Adapt** to climate change and disaster risks through modifying production practices, processing and mitigation, and
- **Develop** capabilities and assets without creating disaster risks for other people's current or future livelihood options.

Characteristics of resilient livelihoods

1. People make sustainable, risk-informed livelihood choices and adopt context-specific production practices in the agriculture and allied sectors.
2. Livelihood practitioners have diverse sources of income coming from a wider livelihood basket so as to ensure minimal impact of disasters.
3. Livelihood practitioners have the capacities and opportunities to access various livelihood options, production and processing practices, financial products, and markets to recover from shocks and stresses.
4. Relevant departments have a plan for ensuring the continuity of markets, supply chains, pertinent financial products, and temporary sources of income in case of disasters.
5. Policies and programmes support timely availability and access to raw materials/inputs, technologies, financial inclusion, backward and forward linkages, and means for processing and marketing for quick recovery of livelihoods after disasters.
6. Migration is only by choice, is safe and not forced.
7. Safe-guarding the livelihoods of marginalised groups such as women-headed households, the landless, SCs and STs, and persons with disabilities (PWDs) is prioritised.

Actions

The above-mentioned characteristics of resilient livelihood will be achieved through focussed actions of different types, including targeted and planned capacity building of different actors, creating an enabling policy and risk governance environment, and communication and awareness activities aimed at attitudinal and behaviour changes. Additionally, **actions to achieve resilience of livelihood will not be limited to actions at the livelihood practitioner level itself, but also include actions at the state, district, block and ULBs-PRIs levels**. Key nodal departments responsible for undertaking actions for resilient livelihoods are Agriculture, Cooperative, Animal Husbandry, Fishery, Water Resources, Rural Development, Rural works, Panchayati Raj, Urban Development, Labour, Forest, and Small and Medium Industries Departments.

Overarching

1. Integrate measures for undertaking disaster risks' recognition, understanding and analysis as well as disaster resilient agricultural practices in the Agriculture Roadmap (2012-17) of Bihar and the Bihar State Rural Livelihood Mission (BSRLM, *Jeevika*).
2. Undertake measures for integrating resilient urban livelihood in the 'National Urban Livelihood Mission' through urban disaster risks recognition and analysis as well as disaster resilient urban livelihood practices.
3. Undertake analysis of the disaster risks to key existing and potential livelihood clusters such as *Litchi*, Cotton, Silk, *Agarbatti*, Vegetable, Maize, *Makhana*, Dairy, Madhubani Painting, Leather, Fishery, Poultry Weaving, Pottery, Bamboo-based work, and Bakery within Bihar with participation of community level stakeholders and undertake actions for management of disaster risks to these livelihood clusters.
4. Support research and development in developing disaster context specific cropping package and techniques and widespread dissemination of the same.
5. Ensure timely provision of inputs and extension services for the high flood prone Group A and drought prone Group C districts so as to reduce the impact of the flood and drought events.
6. Include, in the annual district plan of the Agriculture Department, measures for promotion of disaster resilient cropping varieties and techniques as well as undertaking disaster risk analysis.
7. Undertake widespread targeted extension of successful flood and drought resilient cropping techniques by setting up 'Field Schools' for various primary sector related demonstration of innovations and extension training (for Agriculture, Dairy, Fishery, Poultry, Horticulture and Livestock) and strengthening the *Krishi Vigyan Kendras* (KVK).
8. Enhance the resilience of livelihoods of the unregistered small producers, vendors and traders in the peri-urban and urban areas by mapping the same, undertaking analysis of disaster risks to their livelihoods and initiating measures for risk mitigation, risk transfer and compensation based actions.

9. Initiate measures to strengthen the canal network in the state and increase the irrigation coverage in the 13 drought-prone districts.
10. House the 'Resilient Livelihood Resource Centre' at the *Jeevika* block office so as to provide technical support to local bodies in taking up actions on analysis of disaster risks to livelihoods, designing risk avoidance, reduction, sharing, transfer, and compensation measures, risk informed planning of livelihood initiatives, implementation, and monitoring.

Business Continuity Planning-Preparedness, Response and Recovery

11. Develop plans for starting targeted Cash-For-Work (CFW), Food-For-Work (FFW) and other such wage labour based programmes to ensure availability of work to the disaster affected populace at the temporary sites/camps and mega camps.
12. Ensure provision of agriculture implements and artisan/trade specific tools and equipment as part of recovery measures.
13. Ensure provision of input-subsidy to farmers, artisans, and small vendors and traders as part of recovery measures.
14. Carry out restoration of agricultural lands through de-siltation and promotion of appropriate crops as well as undertake repairs and restoration of public infrastructure and community assets through MGNREGA.

Capacity Building

15. Orient and build the capacities of the GP level *Kisan Salahkars* on disaster risks analysis and disaster resilient cropping techniques.
16. Build the capacities of community level stakeholders (producers in primary and secondary sectors as well as traders, processors and supply chain managers) through ToT, Training Workshops, Demonstrations, Learning Visits, Handholding support, Decision-Support Tools, mock drills, IVRT, and such on: (i) Analysis of disaster risks to livelihood clusters analysis; and (ii) Risk proofing production practices and refining the same in present day contexts.
17. Build the capacities of civil society organizations and other community based institutions/ livelihoods on Farm Field Schools, Context specific cropping packages, risk analysis, and livelihood basket diversification.

Communications, Knowledge Building and Information Systems

18. Design hazard-specific communication material focussing on (i) disaster resilient production practices, (ii) disaster risk analysis to livelihood clusters, (iii) disaster risk avoidance, transfer, sharing, and compensation measures for livelihood clusters, (iv) accessing various financial products, (v) initiating alternate sources of income generation during disasters, (vi) recovering from disasters, and (vii) diversification of livelihood basket.

19. Develop IEC material for the above and undertake regular widespread dissemination of the same through TV, Radio, Print Media, Social Media, Workshops, Demonstrations, and such.
20. Create a Livelihood related database including risk management measures at district and state level, housing data about livelihood practices and practitioners, number of migrants and such.
21. Develop annual status report on specific livelihood clusters and measures taken for risk management.

5.3 Component 3: Resilient Basic Services

Functional continuity and timely restoration of basic services in the aftermath of exposure to a hazard event forms the cornerstone of a resilient society. Ensuring this entails **both structural and non-structural measures** like building better from the start to withstand hazards through proper design and construction, retrofitting and rebuilding, a culture of maintenance, taking into account impact assessments, operational clarity, risk awareness/competence and culture of safety within staff.

Basic services in the context of this roadmap have been considered as seven sectors implemented by the various departments of GoB:

1. **WASH (Water, Sanitation and Hygiene) and Waste Management**: This sector covers water, sanitation, hygiene and waste management that includes provision of drinking water and toilets, hygiene promotion and practices for management of solid and liquid waste.

2. **Food and Nutrition:** This sector includes food and nutrition services as provided through the Public Distribution System (PDS) and Integrated Child Development Services (ICDS), Mid-Day Meal, *Shatabdi Anna Kalash Yojana* as well as through people's own efforts.

3. **Health:** This sector covers provision of promotive, preventive and curative health services as provided through the primary, secondary and tertiary health care facilities of both government and non-government in the state.

4. **Education:** This sector covers provision of primary, secondary and higher education services as well as the non-formal and vocational facilities in the state.

5. **Housing:** This sector includes provision of housing and temporary shelters (i.e. camps and mega-camps) during disaster events through the Indira Awas Yojana (IAY) and Urban Housing Programme as well as through people's own efforts.

6. **Safety, Security & Protection:** This sector includes the group of actions undertaken by the state especially during disaster events for ensuring the safety, security and protection of at-risk population groups like children, adolescents, and women, transgender, People With Disabilities (PWD), and the elderly.

7. **Emergency Support Functions (ESF):**This sector includes the group of actions undertaken by the state as preparedness and response measures to save lives (Evacuation, Search and Rescue and Needs Assessment), restore essential services and critical infrastructure (Emergency Operation Centres, Early Warning System, Warehouses, and Camps), protect property and the environment (Debris Clearance, Dignified Disposal of Dead), and help victims and communities return to normal following disaster incidents.

Infrastructural aspects pertaining to each of the social sectors in these basic services such as Anganwadi Centres, primary-secondary-tertiary medical facilities, Nutrition Rehabilitation Centres, schools, waste processing plants, EOCs, and Warehouses have been included as part of the basic services since these infrastructural aspects are not only an integral part of the service delivery system but also are the responsibility of the respective mandated departments of GoB.

What are resilient basic services?

Resilient basic services in the context of Bihar are envisaged as a bundle of services which are capable to ensure:

- **Efficacy** in the delivery of services to all the intended target groups during non-disaster times through effective risk informed planning, coverage and implementation
- **Effective service delivery** to all the intended target groups during disasters through business continuity plans - BCPs - for back-up and regaining functionality at the earliest
- **Recovery** from disasters through effective planning for building back better and enhanced service delivery

Characteristics of resilient basic services

1. Line departments and all members of communities recognise and act upon their rights and duties for ensuring continuity of basic services at all times.
2. Annual plans of line departments for provision of basic services are risk-informed and account for disruptions in service delivery during disaster situations.
3. Line departments undertake disaster risk analysis before annual planning.
4. Line departments are equipped with Business Continuity Plans (BCPs) for ensuring continuity and early regaining of functionality in provision of basic services during disasters.
5. Essential items and equipment are pre-positioned at district, block and Panchayat/ village levels as well as facilities levels as a part of the BCPs.
6. Departmental staff at state, district, block levels and front-line workers have capacities for risk-informed planning, including risk analysis and delivery of emergency services.
7. The policies and programmes supporting annual planning of line department are flexible enough to allow differential planning for geographies, populations groups (special emphasis on vulnerable groups like women, pregnant and lactating mothers, children < 5yrs, elderly, PWD, SC, minorities, and PLHA) and situations.

Actions

The above-mentioned characteristics of resilient basic services will be achieved through focussed actions of different types, including targeted as well as planned operational and structural enhancements, modifications and/or creation anew of systems and procedures, capacity building of different actors, communication and awareness activities aimed at attitudinal and behaviour changes, and creating an enabling policy and risk governance environment. Additionally, **actions to achieve the resilience of basic services will not be limited to actions at the nodal line department-level itself, but also include actions at the state, district and Gram Panchayat levels**. Key nodal line departments responsible for ensuring resilience in basic services are PHED, Health, Education, Food and Consumer Protection, Housing, RDD, UDD, Social Welfare, and DMD. Mobilization of community based institutions and volunteer groups such as Anganwadi workers, Accredited Social Health Activists (ASHA), parent and teachers associations, Red Cross/Crescent volunteers, Youth Club, women's groups, etc. will be the key to ensure the outreach and continuity of critical basic services.

For ensuring the resilience of each one of the seven sectors of basic services, broad actions are presented below. Detailed actions for each service are available in Annexure 3.

Overarching

1. Develop a resilience index for Health, WASH, Education and Food Security and Nutrition services; a resilience checklist for housing; and quality standards for Emergency Support Functions.
2. Conduct an assessment to identify the current status of services with respect to the resilience index or quality standards, as applicable.
3. Based on this exercise, undertake corrective measures for enhancing the resilience of the infrastructure (facilities) and service delivery systems.
4. Issue a directive to ensure that an annual disaster risk analysis exercise is conducted as part of the planning cycle for targeting, resource allocation and additional measures for specific vulnerabilities.
5. Ensure that Gram Panchayat plans also identify risks related to basic services and plan for addressing the same.
6. Enhance resilience of institutions (residential or short-duration) existing within a district for provision of care to at-risk groups viz. District Disability Rehabilitation Centres (DDRCs), Shelter Homes, CCIs (Child Care Institutions including Orphanages, Foster Homes), Old-age homes, institutions housing PWDs, Hostels (working women, SC boys, girls, ST), KGBVs, residential schools, mental health institutions, prisons, and such through:
    a. Mapping these various institutions.
    b. Undertaking structural and operational resilience related audits of these institutions.
    c. Taking up corrective measures based on these audits.

d. Development of a disaster management plan for each of these institutions, including arrangements to ensure functioning or back-up facilities of these institutions in case of flood, earthquake, fire, and other hazard events.
e. Capacity building of the institution managers and care providers therein on the disaster management plan.

Business Continuity Planning-Preparedness, Response and Recovery

7. Develop a business continuity plans for ensuring effective preparedness, back up and regaining prompt functionality of the respective basic services in case of disaster events.
8. As part of the business continuity plan,
    a. Develop a deployment plan for personnel (for e.g. QMRT, in case of Health Department) for preparedness and response actions.
    b. Pre-position essential equipment and materials (for e.g. essential drugs, reproductive health and dignity kits) and personnel as per the hazard-specific relevant SOPs and / or guidelines before the onset of predictable hazard events.
9. Review the performance of the business continuity plans after each disaster event.
10. Conduct a 'Scenario-Based Analysis' for L3 events and develop a template for damage assessment and costing for recovery planning to be included as part of the annual plan of the department.
11. Set up a database for data about child and human trafficking at the state level, with clear guidelines for intensified action during disasters.
12. Set up community watch mechanisms engaging women, children and adolescent girls to prevent trafficking as well as other exploitation incidents during evacuations and at temporary shelters, camps, and mega-camps.

Strengthening of Emergency Support Functions (ESF)

13. **Early Warning System**: Establish an Early Warning System in the state for predictable hazards like floods, droughts, cyclonic storms / twisters, heat-waves and cold-waves; and finalise the early warning mechanisms for dissemination of early warnings (last mile connectivity) along with information on actions to be taken by community members and officials.
14. **Evacuation**: Develop a deployment plan for key stakeholders like NDRF, SDRF, Police, Civil Defence, Citizen Councils, and PRI-ULB members well in advance of predictable hazard events; and undertake mock drills once in six months in Group A and B districts through multi-stakeholder participation for practice of these protocols in different (L1, L2, L3) scenarios.
15. **Search & Rescue:**
    a. Ensure decentralized positioning of SDRF personnel in Group A districts all-round the year;

b. Create and maintain an online database of trained search and rescue personnel (divers, debris-searchers) at state, district, block, and PRI-ULB levels as well as *Ghats* and other strategic locations;
c. Assess SDRF's need of equipment and materials for S&R during earthquake and other hazard events and procure the same;
d. Create a system for registration of all persons at the search & rescue points, evacuation points, temporary shelters, and camps; Ensure that this registration data is collated in one centralized database; Display the data of rescued persons at all the search & rescue points as well as evacuation points, BDO and DM offices, prominent places and online; and Develop a MIS for the same.

16. **Shelter and Camps/ Mega-camps:** Develop a deployment and operations plan for management of camps and put in place a communication management plan for these camps.
17. **Debris clearance and dignified disposal of dead bodies and animal carcasses:** Procure requisite equipment and materials for debris clearance; identify areas and spots for dumping of debris as well as for dignified disposal of dead bodies and animal carcasses; and train the SDRF, Fire Department, Civil Defence, and Home-Guard personnel as well as Community volunteers on debris clearance and dignified disposal of dead bodies and animal carcasses.
18. **Emergency Operations Centre (EOC)**: Ensure that the state and district EOCs are fully functional with state of the art technology and having:
    a. Operational Plan including 24*7 functioning during emergencies;
    b. Necessary equipment and materials;
    c. Human Resource and deployment plans at EOC as well as for ESF;
    d. Appropriate maps, movement plans, databases required for effective undertaking of ESF;
    e. Database of earthmovers/JCBs, trucks, lorries, dumpers, and other vehicles and equipment for earthmoving;
    f. Develop and equip an alternate EOC at state level;
    g. Create a mobile EOC and deploy the same at the Division level in Group A and B districts.
19. **Warehouses:** Conduct audit of the existing warehouses of the DMD on five-yearly basis, equip the existing warehouses with necessary materials and equipment for effective storage and handling of goods to be stored there and map additional private and public warehouses which may need to be used in case of an L3 event.
20. Undertake digitization of office records, files and other documents of government offices and storage of the same on servers and back up servers.

Capacity Building

21. Respective Departments' functionaries at state, district and block levels for risk analysis and applying the risk analysis in planning of resilient basic services.
22. Orientation of district and block level officials as well as front line workers, PRI members and community leaders on the relevant SOPs and guidelines related to basic services.
23. Construction of 'safe facilities' used as part of the provision of basic services.
24. Front Line Workers on implementation of norms, guidelines and/ or SOPs on delivering services during disasters.
25. Comprehensive capacity enhancement of the EOC personnel:
    a. Assess the human resource requirements (technical as well as quantum) for fulfilling these ESF services, and based on this assessment, recruit new/assign from other departments/ create volunteers to fulfil these ESF services.
    b. EOC personnel on EOC functioning and handling emergency help-lines.
    c. Nodal officers deployed for ESF on undertaking ESF.
    d. Data management within the EOC pertaining to the ESF.

Communications, Knowledge Building and Information Systems

26. Develop and widely disseminate IEC material for Front Line Workers related to preparedness and response times for various hazards.
27. IEC material for supporting resilient construction.
28. Popularize the emergency helpline numbers along with enhancing public awareness on the purpose of its use.

5.4 Component 4: Resilient Critical Infrastructure

Critical Infrastructure in Bihar

Certain public goods (for e.g. roads, bridges) and physical assets (for e.g. dams, telecommunications, electricity, transmission towers) are vital in the functioning of the society, especially during disasters. These have been considered separately as critical infrastructure. Facilities integral for delivery of basic services (for e.g. hospitals, schools, and Anganwadis) are also critical infrastructure, however, these have been included as part of basic services in the earlier component titled 'Resilient Basic Services'.

Functional continuity and timely restoration of critical infrastructure in the aftermath of exposure to a hazard event forms the cornerstone of a resilient society. Ensuring this entails **both structural and non-structural measures** like building better from the start to withstand hazards through proper design and construction, retrofitting and rebuilding, a culture of maintenance, taking into account impact assessments, operational clarity, risk awareness/competence and culture of safety within staff.

Critical infrastructure in the context of this roadmap has been considered as six clusters of infrastructure implemented by the various departments of GoB:

1. **Roads and Bridges:** This cluster covers the highways, link roads, roads and bridge network in the state, as well as critical access roads and bridges at the community level.

2. **Telecommunications:** This cluster covers the phones, mobiles, radio, HAM, Sat Phones, towers, television, and internet network or any other mode of communication as provided by the public and private sector in the state.

3. **Power:** This cluster covers the generation, transmission and supply of electricity through thermal/hydro/nuclear, solar, wind, bio-fuel, and other means of generation by the public and private sector organisations in the state.

4. **Dams, Embankments and Reservoirs:** This cluster covers all the large and small dams, check-dams, related reservoirs (existing and artificial) and embankments existing in the state.

5. **Transport system:** This cluster covers public transport comprising road, rail (including metro), air and river networks including the hubs and installations (airports, rail and bus stations and Ghats), vehicles and depots in the state.

6. **Hazardous industries**: This cluster covers small, medium and large scale chemical factories, refineries, gas-pipelines, power plants, oil reserve tanks, and such.

Service delivery aspects pertaining to each of these critical infrastructure (for e.g. maintenance and upkeep, information-communication, human resource management, and such) have been included as part of the critical infrastructure since these service delivery aspects are not only an integral part of

the critical infrastructure system but also are the responsibility of the respective mandated departments.

What is resilient critical infrastructure?

Resilient critical infrastructure in the context of Bihar is envisaged as a bundle of assets and systems thereof which are capable to ensure:

- **Efficacy** in access to critical infrastructure for all the intended users during non-disaster times through effective risk informed planning, coverage and implementation,
- **Effective** access to critical infrastructure to all the intended target groups during disasters through business continuity plans - BCPs - for back-up and regaining functionality at the earliest,
- **Recovery** from disasters (through effective planning for building back better and enhanced functioning.

Characteristics of resilient critical infrastructure

1. Departments, private service providers and users recognise and act upon their rights and duties for ensuring safe critical infrastructure and continuity of related services at all times.
2. Planning and construction of critical infrastructure is risk-informed and accounts for potential disruptions during disasters.
3. Construction of critical infrastructure does not create new or worsen existing disaster risks.
4. Departments responsible for critical infrastructure are equipped with Business Continuity Plans for ensuring continuity and early regaining of functionality in disaster events of varying magnitudes.
5. Departmental staff at state, district, block levels and front-line workers have capacities for risk-informed planning, including risk analysis and their roles in emergencies.

Actions

The above-mentioned characteristics of resilient critical infrastructure will be achieved through focussed actions of different types, including targeted and planned structural enhancements, modifications and/or creation anew of systems and procedures, capacity building of different actors, communication and awareness activities aimed at attitudinal and behaviour changes, and creating an enabling policy and risk governance environment. Additionally, actions to achieve the resilience of critical infrastructure will not be limited to actions at the nodal department-level itself, but also include actions at the state and district levels, communities and private service providers. Key nodal departments for enhancing the resilience of critical infrastructure are Road Construction, Rural Development, Bihar *Rajya Pul Nirman Nigam*, Bihar State Road Development Corporation Ltd., NHAI, Energy, Bihar State Electricity Regulatory Commission (and allied Corporations), IPRD, Information

Technology, Science and Technology, BSNL Bihar Region Circle Office, WRD, and Transport Departments, Home Department (police).

For ensuring the resilience of each one of the five sectors of critical infrastructure, broad actions are presented below. Detailed actions for each service are available in Annexure 3.

Overarching

1. Develop a 'resilient critical infrastructure index' based on the above-mentioned five characteristics of resilient critical infrastructure.
2. Based on this 'resilient critical infrastructure index', map the existing infrastructure (road, bridges, power, telecommunications, transport, dams, reservoirs, and embankments including their GIS mapping) and determine their current level of resilience.
3. On the basis of this exercise, undertake corrective actions for each of the five critical infrastructure sectors, including replacement of bridges that are structurally unsafe, strengthening or relocation of power generation units, sub-stations, transformers, transmission towers, installation of power and telecommunications towers in selected areas, reinforcing them through specialized materials, underground cabling, structural strengthening of dams and embankments.
4. Include analysis of disaster risks in the 'Environmental Impact Analysis' and ensure compliance of this process before approval for construction of critical infrastructure.
5. Ensure participation of GPs or ULBs of neighbouring areas in decision making about construction of critical infrastructure.
6. Assess the telecommunication and wireless network and facilities of the government for operational readiness.
7. Develop SOPs for effective response to air, rail and industrial accidents.

Business Continuity Planning-Preparedness, Response and Recovery

8. Concerned nodal departments make their business continuity plans in partnership with the respective private service providers, wherever applicable.
9. These business continuity plans should account for, amongst other things:
    - Mapping of strategic locations and critical assets.
    - Scenario based analysis of disaster risks to the critical infrastructure and operating systems.
    - Arrangements for back-up measures (for e.g. alternative installations/sites to function from), including protocols and plans for functioning of these back-up measures.
    - Arrangements for regaining functionality of the primary infrastructure (for e.g. pre-position of materials and personnel for repairs).
    - Creation of 'Quick Response Teams' to make operational the back-up measures as well as restarting the primary set up.

- Agreements with private providers of critical infrastructure (telecommunications, power) to support during disaster events.
- Agreements with vendors and suppliers for supply of critical equipment and repair materials as well as technicians to undertake prompt repairs.
- Mapping of road routes, helipads/ landing sites and development of ready reckoners about critical gateway routes, both within and outside Bihar.
- Mapping of trucks, lorries, earthmovers, JCBs etc. for immediate deployment during disaster events.
- Partnerships with private companies (like L&T, HCC and Gamon India) and coordination mechanisms with engineering wings of armed forces for deployment of resources, equipment and skills for support in debris clearance, immediate restoration of and/or creation of temporary alternatives to damaged critical infrastructure in case of disaster events.
- Sign MoUs with the international banks like the World Bank or ADB regarding the processes (pre-decided templates for contracts etc.) to be undertaken for reconstruction of damaged critical infrastructure in case of disaster events.

Capacity Building

10. Conduct simulation exercises, mock drills and table-top exercises to practice and test the Business Continuity Plans.
11. Orient and build the capacities of concerned personnel in charge of back-up measures and regaining functionality.
12. Orient and build the capacities of personnel, responsible for management of key assets, on the protocols to be followed before, during and after a disaster event.
13. Build a centralised database pertaining to the infrastructural, personnel and systems of the critical infrastructure and explore measures for the application of GIS and other technology in the development and functioning of this database.

5.5 Component 5: RESILIENT CITIES

What is a resilient city?

A resilient city in the Bihar context is envisaged as a dynamic and proactive social unit wherein all individuals, households and the community as a whole is capable to:

- **Assess** through effective risk analysis and early warning systems,
- **Address** through risk informed development planning – including preparedness, response and mitigation actions, and
- **Recover** through effective planning for building back better,

from disasters without compromising its existence and functioning in the long term.

Characteristics of resilient cities

1. People recognise and act upon their rights and duties for a safe and secure environment.
2. Land zoning and urban planning is in sync with the ecosystem as well as with the natural drainage and geo-morphological patterns.
3. Communities practice safe behaviours like constructing safe houses, timely relocation to safe spaces, sustainable livelihood choices and life practices.
4. The city is able to meet small-scale disasters on its own.
5. Urban communities have timely access to early warning information and emergency services like evacuation, safe spaces, search and rescue as well as emergency health care and other essential services.
6. DRR is mainstreamed in ULB level plans by undertaking regular multi-hazard risk analysis.
7. Vibrant community institutions drive the process of risk analysis, risk communication, preparedness and risk reduction actions:
    a. There are ward-level standing committees on DRR for supporting risk analysis and mainstreaming DRR in annual planning.
    b. There are ward-level Community Emergency Response Teams (CERT) comprising citizen council members, civil defence personnel, service providers and select community members for preparedness and response actions.
8. Risk analysis, planning, communication, preparedness and reduction measures are undertaken in an inclusive and participatory manner, accounting for differential needs and capacities of children, adolescents, elderly, women, men, PWD, and traditionally marginalized or minority groups and through appropriate use of technology such as GIS mapping, mobile applications etc.
9. There is availability of and easy access to pre-positioned essential items and life-saving equipment.

10. Continuity of basic services like health, education, nutrition, WASH, and housing and critical infrastructure like power, bridges, roads, and telecommunications is ensured in the city, with either no disruptions or rapid regaining of functionality in case of disruptions.

Cities in Bihar

The term 'city' has been used in the context of all urban areas which include the existing 11 Municipal Corporations, 42 *Nagar Parishads* and 87 *Nagar Panchayats* all of which technically come under the jurisdiction of the ULBs in Bihar.

Actions for resilient cities

The above-mentioned characteristics of resilient cities will be achieved through focussed actions of different types, including targeted and planned capacity building of different actors, communication and awareness activities aimed at attitudinal and behaviour changes, and creating an enabling policy and risk governance environment. Additionally, actions to achieve the resilience of cities will not be limited to actions at the city itself, but also include actions at the state, district and ULB levels.

Resilient City Programme (RCP)

A 'Resilient City Programme' focussing on policy and practice level changes aiming for resilience in urban areas of Bihar would be initiated in partnership with civil society organizations and UN Agencies. The programme will be undertaken in a phased manner across all urban areas of Bihar over the course of fifteen years (2015-30) starting with an intensive pilot programme (2015-20) in one city from each of Group A (Darbhanga), Group B (Muzaffarpur) and Group C (Gaya) as well as 30% wards of Patna city (State Capital). Bihar Sharif and Bhagalpur, from Group B, shall also be included in the first phase in convergence with the 'Smart Cities Project' of GoI. In phase two (2020-2030), it will be scaled up in all the 137 urban areas of Group B and C districts and remaining 70% of wards of Patna city. RCP will broadly focus on:

- Disaster risks recognition, understanding and analysis;
- Disaster risk informed ward level development planning, using participatory, comprehensive and scientific risk analysis;
- Risk reduction actions based on this planning;
- Capacity building measures for risk analysis, risk-informed planning and risk reduction actions;
- Actions for targeted and planned communication for DRR.

Selected broad actions are presented below. Some of these will be undertaken as a part of the Resilient Cities Programme, while others will be stand-alone actions. Some of these will be undertaken

by the ULBs while other will have to be at the district and state levels. A detailed list of specific actions is available in Annexure 3.

Risk Recognition, Analysis and Risk Informed GP Planning

1. Prepare a guideline for multi-hazard risk analysis to be used by ULBs for regular risk analysis at the respective ULB level and for risk-informed development planning.
2. Undertake comprehensive disaster risk analysis, with participation of multiple stakeholders including at-risk communities, as part of the annual planning cycle of the ULB and develop annual reports of the same.
3. Develop a "resilient city checklist" to guide efforts of all stakeholders towards resilient cities.
4. Assess all cities on the basis of this checklist to create a baseline status for the Resilient City Programme and develop annual report card on the resilience related performance of all cities.
5. Integrate in the ULB level development plans, the emerging actions (for preparedness, response, recovery, and risk reduction and mitigation) from the comprehensive disaster risk analysis and the assessment on resilient city checklist.
6. Include resilience related measures from the state context point of view in the recently launched 'Atal Mission for Rapid Urban Transformation' (AMRUT) initiative of GoI.
7. Develop City Disaster Management Plans (CDMP) for all the 140 ULBs in Bihar, and ensure the application of technology and GIS mapping in the development, real-time monitoring and review of CDMPs. Include citizen councils and forums in the development of these plans.
8. Develop Office Disaster Management Plans (ODMPs) for all public and private offices based on the model ODMP developed by BSDMA.
9. Hold an annual "Resilient City" contest (based on the resilient city checklist) and link the same to providing fiscal incentives to the ULBs as well as service-promotion incentives to the UDD and ULBs officials.

Indicative Components of the Resilience City Checklist

- Listing of citizen groups, resident welfare associations, occupier's groups, builders associations
- Listing of factories, small scale industries bottling plants
- Listing of healthcare institutions, technical institutes, school, collages, universities with mobile numbers and nodal persons
- Pre-monsoon cleaning of drains
- Provision for special budget for low income groups like footpath dwellers, homeless/slum dwellers for low cost housing
- Traffic management plan
- Safety of all schools and colleges
- Evacuation plan
- Tree plantation besides roads, schools, colleges and other public spaces
- Enforcement of building bye-laws
- Rain harvesting mechanisms
- Mobile medical units – boat based as well as road based
- Identification of places where evacuated members can be sheltered.

10. Further, for enhancing risk understanding about cities:
    a. Conduct structural audit of key public and community buildings as per the seismic zones in all the urban areas of Bihar.
    b. Undertake Rapid Visual Survey of all existing private buildings as per the seismic zones and fire safety point of view in all the urban areas of Bihar in partnerships with builders associations, citizen councils, resident welfare associations and housing cooperative societies.
    c. Identify the vulnerable areas (Dangerous *Ghats* and large grounds) & high rise buildings as well as occasions (at the time of various festivals, socio-political gatherings, entertainment programs, functions, protests, and such) having potential to cause stampede, analyse the reasons for possible causes of stampede at these vulnerable areas and develop a guideline of preparatory tasks to be undertaken before the function/ occasion.
    d. Undertake a comprehensive study to analyse the causes of road accidents and the changing nature of the same in Bihar.

Risk Reduction Measures

11. Urban Flood-specific:
    a. Set up a vigilance cell within the UDD specifically for strict monitoring and prevention of any construction of private and public buildings inside the flood-line and flood-protection walls.
    b. Develop and implement a rehabilitation and resettlement policy for existing houses inside the flood plains and flood protection walls of urban areas of Bihar.
    c. Identify and/or construct flood shelters at appropriate places within the urban areas.
    d. Set up waste water and sewage treatment and/or recycling plants at appropriate places within all urban areas and then integrate these with the natural drainage systems.

12. Earthquake-specific:
    a. Provide fiscal support in the form of financial incentives like tax rebate/stamp duty concession for earthquake resilient retrofitting and new construction.
    b. Ensure retrofitting of public and community buildings based on structural audit and risk analysis in a phased manner.
    c. Ensure all the new construction of private, public and community buildings is as per the seismic zone-wise construction norms in all urban areas.
    d. Setup testing labs for building material in partnership with builder associations and private sector.
    e. Set up 'Earthquake Safety Clinic' (on the lines of the existing earthquake safety clinic at NIT Patna) in all urban areas of Bihar to provide solutions on structural measures and non-structural aspects related to earthquake safety.

f. Identify areas/spots in all urban areas for disposal of human and animal dead bodies as well as disposal of the infrastructural debris after an earthquake event.

13. Fire-specific:

a. Ensure compliance of fire safety norms in existing and new buildings through corrective actions and punitive measures for non-compliance.
b. Ensure availability of water supply and other fire-fighting materials like sand and chemicals in all public and private buildings in all urban areas.
c. Promote insurance seeking for private buildings and other assets for fire incidents.
d. Undertake GIS mapping of functional water bodies in all urban areas so as to ensure availability of water for the fire tenders in case of fire incidents.
e. Purchase and deploy appropriate fire-fighting equipment and fire tenders in all urban areas.
f. Provide adequate funds (through plan or as untied) to the Fire Department for maintenance and upkeep of equipment and fire tenders as well as updating of the same.

14. Road Accidents specific:

a. Put up appropriate signage pertaining to road safety on all access roads and highways, especially in vulnerable stretches as well as undertake regular maintenance of the same.
b. Ensure that speed breakers are constructed as per norms and dismantle the illegally constructed speed breakers.
c. Ensure strict enforcement of traffic Laws by increasing the number of signals, setting up CCTVs, using breath-analyzers, uniform vehicle numbering system, and initiating and digitizing traffic violation marking system. Develop a policy for school vans, ensuring fabricated doors and windows.
d. Ensuring safety of Vulnerable Road Users (pedestrians, PWDs, elderly, and children) through appropriate signage, creation of footpaths and dedicated lanes for pedestrians and cyclists in all urban areas.
e. Provide emergency medical assistance to accident victims through deployment of ambulances equipped with ALS and tagging of private hospitals with police stations for admitting of accident victims.
f. Include road safety related lessons in school curriculum.

15. Stampede specific:

a. Undertake preparatory tasks like repairs of roads and related structures (*Ghats*), construction of Pontoon bridges, cleaning of drains, setting up of temporary barricades, identification of exit routes, signage, electricity provision, and such at vulnerable areas before occasions having potential to cause stampedes.

b. Assess public buildings (school, colleges, offices, high rise commercial complexes and religious places) from stampede safety point of view and take up corrective structural (like alternate staircases, signage) measures.

Preparedness for Effective Response

16. Conduct emergency management exercises in all urban areas addressing multiple hazards.
17. Ensure the effective implementation of the various SOPs and guidelines through:
    a. Conducting regular mock drills;
    b. Developing a real-time and online monitoring system, data of which is openly available;
    c. Reviewing the SOPs and guidelines based on the usage till date.
18. Form ward level Community Emergency Response Team (CERT) comprising citizen council members, civil defence personnel, service providers and select community members for preparedness and response actions.
19. Based on the flooding and water logging risk analysis, assess the need for water pumps and pumping stations in all urban areas of Bihar and procure and install/ deploy the same at vulnerable and strategic locations.
20. Develop a deputation plan for the pre-monsoon clearance of drainage systems in the urban areas.
21. Promote purchase and deployment of inflatable boats and life buoys by large apartments and colonies through citizen councils and builders' associations.
22. Undertake detailed GIS based mapping of all the roads, lanes, bye-lanes, and public assets in all the urban areas and have these maps ready for effective response during earthquakes.
23. Develop evacuation plans for all public and private buildings.
24. Creation of help line centres that can advice people during emergency and multi-hazard situations.

Capacity Building

25. Undertake comprehensive capacity enhancement of ULB members and UDD officials on risk analyses, risk informed planning and implementing initiatives based on the resilient checklist.
26. Orient, the town planners, engineers and concerned officials involved in city/ town planning as well as sanctioning the construction plans, on ensuring that all construction is in line with the natural drainage patterns and not inside the flood-line in all urban areas.
27. Set up urban-area specific early warning systems, using ICT-IVRT and in partnerships with IIT-Mumbai/ Kanpur, to disseminate timely warnings as well as suggested actions to all stakeholders after reviewing the existing early warning systems of Mumbai, Surat and other cities in India.
28. Build the capacities of CERTs on relevant SOPs, preparedness and response actions.
29. Maintain a data-base for capacity building, including rosters of trained architects, engineers, supervisors, and masons.
30. **Hazard-specific training:**

a. Earthquake: Train architects, builders engineers, supervisors, and masons on retrofitting and seismic-zone wise building codes and construction norms.
b. Road Accidents: Training citizen councils, youth club members, college students, teachers, shop keepers, police personnel on (i) first aid, (ii) traffic rules, (iii) safe driving in all conditions including wet and foggy, (iv) maintaining vehicle fitness, (v) communication to trauma and police centres in case of accident events.
c. Stampede: Training of volunteers and other personnel at the vulnerable areas, through mock drills, workshops, demonstrations, simulations, table-top exercises, and other such methods on crowd and movement management, communication, and other topics pertaining crowd management and stampede.
d. Fire: Training of fire personnel, citizen council members, civil defence and volunteers from residential associations on fire prevention, communication and do's don't's, and first aid for fire.

Communications and Awareness

31. Develop pre-agreed 'communication plans' for disaster preparedness and emergency response with media agencies and civil society organisations.
32. Develop a basket of communication tools to support the Resilient Cities Programme in the short, medium and long term using different media like TV, Radio, Newspapers, Street Plays in Malls, Grounds, Schools etc. and Demonstration Exercises.
33. Awareness campaign and mock drills for vulnerable sections of the society such as differently-abled persons, pregnant women, at old age homes etc.
34. Develop a disaster related database at ULB level and make it openly available in the public domain.

Chapter 6

ENABLING POLICY ARCHITECTURE

6. Enabling policy architecture

This section provides basket of policy instruments that need to be revised or developed in order to create an enabling policy environment for implementing the roadmap. This includes amendments in the PRI and ULB Acts, development and/or revision of policies, guidelines, norms, SOPs and issuance of directives. The new programmes proposed in the sections above have also been mentioned in this section.

(A) Legal Amendments

1) Amend the **PRI Act** to incorporate the following provisions:
   a) Widen the scope of the GP level Standing Committee on Relief Monitoring to a DRR Standing Committee.
   b) Provide untied funds to the tune of INR 25,000/- per year to the GP to undertake DRR related initiatives as sanctioned by the *Gram Sabha* / DRR standing committee, including for taking temporary care of families affected by fire incidents, particularly from the marginalized sections (till compensation is provided under SDRF).
   c) Include DRR related planning in the list of functions to be done by PRIs in sync with the departmental and district planning.
   d) Mandate the GP-level DRR Standing Committee to identify and finalize the list of disaster-affected and those eligible for response as well as for management of relief distribution at the village level.
   e) Mandate the GP-level DRR Standing Committee in decision making pertaining to construction and/or installation related to critical infrastructure.
2) Amend the **ULB Act** to incorporate the following provisions:
   a) Create a standing committee on DRR at the ULB level.
   b) Provide untied funds to the tune of INR 100,000/- per year to the ULB to undertake DRR related initiatives as sanctioned in the ULB annual planning meeting.
   c) Include DRR related planning in the list of functions to be done by ULBs in sync with the departmental and district planning.

(B) Development of Policies

1) Develop a **disaster recovery policy** for the state for L3 disaster event and department wise recovery plans based on the principle of 'Build Back Better'.
2) Develop a **livelihood recovery policy** taking into account the multi-hazard profile and the Build-Back-Better principle.
3) Finalize the **Water Management Policy**.
4) Formulate a **Waste (Solid and Liquid) Management Policy**.

5) Notify the Emergency Support Functions (ESF) of the state.

(C) Directives

(C.1) Directives regarding planning

1) Every department should undertake disaster risk analysis, incorporate this analysis in annual planning (PIP development), for targeting of actions and budget allocation.
2) All departments mandated to provide basic services and critical infrastructure should develop a 'Business Continuity Plan' (BCP), as part of annual planning, by including actions for back-up and regaining prompt functionality of infrastructure (facilities), personnel and operating systems to ensure uninterrupted provision of basic services and critical infrastructure.
3) Include disaster risk analysis and congruity with natural drainage patterns in the development of the current 'Patna Master Plan' as well as the town / city development plans of all 140 ULBs in Bihar.
4) Make it mandatory to carry out a 'Risk Impact Analysis' of a proposed construction activity pertaining to critical infrastructure before approval for the same is given.

(C.2) Directives regarding resource allocation

5) Provision for additional allocation of funds, as part of annual planning, to those districts which have high disaster risks.
6) Provision additional fund for construction of public assets (for e.g. school building, AWC, hospitals) and house construction under IAY as per the multi-hazard context.
7) Increase the allocation under the State Disaster Mitigation Fund to INR 10 Crore for mitigation and disaster risk reduction actions.
8) Provide fiscal support in the form of financial incentives like tax rebate / stamp duty concession for earthquake resilient retrofitting and new construction.
9) Enhance the wages for MGNREGA for the repairs and restoration works undertaken as part of disaster recovery.
10) Modify procedures for PDS related procurement and provision to dealer through prepositioning for known hazard events and for conducting market analysis during disasters and making real-time adjustments to essential (especially food) supplies.
11) Broaden the scope of the *Anna Kalash Yojana* to include households affected by fire incidents.

(D) Guidelines and Manuals

1) Develop guidelines for line departments on how to conduct disaster risk analysis and integrate into their annual planning.
2) Develop guidelines for PRIs and ULBs on how to conduct disaster risk analysis and integrate into their annual planning.
3) Develop guidelines for non-structural mitigation for earthquakes

4) Develop guidelines for provision of psychosocial care in disasters
5) Adapt the Minimum Initial Service Package (MISP) guidelines for reproductive health and protection of girls and women for the Bihar context
6) Develop the State's School Safety Policy Guidelines on lines of the NSSPG
7) Develop guidelines for toilet construction based on disaster risks in the Group A and Group B districts
8) Develop a template for School Disaster Management Plans
9) Modify the building plan and completion certification guidelines of UDD so as to make it mandatory for builders to provide a 'House Resilience Plan' to the house-owner that includes testing and upgrading on requirements from 5-10-20 years' point of view, maintenance guidelines and potential risks.
10) Develop a manual for provision of Emergency Support Functions (to be housed at and implemented from the EOC), including guidelines for the following:
    d) dissemination of early warning
    e) conducting mock drills on earthquakes and fire
    f) operations and management of EOCs,
    g) camp and mega camp management,
    h) management of warehouses

(E) Norms

1) Develop norms for provision of drinking water, sanitation and hygiene services in disasters.
2) Develop norms for provision of nutrition services during disasters, including doubling of THR for households with pregnant and lactating women and malnourished children and inclusion of '*sattu*' in the SDRF norms.
3) Contextualise the IPHS norms for disasters in the Bihar context.
4) Revise the IAY norms for inclusion of disaster resilient housing design.

(F) Standard Operating Procedures (SOP)

Develop SOPs for:

1) Earthquakes
2) Cyclonic Storms
3) Crowd Management
4) Child protection in Disasters
5) Vector and water borne diseases and biological hazards
6) Management of Gender Based Violence in Disasters
7) Debris clearance, disposal of dead bodies and animal carcasses
8) Air, Rail and Industrial Accidents

(G) Programmes

1) Resilient Village Programme (*Mukhyamantri Aapda Surakshit Gram Karyakram*): This programme will be designed on lines of the Community Based DRR programmes.
2) 'Resilient City Programme' This programme would be initiated in partnership with civil society organizations and UN Agencies, in a phased manner across all urban areas of Bihar over the course of fifteen years (2015-30). It will be started with an intensive pilot programme (2015-20) in one city from each of Group A (Darbhanga), Group B (Muzaffarpur) and Group C (Gaya) as well as 30% wards of Patna city (State Capital) and then scaled up (2020-2030) in all the 137 urban areas of Group B and C districts and remaining 70% of wards of Patna city.
3) *Mukhya Mantri School Safety Programme (MSSP):* Already ongoing; intensified implementation as a part of the roadmap.

Chapter 7

ROADMAP IMPLEMENTATION ARRANGEMENTS

7. Roadmap Implementation Arrangements

This section presents the arrangements for the implementation of this 15 year roadmap including institutions, human resources and mechanisms for implementation. Given that Bihar already has a strong institutional framework for disaster management, the implementation of the roadmap is largely based within this framework. The existence of a vibrant civil society with an established precedent for joint actions by government departments and civil society organisations has also informed the implementation arrangements. Finally, a new institution in the form of a Roadmap Implementation Support Unit has been strongly proposed. These are detailed below:

(A.1) Institutions - EXISTING

(1) **Crisis Management Group (CMG):** The CMG is the State Government's apex institution mandated to direct the management of any crisis in the state. It is headed by the Chief Secretary and Principal Secretaries from 21 Departments. Typically, the CMG approves and recommends financial measures for preparedness and mitigation as well as inter departmental coordination; and in case of an event, meets on a weekly basis for taking stock of the severity of the crisis.

The CMG will oversee the strategic planning, coordination and monitoring of the roadmap implementation.

(2) **Disaster Management Department (DMD):** The DMD, headed by PS, is the nodal department of GoB for disaster management. It will anchor the implementation of the roadmap through:

(i) implementation of the resilient village and city programmes,

(ii) provision of need-based technical support to concerned line departments in risk analysis and risk informed planning,

(iii) development of pertinent policy instruments (SOPs, guidelines, directives),

(iv) management of disaster data-base.

(3) **Bihar State Disaster Management Authority (BSDMA):** Headed by the Chief Minister as the Chairperson and with a senior retired IAS official in-charge of operational leadership as the Vice-Chairperson, BSDMA was constituted as the strategic institution for informing and shaping disaster management policy. BSDMA will facilitate the processes of:

(i) multi-hazard risk analysis (development of models, protocols and decision-support tools and annual risk analysis reports),

(ii) designing and implementing state-wide communication campaign on disaster risk reduction,

(iii) development of resilient village and city indexes and capacity building of the concerned line departments, PRIs and community members pertaining to the same.

(4) **District Disaster Management Authorities (DDMAs):** Headed by the District Magistrate as the Chairperson and comprising district-level heads of the line departments, the DDMAs are mandated to play a central role in disaster management. The Roadmap envisages that the DDMAs will play an integral role in disaster risk reduction by:

(i) Consolidation of disaster risk analysis at the district level,

(ii) Ensuring that district-level planning of line departments is risk-informed,

(iii) Prioritization of DRR actions to be undertaken in the district and coordination during implementation,

(iv) Monitoring and review of the DRR Roadmap implementation in the district.

(5) **Bihar Institute for Public Administration and Rural Development (BIPARD) and Disaster Management Institute (DMI):** BIPARD is the administrative training institute of the state, with a Centre for disaster management will facilitate the capacity building elements in the roadmap in partnership with DMI.

(6) **UN Agencies and Civil Society Organisations (CSOs)**: It is envisioned that UN Agencies and CSOs will play a critical role in leading, supporting and/ or guiding the implementation of actions within this Roadmap as per their mandates, capacities and interests. As a concrete step towards achieving this, it is recommended that the UN Agencies and CSOs conduct a consultation on the roadmap implementation and identify the themes and areas where they would like to engage with the implementation of this roadmap.

(A.2) Institutions - PROPOSED

(7) **State Level Task Force** will be constituted, headed by PS-DMD or Secretary-DMD and comprising members from GoB (concerned line departments), CSOs, and UN Agencies for coordination between stakeholders (intra-government and non-government), and monitoring the implementation of the Roadmap.

(8) **Roadmap Implementation Support Unit (RISU)** will be established, headed by a middle level IAS officer and a dedicated full-time team of technical experts (5 state level officials from GoB and 5 domain experts from civil society/ academia). The RISU will support the planning, implementation and monitoring functions of the DRR Roadmap. Roles and responsibilities of the RISU will be developed as an immediate next step after the Roadmap is approved.

(9) **State Institute for Disaster Management** will be established to function as the nodal state level capacity building cum resource centre on disaster management and risk reduction.

(10) **Transboundary DRR Cooperation Platform** will be initiated for cooperation and coordination with neighbouring states and trans-border focussing on ecosystem protection, early warning communication, preparedness, response, and risk reduction measures.

(11) **Block Disaster Risk Management Resource Centres** will be formed to provide a platform for (i) learning and sharing amongst community representatives, DRR practitioners,

academicians, and government officials about risk analysis, risk informed development planning, DRR actions' design-implementation challenges, and lessons learnt; (ii) technical support to the villages and urban areas on risk analysis, risk informed development planning and DRR initiatives; (iii) capacity building of members of CERTs and PRIs on ESF.

(12) **Road Safety Authority** will be created that is mandated for developing policies pertaining to vehicle and road safety, developing quality norms, capacity building, and oversight.

(B) Personnel

(1) The District Disaster Management Cells will be strengthened by:

a. Ensuring that every district has a full-time ADM-Disaster, especially in the Group A and Group B districts.

b. Conducting customized capacity building initiatives for Senior Deputy Collectors for implementing the DRR Roadmap.

c. Recruiting District Project Officers either by creating a cadre as a technical service within the state administrative services or on a contractual basis.

d. Create a dedicated team comprising DRR, CB, MIS & IT, Admin and Logistics experts at the district level to support the DDMA.

(C) Programmes and Systems

(1) A **Disaster Management Information System** will be established, at state and district levels, within the DMD for data entry, collation, analysis and reporting. The development and periodic updating of the baseline status of the DRR Roadmap will be undertaken through this system. This system will be housed within the RISU, however it should be established on priority even if the RISU is not established and in that case, housed within the DMD. Once the system is established, disaster risk reduction related outlays should be published in the Annual Economic Surveys.

(2) **Resilient Village Programme** (*Mukhya Mantri Aapda Surakshit Gram Karyakram*) will be housed in the DMD and implemented by RISU in partnership with civil society organisations.

(3) **Resilient City Programme** will be housed in the DMD and implemented by the RISU in partnership with civil society organisations.

Chapter 8

MONITORING AND EVALUATION ASPECTS

8. Monitoring and Evaluation Aspects

Monitoring and evaluation of the Roadmap will be undertaken at multiple levels with differential focus and frequency. The monitoring and evaluation will be aimed at tracking both the implementation of the designed actions as well as progress on achievement of the envisioned targets. Accordingly, review and reporting mechanism have been built in at multiple levels. The suggested actions here will be over and above the routine monitoring and evaluation done by the line departments.

Institution	Focus and means of monitoring	Frequency
CMG, headed by CS	• Strategic Review (Line Departments' presentations)	• Annual
Special Task Force, headed by PS-DMD	• Annual Resilience Report Card • Progress review of Resilient Village and City Programmes • On-site stock-taking of select key interventions • Review of SOPs and guidelines • Sharing of progress through BCDRR • Mid-term Evaluation of Roadmap Implementation • End-term Evaluation	• Annual • 6 monthly • 6 monthly • Post-event • Biennial • 2022-23 • 2030
Line Departments, headed by respective PS'	• Review of plans for: risk analysis, risk-informed actions and Business Continuity Planning (BCP) • Appraisal of implementation of risk-informed actions additional risk reduction initiatives undertaken from the Roadmap • Review of BCP	• Before approval of annual plans • As part of routine monitoring • Post-event
Roadmap Implementation Support Unit (RISU)	• Development of baseline for targets • Management of data of the roadmap implementation • On-site monitoring of specific actions • Development and sharing of analytical reports	• 2015-16 • Ongoing • Quarterly • Half-yearly
DDMA, headed by DM	• Review of district plans of departments for: risk analysis, risk-informed actions and BCP • Review of DDMP	• Annual • Annual and Post-event

	• Review of Resilient Village and City Programmes • District Resilience Report Card	• 6 monthly • Annual
BDO	Review of Resilient Village and City Programmes	Quarterly
GP/ ULB	Review of plans for risk analysis and risk-informed actions Assessment of implementation of risk-informed actions additional risk reduction initiatives undertaken from the Roadmap	Quarterly
CSOs	Participation of CSOs in all the above mentioned monitoring and evaluation activities.	

9. Budgetary implications of roadmap

To be added

ANNEXURES

10. Annexures

Annexure 1: Contributions to the Roadmap

Civil Society

1. Save the Children, Nalanda
2. NavJagriti, Khagariya and Samastipur
3. IDF, Muzaffarpur
4. Adithi, Sitamarhi
5. GDS, Sitamarhi
6. SewaSadan, Muzaffarpur
7. Sewa Kendra, West Chamapran
8. Vikalp Foundation, Gaya
9. BUDSSS, Rohtas
10. Samagrah Sewa, Jamui
11. BSSS, Bhagalpur
12. BSS, Darbhanga
13. GPSVS, Supaul
14. SSEVK, East Champaran
15. PSES, Katihar
16. Compiled Input from xx NGOs of Mission DRR
17. CARITAS India
18. UNFPA
19. Sphere India

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28. Mahendra.R, UN Solution Exchange, UNDP, New Delhi
29. Jyotiraj Patra, South Asia-Ecosystem Services for Poverty Alleviation, New Delhi

Responses to Newspaper Advertisement (Dated 16.06.15)

30. Ashok Ram
31. Suprintendent Engineer, Path Nirman Vibhag, Bhagalpur
32. Avinash, Danapur

Paper Submissions

33. Risk Informed Development Planning System, Puthumai A. Nazarene
34. Risk Informed Development Planning, Sarbjit Singh Sahota
35. Resilience Audit – A Must for Comprehensive DRR!, Anindo Banerjee
36. Lessons for quality monitoring of structural resilience in Bihar – a case study, Er. Dukhi Sah
37. Safe while studying – Progress and Potential for School Safety Agenda in Bihar, Mona C. Anand
38. Disaster Resilient Housing in Rural Bihar - lessons from Systems Thinking, Mona C. Anand
39. Role of Private Sector in Disaster Risk Reduction in Bihar, Kaustubh Devale and Sheena Arora
40. Road Safety, Harish Balasubramani & Padmasree Harish

41. Minimum Initial Service Package for Sexual and Reproductive Health in Disasters, Dr. Henna Hejazi
42. Resilient Recovery and Reconstruction: Build Back Better, Sarbjit Singh Sahota
43. Train to Respond: Building Resilient Healthcare Systems by Strengthening Local Capacities in Bihar, Ravikant Singh, Barnali Singha, Sunny Borgohain and Mridul Deka
44. Media and communication in disaster risk reduction and resilience: An evidence based approach for Bihar, Ankur Garg and Lisa Robinson
45. Mass Gathering Event Management: A Case Study of Chhath Pooja, 2013, Patna, Vishal Vaswani
46. Fire Safety in Hospital, Dr. DK Gupta
47. PRIs in Disaster Management, Dr. E.L.S.N Bala Prasad
48. Resilient Cities: Key Challenges for Bihar, Mihir R. Bhatt with Vandana Chauhan
49. Risk Informed Development Planning: Conceptual Challenges Ahead for Bihar, Mihir R. Bhatt with Vandana Chauhan
50. Vision Document on Earthquake Risk Mitigation in Bihar, Er. Barun Kant Mishra and Vishal Vasvani

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23. Shyam, BSS
24. Amar, Motihari
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26. Dr.Rajan Sinha
27. Pallavi Kumar, UNFPA
28. Anindo Banerjee, Praxis
29. Kapileshwar Ram, Dalit Adhikar Manch
30. Ramesh Kumar
31. Sheena Arora, RedR India

32. Kaustubh Devale, RedR India

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3. GoB (2010) Roadmap for Health Department
4. GoB (2013) Bihar State Disaster Management Plan
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7. Government of Sri Lanka (2005) Towards a Safer Sri Lanka: A Roadmap for Disaster Risk Management
8. SDMC (2011) SAARC Roadmaps on Risk Management in South Asia

Annexure 2: Risk Analysis Tool (attached excel sheet)

Annexure 3: Detailed Actions for Five Components (attached excel sheet)

Annexure 4: Seven Global Targets of SFDRR

1. Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.
2. Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015.
3. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
4. Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.
7. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.