



**KHAGARIA
ADMINISTRATION**



District Disaster Management Plan Khagaria



जिला आपातकालीन संचालन केन्द्र, खगड़िया

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The Introduction

Disaster is an event that causes the sudden disruption to normal life of a society and causes damage to property and lives to such an extent that normal social and economic mechanisms available to the society are inadequate to restore normalcy. Disasters are caused by hazards which impact upon vulnerable people, infrastructure, assets, and environment. As per Disaster Management (DM) Act, 2005 "*Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence, which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected areas.*"

Disaster management in India is an evolving process and during the last one decade, there has been a paradigm shift in the approach of disaster management from relief mode to a more proactive way of disaster management covering all aspects right from prevention, mitigation, preparedness to rehabilitation, reconstruction and recovery. As per Section 31 of the Disaster Management Act, 2005 (DM Act) India, District Disaster Management Authority (DDMA) of each district in the country shall prepare a District Disaster Management Plan (DDMP), which is to be approved by the State Disaster Management Authority (SDMA). It is to be reviewed and updated annually. DDMP will enable the districts and other administrative bodies to take proactive measures towards prevention, mitigation, preparedness for rehabilitation, and reconstruction and recovery against disasters. This also reinforces the national vision of building a safer and disaster resilient India by developing a holistic, proactive, multi-disaster and technology driven strategy for Disaster Management (DM) with a bottom up approach.

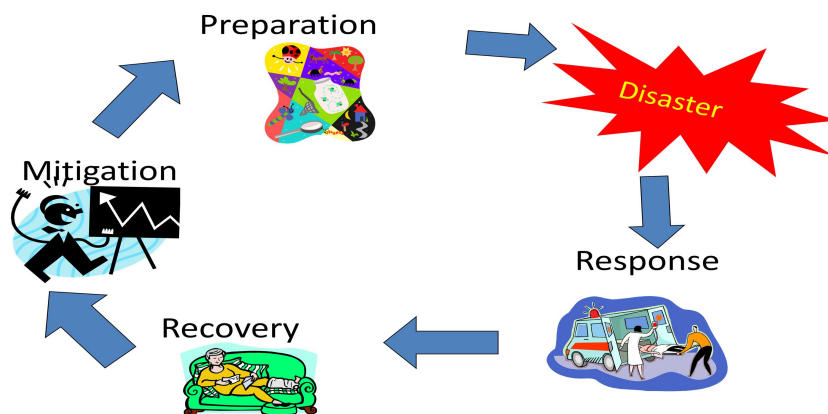


Figure 0:1 Phases of Disaster Management

The multi-disaster prone State of Bihar requires a multi-disciplinary approach to deal with these disasters. This also demands active participation of various stakeholders. It requires a continuous and integrated process of planning, organizing, coordinating, and implementing measures that are necessary for prevention, mitigation, and preparation to face any disaster event and to respond, rehabilitate and reconstruct in post-disaster scenarios (Figure 0:1). Thus, it is important to put a plan in place for dealing with disasters in an organized way with all the stakeholders being well aware of their roles and responsibilities in responding to disasters.

A number of special programs are in operation in the State and districts of Bihar for mitigating the impacts of natural disasters and local communities have developed their own

indigenous coping mechanisms. In particular, there is a need to have a comprehensive plan at district level, which will aid in implementing all policy guidelines and strategies.

The Vision

The disaster management process in Bihar has been evolving considerably since the start of 2000 and it further got strengthened after national and state level policies. The DM Act 2005 has clearly mandated for disaster management plan at district level. Furthermore, the Roadmap for Disaster Risk Reduction (2015-30), Government of Bihar has provided envisioning guidelines to the disaster managers to understand and act on disaster risk reduction taking Sendai Framework into consideration. As Bihar is considered as one of the most multi-hazard prone States in the country, the Government of Bihar adopts the Bihar Disaster Risk Reduction Framework (BDRRF) to achieve the vision of a “Disaster Resilient Bihar”. The vision of the Plan is

“Make Bihar disaster resilient, achieves substantial disaster risk reduction, and significantly decreases the losses of life, livelihoods, and assets – economic, physical, social, cultural, and environmental – by maximizing the ability to cope with disasters at all levels of administration as well as among communities.”¹

The Objectives

Along with the approval given in the DM Act 2005, the district plan has incorporated the national and state commitment towards the Sendai Framework. Accordingly, the broad objectives of the DDMP are:

1. Improve the understanding of disaster risk, hazards, and vulnerabilities of the district
2. Emphasize on pre-disaster phase by promoting a culture of prevention, mitigation and preparedness at all levels in the district
3. Strengthen disaster risk governance at all levels from local to district
4. Emphasize on different tasks and responsibilities of the Stakeholders and line departments in the district during the pre-disaster and post-disaster phases of disaster
5. Invest in disaster risk reduction for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development at district level
6. Enhance disaster preparedness for effective response to disaster in the district
7. Promote “Build Back Better” in recovery, rehabilitation and reconstruction
8. Prevent hazards turning into disasters and achieve substantial reduction of disaster risk and losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental) in the district
9. Increase resilience and prevent the emergence of new disaster risks and reduce the existing risks
10. Emphasize on putting in place institutional arrangements and techno-legal framework
11. Empower both local authorities and communities as partners to reduce and manage disaster risks
12. Strengthen scientific and technical capabilities in all aspects of disaster management
13. Capacity development at all levels to effectively respond to multiple hazards and for community-based disaster management
14. Provide, clarity on roles and responsibilities of various Departments and agencies involved in different aspects of disaster management
15. Facilitate the mainstreaming of DRR concerns into the developmental planning and processes.

¹ Based on National Disaster Management Plan (NDMP), 2016, NDMA, Ministry of Home Affairs, Govt. of India

16. Emphasize on developing the standardized mechanism to respond to disaster situation to manage the disaster efficiently.

The DDMP is the guide for achieving the objective of the disaster management phases i.e. prevention, preparedness, mitigation, response, and recovery. This plan will also help the stakeholders to remain prepared to respond to disasters with the sense of urgency in a planned way to minimize human, property and environmental loss.

The Approach

The term Disaster Management as used in the DM Act 2005 and the National Policy on Disaster Management (NPDM) 2009 document is comprehensive covering all aspects – disaster risk reduction, disaster risk management, disaster preparedness, disaster response, and post-disaster recovery. This plan document attempts to use the term with the same meaning as defined in the DM Act 2005 for the following:

1. Prevention of danger or threat of any disaster;
2. Mitigation or reduction of risk of any disaster or its severity or consequences;
3. Capacity-building;
4. Preparedness to deal with any disaster;
5. Prompt response to any threatening disaster situation or disaster;
6. Assessing the severity or magnitude of effects of any disaster;
7. Evacuation, rescue and relief; and
8. Rehabilitation and reconstruction.

The approach adopted for the formulation of the DDMP has been

- i) Holistic approach: in which all the hazards- natural and man-made the district is vulnerable to has been covered.
- ii) Integrative approach: in which prevention, mitigation, preparedness & response measures have been discussed.
- iii) Participative approach: in which representatives of the affected people, the Panchayati Raj Institutions, the local bodies, the district administration, the government departments & expert institutions have been involved.
- iv) Associative approach: in which space for the support and help from the corporate bodies, civil societies, NGOs, CBOs and others need to be created and need to solicit their participation in all the phases of disaster management. This will help in improve the capacity building of the stakeholders.

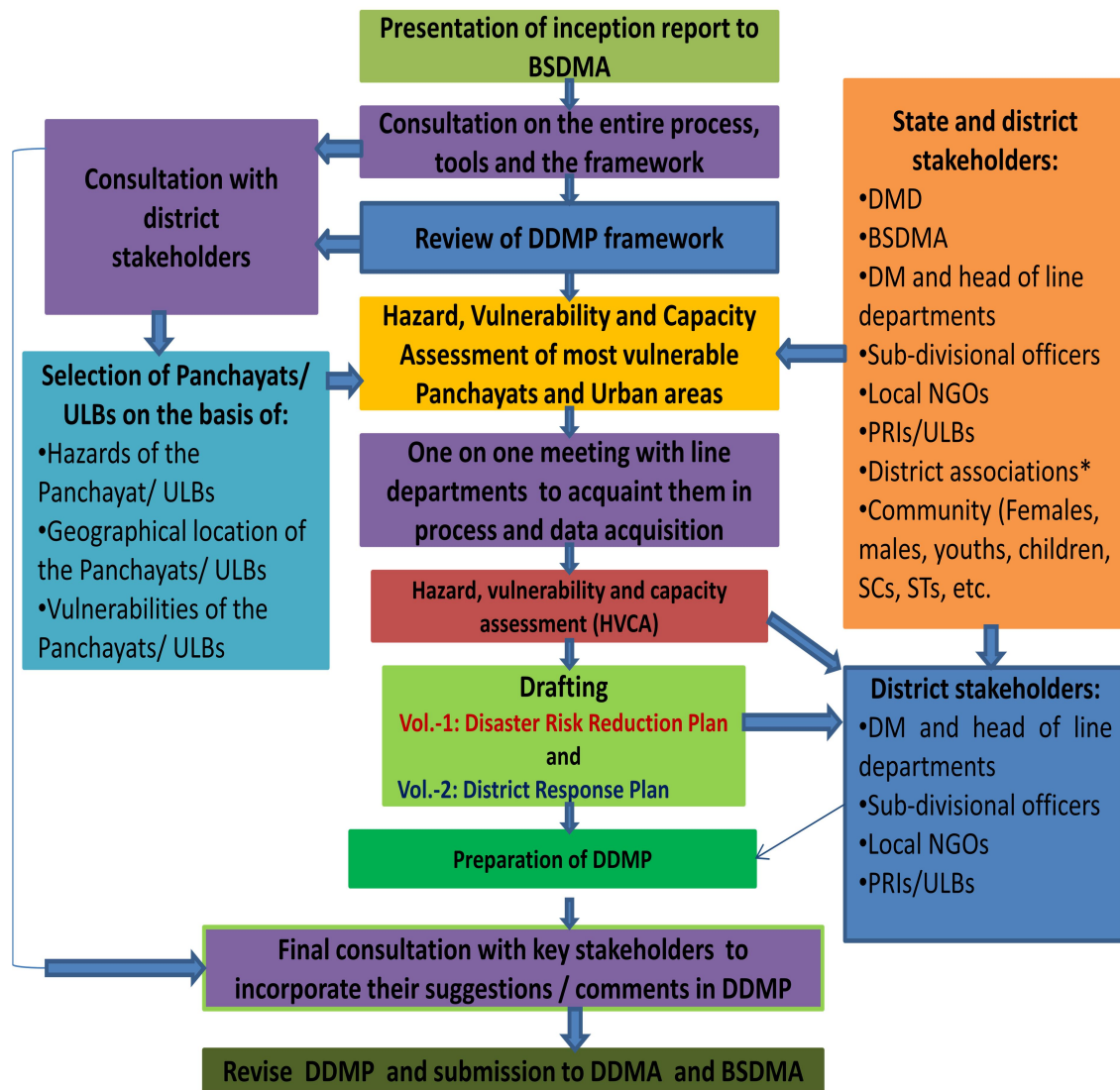
The Strategy

Every district has distinct characteristics and vulnerability to disaster. The approach to manage the vulnerability of the district to various disasters should be as per the needs of the district. The context analysis and district profile; learning from historical disaster events; international and national best practices, and paradigm shift in disaster management have been the core to the district-plan development strategy. The approach to the development strategy is inclusive and participatory. Further, considering the guidelines given by the NDMA for district level disaster management planning, the following strategies are adopted to develop this DDMP.

- (i) **Comprehensive Planning:** The plan engages the key stakeholders in the district for natural and man-made hazards and for all phases of disaster management (Preparedness, Response, Recovery, and Mitigation).
- (ii) **Emergency Support Functions (ESF):** The plan includes for implementation of various strategies and planning for disaster risk reduction; and continuity, improvement and maintenance of essential services in the district at different levels.

- (iii) **Integration and Coordination among the key stakeholders and emergency support functions:** The plan includes institutional mechanisms, tools and best practices for integration and coordination among the key stakeholders, and emergency support functions in the district at different levels.
- (iv) **Worst-case scenario and contingency plan:** The plan includes contingency plans for worst-case scenarios (historical disaster events as well as projected situations), periodic validation and updating, etc.
- (v) **Follow up actions:** The plan suggests follow up actions for the key stakeholders in the district for periodic updating of this DDMP and encourages them to develop their own comprehensive disaster management plans.

Following are the steps involved in the DDMP development process (Figure 0:2):



*-District associations means district level traders' associations, medical associations and other associations etc.

Figure 0:2 Methodology adopted for DDMP preparation

The Nation Disaster Management Act 2005, Clause 41 specifies the function of local authorities in regards to Disaster Management. It enlists following functions:

- i) Ensure that its officers and employees are trained for disaster management;
- ii) Ensure that the resources relating to DM are so maintained as to be readily available for use in the event of any threatening disaster situation or disaster;
- iii) Ensure all construction projects under it or within its jurisdiction conform to the standards and specifications laid down for prevention of disasters and mitigation by National Authority, State Authority and District Authority; and
- iv) Carry out relief, rehabilitation and reconstruction activities in the affected area in accordance with the State Plan and District Plan.

Duties of the District Magistrate with regard to Disaster Management

The District Magistrate has the following duties:

- (i) To facilitate and coordinate with local Government bodies to ensure that pre and post disaster management activities in the district are carried out.
- (ii) To assist community training, awareness programmes and the installation of emergency facilities with the support of local administration, non-governmental organizations and the private sector.
- (iii) To function as a leader of the team and take appropriate actions to smoothen the response and relief activities to minimize the adverse impact of disaster.
- (iv) To recommend the Secretary of DMD and State Government for declaration of disaster.

Duties of the Local Authorities with regard to Disaster Management

The local authorities have the following duties:

- (i) To assist the District Magistrate in disaster management activities
- (ii) To ensure training of its officers and employees and maintenance of resources to be readily available for use, in the event of a disaster
- (iii) To undertake capacity building measures and awareness and sensitization of the community.
- (iv) To ensure that all construction projects under it conform to the laid down standards and specifications.
- (v) Each department of the Government in a district shall prepare a disaster management plan for the district. The local authorities need to ensure that relief, rehabilitation and reconstruction activities in the affected areas, within the district, are carried out.
- (vi) Trust / Organizations managing places of Worships & Congregation in the district shall prepare on-site and off-site disaster management plan and carry out mitigation, response, relief, rehabilitation and reconstruction activities.

Private Sector

- (i) The private sector should be encouraged to ensure their active participation in the pre-disaster activities in with the overall plan developed by the DDMA or the District Magistrate.
- (ii) They should adhere to the relevant rules regarding prevention of disasters, as may be stipulated by relevant local authorities.

- (iii) As a part of CSR, undertake DRR projects in consultation with District Magistrate for enhancing district's resilience.

Community Groups and Voluntary Agencies

- (i) Local community groups and voluntary agencies including NGOs normally help in prevention and mitigation activities under the overall direction and supervision of the DDMA or the District Magistrate.
- (ii) They should be encouraged to participate in all training activities that are organized and to familiarize themselves with their role in disaster management.

Citizens

It is the duty of every citizen to assist the District Magistrate or such other person entrusted with or engaged in disaster management whenever demanded generally for the purpose of disaster management.

The Nation Disaster Management Act 2005, clause 24 (g, h, and j) and clause 34 (l) empowers SEC and DDMA's to seek services / expertise from **NGOs and private sectors** to be used during disasters or threatening disaster situations:

- i) Ensure that non-governmental organizations carry out their activities in an **equitable and non-discriminatory manner**;
- ii) It may require experts and consultants in the field of disasters to provide advice and assistance for rescue and relief; and
- iii) Procure exclusive or preferential use of amenities from any authority or person as and when required.

How to use the DDMP?

- (i) Section 31 of DM Act 2005 makes it mandatory for every district to prepare a disaster management plan, for the protection of life and property from the effects of hazardous events within the district.
- (ii) In significant emergencies or disasters, District Magistrate or the chairperson of DDMA will have the powers of overall supervision, direction and control as may be specified under Bihar State Government Rules / Bihar State Disaster Management Plan guidelines.
- (iii) The district EOC should be staffed and operated as the situation dictates. When activated, operations will be supported by senior officers from line departments, state and central government agencies. Private sector and volunteer organizations may also be used to provide information, data and resources to cope with the situation.
- (iv) The DDMA may recommend for action under Sec 30 of DM Act 2005.
- (v) Facilities that are vital for the functioning of district government have to be identified.
- (vi) The DM or his designee will coordinate and control resources of the district.
- (vii) Emergency public information should be disseminated by all available media outlets through the designated media and information officer.
- (viii) Planning and training of personnel are prerequisites to effective emergency operations and must be considered as integral part of disaster preparation.

- (ix) Coordination with surrounding districts is essential. When a disaster event occurs, it may affect beyond district boundaries. Procedure should be established and exercised for inter district collaboration.
- (x) Departments, agencies and organizations assigned either primary or supporting responsibilities in this document must develop implementation documents in order to support this plan.
- (xi) When local resources found to be inadequate during emergency operations, request for assistance should be made to the State or higher levels of government and other agencies in accordance with set rules and procedures.
- (xii) District authority can use normal channel for requesting assistance and/or resources, i.e., through the District Emergency Operations Centre (DEOC) to the SEOC. If state resources are exhausted, the state can ask for central assistance to get the needed resources.
- (xiii) The DEOC will coordinate with the SEOC, agencies of the Govt. of India like IMD / CWC to maintain up-to-date information concerning potential flooding, cyclones etc. As appropriate, such information can be provided to the citizens of the affected areas in the district.
- (xiv) Upon receipt of warnings for potential problems in these areas, DEOC / designated officials can appropriately issue alert and notify actions to be taken by the residents.
- (xv) Disaster occurrence could result in disruption of government functions and, therefore, all levels of local government and their departments should develop and maintain procedures to ensure continuity of Government functions.

It is necessary that for *suo moto* activation of the agencies involved in the disaster management, the institutional trigger mechanism should be there so that every agency takes its assigned role at the time of such disaster.

There will be the trigger mechanisms that can be set up, depending on the warning signals mentioned below:

Warning Signal Available

In such case the Govt. of India / State Govt. has authorized agencies generating such early warning signals, in case the matter is very urgent needing action at Block/GP/Village levels, the alerts and action points can go directly to all concerned. Arrangements need to be in place to ensure prompt receipt of these signals and actions thereon. After such warning/advisory received by the State Govt., the SEOC will communicate it to the DEOC urgently. The DEOC will communicate such warning to the departments at the district level (Figure 0:3).

The information flow in such cases will be as follows:-

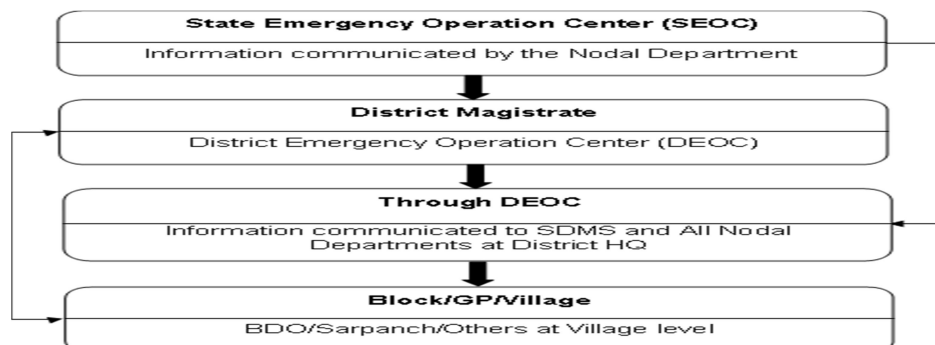


Figure 0:3 With-warning Information flows from Top-Down

Without Early Warning Signal

When disaster occurs without any early warning, in that case the information starts from the place of incident through government agency or otherwise and the institutional mechanism in such cases will be as follows (Figure 0:4):-

- (i) The concerned village will report to the Panchayat, block, police station/SDM/DM and the information will be sent to the Special Secretary/Secretary of DMD.
- (ii) DDMA will assess the information and assess the disaster to be of the level L0, L1, L2 or L3.
- (iii) DEOC will be activated and if required the SEOC will be kept at alert if assistance needed; otherwise information of the incident will be passed on to SEOC.
- (iv) DDMA will convene the meeting of DEOC and plan the management of the disaster as Incident Response Plan.
- (v) The respective Incident response teams will be rushed to the site for effective management.

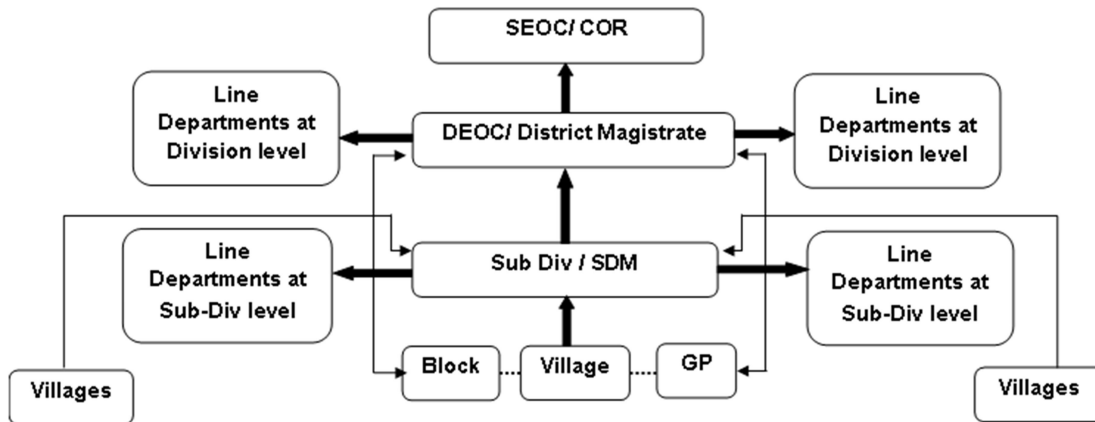


Figure 0:4 Without Warning-Information flow from Bottoms up (crisscross scenario)

The disaster response structure will be activated on the receipt of a disaster warning or on the occurrence of a disaster by the competent authority. The occurrence of a disaster may be reported by the concerned monitoring authority to the Special Secretary/Secretary of DMD/BSDMA by the fastest means. The BSDMA/SEC will activate all departments for emergency response including the SEOC, DEOC, police personnel and ERCs. In addition, they will issue instructions to include the following details:

- (i) Exact quantum of resources (in terms of manpower, equipment and essential items from key departments/stakeholders) that is required.
- (ii) The type of assistance to be provided.
- (iii) The time limit within which assistance is needed.
- (iv) Details of other Task/Response Forces through which coordination should take place.
- (v) The SEOC, ERCs and other control rooms at the State level as well as district control rooms should be activated with full strength.

1 District Profile

Khagaria district is located in the northern part of the state of Bihar and most parts of the district lies on the northern bank of River Ganga. It occupies a central position in North Bihar. Khagaria as a district was created on 10th May 1981. As a sub-division of the old district of Munger, Khagaria was the youngest, in terms of creation of sub-division in 1943-44, before independence. Khagaria was created as a separate sub-division mainly because of the difficulties arising out of a lack of easy means of communications. Railways were a very old means of communication in this district. The Mansi-Saharsa branch line, however, when gets disturbed during rains between Katyani Asthan and Koparia, a distance of 10 km, which has to be covered by boats.

Being surrounded by 7 rivers, recurrence of floods is almost an annual affair in Khagaria. Ganga, Burhi Gandak, Bagmati, Kamla, Kosi, Kali Kosi, and Kareh pass through the district. The recurrence of floods along with water logging problem makes commuting extremely difficult in the rainy season. Before the construction of South embankment of Baghmati and Gogri- Narayanpur embankment, the vast portion of land between the railway line and three streams, namely, the Bagmati, the Kamla and The Ghaghri (the main stream of Kosi) and the various streams, as Maria and Maitha, used to abound in marshes. Southern part of Khagaria, Gogri, and Parbatta blocks are affected by the river Ganga. Burhi Gandak affects Khagaria, Gogri and Mansi blocks. Bagmati affects Alauli, Mansi and Chautham blocks. Kosi affects Gogri, Chautham, and Beldour blocks. Kamla and Kareh Rivers affect Alauli and Chautham blocks.

Khagaria town is the administrative headquarter of the district. Following are the administrative divisions of the district (Table 1-1):

Table 1-1 Administrative Divisions of Khagaria District

Administrative Division	Number
No. of Sub-Division	02
No. of Blocks	07
No. of Panchayats	113
No. of Vulnerable Panchayat	78
No. of Fully Floody Panchayat	28
No. of Revenue Villages	306
No. of Statutory Towns	06

Geographical Features

Location

The district is located at a Longitude of 86°29'E to 86°48'E east and the Latitude is 25°30' N to 25°50' N north. It is situated at a height of 36-44 meters above Mean Sea Level.(Figure 1:1)



Figure 1:1 Map of Khagaria District

Topography

Khagaria lies in the middle part of the Gangetic plain, which is a low-lying flat terrain. Major part of the alluvial plain comprising this district is mainly a saucer-shaped depression. Its terrain slopes from the western and northwestern sides to the south eastern side.

Geomorphologically, Khagaria district is part of Gandak-Kosi confluence. The central part of the district is inundated during the rains due to overflow of the rivers and for the rest of the year is full of marshy hollows. However, the problem of inundation has decreased after the construction of embankments. A large part in the northeastern area of the district, such as Gogri-Maheshkhunt-Saharsa Road in the north by the Kosi and in the south by the Ganga is completely inundated during rainy season except for the NH and the New Delhi-Guwahati Railway line. Southern part of this district appears to be an elevated landmass and serves as relatively safe place during floods (Figure 1:2).

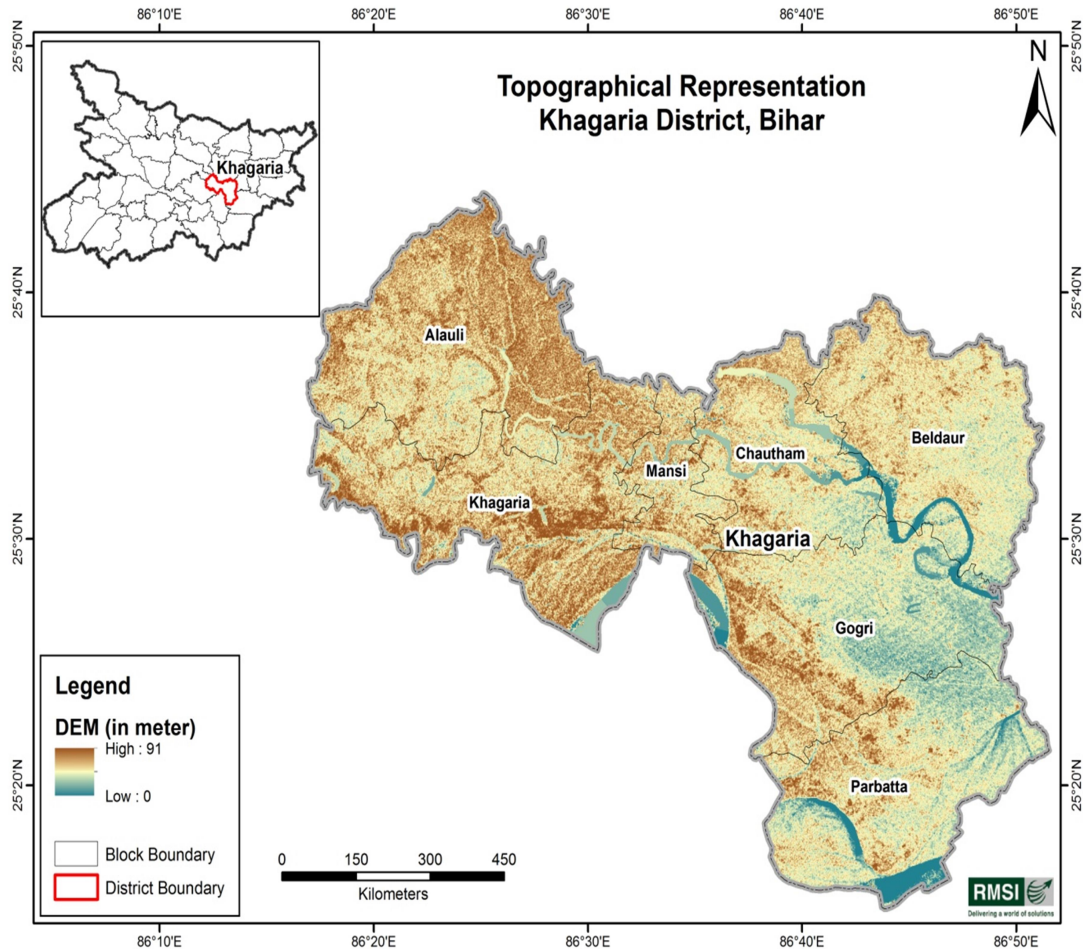


Figure 1:2 Topography of Khagaria district

Rivers

Khagaria district is located in the middle Ganga plains. It has peculiar characteristics as seven rivers flow through its area. These rivers are Ganga, Kosi, Burhi Gandak, Bagmati, Kamla, Kareh, and Kali Kosi (Figure 1:3). Many rivulets also flow through this district, which literally makes it land of rivers.

River Burhi Gandak, runs a zigzag course through the district of Begusarai and enters Khagaria for a short while, running by the side of the town of Khagaria, and flows in to the Ganga. It forms the western boundary of the Khagaria town and a protection embankment built along the eastern side of this river, protects Khagaria town from the floods of Burhi Gandak. River Bagmati enters the district from the western side, through the district of Begusarai. It then pursues a winding but generally easterly direction, until it flows into the rivers Tiljuga or the Kamla near Chautham.

River Tiljuga or Kamla enters the district from Darbhanga, near Mohraghat. It then flows southeast to Chautham, merges into the Bagmati, and the united stream flows into the district of Bhagalpur under the name of the Ghaghri, one of the main branches of the Kosi.

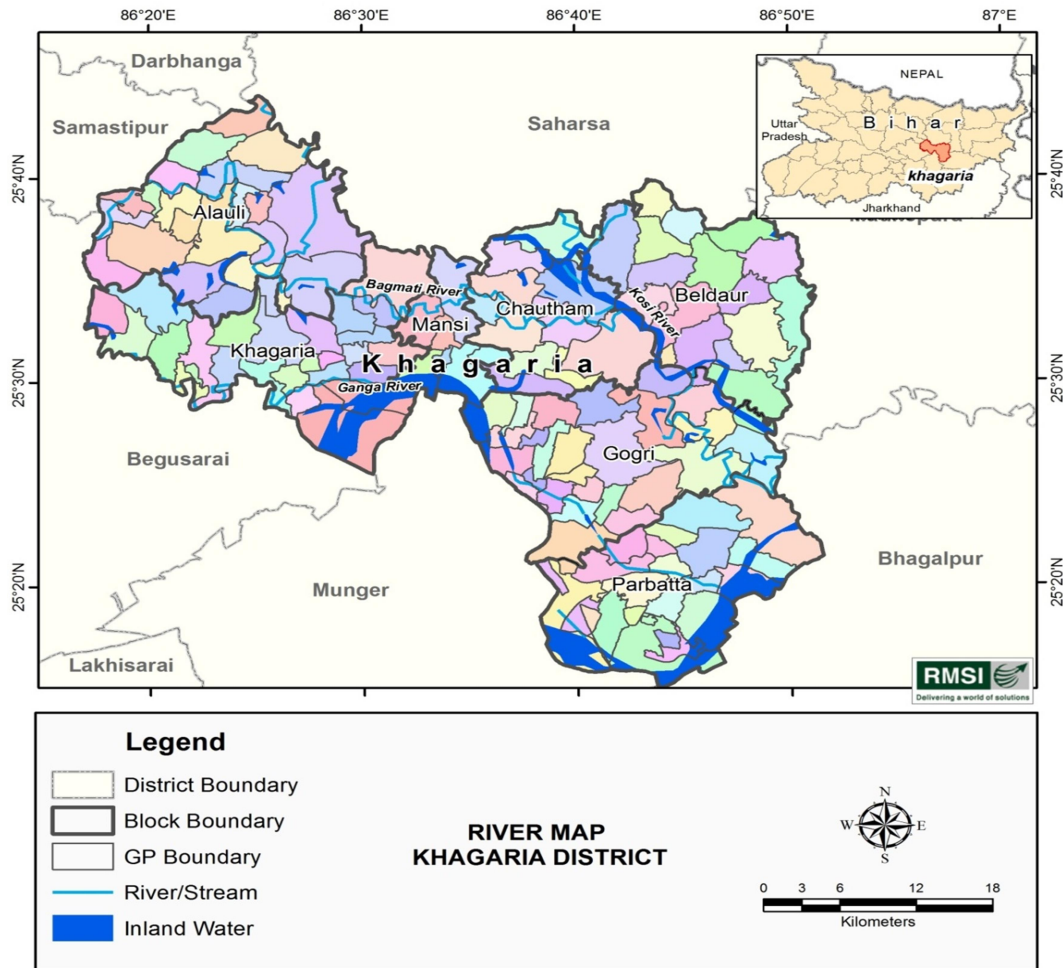


Figure 1:3 Rivers in Khagaria district

Table 1-2 Rivers crossing through the Gram Panchayats and Blocks of Khagaria District

S. No.	Name of Block	Panchayat	Floody Panchayat with River/Tributary	River	River in and Out
1	Khagaria	1.Bachauta, 2.Barai, 3.Belasimri, 4.Bhadas South, 5.Bhadas North, 6.Dhusmuri Bisanpur, 7.Gaura Sakti, 8.Jahangira, 9.Jalkaura, 10.Kasimpur, 11.Labhgaun, 12.Marar North, 13.Marar South, 14.Olapur Gangor 15.Rahimpur	1.Barai (chanhadhar) 2.Dhusmuri Bisanpur (Chanhadhar), 3.Ranisakarpura (Deni moen) 4.Belasimri (Deni moen), 5.Olapur (Budhigandak) 6.Tettrabad (Budhigandak) 7.Jahangira (Budhigandak) 8.Labhgaun (Budhigandak) 9.Kasimpur(Budhigandak) 10.Uttar	Ganga, Budhi Gandak and Bagmat i	Budhigandak Entry- Belasimri Exit - Rahimpur Dakshini Ward-01, Ganga Entry- Rahimpur Dakshini Ward-17 During Flood in Rahimpur Madhya

		Dakshin, 16.Rahimpur Madhya, 17.Rahimpur Uttar, 18.Ranisakarpura, 19.Rashounk, 20.Tetarabad, 21.Uttar Marar.	Marar(Bhagmati), 11.Rasa unk (Bhagmati), 12.Rahimpur Dakshin (Bhudhigandak+Ganga) 13.Rahimpur Uttar (Bhudhigandak+Ganga) 14.Rahimpur Madhya (Bhudhigandak+Ganga) 01.Nagarparisad Khagaria (Budhigandak) Note-Rest Panchayat's can be Affected by Rain or Breaking Dam.		Ward-15 Exit - Rahimpur Dakshini Ward-01
2	Alauli	1.Amba Ichrua, 2.Anandpur Maran, 3.Bahadurpur,4.Ba ndh Chatar, 5.Bhikhari Ghat, 6.Chandpurt Khurd, 7.Chera Khera, 8.Chhilkauri, 9.Dahmakhairi Khutha, 10.Goriyami, 11.Gaura Chak, 12.Haripur, 13.Hathwan, 14.Meghauna, 15.Rampur Alauli, 16.Roun, 17.Sahsi, 18.Sahar Banni, 19.Shumbha, 20.Simraha.	1.Meghauna (Bagmati), 2.Hathwan (Bagmati), 3.Sahar Banni (Kareh+Bagmati) 4.Chera Khera (Kamla) 5.Rampur Alauli (Bagmati) 6.Bandh Chatar (Bagmati), 7.Anandpur Maran (Bagmati+Kamla) 8.Dahma Khairi Khutha (Bagmati+Kamla) Note-Rest Panchayat's can be Affected by Rain or Breaking Dam.	Bagmat i, Kareh and Kamla	Bagmati and Kareh Entry- Sahar Banni and Exit - Dahma Khairi Khutha while Kamla Entry- Chera Khera Exit - Dahma Khairi Khutha.
3	Chautham	1.Buchcha, 2.Chautham, 3.Dhutaui, 4.East Borne, 5.Hardiya, 6.Middle Borne, 7.Nirpur, 8.Pipra, 9.Rohiyar, 10.Sarsawa, 11.Telaunchh, 12.Thuthi Mohanpur, 13.West Borne.	1.Buchcha (Bagmati), 2.Sarsawa (Bagmati), 3.Thuthi Mohanpur (Bagmati), 4.Rohiyar (Bagmati), 5.Chautham (Bagmati), 6.West Borne (Bagmati), 7.Middle Borne (Bagmati), 8.East Borne (Bagmati) Note-Rest Panchayat's can be Affected by Rain or Breaking Dam.	Bagmat i, Kareh Kamla, and Koshi	Koshi-Entry Dhamara Bridge Buccha Exit East Borne and Bagmati Entry Khirmiya Tola Hardiya Panchayat near at Nawada Ghat while Merge in Koshi at East Borne Exit – Kathmara.

4	Mansi	1.Amani, 2.Balha, 3.Paschimi Thatha, 4.Purbi Thatha.	Amani (Bagmati) Saidpur	Bagmati	Bagmati Entry- Amni Exit -Saidpur
5	Gogri	1.Baltara, 2.Banni, 3.Basudeopur, 4.Borna, 5.Deotha, 6.Gogri, 7.Gouchhari, 8.Itahari, 9.Jhiktiya, 10.Koela, 11.Madarpur, 12.Maheshkhunt, 13.Maira, 14.Paikat, 15.Pakrail, 16.Basudevpur, 17.Paura, 18.Rampur, 19.Samaspur, 20.Sherchakla.	1.Baltara(Koshi) 2. Banni (Budhi Gandak+Ganga) 3. Borna (Budhi Gandak+Ganga) 4. Deotha (Koshi+Rain water) 5. Gogri (Budhi Gandak+Ganga) 6. Itahari (Ganga) 7. Jhiktiya (Budhi Gandak+Ganga) 8. Koela (Rain water) 9. Paikat (Koshi+Rain water) 10. Paura (Koshi) 11. Rampur (Budhi Gandak+Ganga) 12. Samaspur (Budhi Gandak+Ganga) Note-Rest Panchayat's can be Affected by Rain or Breaking Dam.	Ganga, Budhi Gandak and Koshi	Ganga Entry- kundi Ghat and Exit - (Siranya, Sher chakla) Budhi Gandak Entry- Banni and Exit - near Mairiya while merge in ganga near Agwani ghat Koshi Entry- Baltara Exit -Paikat
6	Parbatta	1.Baisa, 2.Bandehra, 3.Bharso, 4.Dariyapur Bhelwa, 5.Deori, 6.Jarawarpur, 7.Kabela, 8.Khajraitha, 9.Khiradih, 10.Kolwara, 11.Kulharia, 12.Lagar, 13.Madhowpur, 14.Mahaddipur, 15.Pipralatif, 16.Saurh North, 17.Sourh South, 18.Siadatpur Aguani, 19.Temtha Karari.	1.Bharso(Ganga), 2.Dariyapur Bhelwa (Ganga) 3.Jarawarpur (Ganga), 4.Kabela (Ganga), 5.Khajraitha (Ganga), 6.Khiradih (Ganga) 7.Kulharia (Ganga), 8.Lagar (Ganga), 9.Madhowpur (Ganga) 10.Saurh North (Ganga), 11.Sourh South (Ganga) 12.Temtha Karari (Ganga) Note-Rest Panchayat's can be Affected by Rain or Breaking Dam.	Ganga,	Entry- Kabela Exit- Sourh Uttari

7	Beldour	1.Balaitha, 2.Bela Nauwad, 3.Bobil, 4.Chodhli, 5.Dighaun, 6.Dumri, 7.Itmadi, 8.Kainjri, 9.Kurwan, 10.Mahinath Nagar, 11.Mali, 12.Pachaut, 13.Pirnagara, 14.Sakrohar, 15.Telihar.	1.Balaitha (Koshi and Kali Koshi), 2.Bela Nauwad (Koshi), 3.Bobil (Koshi and Kali Koshi), 4.Chodhli (Koshi and Kali Koshi), 5.Dighaun (Koshi and Kali Koshi), 6.Dumri (Koshi and Kali Koshi), 7.Itmadi (Koshi and Kali Koshi), 8.Kainjri (Koshi), 9.Kurwan (Koshi and Kali Koshi), 10.Mahinath Nagar (Koshi and Kali Koshi), 11.Mali (Koshi and Kali Koshi), 12.Pachaut (Koshi and Kali Koshi), 13.Pirnagara (Koshi and Kali Koshi), 14.Sakrohar (Koshi and Kali Koshi), 15.Telihar (Koshi and Kali Koshi).	Koshi and Kali Koshi	Koshi and Kali Koshi-Entry Near Usraha Bridge Balaitha/Dumri Panchayat and Exit Kanjari.
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Figure 1:4 Major Soil Types in Khagaria district (Source: NBSS& LUP, Regional Centre, Kolkata, 2010)

Soil

Based on soil characterization, rainfall, temperature, and terrain, four main agro-climatic zones in Bihar have been identified each with its own unique characteristics. Khagaria district falls under Agro-Climatic Zone I (Northern West) which is located north of the river Ganges. Zones I and II are considered as flood prone.

Soil of Khagaria is mainly alluvial and is a mixture of clay and sand of varying proportion good for agriculture. Soil texture varies from sandy loam to coarse loamy in the upland areas which bounds the flood plains of the river), to fine loam in the flood basin areas of the Himalayan rivers. Loam is found in the levees of Ganga while clay and clayey loam is generally present in the basin of Burhi Gandak and Bagmati Rivers (Figure 1:4).

Based on soil characterization, rainfall, temperature, and terrain, four main agro-climatic zones in Bihar have been identified each with its own unique characteristics. Khagaria District falls under Agro-Climatic Zone I (Northern West) which is located north of the river Ganges. Zones I and II are flood prone.

Climatic Features

Climate of Khagaria is humid sub-tropical and is generally healthy. Summers in the district have a good deal of rainfall, while the winters have very little rainfall. However, the early onset of monsoon and heavy rainfall always causes havoc in the district by damaging the standing crops. Further, heat waves during summer and severe cold waves during winter mostly affect the poor posing a challenge for the district and local administrations to mitigate the adverse effect of such seasonal hazards in the district.

Rainfall

The average annual rainfall in the District of Ganga-Burhi Gandak Rivers is 1,084 mm of which around 80% falls between mid-June and mid-October.² Monsoon normally starts in June and lasts until October. The early monsoon currents, channelled to the NW are the principal source of rainfall of the region. 17% of the pre-monsoonal rains, which is spread in different months of the year (especially during the months of November-January), is due to the Norwester effect. Heavy rains, supplemented by physiographic features, lead to heavy flood. Most part of the winter is dry except for some sporadic rains. The driest month is December with rainfall averaging 1mm. (Figure 1:5)

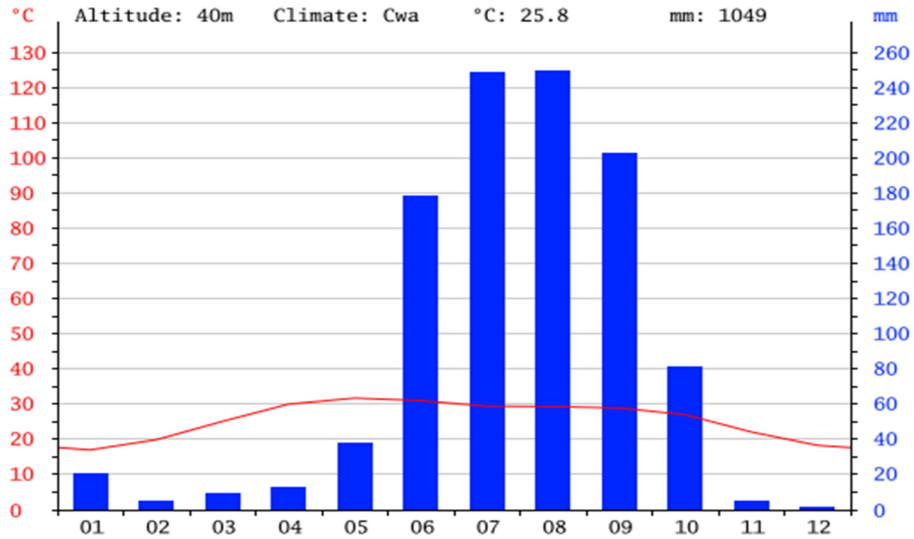
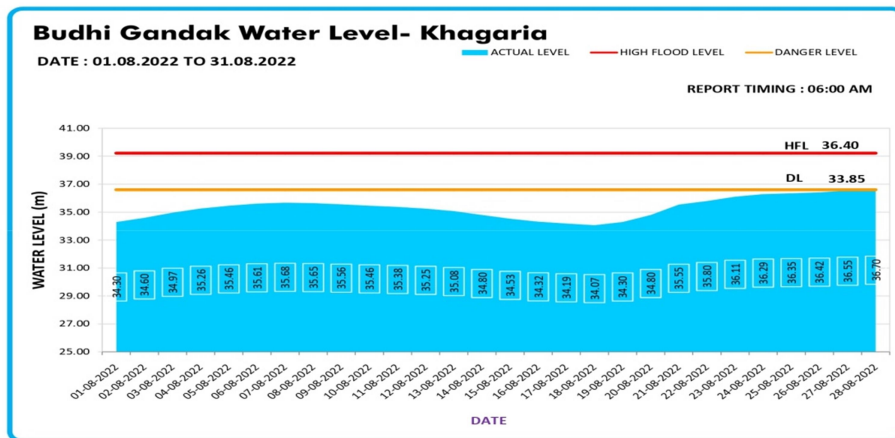
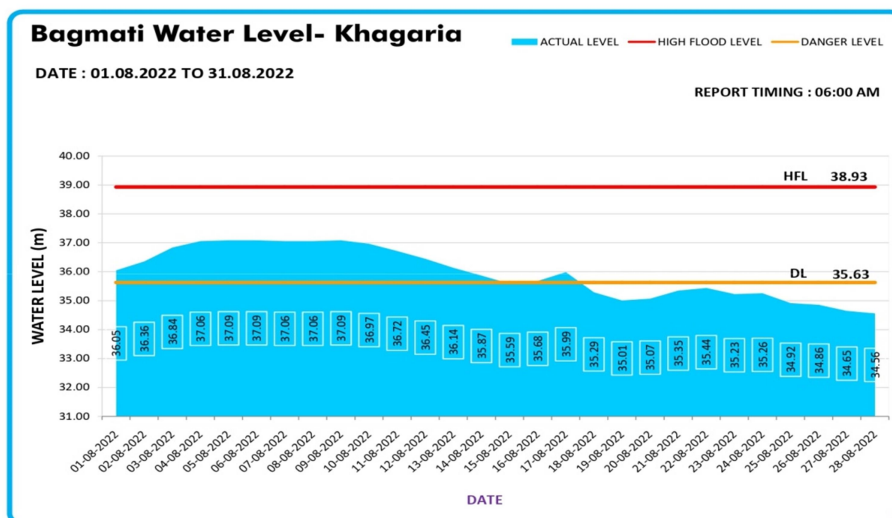
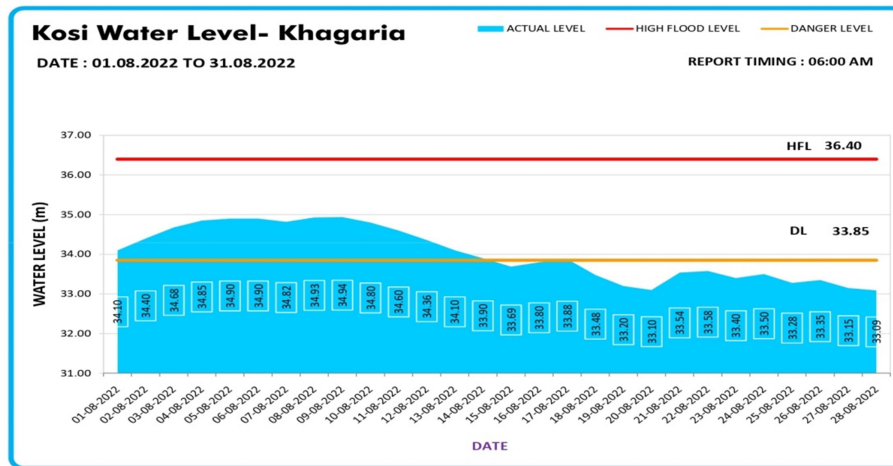


Figure 1:5 Historical Average Rainfall pattern of Khagaria district (2000-2013)
(Source: IMD)



²Source: Meteorological Dept., Patna



DEOC, Khagaria

Temperature

Average annual temperature of this region remains around 25.8°C. The summers are very hot. Day temperature in summer in Khagaria District remains in between 29°C to 45°C. There is gradual increase in average temperature from January (16°C) to May (36°C).

During summer, due to high temperature, this becomes an area of low pressure. Owing to this, the plains of Khagaria and associated areas get under the influence of strong winds during this period due to the cyclonic disturbances in Bay of Bengal. Khagaria. This leads to dust storms. These dry, hot, dusty storms are locally called as “loo” which is prevalent in the months of May-June. (Figure 1:6)

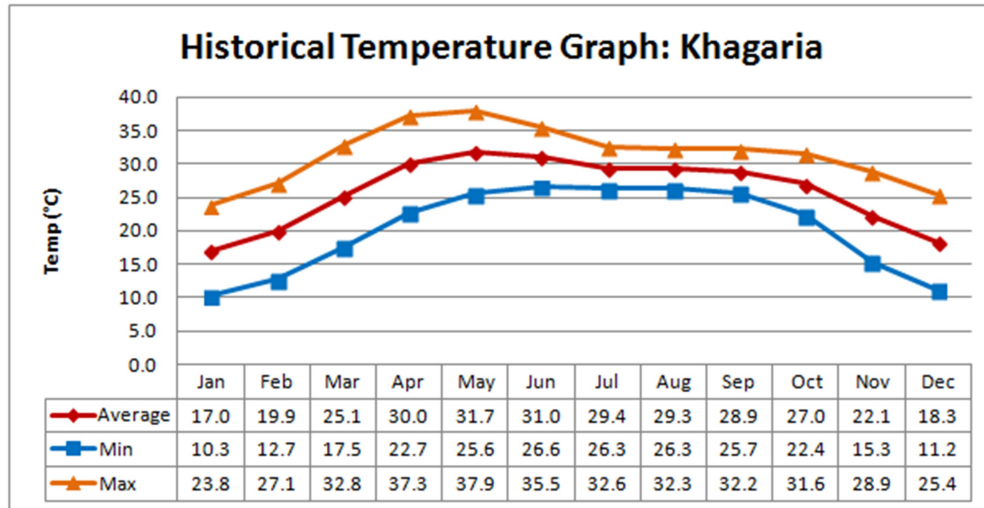


Figure 1:6 Historical Temperature Pattern of Khagaria district (2000-2013)

(Source: IMD)

Khagaria experiences three main seasons. Summer season starts from March and remains until mid-June. May is the hottest month when average temperature remains around 31.7°C. The monsoon season breaks in mid-June and lasts until mid-October. Most precipitation falls in month of July and August with an average monthly rainfall of 248 mm in the district. Winter season starts from mid-October and last until February. January is the coldest month with an average temperature of 17.0°C. The months of February and March, when temperature begins rising, are considered the transitional spring season or “Basant Ritu”. The months of September and October are described as “*Shishir*” when the weather transitions from monsoon season to winter season.

It is observed from the rainfall trend for last 15 years, the district has been facing ‘disturbed monsoon’. Though we cannot directly correlate this with climate change, the impact of climate change is very much felt in monsoon season in the district. Bihar is observing increased climatic variability leading to increased occurrence of extreme climatic events such as intense heat waves across the area and more intense precipitation of shorter duration. Such large amount of rainfall for the shorter duration increases the run-off and hampers the natural ground water recharge process without getting enough time for water to get percolated. In longer run, this may affect ground water table in the region. Climate change impact in the region may thus become a reality.

Cultural & Historical Perspective

It is said that the entire areas, now included in the district of Khagaria, was “Dahnal”, affected by floods of the Ganga, the Gandak, the Kamla, the Bagmati and the Kosi. Because of its topography, any site of importance must have been washed away. That is why, it does not possess any historical site of importance. According to the history, commonly known in this part, it is said that during the time of Emperor Akbar, Raja Todarmal had been entrusted with the duty of conducting a survey of the entire area, but as he failed to do it due to difficult terrain, rivers and dense forests, he advised that this area should be excluded. In other words, he adopted the policy of “Farak Kiya” and that is why the area is known as “Pharkiya Pargana”.³

³<http://khagaria.bih.nic.in/history.htm>

Following are the important sites:

- **Katyayani Asthan:** Katyayani Asthan is situated on the bank of river Kosi at distance of 12 km from Khagaria town. Temples of Mata Katyayani as well as of Bhagwan Ram, Lakshman and Ma Janaki are situated at this place. Every Monday and Friday, a large number of devotees come to this place for offering Puja.

Demographic Information

Demography

According to the Census 2011, Khagaria district has a population of 1,666,886 and is ranked 300th in India (out of 640 districts) (Figure 1:7). As per Census 2011, 94.7% population of Khagaria district lives in rural areas (Figure 1:8). The total population living in rural areas is 1,579,708.

The district has a population density of 1,122 persons per square kilometre and a sex ratio of 886 females for 1,000 males. Its population growth rate over the decade 2001-2011 was 30.19% (Figure 1:9). Its population growth rate over the decade 2001-2011 was 26.44%. Khagaria has a sex ratio of 895 females for every 1,000 males.

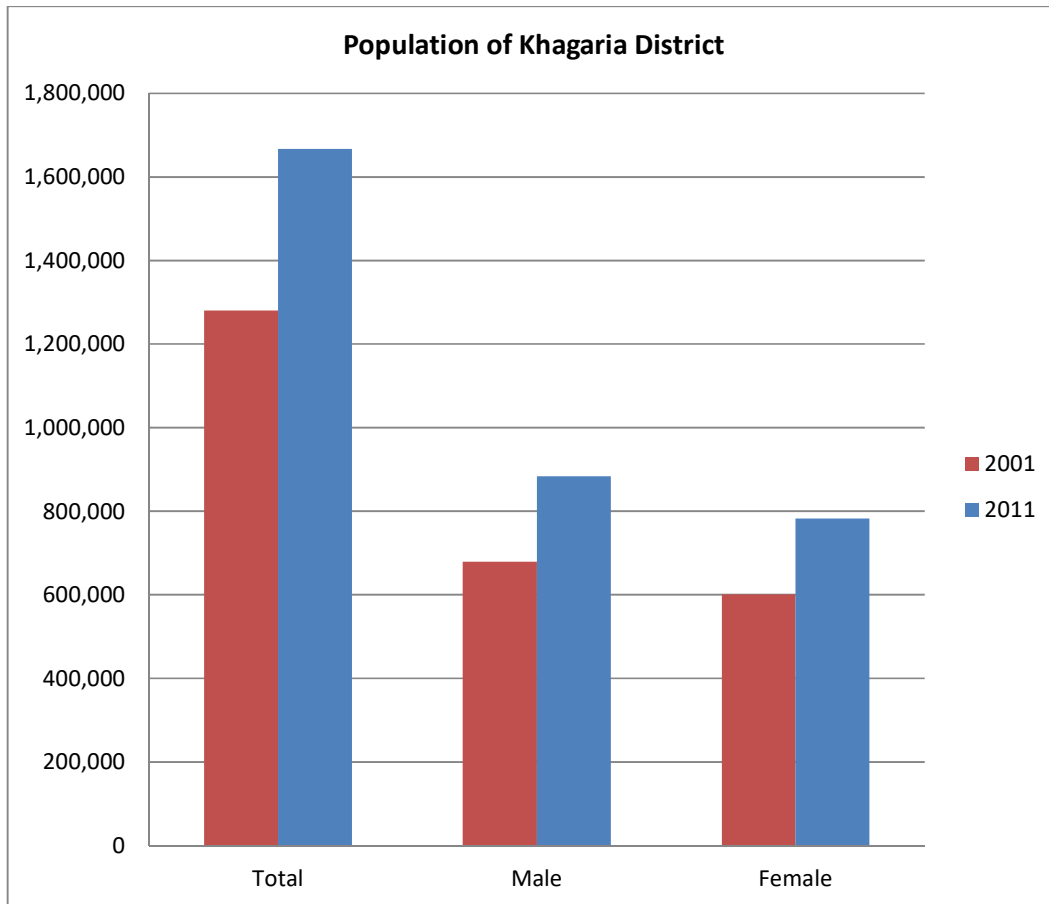


Figure 1:7 Population of Khagaria district

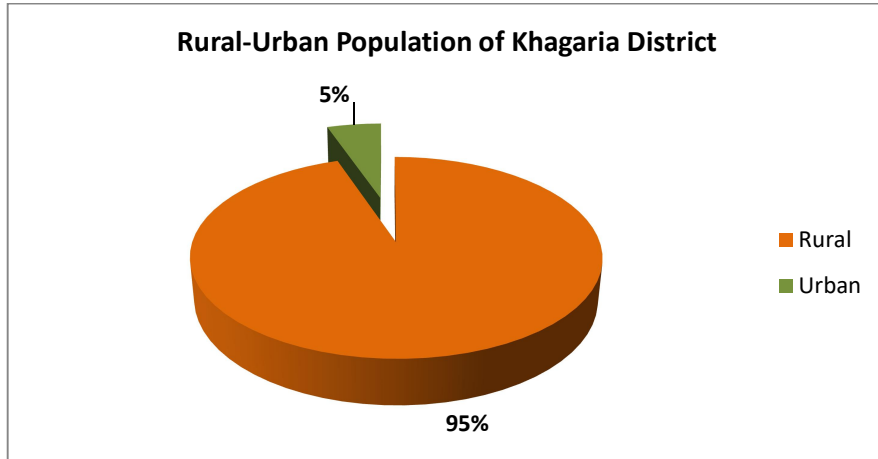


Figure 1:8 Rural Urban population of Khagaria district

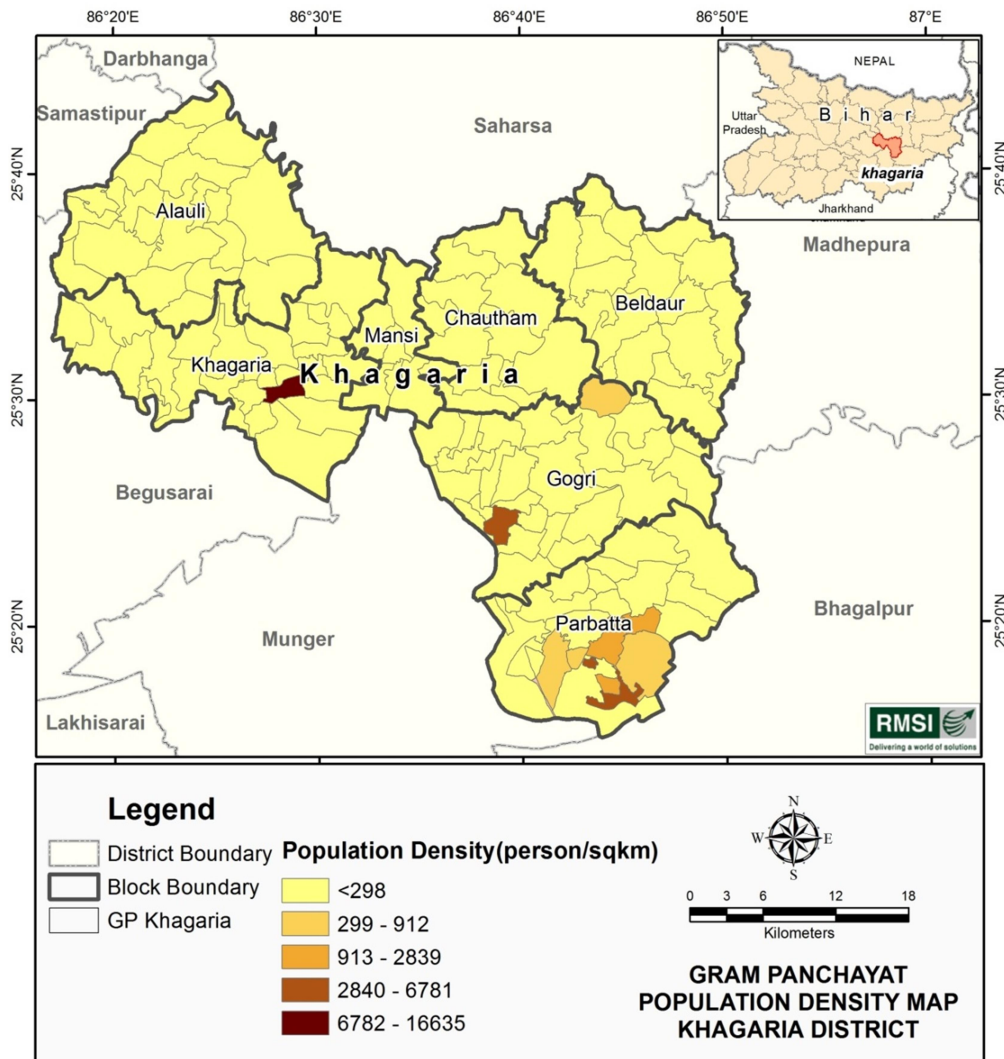


Figure 1:9 Population density distribution of Khagaria district
(Source: Census 2011)

Population density in Khagaria Municipality and some parts of Gogri and Parbatta blocks are very high (2840 persons per sq km) whereas most parts of all seven blocks are having population density < 298 person per sq km.

Major Religions and Languages

Major of the people in the district are Hindus. The district has small number of Muslims, Sikhs, Buddhists, Jains, and Christians.

Hindi and Maithili are the main official languages in this district. Angika (a local dialect of Maithili) is mostly used as a local language of communication in this district.

Education

Average literacy rate of Khagaria in 2011 was 57.92% as compared to 41.35% in 2001. Gender wise, male and female literacy was 65.25% and 49.56% respectively (2011) as compared to 51.82% and 29.35% (2001) respectively in the district (Figure 1:10).

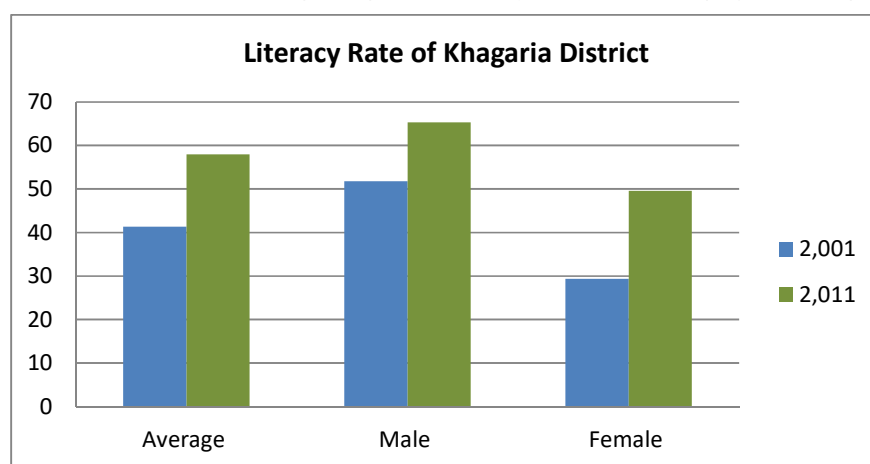


Figure 1:10 Literacy rate of Khagaria district

Sources of Livelihood

Per Capita Gross District Domestic Product (GDDP)

The latest estimate for per capita GDDP (Gross District Domestic Product) of the district Khagaria is Rs 11,515 in 2011-12 at 2004-05 Base Prices⁴, which makes it the 14th prosperous district of Bihar. Though Khagaria has a better average than the Bihar average of Rs 14,574, it is quite low when compared to the All India average of Rs 38,048 during 2011-12.

Main Occupations

Main occupation of the people of the district is agriculture and agri-based industries. People are also engaged in the secondary and tertiary sectors.

The traditional occupation in this area has been the rearing of milch cattle. Animals are used in agricultural work even today. In urban areas, rearing of cows of hybrid quality has increased. Due to the abundance of milch cattle's in this area, sale of milk and milk-products, especially ghee is also an important business activity here. Despite domestic use of milk, a huge quantity of milk is sold to the Barauni Milk Composite Dairy Industry. This gives lucrative income and employment to the people of Khagaria. As well as Maheshkhoot Milk Dairy Industry about to develop.

⁴ Source: Economic Survey-2015-16, GoB page 50; Directorate of Economics and Statistics, GOB

Agriculture

Being a predominantly agrarian economy, the source of livelihood in the district primarily depends on agricultural products. Above 80% people depend upon agriculture. Wheat is the prominent Rabi crop in the district. Due to floods and water logging, the paddy production is very low, except in the southern part of the district. Maize is grown abundantly almost throughout the district, while banana cultivation as a cash crop, has grown into prominence in last two decades. Banana cultivation is done mostly in Chautham, Gogri and Parbatta blocks.

Apart from these mango and litchi orchards are abundant in this district and are found almost throughout the entire area. These orchards are said to be in existence since long.

Animal Husbandry

Apart from agriculture, animal husbandry is one of the key sectors, which plays an important role in employment and income opportunities for the rural masses of Bihar. This sector contributes about one-fifth of the total rural income, and provides large-scale employment to women, and workers belonging to the marginalized sections of society. Further, since many households are either landless or land-poor in rural Bihar, this sector supplements their low income from agricultural occupation.

According to the livestock census of 2012, the total livestock population in Bihar was 329.39 lakh and total poultry population was 127.48 lakhs. Khagaria district had around 5.63 lakhs livestock population and 1.47 lakhs poultry population. Livestock population includes cattle, buffalo, goat, pig, horses & ponies, mules, donkeys, and while poultry includes total birds in the poultry farms and hatcheries. Taking note of the importance of the sector, the state government has taken several important steps for its development. These include breed upgradation, health and nutrition, insurance scheme for milch animals, and marketing of the products of the sectors. Further, training programmes have been arranged for rural workers to enhance their skill in animal husbandry.

The rearing of milch cattle has been a traditional occupation in the district because of the abundance of good pastures among the hills to the south during the rainy season and ground of Khagaria in the dry season. Animal husbandry is the area where there is ample scope for the district to grow.

Industry

Khagaria does not have very known industries as such. However, some of the small sized industries such as agro based, ready-made garments & embroidery, wood/ wooden based furniture, paper & paper products, leather based, chemical/ chemical based, mineral based, metal based, engineering units, electrical machinery & transport equipment, repairing & servicing, etc are found in the district. This district has remarkable potential for agro- based industries because of the large production of maize and oilseeds, etc.

Industries in Khagaria district can be categorized as follows:

- Major industries: metal, wooden and agro processing;
- Potential areas for service industries: Transportation, hotels/restaurant, beauty parlours/ salons, health gym, mobile repairing centres, etc.
- Potential for new MSMEs: agro based products (maize product), dairy product, water treatment plants, readymade garments, restaurants, beauty parlours/ salons, boutiques, etc.

Tourism

In Khagaria district tourism is mainly related to religious festivities. Katyani Asthan, Aguawani ghat, etc are the important religious places, which attract tourists from the nearby locality and districts.

Services

Beside agriculture and industries there are other services like painting, fisheries, handicrafts, and weaving etc. which are the primary source of income for many families and also a vital source for the economic growth of the district.

Natural Resources

Forest

Khagaria district overall lacks forest cover. Even if it is found, it is in small patches in Gogri, Beldour and Alauli blocks. There is no hill and no mineral found in Khagaria district.

Agriculture

Endowed with the fertile alluvial soil having abundant water resources, particularly ground water resources, Khagaria district forms rich ground for agriculture. Around 70% of the land is cultivable which supports the agrarian economy of the district majorly. With varied soil categories found in agro-climatic zone-I (northern west), a variety of crops is grown here. Wheat is the prominent Rabi crop in the district. Due to recurrent floods and related water logging issues, the paddy production is very low, except in the southern part of the district. Maize is grown abundantly almost throughout the district. Apart from food grains, the district produces pulses, oilseeds, fiber crops, sugarcane, fruits, vegetables and other crops. The district's many rivers also make favourable conditions for paddy cropping, if floods are in control.

Mostly orchards of mango and litchi are present in this district. Banana is also grown on a large scale in Chautham, Gogri and Parbatta blocks in this district. Apart from this, several other trees are also found in this district. These include guava, lemon, shisham, babul, neem, gamahar, peepal, bamboo, shirish, etc.

Figure 1:12 and Figure 1:11 depict the overall land use and land cover patterns in the district.

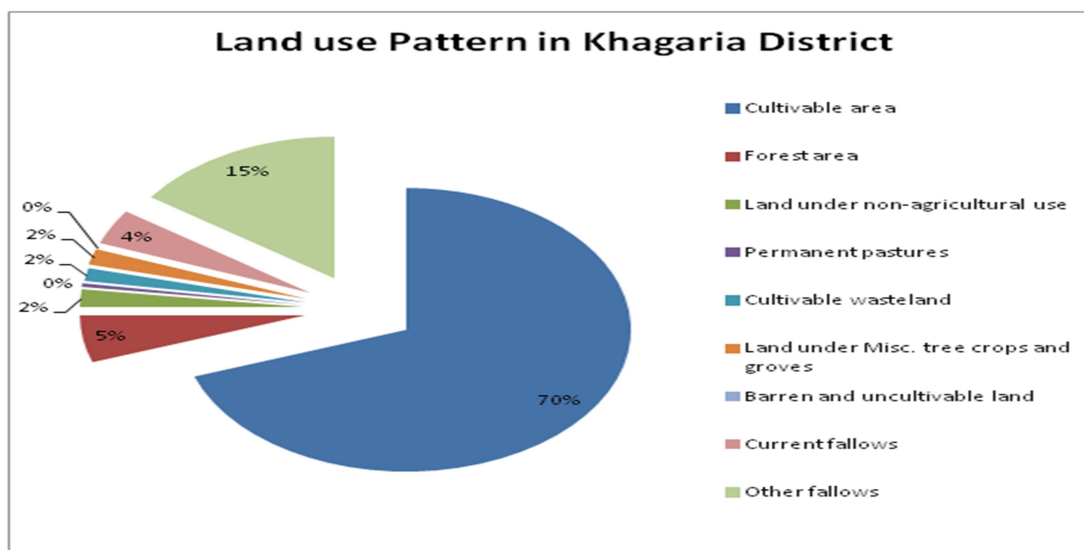


Figure 1:11 Land use Pattern in Khagaria district

(Source: Agriculture Contingency plan for district (*krishi.bih.nic.in*), 2013)

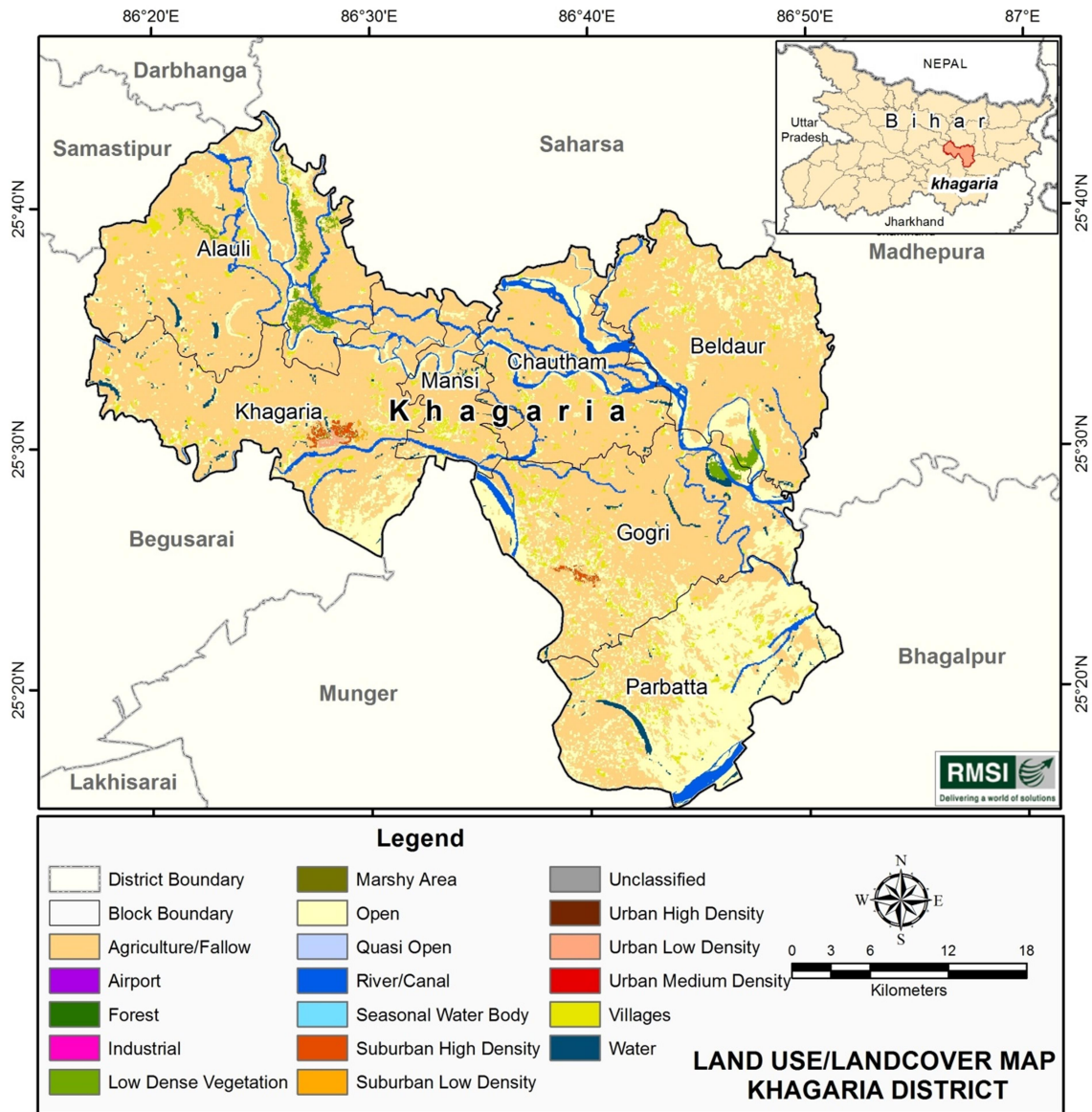


Figure 1:12 Land use/ Land cover of Khagaria district

Irrigation system

Agriculture in the district mainly depends on rainfall. Tanks, tube-wells, lift irrigation and artesian wells are being used for irrigating agriculture lands where Rabi crops are practiced. Despite the abundance of rivers in the district, there is no system of canal irrigation which is probably due to the heavy salination nature of the region. As a result, the cultivators are dependent on the use of private borings fitted with pump sets. Fortunately, due to high water table in the area, the cost of boring is not very high and even middle class farmers can afford to have private boring and pump sets.

Agriculture, being the mainstay of the economy of the district, Government sponsored financing programmes, also give importance to bank financing of individual owned irrigation projects, comprising mainly of 5-7.5 KVA pump sets and borings. To improve the functioning of the state owned tube wells, the ownership and maintenance of the tube wells are transferred to groups of beneficiaries and this is under the process of implementation in this district. There is a scope to increase such practices especially in the Gram Panchayats where there is a scarcity of water

Hydrogeological conditions in the district are extremely favourable for the constructions of tube wells as the wells drilled up to depth of 100 meter can give discharge up to 200-250 m³ /hr with a drawdown of only 3 m.⁵ Ground water development can be improved to increase the cropping intensity in the district. The ground water is generally within permissible limit for agriculture and human consumptions.

The stage of ground water development is 43.8%. The stage of ground water development is highest in Parbatta (50.5%) and lowest in Alauli (35%). As stages of ground water development in all the blocks are less than 70%, and there is no long-term decline in water levels, all the blocks are under safe category. The block wise ground water resource is given in

Figure

1-13.

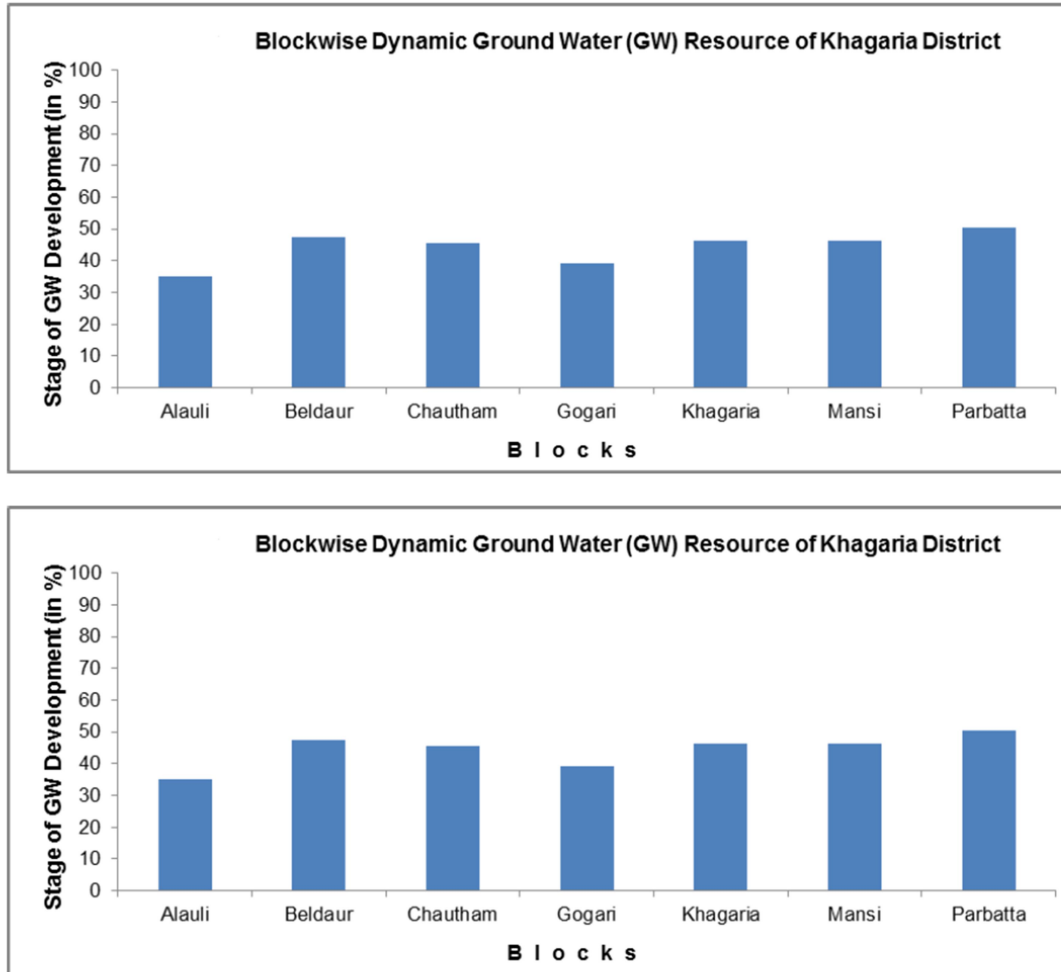


Figure 1-13: Block wise Dynamic Ground water resource of Khagaria District

(Source: Ground Water Information Booklet, Khagaria District, Bihar, September 2013; CGWB, Ministry of Water Resources, GOI)

Khagaria is one of the arsenic affected districts in Bihar. Arsenic contamination has been reported from the shallow aquifers and has been affecting the aquifers up to 60 m bgl. Though the contamination is patchy in distribution even within the shallow aquifers it is desirable that caution is taken for drinking water supply. Taking the experience of adjoining districts after arsenic investigation into consideration, it is recommended to tap only the

⁵Source: Ground Water Information Booklet, Khagaria District, Bihar, September 2013, CGWB; Ministry of Water Resources (MoWR), Govt. of India Sept 2013.

deeper aquifer zones (>80 m bgl) in the contaminated areas for use for water supply (CGWB, 2013).

Infrastructure and Services

Roads and Railways

Khagaria district is well connected to other parts of Bihar and the country through railways as well as roads. New Delhi-Guwahati railway lines passes through Khagaria. Other prominent stations are Mansi, Maheshkhunt and Pasraha. Mansi had been an important place from the point of view of railways, since it used to be the headquarters of an Engineering district of railway but now most of important offices of railways have shifted from this place to other places, and mostly to Khagaria or Barauni, which falls in Khagaria district.

NH-31 passes through the district almost parallel to the railway line in west-east direction, the intersection of the two existing at a place called Chukati, 8 km eastward from Khagaria. Almost 46 Km of NH- 31 falls within the jurisdiction of Khagaria district. From Maheshkhunt, on NH-31, Branches of one road to Saharsa District. Excessive rains and water logging coupled with poor maintenance account for poor road condition. Prominent roads of the district, which are maintained by Road Construction Department are Maheshkhunt-Chautham-Beldour road (26 Km), Maheshkhunt-Gogri- Parbatta-Sultanganj ghat road (32 Km.), Khagaria-Alauli road (18 Km), Khagaria-Parihara- Bakhri Road (19 Km.), Khagaria-Munger ghat road (6.5 Km), Khagaria-Sonmankhi road (6.5 Km) and Pansalwa–Bajnathpur road (11 Km). Due to existence of several rivers and rivulets, all weather roads in the interiors of the district would require huge investment in bridges and culverts, the lack of which makes large part of rural area accessible by boats only during the rainy season (

Figure 1:14).

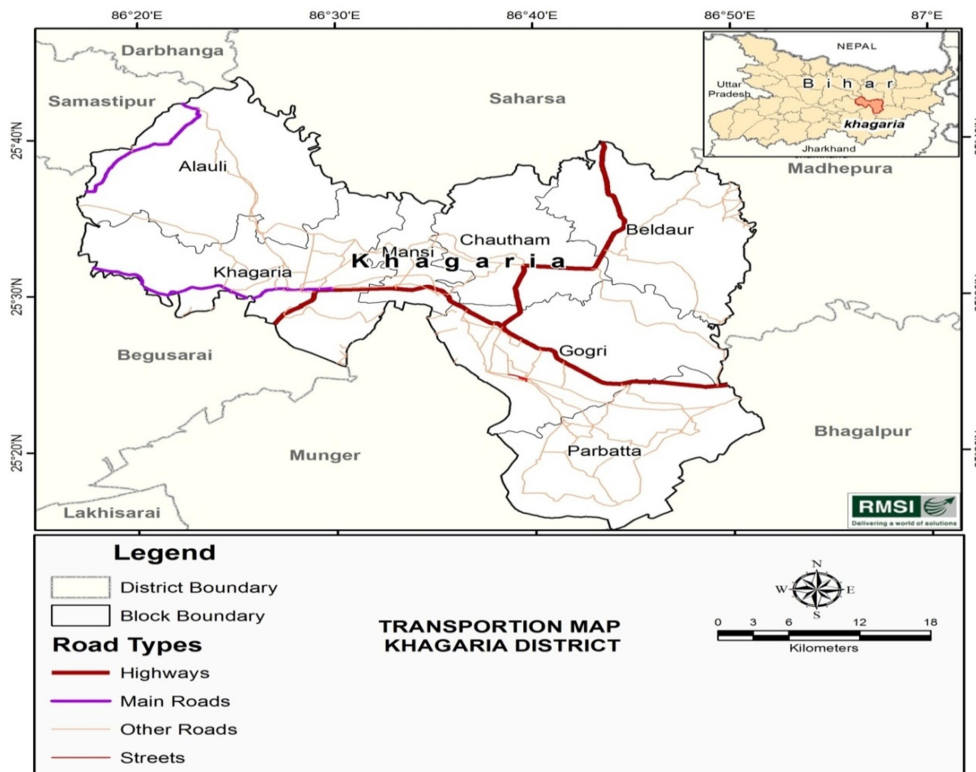


Figure 1:14 Major Transportation Network in Khagaria district

Hospitals

As health care services are one of the major facilities required at any place, this district also needs a good health care system to meet all the medical requirements of the people of the district during normal situation as well as during disaster periods. In Khagaria, the Health and Family Welfare Department of Bihar Government and District Health Society Khagaria generally provide public health care facilities. Moreover, a number of private hospitals, clinics, nursing homes, pathology labs, blood banks, and pharmaceutical stores also play a major role in developing health care infrastructure in the district.

Among health facilities available in the district are 7 PHCs, 25 APHCs, 193 HSCs, and no SDH as per district health department. There is one referral hospital. About 29 veterinary hospital and dispensaries exist in the district.

Over the period, District Health Society Khagaria manages all government health care facilities in the Khagaria town as well as other parts of the district. Due to availability of free and cheap medical services, public hospitals and health care centres are much popular among poor people. Sadar hospital Khagaria is the popular government hospital in the district. (Figure 1:15).

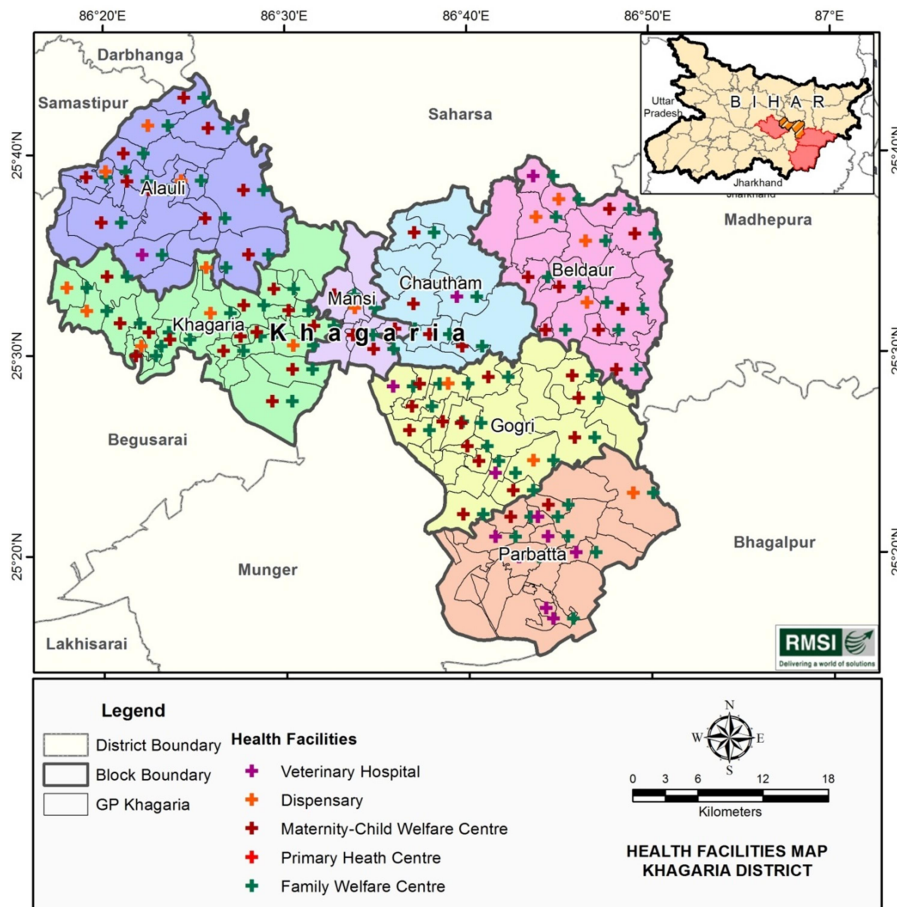


Figure 1:15 Important Health Facilities available in Gram Panchayats of Khagaria district

(Source: Census 2011)

[Note: Health facilities representation on maps depicts institution presence in the Panchayat and not their exact locations.]

Educational Institutions

Education plays an important role in promoting and enabling Disaster Risk Reduction (DRR). Mainstreaming DRR into school curriculum is aimed to raise awareness and provide a better understanding of disaster management for children, teachers and communities. The students and educated people of all ages can actively participate in school safety measures and also work with teachers and other adults in the community towards minimizing risk before, during and after disaster events

Table 1-3).

Government can effectively reach out to communities and protect them by focusing on schools in DRR initiatives to achieve greater resilience to disasters. Moreover, accompanying structural changes to improve safety in building schools will not only protect children and their access to education, but will also minimize the long-term costs.

District has the following educational infrastructure:

Table 1-3 Important Educational Institutions in Khagaria District

SI No.	Educational Institutions	Number
1	Govt. Primary School	557
2	Govt. Secondary School	579
3	Govt. High School	31
4	Govt. Residential School	1
5	Govt. High School Project	5
6	Govt. College	5
7	Govt. Polytechnic	1
8	ITI	1
9	B T College	2
10	Ayurvedic Medical College	1

Source: DISE for Khagaria

As per Census 2011, following map (Figure 1:16) depicts the important educational institutions present in the Gram Panchayats of all the blocks of the district.

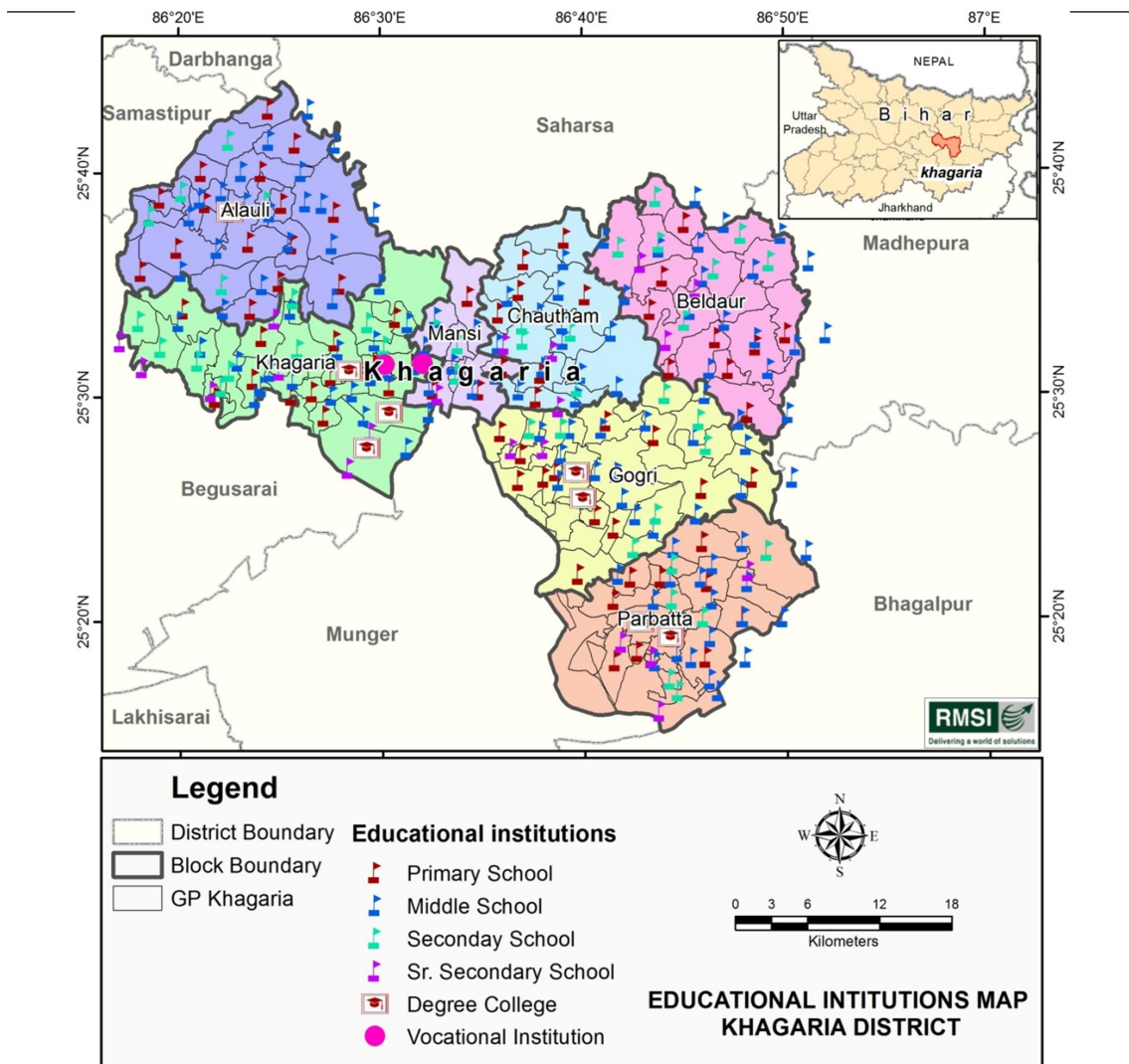


Figure 1:16 Important Educational Institutions available in Gram Panchayats of Khagaria district

(Source: Census 2011)

[Note: Educational institutions' representations on maps depict institutions' presence in the Panchayat and not their exact locations.]

Water Sources

Ground water is the main source of water in Khagaria. Ground water is extracted through high yielding tube-wells. The Khagaria Municipal Corporation and the Public Health Engineering Department (PHED) are statutory authorities in charge of supply and maintenance of water supply in the municipal area. Both agencies are jointly responsible for supply of potable water including planning, design, construction, implementation, maintenance, operation and management of water supply. Ground water is the main source of water in Khagaria.

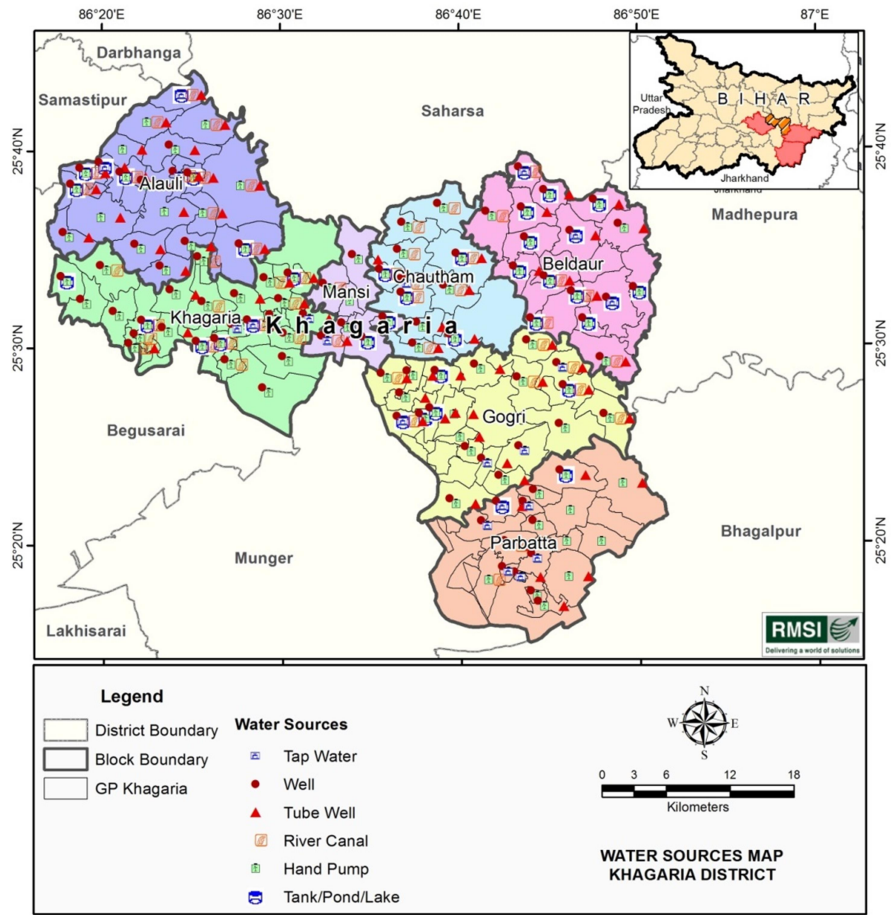


Figure 1:17 Water Sources

in Khagariadistrict

(Source: Census 2011)

[Note: Various water sources representation on maps depicts sources presence in the Panchayat and not their exact locations.]

Department of Water Resource

Flood Control-1 & 2-(Embankments/Dams)

FCD-1					
Dam Name	From to till	Length	Water Logging Area	River side ward & Panchayat	Vulnarable Place
KTPE khagaria town protection embankment.	Baluahi to Bakhri	3 km	Dannagar	Ward-26, Near Aghauri Ghat	Ward-26, Near Aghauri Ghat
Ramchandra jamidari Dam.	Sluice Gate to Railway Line	1 km	Islampur		
Budhigandhak Bayatat.	Railway Line Madhwa to Belasimri	19 km (0 to 2 km, 7 to 18.50 km)			Madhwa, Chandpura (Tantitola,Jalkaura)
Budhigandhak Dayatat.	NH-31, Nankumanda I Tola to Chakki (Olapur Gangore)	6 km (0 to 2km, 10 to 12 km, 13 to 15 km)			
G.N Tatband Gogri Narayanpur.	Banni Gogri to Dudhela (Parbatta)	51 km (0 to 51 km)	Bharatkhand, Khajraitha, Dudhela	Banni,Bhadlay,Borna,Rampur,Bhudhiyagaun,kabela, Dumriya,Madhopur,Kanjalan,Lagar,Salarpur,Bharatkhand,Dudhela.	Nayagaoun,Temtha,Bharatkhand,Khajraitha,Lagar
Chaidha Baktiyarpur jamidari Dam.	Chukti spur to Thatha spur	2 km	Chukti		

FCD-1 Erosion and Project				
River	Place/Panchayat	Proposed Project	Length (mts)	Remarks
Budhigandhak	Madhwa,Jalkaura	Sand Bag Wall	300	
Ganga	Dudhala,	Sand Bag Wall	150	570
	Bharatkhand,Lagar	Pacca Dowels	600	
	Nayagawn	Sand Bag Wall	450	
	Kabela	Sand Bag Wall	70	
	Pachkuti	Sand Bag Wall	50	

FCD-2					
Dam Name	From to till	Length	Water Logging Area	River side ward & Panchayat	Vulnerable Place
Karachin Badla Ghat	Meghauna (Alauli) to Bagha (Mansi)	37 km (10.5 km to 47.5 km)	Sonmanki to Rasaunk	Aura, Bahorwa (Meghauna), Sahar Banni, Cherakhera, Anandpur Maran, Daimakhairi Kutha, Uttar Marar,	Alauli- Meghauna, Hathwan, Rampur Alauli, Ambalcharua, Bandhcharat, Daimakhairi Kutha, Amni (Mansi)
B.N Dam	Badla Ghat (Hardiya) to Paikat	35.6 km (0 to 35.6 km)	Koila Paikat	Phulwaria, Launga, Paryagi, Sahroun (Pachaut), Gandhi Nagar (Itmadi)	Malpa (Dhutaui), koila Paikat
Chodhli Jamidari Dam	Dumri Bridge to Barun (Itmadi)	13.5 km (0 to 13.5 km)		Pachaut, Itmadi, Sahraun	Barun, Pachaut, Itmadi, Sahraun
Telihar Jamidari Dam	Dumri Bridge to Kanjari	17.5 km (0 to 17.5 km)		Thakurbasa	Thakurbasa
Baltara Jamidari Dam	B.N Dam to B.N Dam (Around Baltara)	2 km (0 to 2 km)		Baltara	Baltara

FCD-1 Identified Places for E.C Bags		
River	Places	Anchal/Block
Budhigandhak	Tantitola (Olapur Gangore)	Khagaria
	Jalkaura	Khagaria
	Madhwa (Kasimpur)	Khagaria
	Ramchandra	Khagaria
	Chaidha	Mansi
Ganga	Nayagawn	Parbatta
	Lagar	Parbatta
	Temtha	Parbatta
	Madhopur	Parbatta
	Bharatkhand	Parbatta
	Dhudhela	Parbatta

FCD-2 Erosion and Project				
River	Place/Panchayat	Proposed Project	Length (mts)	Remarks
Bagmati	B.N Embankment Near 9 km	Balla Pilling/E.C Bag/Geo Bag	190	
	B.N Embankment Malpa (Near 5 km)	Balla Pilling/E.C Bag/Geo Bag	105	
	K.B Embankment Near Sonmanki Bridge (34.4 km)	Balla Pilling/E.C Bag/Geo Bag	170	
	Lagma Bharpura	Balla Pilling/E.C Bag/Geo Bag	170	
	B.N Embankment Bangalia (Near 4.5 km)	Balla Pilling/E.C Bag/Geo Bag	435	
	B.N Embankment Agrahan (Near 10 km)	Balla Pilling/E.C Bag/Geo Bag	380	
Koshi	B.N Embankment (Near 24 km) Launga	Balla Pilling/E.C Bag/Geo Bag	170	
	B.N Embankment (Near 32 km) Birwas	Balla Pilling/E.C Bag/Geo Bag	170	
	Chodhli Jamidari Dam (Near 12 km) Barun	Balla Pilling/E.C Bag/Geo Bag	375	
	Telihar Jamidari Dam (Near 2 km) Thakurbasa	Balla Pilling/E.C Bag/Geo Bag	520	
	Chodhli Jamidari Dam (Near 4 km) Pachaut	Balla Pilling/E.C Bag/Geo Bag	1020	
	B.N Embankment (Near 25 km) Fulwaria	Balla Pilling/E.C Bag/Geo Bag	500	
	Chodhli Jamidari Dam (Near 9 km) Gandhi Nagar Itmadi	Balla Pilling/E.C Bag/Geo Bag	410	

FCD-2 Identified Places for E.C Bags		
River	Places	Anchal/Block
Bagmati	K.V Dam (Near 11.5 km) Kokraha	Alauli
	K.V Dam (Near 12.5 km) Aura	Alauli
	K.V Dam (Near 15 km) Bandher Dhala	Alauli
	K.V Dam (Near 21 km) Ghuranmor	Alauli
	K.V Dam (Near 27 km) Santosh	Alauli
	K.V Dam (Near 35 km) Etwa	Khagaria
	K.V Dam (Near 38 km) Budhwa Dhala	Khagaria
	K.V Dam (Near 44 km) Saidpur	Mansi
Bagmati/Koshi	B.N Dam (Near 4 km) Malpa	Chautham
	B.N Dam (Near 8 km) Lalpur	Chautham
	B.N Dam (Near 13 km) Devka	Chautham
	Lagma Jamidari Dam (Near 2 km) Lagma	Chautham
	Telihar Jamidari Dam (Near 4 km) Telihar	Beldaur
	Telihar Jamidari Dam (Near 10 km) Misrbasa	Beldaur
	Chodhli Jamidari Dam (Near 0 km) B.P Mandal Setu	Beldaur
	Chodhli Jamidari Dam (Near 12 km) Barun	Beldaur
	Chodhli Jamidari Dam (Near 2	Beldaur
	Koshi	B.N Dam (Near 24 km) Launga
B.N Dam (Near 31 km) Birwas		Gogri

FCD-1, Temporary Camp		
River	Camp/Places	Anchal/Block
Budhigandhak	Tantitola (Olapur Gangore)	Khagaria
Ganga	Borna	Gogri
	Araiya gawn	Parbatta
	Naya gawn	Parbatta
	Temtha	Parbatta
	Lagar	Parbatta
	Bharatkhand	Parbatta

FCD-2, Temporary Camp		
River	Camp/Places	Anchal/Block
Bagmati	Sluice Gate Kokraha (Near 11.5 km) K.B Dam	Alauli
	Sluice Gate Aura (Near 12.5 km) K.B Dam	Alauli
	Sluice Gate Bandher Dhala (Near 15 km) K.B Dam	Alauli
	Sluice Gate Ghuranmor (Near 22 km) K.B Dam	Alauli
Bagmati/Koshi	Sluice Gate Telihar (Near 5 km) Jamidari Dam	Beldaur
	Sluice Gate Misrawasa Near 10 km) Telihar Jamidari Dam	Beldaur

Table 1-4 shows the embankments⁶ in Khagaria district and nearest Gram Panchayats and villages that are vulnerable to embankment breach:

Table 1-4 Embankments in Khagaria District.

Name of Rivers	Name of Embankments	Length (km)	Nearest Vulnerable Places
Ganga	1. Khagaria Town Protection Embankment Left	3	Aghori Sthan Khagaria
	2. Gogri Narayanpur Link Bandh Left	51	Narayanpur
Kosi	3. Badlaghat-Nagarpara Embankment Right	40	Malpa, Lalpur, Choutham, Poura, Basua, Paikat, Paharpur, Dewaka
Bagmati	4. Karachi Badla Ghat Embankment Right	47.5	Saidpur, Amni, Chatar, Rasouk, Amba-Alauli

⁶Source:Khagaria District Administration

	5. Nagarpara Embankment Right	16	Bhawanipur, Jayrampur
Burhi Gandak	6. Burhi Gandak Right Embankment	20	Terasi, Hardiya, Chakkai
	7. Burhi Gandak Left Embankment	19	Jalkoura, Chainpura, Olapur

(Source: Disaster Management Cell, Collectorate of Khagaria)

Department / Agency	Prevention	Mitigation	Preparedness
Flood			
Department of Water Resources	<ul style="list-style-type: none"> • multipurpose storage dams for flood prevention and sediment detention, administrative measures for restricting occupancy of flood zone • Converting the abandoned course of the river bed into reservoirs with proper intake and outlet channels so that, instead of allowing the flood water to flow down, the excess water gets accumulated in these reservoirs.. 	<ul style="list-style-type: none"> • The revival and maintenance of traditional practices of ahar, pynes and ponds system for diverting and storing flood water and making use of the same for multipurpose activities including irrigation, restoration of water tables etc. • conversion of rivulets and tributaries into reservoirs for storing flood water for a desired period and for later use • in suitably selected places large anti-flood sluices across the rivers are built then a controlled release of water will take place, a considerable level of water would be maintained in the tributaries as well • Storing Flood Water in reservoirs • Channel Alterations with provisions for 	

Department / Agency	Prevention	Mitigation	Preparedness
		<p>regular maintenance of the slopes in the channel, removing of debris and other obstructions, using natural vegetation for strengthening the sides of the channels and for using it as a source of promoting fisheries etc.</p> <ul style="list-style-type: none"> • River bank plantation: (a) large trees with deep root systems in the upper reaches, (b) a good mix of trees, shrubs and ground cover that may bind middle reaches and (c) trees, shrubs and ground cover with matted root systems and flexible branches at the lower reaches. • Deepening of chauris and mauns for intake of inundating water through natural 'dhars' and 'bahiyars'. • Exploring the possibility of setting up of hydroelectric power generating units of 5 to 10 MWs. • the traditional practices of interlinking dhars, bahiyars, chauris and mauns should be revived 	

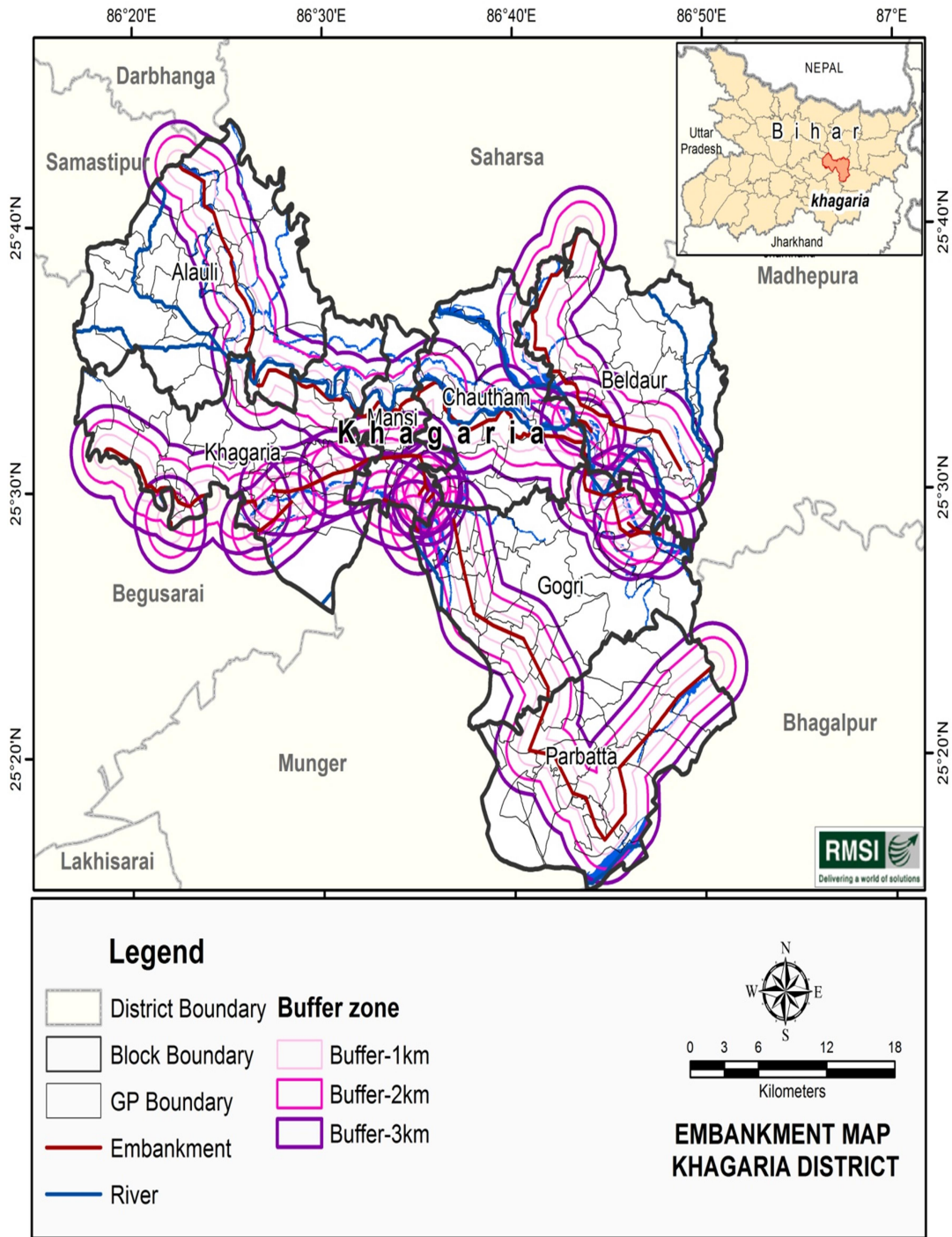


Figure 1-18: Embankment Map of Khagaria district

2 Hazard and Risk Profile of the District

History of Disaster Events

Khagaria is a flood-prone district. Every year Khagaria is affected by floods causing a great damage to crops, buildings roads, human lives, and animals. The Ganga, the Burhi Gandak, Koshi, Bagmati, Kali Koshi, Kamla and Kareh flow through this district. In normal cases, when the water level rises mainly in these rivers, 7 blocks of Khagaria district namely Gogri, Alauli, Beldour, Chautham, Khagaria, Parbatta, and Mansi get affected by floods (Table 2-1).

Table 2-1 Flood Affected Blocks of Khagaria district (1987-2010)

SI No.	Blocks	Years of Flood Occurrences	Frequency
1	Gogari	87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 2000, 01, 02, 03, 04, 05, 07, 08, 09, 13, 16,18,19,20,21	28
2	Alauli	87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 2000, 01, 02, 03, 04, 05, 07, 09, 13, 16,20,21	25
3	Chautham	87, 88, 89, 90, 91, 93, 94, 95, 96, 97, 98, 99, 2000, 01, 02, 03, 04, 05, 07, 09, 13, 16,20,21	24
4	Beldaur	87, 88, 89, 90, 91, 93, 94, 95, 96, 97, 98, 99, 2000, 01, 02, 03, 04, 05, 07, 08, 09, 16,20,21	24
5	Khagaria	87, 88, 89, 90, 91, 93, 94, 95, 96, 98, 99, 2000, 01, 02, 03, 04, 05, 07, 08, 09,18,19,20,21	24
6	Parbatta	87, 88, 90, 91, 92, 93, 94, 95, 96, 98, 99, 01, 03, 04, 05, 06, 07, 08, 13, 16,18,19,21	23
7	Mansi	96, 98, 99, 2000, 01, 02, 03, 04, 05, 07, 09, 13, 16,19,20,21	16

Source: DMD, Government of Bihar.

Major Hazards

Table 2-2 List of Hazards in Khagaria district

Natural Hazards	Man-made Hazards
Flood	Epidemic
Earthquake	
Drought	Road/Rail Accidents
Windstorm/Cyclonic wind	Boat Tragedies
Cold Waves	Drowning into river, pond, dug wells
Heat Waves	Snakbite
Fire	
Lightning	

Table 2-3 Khagaria: Snapshot of District level vulnerability to Hazards

Hazard Type	Causes	Vulnerable	Affected Population/ Assets	Affected Blocks
Flood	<ul style="list-style-type: none"> • High rainfall at the higher reaches and catchments • Decreased carrying capacity of the river due to siltation • Increased incidences of downpour concentrated in a limited period. 	<ul style="list-style-type: none"> • Agriculture- Crops, trees; • Irrigation- Canals, Tube wells; • Transportation- Road, Railways; • Livestock- Cattle, Buffalo, Goat, Pig, horses, donkeys, etc; • Educational institutions- Primary, secondary, and senior secondary schools, Colleges, etc. • Community centres, Government buildings, Government assets, • Vulnerable population- children, aged, disabled, ill & weak, pregnant women, etc 	<ul style="list-style-type: none"> • Humans, • Animals, • Weak houses, • Crops, • Transport network, • Communication network and other assets. 	<ul style="list-style-type: none"> • All Blocks (Khagaria, Alauli, Mansi, Chautham, Gogri, Parbatta, and Beldour)
Drought	<ul style="list-style-type: none"> • Deficient rainfall 	<ul style="list-style-type: none"> • Crops; • Livestock, • Drinking water, • Livelihood 	<ul style="list-style-type: none"> • Humans, • Animals, • Crops, • Assets 	All Blocks
Earthquake	<ul style="list-style-type: none"> • Falling in Earthquake Zone IV (high damaging risk zone) making it vulnerable • Passage of a prominent sub surface fault- Munger- 	<ul style="list-style-type: none"> • Humans, • Livestock, • Weak houses, • Community Centre, • Medical services 	<ul style="list-style-type: none"> • Humans, • Animals, • Weak houses, • Community centre, • Cereal Crops, • Transport network, • Communication network, • health services, • Water distribution system, • electrical supply 	All Blocks

Hazard Type	Causes	Vulnerable	Affected Population/ Assets	Affected Blocks
	Saharsa ridge fault		system, • other assets	
Cyclonic wind and Windstorm	<ul style="list-style-type: none"> • Severe weather conditions and low pressure creation leading to formation of windstorms and cyclones 	<ul style="list-style-type: none"> • Trees, • Crops, • Kutchcha and thatched roof houses, • Livestock, • Agricultural labourers, • Schools and Colleges, • Telecommunication, • Electricity supply, • Transport system, • Pregnant women, • Aged people, • Children, and ill person 	<ul style="list-style-type: none"> • Humans, Animals, Crops, Assets 	All Blocks
Cold Waves/ Hailstorm	<ul style="list-style-type: none"> • Change in prevailing weather conditions 	<ul style="list-style-type: none"> • Humans, • Livestock, • Crops and vegetables, etc 	<ul style="list-style-type: none"> • Humans, • Animals, • Crops, • Assets 	All Blocks
Fire	<ul style="list-style-type: none"> • Anthropogenic factors such as negligence, electrical short circuit, thatched and bush houses • Strong winds 	<ul style="list-style-type: none"> • Human, • Trees, • Crops, • Kutchcha and thatched roof houses, • Livestock, etc, 	<ul style="list-style-type: none"> • Humans, • Animals, • Crops, • Assets 	All Blocks
Accidents-Road and Rail	<ul style="list-style-type: none"> • Heavy traffic on National Highway has increased the 	<ul style="list-style-type: none"> • Humans, • Passengers, • Inhabitants near NH. 	<ul style="list-style-type: none"> • Passengers 	<ul style="list-style-type: none"> • Places near accident site • Road Hazardious Place • Satish Nagar Chauraha

Hazard Type	Causes	Vulnerable	Affected Population/ Assets	Affected Blocks
	<p>possibility of fatal accidents</p> <ul style="list-style-type: none"> • Vehicular speed on the NH often becomes the cause of rising number of road accidents. 			<p>Parbatta</p> <ul style="list-style-type: none"> • Maheskunt Chauraha Gogri • 5KM NH-31 • Karuha Mor Chautham • Kathyani Asthan Chautham
Lightning		<ul style="list-style-type: none"> • Humans, • Livestock, • Trees, etc 	<ul style="list-style-type: none"> • Humans, • Livestock, • Trees, • Houses, etc 	All Blocks
Snakebite		<ul style="list-style-type: none"> •Humans, •Livestock, 	<ul style="list-style-type: none"> •Humans, •Livestock 	All blocks

Flood hazard

Being surrounded and located at the banks of the rivers Ganga, Kosi, Burhi Gandak, Baghmati, Kamla, Kareh, and Kali Kosi, recurrence of flood is an annual affair. The district is, thus, very much prone to flood. District faced unprecedented flooding situation in 1987, 2004, 2007, 2008, 2009, 2011, 2013, and 2015. The flood of 2007-08 in the district is considered as the most destructive in terms of damage to human lives and properties. 221 villages in 88 Panchayats got badly affected in this flood event. Even Khagaria Collectorate got submerged under 4 feet of floodwater.

Following flood affected areas in Khagaria district have recorded high flood water level (H.F.L) (Table 2-4).

Table 2-4.High Flood water level areas

Ganga at Kharadhar sluice gate, Narayanpur Block/ Bharatpur, Gogri Block:	Budhi Gandak at NH-31, Aghoristhan, near bridge :
<ul style="list-style-type: none"> • Maximum Water Level: 35.81m (2013) • Danger Level: 34.07 m • Water Level on dated 25-08-2015: 41.495 	<ul style="list-style-type: none"> • Maximum Water Level: 39.22m (1987) • Danger Level: 36.60 m • Water Level on dated 20-09-2015: 39.73

Table 2-5 Level of flood vulnerability of the blocks in Khagaria district

SI No.	Block names	Flood vulnerability
1	Mansi	Medium
2	Alauli	High/Medium
3	Chautham	High/Medium
4	Gogri	High/Medium
5	Beldour	High/Medium
6	Khagaria	High/Medium
7	Parbatta	High/Medium

As part of the flood mitigation measures there are several initiatives in the upstream of the river and construction of embankments along the river.

DO'S AND DON'TS for Flood⁷

Do's –

- Keep Emergency kit, jewellerys and important documents ready.
- Listen carefully to flood warnings.
- Immediately move to a higher and safer place.
- Boat Registration.
- Boat Agreement.
- Gahni Work of Boat.
- Updation of Volunteer and Gotakhor List.
- Community Kitchen Preparedness.
- Good's Tendor.

Don'ts –

- Do not enter into floodwater.
- Do not stand close to electric poles and wires.
- Do not use contaminated water.
- Children Restricted Play in Flood.
- Do not spread runoff.
- Do not ignore government information and suggestions.
- Do not ignore government instructions when water comes in the house.

Earthquake hazard

As per the earthquake hazard map of BMTPC the district falls under the Zone IV (high damaging risk zone) and the Munger-Saharsa ridge fault, a prominent sub surface fault, passes through the district (

⁷ BSDMA Guidelines

Figure 2:1).

Some of the historical earthquake disaster in an around Bihar-Nepal boarder is provided in the Table 2-6 below.

Table 2-6 Significant historical earthquake disaster around Bihar-Nepal border

Event date	Description	Magnitude
Jan15,1934	One of the most devastating earthquakes in Nepal's history, known as the Bihar-Nepal earthquake, killed more than 16,000 people from Nepal and India	8.0
July 29,1980	In the western region of Nepal killed more than a hundred people and destroyed thousands of buildings	6.5
Aug 20,1988	Occurred near the Nepal-India border and killed more than a thousand people.	6.8
Sept18, 2011	This earthquake killed 16 people in Nepal and India	6.9
April, 2015	Over 9,000 people were killed and injured more than 23,000 particularly in Nepal. It was the worst natural disaster to strike Nepal since the 1934 Nepal-Bihar earthquake.	8.1



Figure 2:1 Earthquake Risk Zone in Khagaria district

In addition to this, the eastern Patna fault also passes just along the northern border and the earthquake zone V is couple of kilometres north of the district. The district has experienced the shock of some of the major earthquakes in the past in the Himalaya, particularly the 1934 and the recent one in 2015. However, there is no significant historical loss recorded.

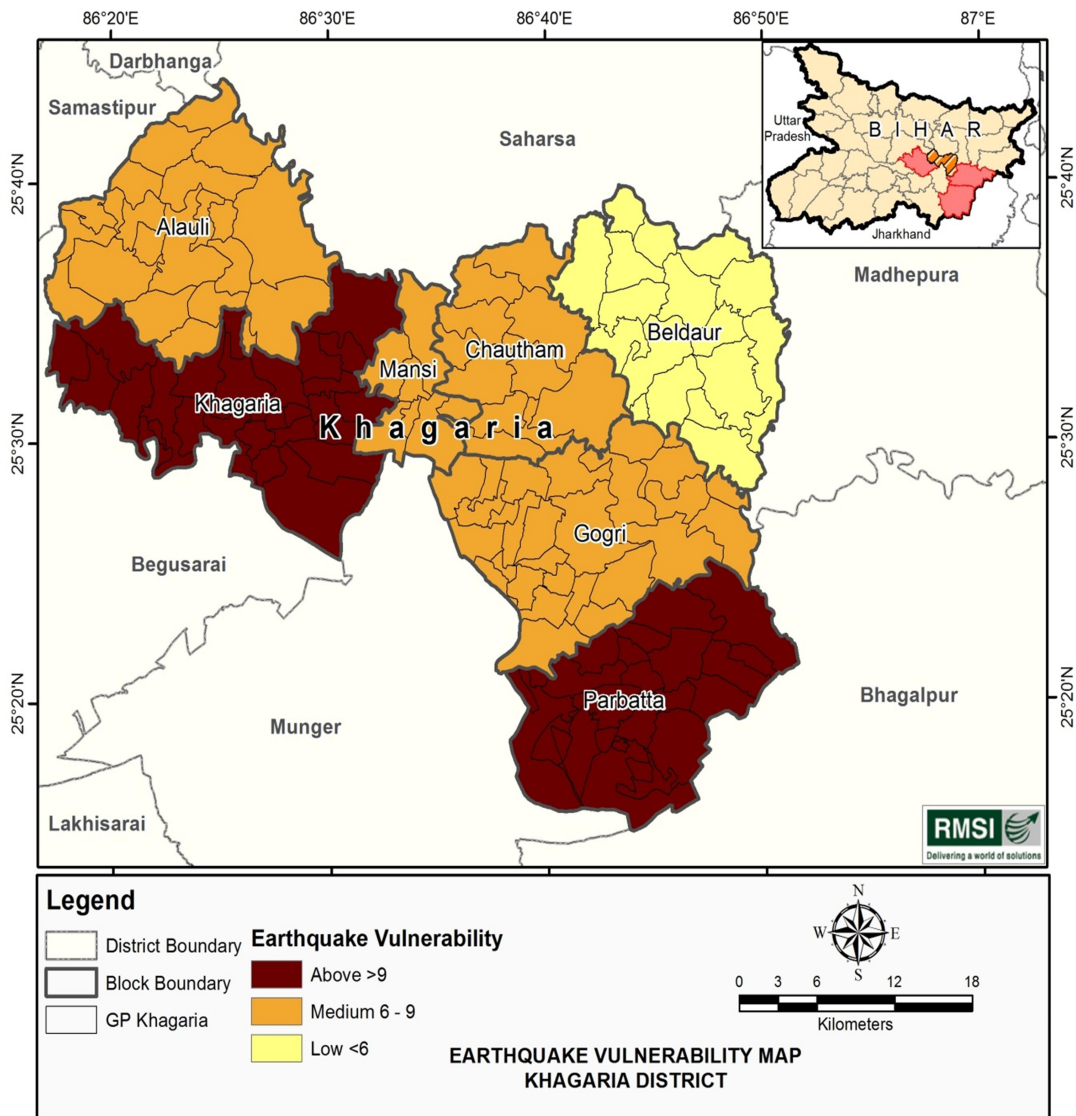


Figure 2:2 Earthquake Vulnerability in Khagaria district

(Source: RMSI Analysis based on field survey and district consultations)

Seismologically, the entire Bihar State is vulnerable as the State has a history of moderate to severe earthquakes. Moreover, the factors such as poor building construction, increased demographic pressure, deteriorating environmental conditions, poor living conditions, unplanned urbanization in urban areas with narrow lanes and crucial traffic congestion problems, etc are responsible for making Khagaria more at risk to earthquake tremors. Building and other structures which are not built with proper design and structures that are built on soft ground and slopes may collapse due to elevation, depression, tilting or violent shaking of the ground (Figure 2:2).

However, in general the construction quality of the residential buildings, particularly the traditional semi pucca houses and kutcha houses do not follow engineering standards and are vulnerable to earthquake. Bihar State has recently taken proactive steps towards mitigation of earthquake hazards in many districts, provides training for engineers, and is carrying out field-based investigation with the support of IMD.

DO'S AND DON'TS for Earthquake⁸

A. Before an earthquake:

- Follow and advocate local safe building codes for earthquake resistant construction.
- Follow and advocate upgrading poorly built structures.
- Make plan and preparation for emergency relief.
- Identify the medical centres, fire-fighting stations, police posts and organize relief society of your area.
- Know the electric and water shut off locations in your house.
- Heavy objects, glasses, cutlery should be kept in lower shelves.
- Flowerpots should not be kept on the ramparts.

B. During an earthquake:

- Keep calm and reassure others.
- During the event, the safest place is an open space, away from buildings.
- If you are indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not rush to go out of the building, to avoid stampede.
- If you are outside, move away from buildings and utility wires.
- Once in the open, stay there till the vibrations stops.
- If you are in a moving vehicle, stop as quickly as possible and stay in the vehicle.
- Free all pets and domestic animals so that they can run outside.
- Do not use candles, matches or other open flames. Put out all fires.

C. After an earthquake:

- Keep stock of drinking water, foodstuff and first aid equipment in accessible place.
- Do not spread and believe rumours.
- Turn on your transistor or television to get the latest information/bulletins and aftershock warnings.
- Provide help to others and develop confidence.
- Attend the injured persons, give them aid, whatever is possible, and inform hospital.
- Be prepared for aftershocks as these may strike.
- Close the valve of kitchen gas stove, if it is on. If it is closed, do not open. Do not use open flames.
- Do not operate electric switches or appliances, if gas leaks are suspected.
- Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires of electricity.
- If needed, open doors and cupboards carefully as objects may fall.

Drought hazard

Historically drought is not considered as a severe hazard in the district. However, the historical data shows that district has been declared drought affected district at 10 instances during the 50 years period from 1966-2016 (1966, 70, 71, 72, 79, 81, 82, 01, 13, 16). In addition to this, the change in rainfall pattern can affect the crops yield in the district. The district has developed an agricultural contingency plans which focuses on flood and drought. The deviation in the rainfall pattern particularly less rainfall during Rabi season impact the district as the soil of the district is highly permeable and is poor to retain moisture. The State was declared as drought year during 2013 as it received 25% deficit rain and 33 districts including Khagaria was declared as drought affected district. In the year 2016, 26 districts were declared drought hit including Khagaria.

⁸ BSDMA Guidelines

Windstorm/Cyclonic wind

Cyclonic winds are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation. Cyclonic winds are usually accompanied by violent storms, bad weather and rains. The windstorms or thunderstorms, which descend from Nepal, are said to be a violent version of “Kaal Baisakhi” that are common around April and May. These localized thunderstorms in the Gangetic plains are associated with strong storms and torrential rains. Wind speed reaches to 47m/s (169km/h) which puts whole Khagaria district in high damage risk zone.

Cyclonic winds in Bihar State are characterized by their devastating potential to damage structures, viz. houses; lifeline infrastructure-power and communication towers; hospitals; food storage facilities; roads, bridges and culverts; standing crops etc. Besides maize crop, large areas under wheat, mangoes, banana and litchi grown in the belt also suffer damage.

Khagaria district often experiences the cyclonic wind problem. Corn and wheat belts bear the brunt by the wind at a speed of 150-200 km/h. Farmers of Kosi-Seemanchal belt gets affected by the devastation wreaked by unseasonal rain and heavy winds just around the time of Rabi crops’ harvesting and arrival in the markets. There has been large scale flattening of standing maize crop. Apart from yield loss, there is also deterioration in quality of the grain.

The four districts, along with Khagaria, Begusarai, Bhagalpur and Samastipur, constitute Bihar’s corn (maize) belt. Farmers in these districts harvest yields of over 40 quintal per acre. Besides corn, large areas under wheat, mangoes, banana and litchi grown in the belt also suffer damage. However, this time, it is the severity just when the crop was maturing or ripe that has taken a toll.(Figure 2:3).

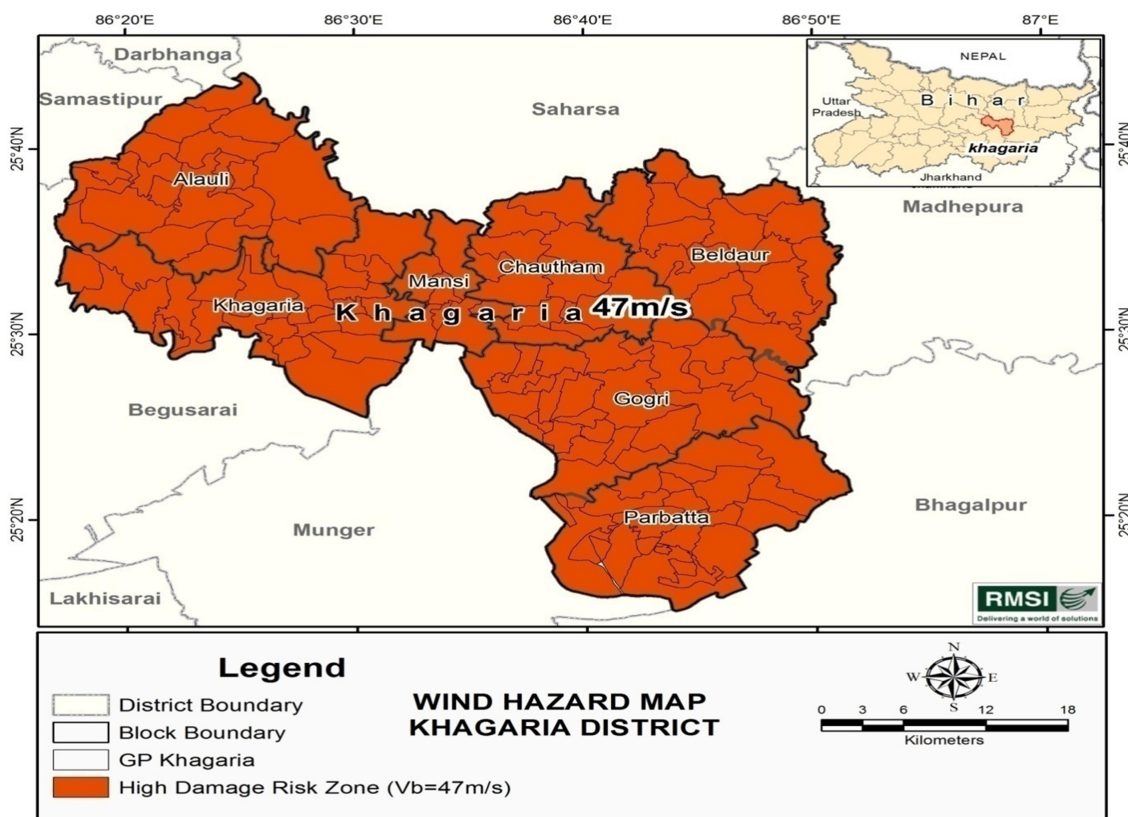


Figure 2:3 Wind Hazard Map of Khagaria district

(Source: RMSI Analysis based on field survey and district consultation)

Cold waves hazard

Khagaria district experiences severe cold waves conditions during the months of December and January. The average temperature during these months is around 13-15°C. Casualty due to cold waves increases as it gets worsened in the district. Severe cold waves conditions reported in 2008, 2011 and 2012 in the district in the recent past with one death reported in the district in 2012. Mostly poor people living in kutcha houses who are less protected used to get affected often in the cold waves (Figure 2:4). Chautham, Mansi, and Parbatta are the medium vulnerable blocks to cold waves and rest all blocks are of low vulnerable blocks.

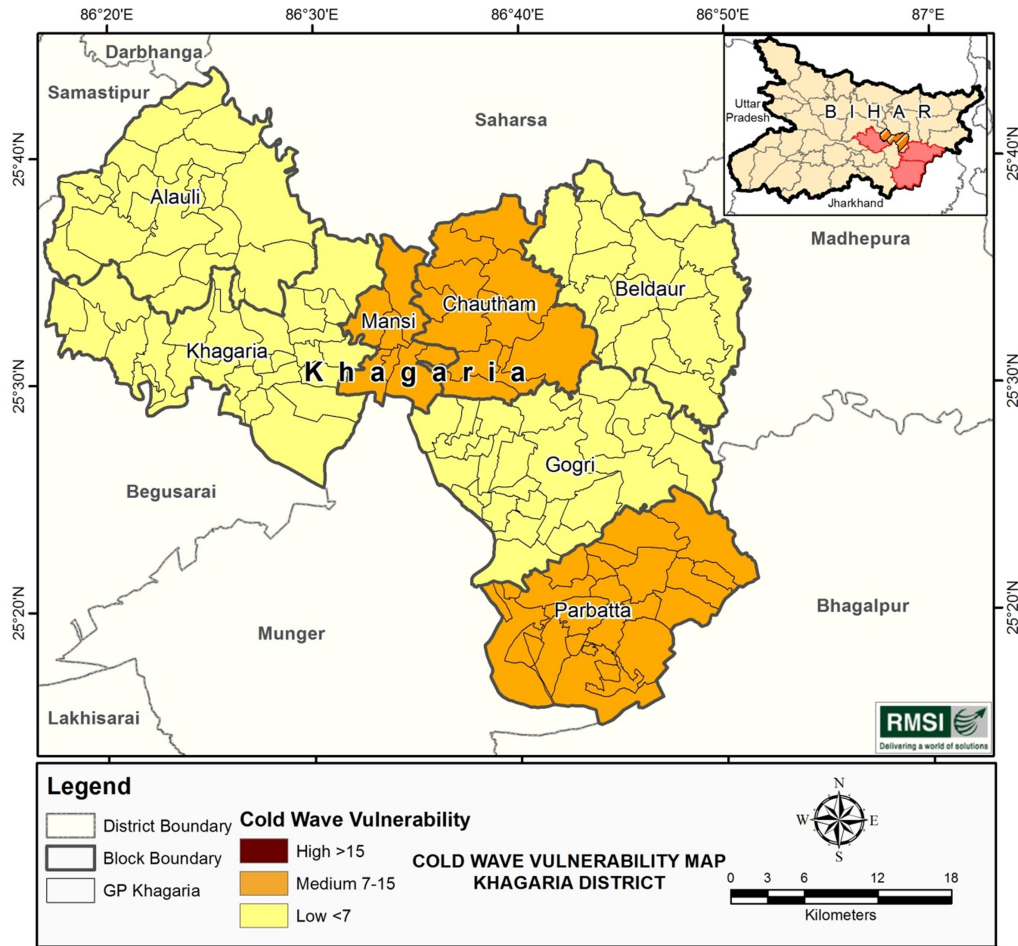


Figure 2:4 Cold Waves Vulnerability in Khagaria district

(Source: RMSI Analysis based on field survey and district consultations)

Heat Waves

Heat wave is a prolonged period of abnormally hot weather. With an overall warming of the Earth's climate, heat waves are expected to become more frequent, longer, and more intense in places where they already occur. Increased frequency and severity of heat waves can lead to more illness and death, particularly among older adults, the young, and other vulnerable groups such as school going children, daily wagers, etc.

I. Based on departure from normal

- a. **Heat Wave:** Departure from normal is 4.5⁰C to 6.4 ⁰C
- b. **Severe Heat Wave:** Departure from normal is more than 6.4 ⁰C

II. Based on actual maximum temperature

- a. **Heat Wave:** When actual maximum temperature is equal to or higher than 45⁰C
- b. **Severe Heat Wave:** Departure from normal is more than is equal to or higher than 47⁰C

The districts in central and western Bihar are vulnerable to hot and dry summer wind condition, locally known as 'loo', due to the influence of the scorching temperatures in Rajasthan and northwest parts, including the Uttarakhand area. Northeast districts of Bihar, however, with the influence of the low-pressure system developing along the Bay of Bengal in India, are getting cool air containing some moisture, resulting in the fall in mercury.

The dry spell compounded with the absence of development of rain forming systems leads the mercury level to rise above 42 degree Celsius in most places of the state including Khagaria district. With the day temperatures soaring above 42 degree Celsius, human activities in public places get decreased significantly in these months. Likewise, the dry spell followed by hot afternoon wind also affects the life in almost all the districts of north, northeast and central Bihar.

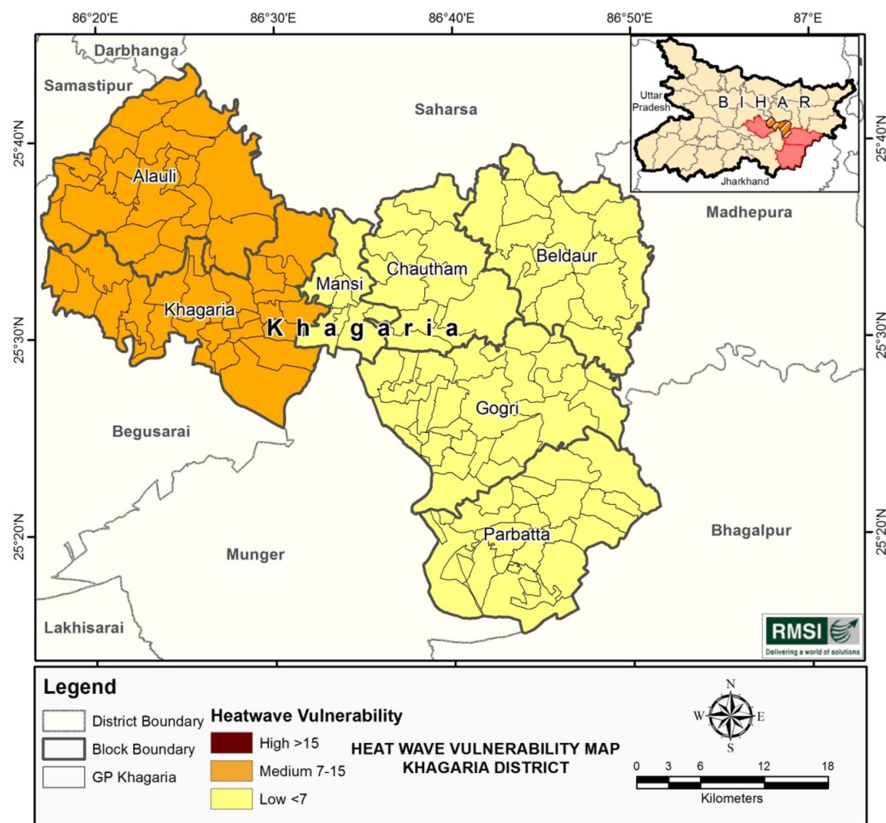


Figure 2-5 Heat waves Vulnerability Map of Khagaria district

(Source: RMSI Analysis based on field survey and district consultations)

Hot weather conditions also increase the risk of various diseases. According to Dr P K Verma of PMCH, along with the diarrhoea, complaints of headache and fever also get

increased due to such prevailing heat conditions. In Khagaria, old people succumb to death due to an apparent hyperthermia.

DO'S AND DON'TS FOR HEAT WAVES⁹

Do's:-

- Drink 2 to 3 litres of water per day or sufficient water, as often as possible, even if not thirsty
- Wear lightweight, light-coloured, loose, porous natural fibre clothes.
- Always carry water while travelling.
- Wear hat and keep clothing damp, while working outside.
- Use umbrella, sunscreen as sunburn limits your ability to cope up with heat.
- Visit doctor, if you suffer chronic illness or feel ill.
- Use ORS, homemade indigenous drinks like lassi, torani (rice water), lemon sherbet (lemon water), and butter milk, etc., which help to rehydrate the body, and protect us from sunstroke.
- Keep animals in the shade with plenty of water.
- Keep your home cool with curtain, shutters or awnings on the sunny side and open windows at night.
- Use fans, damp clothing and have frequent cool showers.
- When a person is affected by heat wave, ensure the person lies down in a cool place; wipe her/him with a wet cloth; wash the body frequently.
- Pour normal water on the head of the affected person to bring down the body temperature.
- Use an icepack on the head of the affected person.

Don'ts:-

- Do not go out in the hot sun, especially between 12 noon to 3 p.m.
- Do not undertake strenuous activities; avoid work outside during 12 noon to 3 p.m.
- Do not consume alcoholic, caffeinated or carbonated drinks, which dehydrate the body.
- Do not eat high-protein foods, which increase metabolic heat.
- Do not leave children or pets in parked vehicles.
- Do not come directly in touch with sunlight.

Fire hazard

The district is highly vulnerable to fire hazards. The district has 2 operating fire stations in Khagaria and Gogri blocks with an average population **servng** per fire station of about 5 Lakhs. As per fire safety standards of India, to adhere to the standard the district needs more fire stations in each block.

Mansi and Chautham blocks are highly vulnerable to fire owing to high population density and poor housing materials, etc whereas Khagaria block is of medium vulnerable block. Rest all blocks are low vulnerable to fire.

⁹ BSDMA guidelines



Figure 2:6 Fire stations gap analysis for Khagaria rural area

(Source: Fire Hazard and Risk Analysis in the Country for Revamping the Fire Services in the Country, Bihar report, MHA, 2012.)

Apart from the above fire stations, small vehicles of 300-350 litres water capacity used as fire tenders and such facilities are available at Beldour Thana and Khagaria Nagar Thana.

In financial year 2014-15, official estimate shows that around 568 families got affected due to fire in which two deaths reported.

Table 2-7 Fire Incidence reported in Khagaria district in 2015

Month	Urban			Rural			Grand Total
	Large	Small	Total	Large	Small	Total	
Jan	0	1	1	0	0	0	1
Feb	0	0	0	0	0	0	0
Mar	1	3	4	0	1	1	5
Apr	0	0	0	2	8	10	10
May	1	5	6	2	3	5	9
Jun	1	2	3	0	3	3	6
Jul	0	1	1	0	0	0	1
Aug	0	2	2	0	1	1	3
Sep	0	1	1	0	0	0	1
Oct	0	1	1	0	1	1	2
Nov	1	2	3	1	3	4	8
Dec	NA	NA	NA	NA	NA	NA	NA
Total	4	18	22	5	20	25	47

Source: Fire Department, Khagaria

DO'S AND DON'TS for Fire¹⁰

Do's –

- Keep sand bucket and fire extinguishers ready.
- In case of fire follow Stop – Drop – Roll principle.
- In case of smoke in a room crawl on your knees.

Don'ts –

- Do not put excess load on electric sockets.
- Avoid oiling up of garbage and dry leaves on roof of the house.
- Do not light firecrackers at congested places and near vehicles.

Lightning

Lightning strikes are common occurrences in the heavy monsoon across Bihar. The conditions responsible for lightning are created where warm, moist air rises and mixes with cold air above. More lightning happens near the equator. India's eastern regions are most vulnerable to lightning. A significant number of recent deaths are farm labourers and people working in the open fields. Probability of occurrence of lightning in Khagaria district is observed as more or less at higher side. Because of lack of awareness and preparedness, deaths also happen due to lightning strikes. Predicting lightning is very complicated as everything from trigger to strike happens within a second.

Death toll in Khagaria district due to lightning is reported to 10 in 2015 as per official estimates. Death due to lightning in year 2020, 2021 and 2022 are as follows:

DEATH REPORT HUMAN

YEAR:-	2022-23	2021-22	2020-21
BLOCK NAME	LIGHTNING		
	DEATH	DEATH	DEATH
ALAULI	03	01	00
BELDAUR	00	01	03
CHAUTHAM	02	00	00
GOGRI	00	00	00
KHAGARIA	00	01	00
MANSI	00	00	00
PARBATA	04	00	00
TOTAL	09	03	03

Sensors based early warning system has been developed by Department of Disaster Management with the support of earth network, established 8 sensors in 07 districts. Early warning alerts about lightning can be received in any part of state before 30-35 minute before. The early warning alerts being disseminated to community through SMS.

Through Indravajra mobile app the lightning alerts signals can be received before 40 minutes under the range of 20 kilometer. Awareness about downloading the Indravajra app from google play store is being disseminated among community and other stakeholders.

¹⁰ BSDMA Guidelines

How to stay safe in Lightning:

- Avoid using electronic equipment.
- Stay indoors.
- If no shelter is available, bend down low but do not lie on the ground.
- Do not lean on concrete walls.
- Stay aware of the weather forecasts, preferably through a battery operated radio.

Mitigation Measures:

- Provision for lightning arrester in the high rise buildings
- Provision of lightning arrester (tarit chalak) in the field to avoid any lightning strike in the field, which poses threat to the farmers while in the field

Incessant Rains/ Untimely Rains

Incessant and untimely rainfall create problem, which lead to uncomfortable situation for the people in the district. It has been observed that such incessant and untimely rains are occurring frequently in recent past. Climate change scientists associate such rainfall patterns to the climate change and its impacts.

Epidemic hazard

Continuous rain and flood situation often lead to water logging situation and conducive environment for waterborne and vector borne diseases.

COVID19 has been reported as an epidemic globally. Coronavirus disease 2019 (COVID-19) is a contagious disease caused by a virus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease quickly spread worldwide, resulting in the pandemic. Symptoms are variable, but often include fever, cough, headache fatigue, breathing difficulties, loss of smell, and loss of taste. Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms. Of those people who develop symptoms noticeable enough to be classed as patients, most (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging), and 5% develop critical symptoms (respiratory failure, shock, or multiorgan dysfunction). Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease. COVID-19 transmits when people breathe air contaminated by droplets and small airborne particles containing the virus.

In Khagaria district in year 2020 and 2021 total number 196 death due to covid happened. 186 recoved at District Hospital, Khagaira Sadar.

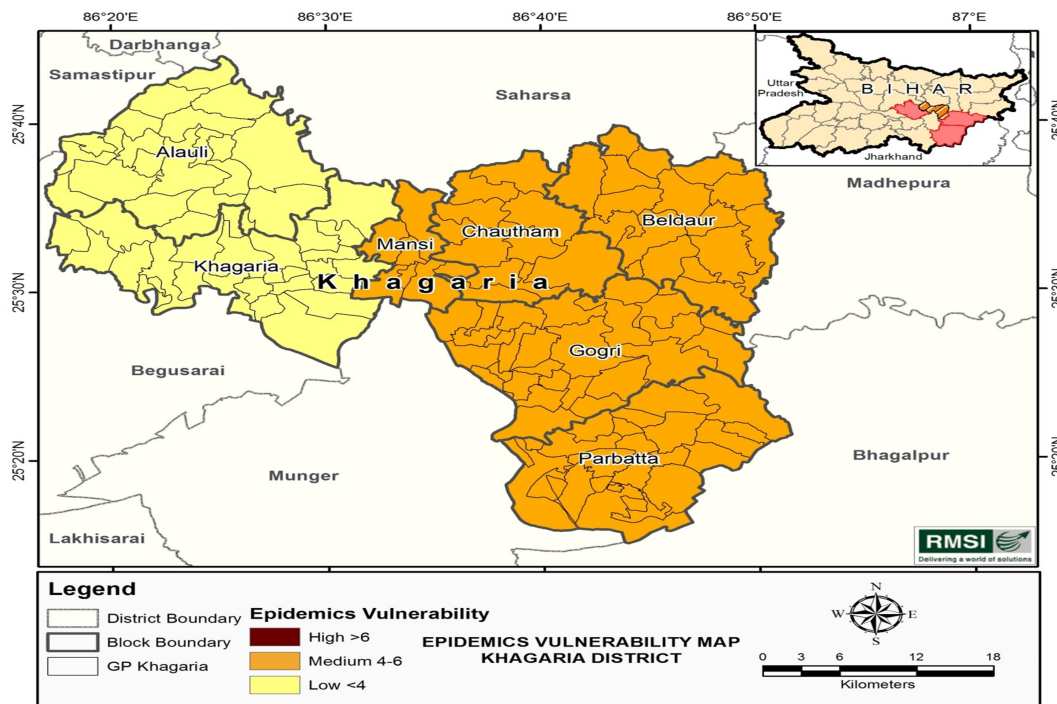


Figure 2:7 Epidemic Vulnerability map of Khagaria district

(Source: RMSI Analysis based on field survey and district consultations)

Road/Rail accident

The NH-31 and the 20 MDRs pass through the district connecting to other districts of the State. The NH-31 goes right up to Guwahati and is an important road link of Bihar to the north-eastern part of the country and to northern Bengal. The NH in Khagaria attracts heavy traffic flow and is vulnerable to road accident due to the heavy traffic density as well as connecting narrow roads. New Delhi-Guwahati railway line passes through Khagaria. Apart from Khagaria, other prominent stations are Mansi, Maheshkhunt, and Pasraha.

The Dhamara Ghat train accident occurred on 19 August 2013 when the Rajya Rani Express train struck a large group of people at the Dhamara Ghat in Khagaria district. More than 50 people were killed and around 25 people were injured. The victims were mostly Hindu pilgrims returning from prayers at the nearby Katyayani mandir. The victims were walking along the tracks at Dhamara Ghat station after disembarking from the Samastipur-Saharsa passenger train when the Saharsa-Patna Rajya Rani Express travelling at 80 km/h, struck them.

High Accident Prone Police Station of Khagaria district (Sept 2021_August 2022)

Sr. No.	Police Station	Number of Accidents
1.	Maheshkhut	21
2.	Pasraha	14
3.	Mansi	19

Source: DTO Office Khagaria

DO'S AND DON'TS for Road Safety¹¹

Do's –

- Always wear seat belt while driving or sitting in a Car.
- Always wear Helmet on a two-wheeler.
- Obey Traffic Rules.

Don'ts –

- Do not talk on Mobile phone while driving.
- Do not overtake from wrong side.
- Do not drink and drive.

Boat Tragedies

Boat tragedies in Khagaria district are closely associated with transportation over river by crossing it, festivals, religious events which have large congregation of people, which has threatening potential for any accident to happen due to drowning. However, there are no such cases recorded in recent past. There is one threat looming large in the district during festive month of Savan when kawarians especially “Dak Bam” take route for holy water offering to the temple in Devgarh.

Hazard seasonality map

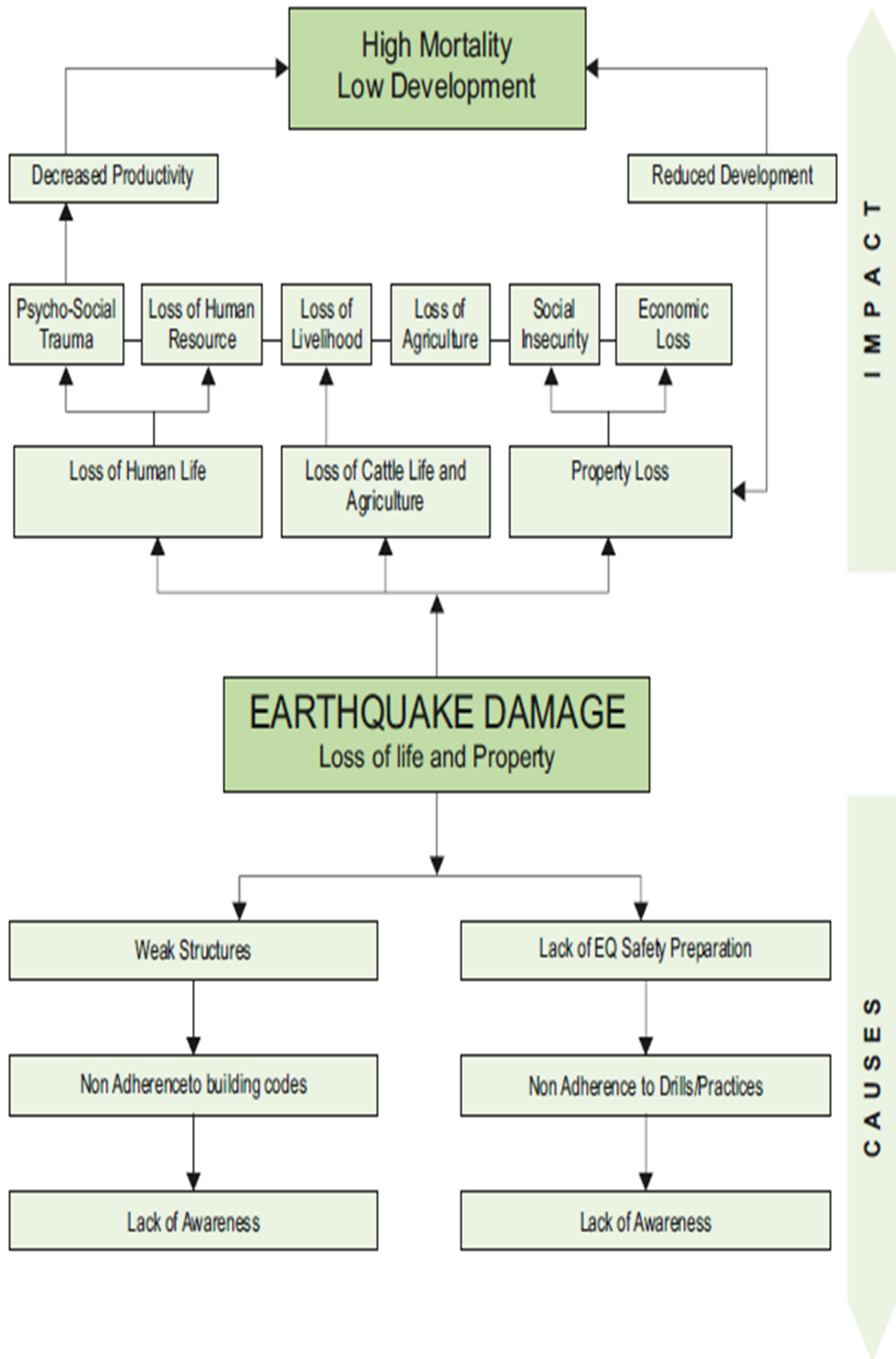
Even though the district is highly vulnerable to flood and earthquake, it is also potentially vulnerable to other hazards including cold wave, strong winds, industrial/chemical hazard, fire, epidemics, etc. Table 2-8 shows the probability of occurrence of these hazards across the year.

Table 2-8 Hazard seasonality map of Khagaria district

Hazard	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Flood												
Earthquake												
Drought												
Cyclonic winds/ Windstorm												
Cold wave												
Heat Waves												
Lightning												
Fire												
Road/Rail Accidents												
Boat Tragedies/ Drowning in rivers/ ponds												
Epidemic												

¹¹ BSDMA Guidelines

For Earthquake



3 Institutional Arrangements for Disaster Risk Reduction and Management

Institutional Mechanism for Disaster Management

India has an integrated framework for risk-informed planning and decision making at the National, State, District and sub-district levels to help planners examine hazards and produce integrated, coordinated and synchronized plans. The Disaster Management Act 2005 provides for an effective institutional mechanism (Figure 3:1) for drawing up and monitoring implementation of disaster management plan for prevention and mitigating effects of disasters and for taking a holistic, coordinated and prompt response to any disaster situation. Under Section 78 of the DM Act 2005, powers are conferred to the State Government for making rules to carry out the provisions of this Act and notify such rules in the official gazette. The basic responsibility of undertaking rescue, relief and rehabilitation measures in the event of natural disasters, as at present, is that of the State Governments concerned. The Central Government supplements the efforts of the States by providing financial and logistic support.

Institutional Framework

DM Act 2005

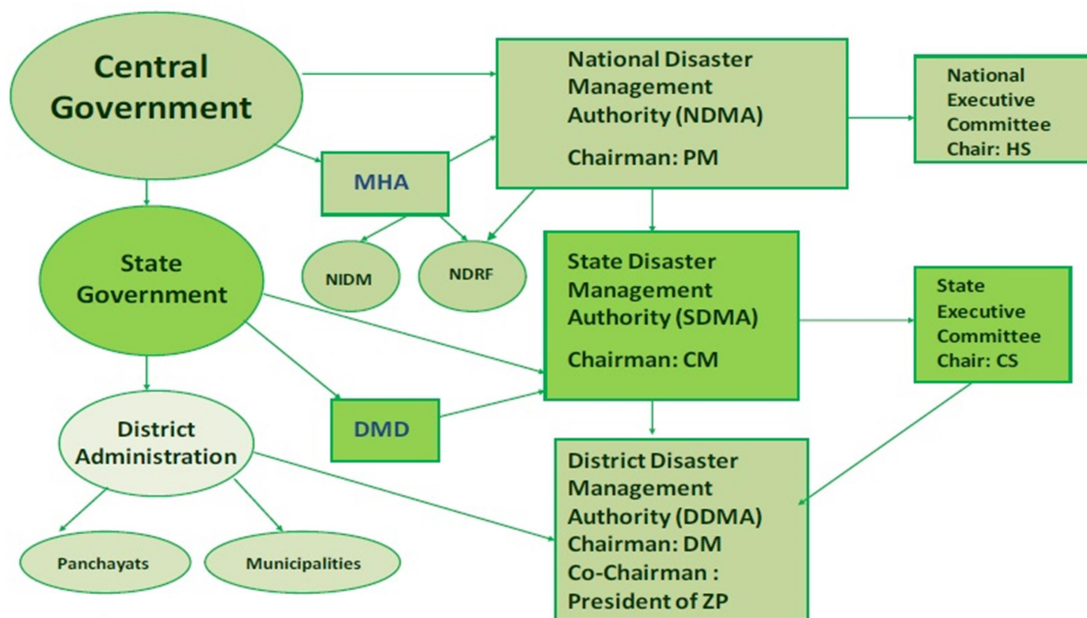


Figure 3:1 Institutional Arrangement as per DM Act 2005

The responsibility for implementation of all governmental plans and activities lies with the district administration. The actual day-to-day function of administering relief is the responsibility of the District Magistrate who exercises coordinating and supervising powers over all line departments in the district. The institutional mechanisms for carrying out response, relief and rehabilitation are well-envisaged under DM Act 2005 and DM Policy 2009. These mechanisms are robust and effective in terms of disaster response, relief and rehabilitation.

Various administrative units in the district have specific roles to play in different stages of disaster management cycle. The institutions in the district are classified as per their administrative levels such as district, sub-divisional, block, Panchayat, village and community levels.

Classification of the Institutions at District Level

This section gives a brief overview of the institutional mechanism for disaster management in the district. The institutional mechanism for disaster management at the district level, as envisaged in the national plan and other national guidelines, is as follows-

1. District Disaster Management Authority (DDMA)
2. District Disaster Management Advisory Committee (DDMAC)
3. Local Self Government
4. District Emergency Operations Centre (DEOC)

District Disaster Management Authority: Section 25 of the Disaster Management Act 2005, emphasized that every State Government shall establish a District Disaster Management Authority in each district. District Disaster Management Authority is functional in Khagaria district.

Local Self Government: Local Self Government includes Panchayati Raj Institutions (PRIs), Municipal bodies, District and Cantonment Boards and Town Planning Authorities, which control and manage civic services. These bodies prepare DM Plans in consonance with the guidelines of NDMA, SDMAs and DDMA. This also ensures capacity building of their officers and employees for managing disasters, and to carry out relief, rehabilitation and reconstruction activities in the affected areas.

District Emergency Operations Centre: The DEOC is the central point of activities in a disaster situation in the district apart from its routine normal time activities. The EOC should have the flexibility to expand when demand increases and contract when the situation comes to normal. It is connected with State EOC in the upstream (which further connects to National EOC) and other EOC(s) in the downstream including other field offices during emergencies. The DDMA is the prime agency responsible for issuing the disaster warning at the district level through the DEOC. Agencies responsible to issue the warnings should issue the warning before any disaster. However, disasters can also take place without any warning such as Earthquakes, flash floods & man-made disaster. The preparedness action plan is crucial in order to safeguard the lives and properties.

Planning Consideration: Disaster Management Planning includes the key areas involved in addressing any threat or hazard: prevention, mitigation, response and recovery.

Stakeholders Capacity Analysis

Capacity refers to the resources available with the district that can be used during disaster event for the safe living of the people in the district. The resources include human resource, skill, infrastructure and finance. In the present section, we have provided resource status of the key sectors, which are involved in pre, during and post disaster events. This gives insight for the district administration to manage resources during any disaster event or emergency situation and further requirement to increase capacity of the stakeholders to tackle disaster events. It is important to note that the demand of the key resources is directly related to the severity of disaster. In severe disaster situation, resources from other adjoining districts can be utilized in coordination with respective district administration. Further resources can be brought from the State level in order to handle severe disaster events. The key resources available within the district are provided in Table 3-1.

Table 3-1 Key resources available within the district

Infrastructure	Quantity
Health	
Civil Hospital	01
Sub-Divisional Hospital	0
Referral Hospital	01
PHC	07
APHC & HSC	25 & 193
Major Private Hospital	25
Major Clinics	08
Ambulance Services	12
Blood Banks	01
Veterinary Hospitals	29
Education	
Primary schools	557
Middle schools	504
Senior secondary schools	106
Higher Senior Secondary/ Colleges	01
Police	
Police posts	-
Police stations	15
Fire stations	
Fire stations	02
Roads	
National highways	NH 31 (46km) NH 107 (35km) Road needs to be broadened to reduce road accidents

Infrastructure	Quantity
State highways	180 km
Main district roads	550
Other roads	950
Communications	
Telephone connections	-
Post offices	232
Telephone centres*	01
Banks	
Commercial banks	66
Cooperative banks	09
Gramin Bank	21
Land Development Bank	03
Others	
PDS shops	634
Nearest NDRF Battalion	Patna
SDRF Team,	Gausala Road, Khagaria
Source: Brief Industrial Profile of Khagaria District, MSME, Bihar	

* the district has very high presence of mobile phone of different private telecommunication providers.

Stakeholder Capacity Building and Training Requirements

Capacity Building and Trainings

For a successful implementation of DDMP, participation of all concerned stakeholders is important. Without building capacity or raising awareness amongst stakeholders can be detrimental to the development of a successful and sustainable DDMP.

When undertaking disaster management planning assessments, it is important that the indigenous traditions; and methods and materials used for disaster management locally are considered and incorporated appropriately. Local residents are the first emergency responders to such incidents, particularly in remote areas and, thus, critical to the successful outcome. Capacity building intends to develop and strengthen skills, competencies and abilities of both government and non-government officials and communities to achieve their desired results pre, during and post disasters, as well as preventing hazardous events from becoming disasters.

Developing institutional capacity is very important. At the same time, by making the local community part of the process and solution would help in ensuring that disaster mitigation measures are more likely to be implemented and maintained over the period with local flavour.

The capacity building plan should cater to the differential capacity building needs based on the functional responsibilities assigned to the stakeholders. It should address -

- 1) Institutional capacity building:
 - a) Government officials / policy makers,
 - b) Engineers, Architects, Masons, Doctors, Nurses, Teachers and other professionals,
 - c) State Police, Fire Services, State Disaster Response Force,
- 2) Community capacity building and Community Based Disaster Management: It should focus on vulnerable groups – women, children, aged persons, female headed households and disabled persons.
- 3) Knowledge Management, networking and sharing: Community registries to collate basic contact information for persons with disabilities
- 4) Training of Trainers: Civil Defence/Home Guards/Volunteers
- 5) Disaster Management Education:
 - a) Schools,
 - b) Colleges- medical, Engineering.
- 6) Skill up gradation and follow up training programmes,
- 7) Inventory of trained professionals, engineers, architects and masons, medical professionals, rescue specialists, etc.

Disaster management institutions such as BSDMA and DDMA shall be strengthened by building capacity in the district as well as in the State. Training modules, fulfilling the specific requirements of the State / District, should be designed and implemented in consultation with BSDMA. Capacity building requirement at all levels in institutional hierarchy as well as community should be addressed adequately. Training and capacity building program should be integrated with the monitoring and evaluation system for effective revision of the program.¹²

The following table shows an analysis of the key stakeholders identified (Table 3-2).

Table 3-2 List of Key Stakeholders

Key Stakeholders	
District level Line Departments	
1. Agriculture Department	11. Panchayati Raj Institutions Department
2. Animal Husbandry and Fisheries Department	12. PHED Department
3. Civil Supplies	13. Planning and Development Department
4. Education Department	14. Police Department
5. Fire Department	15. Rural Development Department
6. Flood Control	16. Rural Works
7. Food Corporation Department	17. Social Welfare
8. Health Department	18. Statistics Department
9. Information and Public Relation Department	19. Transport Department

¹² Based on Guidelines for DDMP preparation by NDMA

10. Minor Irrigation	
Other Stakeholders	
1. Academic Institutions	8. Inter Agency Groups
2. Architects, Engineers, Diploma Holders and Masons	9. Local and International Media
3. Artisans, Craftsmen Groups	10. Local NGOs, International NGOs, UN Agencies, Red Cross, National NGOs
4. Business Groups and Private sectors including corporate, industry, SMEs, traders and market associations	11. SHG, Women, Farmers, JEEVIKA Groups
5. Dalit and Tribal Associations	12. Transporters (Train, Road and Ferries)
6. Ex-Servicemen and Retired Professionals Associations	13. Youth Groups
7. Health Associations (Medical Association, Chemist and Druggist Association, RVC, Nurses)	

Training, tests and exercises are essential to ensure Government officials, emergency response personnel and the public are operationally ready. As part of the emergency management training Curriculum, it shall be ensured that personnel with emergency responsibilities complete emergency management courses as prescribed from time-to-time by the National / State/ District Authority.

Training program should include all stakeholders including – community, home guard, NSS, NCC, NYK, Schools and colleges, Civil society, CBOs, corporate entities, SDRF, Fire Service, Media, Police etc.

Table 3-3 Preparedness Training and Capacity Building of Key Stakeholders

SI No.	Activity	Responsibility
1	Training to Home Guard personnel in various phases of disaster management including search and rescue	Home Guards BSDMA
2	Training to NCC and NSS personnel in various phases of disaster management	Department of Youth Affairs BSDMA
3	Training to educational and training institutions personnel in various phases of disaster management	BSDMA
4	Training to civil society, CBOs and corporate entities in various phases of disaster management	BSDMA; NGOs
5	Training to fire and emergency services personnel in various phases of disaster management	Fire Service Deptt.
6	Training to police and traffic personnel in various phases of disaster management	Police Deptt.; PTS, BSDMA
7	Training to State Disaster Response Force (SDRF) Teams in various phases of disaster management	NIDM; NDRF; BSDMA
8	Training to media personnel in various phases of disaster management	NIDM; Information Deptt.; BSDMA
9	Training to govt. officials in various phases of disaster	NIDM; BSDMA

SI No.	Activity	Responsibility
	management	
10	Training to engineers, architects, structural engineers, builders and masons in various phases of disaster management	PEC; Hazard Safety Cell of PWD; NIDM; BSDMA

Preparedness Exercise:

Exercises provide personnel with an opportunity to become thoroughly familiar with the procedures, facilities and systems, which will actually be used during emergencies. District and State agencies and its departments should plan for and/or participate in an all-hazards exercise program that involves emergency management/response personnel from multiple disciplines and/or multiple jurisdictions.

Exercises should

- stress the application of standardized emergency management;
- be based on risk assessments (credible threats, vulnerabilities and consequences);
- include non-governmental organizations and the private sector, when appropriate;
- incorporate the concepts and principles of IRS as envisaged in the Crisis Management Framework;
- demonstrate continuity of operations issues;
- incorporate issues related to special needs populations;

Following are the exercises range from seminars/workshops to full scale demonstrations:

- **Seminars/Workshops** are low-stress, informal discussions in a group setting with little or no simulation. It should be used to provide information and introduce people to policies, plans and procedures.
- **Drills/Tests** should be conducted on a regular basis to maintain the readiness of operational procedures, personnel and equipment. Examples include tests of outdoor warning systems and the Emergency Alert System.
- **Tabletop Exercises** should be conducted to provide a convenient and low-cost method designed to evaluate policy, plans and procedures and resolve coordination and responsibilities. Such exercises are a good way to check existence of policies and procedures to handle certain issues.
- **Functional Exercises** are designed to test and evaluate the capability of an individual function such as communications, public evacuation, or medical.
- **Full-Scale Exercises** simulate an actual emergency. They typically involve complete emergency management staff and are designed to evaluate the operational capability of the emergency management system.

In addition to this, considering the high flood vulnerability in the district it is critical to provide community training (including school children) in swimming and specialized training to youth volunteers in rescue operation during flood.

Implementation of DDMP

This is important to implement the DDMP in the district as per provisions given in the plan. Implementation of DDMP is divided into four sections:

- 1) Authority of plan implementation,
- 2) Responsibility and accountability,
- 3) Financial provisions available for disaster management at district level, and

4) Suggested follow up actions for different stakeholders for implementation of this plan.

Authority

As per section 25 of DM Act 2005, every district shall establish DDMA. Section 31 of the DM Act 2005 empowers the DDMA to develop a comprehensive district disaster-management plan and its periodic updation.

Responsibility and Accountability

The DDMA will be responsible for the overall planning, coordination and implementation of the plan. DM Act, 2005 envisage that the DDMA shall be responsible and accountable to the following:

- Coordinate and monitor the implementation of District Disaster Management Plan in tune with National and State policies
- Ensure that the concerned line departments and local authorities identify vulnerable areas in the district and undertake suitable preventive and mitigation measures
- Ensure that the guidelines laid down by the National, State, and District authorities for prevention of disaster, mitigation of its effect, preparedness and response measures are followed by all the line departments at the district level, local authorities and other concerned authorities
- Review the preparedness and response measures to any disaster or impending disaster and give direction to the concerned departments/ authorities for the scaling up the measures
- Lay down guidelines to be followed by the government departments at district level to mainstream the DRR concerns in the developmental plan/work
- Organize and coordinate specialized training programmes time to time for the officers, employees and voluntary rescue workers at different levels in the district
- Lay down guidelines for the preparation of departmental Response Plan as per the District Response plan and ensure that each district department prepares its own departmental response plan
- Set up, maintain, review and upgrade the mechanism for early warning systems to disseminate timely proper information to the public
- Coordinate response to any threatening disaster situation
- Advice, assist and coordinate government, non-government and other stakeholders for engaging them in disaster management
- Coordinate, guide and provide technical and non technical support to the local authorities in discharging prevention, mitigation and other functions effectively
- Identify safe evacuation sites and make arrangements for the basic evacuation protocol in those sites
- Establish stockpiles of relief and rescue materials and ensure communication systems are in order
- Provide information to the State Authority relating to different aspects of disaster management.
- Review and update the district level response plan.
- Perform other activities as assigned by the State Authority or the prompt activities, which are necessary for disaster management.

Follow-up Actions

DDMP of Khagariais prepared after consultations with various stakeholders in the district. The experience gained on the basis of community consultations and field visits to the most vulnerable locations in the Blocks and GPs has also been done incorporated new ideas in context of district. This document also incorporates the best practices from different States in the country. Mainstreaming DRR concerns with the developmental works has also been

suggested. To make DM plan more district specific, following institutions should take follow up actions:

DDMA

- Prepare a comprehensive contingency plan specific for each hazard in the district
- Prepare a detailed Hazard/Risk assessment incorporating all the relevant parameters
- Set up an EOC
- Ensure establishment of GP level task force/committee
- Periodic review of the DDMP and its annual updating as per district requirement
- Updating of data/information annually
- Form an advisory committee to ensure efficient discharge of its functions
- Ensure preparation of detailed Departmental DM Plan/SOPs in each Government department
- Prepare a checklist of resources available with all the District departments and local authorities
- Prepare a format for the deployment of initial assessment team
- Establish a District Disaster Response Force

DEOC

- Prepare a list of all the nodal ESF and resources available
- Establish a permanent seat for each ESF in the EOC hall for emergency situation
- Prepare a list of manpower and equipment
- Prepare a List of all the roads and important infrastructures
- Prepare a list of safe shelters
- Prepare a list of all the means of communication and broadcasting
- Prepare a list of means of information broadcasting agencies with full address and proper documentation ESF
- Prepare a checklist of resources, tools etc., available
- Prepare a format for minimum standard of resources, materials etc., required
- Prepare a module to conduct training and mock drills
- Prepare a list of all the important contact numbers with full addresses

Government Departments

- Prepare a Departmental DM Plan and SOPs
- Prepare a detailed Hazard/Risk assessment of the district considering all the relevant indicators
- Nominate the nodal officer for disaster management
- Prepare a format for collection of information and proper documentation
- Prepare a list of staffs with clearly defined roles and responsibilities
- Prepare a checklist of resources available within the department
- Prepare a list of the resources and materials required for effective functioning and procure these if there is a gap GP committee
- Nominate the members for each committee within 3 months of the release of DDMP
- Prepare a detail Hazard/Risk assessment.
- Clearly define the role and responsibility of each member
- Checklist of the resources available within the committee
- Empaneled firms who can provide standard emergency relief packets in different localities of the district. The content of the emergency relief packets should be tested and approved by civil supply department and the price should be reviewed and fixed annually.

4 Disaster Prevention, Mitigation, Preparedness and Capacity Building & Awareness: Specific Actions for Line Departments and Other Stakeholders

Disaster Prevention Measures

Disaster prevention includes actions that reduce risk from natural or man-made disaster events. Prevention measures like building codes, floodplain management, storm water management, coastal area zoning and management plan, etc. are required. These measures can be planned and implemented by the districts as a part of prevention measures. It is required to list and elaborate all types of measures.

Long term prevention and mitigation goals should be clearly in place and these goals should be connected with measures that district has planned and implemented. These goals may include (but not limited to):

- Provide better early warning methods for flood, cyclonic winds/strong winds, heat/cold waves
- Reduce the destruction and loss of life within buildings
- Provide for safer environments for transportation systems
- Eliminate flooding in populated areas
- Ensure redundant water supply systems
- Reduce environmental degradation and restoration of livelihood
- Reduce effects of the natural environment on the infrastructure
- Ensure redundant power systems on critical facilities
- Ensure adequate materials available for road maintenance

Protection reduces or eliminates a threat to people, property and the environment. Primarily focused on adversarial incidents, the protection of Critical Infrastructure and Key Resources (CIKR) is vital to local districts, national security, public health & safety and economic vitality. Protection includes actions or measures taken to cover or shield assets from exposure, injury or destruction. Protective actions may occur before, during or after an incident and prevent, minimize or contain the impact of an incident.¹³

Disaster Mitigation Plans

Disaster mitigation¹⁴ is the effort to reduce loss of life and property by lessening the impact of disasters. For mitigation strategies to be effective we need to take actions now - before the next disaster - to reduce human and financial consequences later. It is important to know that disasters can happen at anytime and anyplace and if we are not prepared, the consequences can be fatal. Effective mitigation requires that we all understand local risks, address the hard choices, and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security and self-reliance.

Mitigation measures are described as the strategies and interventions to reduce both the effect of the hazard and the vulnerable conditions. Therefore, mitigation activities can be focused on the hazard itself or the elements exposed to the threat. Mitigation is generally categorized into two main types - structural and non-structural.

¹³ Based on Guidelines for DDMP preparation by NDMA

¹⁴<https://www.fema.gov/what-mitigation>

Mitigation plan involves both structural and non-structural mitigation measures¹⁵. Structural mitigation measures are the most traditional approach used to reduce disaster risk through proper engineering practices and physical construction to reduce or avoid possible impacts of hazards. Examples include designing electrical power systems and transportation infrastructure to withstand weather and earthquakes; sinking transmission lines for protection from cyclones and windstorms; and, building levees and dams to minimize floods. Other flood mitigation measures include: construction of floodways, spillways, hydraulic control structures, dykes, dams, control gates, drainage system improvements (including river-dredging) and flood detention basins. Non-structural mitigation measures are non-engineered activities that reduce the intensity of and vulnerability to hazards. Non-structural mitigation measures include such activities as land use planning and management; zoning ordinances and building codes; public education and training; and upstream and mountain reforestation. Numerous parties can implement non-structural mitigation measures: governmental authorities with the power to legislate and enforce building codes and zoning requirements; NGO's that initiate neighbourhood loss-prevention programs; and private sector enterprises that provide incentives for loss-reducing measures.

Mitigation plan is very important part of the disaster management plan. Most of the time natural disaster event occurs at random and without any prior notice. In this light the mitigation plan intends to reduce the risks of disaster. Khagariadistrict is prone to many disasters.

Multi-Hazard Mitigation Actions

District faces mainly two types of hazards- natural and man-made. "*Natural hazards*" may occur either below surface, above the surface, or from deep within surface. Natural hazards that occur on the surface are visible and their origin is also traceable. Thus, such hazard mitigation is possible to a great extent. Examples are floods, drought, cyclonic storm, fire, etc. Natural hazards, that occurs from deep within or above the surface, are sudden, hidden and its source inaccessible. Thus, such hazard mitigation is not possible. Examples are earthquake, volcanic eruptions, cloud-bursts etc.

"*Man-made hazards*" are of accidental or incidental nature. *Accidental man-made hazards* are momentous and are thus unavoidable. For example- road, rail, air, water ways accidents, etc. *Incidental man-made hazards* are normally static occur as a result of system or human failure. For example fire, explosion, epidemics, industrial accidents, etc.

In case of man-made hazards- both accidental and incidental, the prevention & mitigations measures largely depend upon training, discipline, technology and system in place.

The following structural and non-structural measures can be considered as per the NDMA guidelines:

Structural Mitigation Measures

- All public buildings like schools, colleges, hospitals, health centres, etc. should be resilient to multi-hazards by constructing them on raised plinths and high ground with retrofitting, adequate exit gates and sufficient fire extinguishers;
- Construct multipurpose community centres in all vulnerable areas to be functional as disaster shelters as and when required;
- All houses built in the vulnerable areas should have multi-hazard resilient features keeping local cultural housing practices intact;

Following are some of the prudent watershed management practices:

¹⁵<http://web.worldbank.org/> Disaster Risk Reduction - Risk Mitigation

- District Administration can conduct a study to assess the existing structures and systems in place for watershed management and recommend best options for effective watershed management;
- Periodical cleaning, de-silting and deepening of natural water reservoirs and drainage channels;
- Construction of irrigation channels. Sluice gates can be linked with ponds, which could be used as a water resource for enhancing livelihoods of the people.

Non-Structural Mitigation Measures

- Risk transfer mechanisms: Establishment and strengthening of insurance schemes and policies, which would transfer losses the risk due to hazard to a third party. Insurance schemes for crops, cattle, small businesses, and lives should be strengthened and promoted to minimize economic losses;
- Formation of groups of architects, engineers and masons and trainings for them on how to build safe infrastructure;
- Formulate policies and bye-laws to bring alternate safe housing technologies along with rainwater harvesting structures to reduce long-term vulnerability;
- Encourage disaster-proof habitat planning and awareness at community level for shifting or relocating from low lying areas and villages within embankments to safe raised grounds, with incentives if possible;
- Include first-aid, rescue and evacuation methods in curriculum of school, college, educational institutions starting from primary level;
- Suggest R&D on alternative cropping practices to cope up with the adverse effects of flood, water logging or drought.

Specific Hazard Mitigation Actions

In this section of DDMP, specific actions are enlisted, which are meant to be taken during non-disaster periods for preparedness and mitigation measures in the district. This volume intends to provide hazard-specific mitigation strategies for various structural and non-structural measures. In addition to the multi-hazard mitigation actions, the following hazard-specific mitigation actions can be taken as per the vulnerability of the villages/blocks of Khagaria district (Table 4-1):

Table 4-1 Hazard Specific Structural and Non-structural Mitigation Measures

Hazard	Structural Mitigation Measures	Non-structural Mitigation Measures
Flood	(i) Strengthening/ construction of embankments, flood walls and flood levees (ii) Proper regulation of lakes, ponds, dams and other water storage reservoirs and improvement of channels (iii) Proper de-silting/dredging of rivers in order to keep the rise of the river beds minimum (iv) Drainage improvement in order to avoid congestion (v) Diversion of flood water in order to lower water levels in the rivers (vi) Catchment area treatment,	(i) Flood plain zoning to regulate land use in the flood plains (ii) Flood proofing (iii) Flood forecasting and warning (iv) Integrated Water Resource Management such as water resources assessment, socio-economic assessment, water resources planning, implementation of action plans, day-to-day water resources management (adjustments of the plans) and water resources protection and conservation (v) Medical preparedness in terms of after-effects of floods requiring medical attention

Hazard	Structural Mitigation Measures	Non-structural Mitigation Measures
	<p>afforestation, building up of check dams and detention basins in order to reduce the flood peaks and control the sudden surge in runoff</p> <p>(vii) Anti-erosion works such as revetment or pitching along with launching apron and spurs of earth protected by armour of stones or spurs of loose stones or stones in wire-mesh crates</p> <p>(viii) Alignment, Location, Design and Provision of Waterway i.e. Vents, Culverts, Bridges and Causeways in National Highways, State Highways, District and Other Roads and Railways</p> <p>(ix) Embankments' inspection, rehabilitation and maintenance programs to ensure that the design capabilities are maintained</p>	<p>(vi) Creation of awareness to the types of illnesses and other health problems that can result in the aftermath of floods, to all the medical teams and the community at large</p> <p>(vii) Creation of trained medical first responders for first aid and resuscitation measures</p> <p>(viii) Preparation of medical stores and medical kits</p> <p>(ix) Development of patient evacuation plans</p>
Drought	<p>(i) Water management including water harvesting and conservation</p> <p>(ii) Sluice gates to be linked with ponds</p> <p>(iii) Cloud seeding in drought-prone areas</p> <p>(iv) Construction of irrigation channels</p> <p>(v) Micro-irrigation including drip and sprinkler irrigation</p> <p>(vi) Afforestation with bio-diesel species through the National Afforestation Programme</p> <p>(vii) Existing ponds to be cleaned and more ponds to be dug as part of MNREGA activities in the district</p>	<p>(i) Drought-prone area delineation at block level based on rainfall, cropping pattern, available supplement irrigation, satellite derived indicators, soil map, groundwater availability map, cattle population and fodder demand and socio-economic data</p> <p>(ii) Gradation of drought-prone areas based on the frequency of occurrence of droughts, sensitivity to rainfall variation and vulnerability of community</p> <p>(iii) Monitoring of drought based on rainfall and other parameters, crop health, available ground water and migration and impact on community</p> <p>(iv) Crop Insurance</p>
Earthquake	<p>(i) Seismic strengthening of existing structures</p> <p>(ii) Prioritization of structures especially critical/ lifeline structures</p> <p>(iii) Structural safety audit of critical lifeline structures</p> <p>(iv) Retrofitting of weak buildings</p> <p>(v) Earthquake-resistant construction</p>	<p>(i) Development of Rapid Visual Screening procedures and Detailed Vulnerability Assessment</p> <p>(ii) Regular conduction of Fire Safety Audits and Electrical Safety Audits</p> <p>(iii) Public Awareness Campaigns</p> <p>(iv) Techno-legal regime for ensuring compliance of earthquake-resistant</p>

Hazard	Structural Mitigation Measures	Non-structural Mitigation Measures
	<p>in rural and semi-urban areas (vi) Follow building Bye-laws of Govt. of Bihar applicable for Zone-V region for all building constructions</p>	<p>design and construction practices in all new constructions (v) Licensing and certification of professionals (vi) Compliance review by professionals of PRIs and ULBs (vii) Medical preparedness (viii) Earthquake engineering education</p>
Fire	<p>(i) Establishment of Fire-stations as per Fire Safety Bye-laws</p>	<p>(i) Implementation of Fire Act (ii) Updating basic infrastructure and adopting modern technologies (iii) Improving outreach of fire services up to interiors of village (iv) Making the fire services a multi-hazard response unit (v) Training of community members in fire-fighting techniques (vi) Putting in place audit system (vii) Compulsory fire hazard evaluation of all types of buildings old and new (viii) Planning calendar of evacuation and mock drills in vital installations, industrial plants, government buildings, schools and critical infrastructures like hospitals, etc. (ix) Enforcement of fire approvals as per the provisions contained in National Building Code (NBC), 2005 (Part IV- Life & Fire Safety) for new constructions.</p>
Chemical/ Industrial Accidents	<p>(i) Creation of appropriate infrastructure as mentioned in Off-site and On-site plans including Public Address system</p>	<p>(i) Enforcement of code of practices, procedures and standards (ii) Audits of On-site & Off-site Emergency plans at regular intervals (iii) Statutory inspection, safety audit and testing of emergency plans (iv) Safety Audit (v) Hotline telephone connection with nearby emergency services (vi) Awareness generation among community regarding HAZMAT (vii) Training of specialized Medical First Aid Responders</p>

Measures to reduce the accidents:

- Strengthening of the rail track in problematic stretch near Aguanighat from Pasraha/Narayanpur to Gauchhari, which has suffered derailment in 2009 due to sinking of track leading to slipping of slope failure. The topography of the area is such that on right side (facing Gauchhari) of embankment remain inundated with Kosi river flood water and on left side of the embankment, there is floodwater of Ganga river, which inundates the area. Thus on both sides of the bank, water remains stagnant for about 8-10 months during the year. To avoid such incidents in the future, sand layering, provision of blanket and geo-membrane, flattening of slope of the embankment, etc are among some of the measures.
- Some of the road stretches in the district having dense trees and turnings reduce the visibility, which lead to many fatal accidents every year.
- These stretches need to be illuminated and trees should be pruned in order to reduce its proneness to road accidents
- Accident prone rail stretches should be manned to avert the accidents.

Stages of Disaster Mitigation Action Plan in Khagaria

As in most cases disaster comes immediate and unnoticed, a comprehensive mitigation plan will help in minimizing the risks involved with the disaster. Khagaria district is most importantly and widely vulnerable to flood risks. Second important and potential threat to the district is chemical disaster. Khagaria has important oil refineries, which always keep pouring poisonous gases through their chimneys into the air. Moreover, oil tankers running around the district pose danger to the district and may turn into serious life threatening disaster. Khagaria being in earthquake zone-IV is always at serious danger for tremors of moderate to high magnitude. Apart from these, the district is also vulnerable to fire, cold waves, hailstorms, etc.

Seeing all such threatening disasters, Khagaria district will have 3 stage mitigation plans:

Stage -1: Before Disaster

Stage-2: During Disaster

Stage-3: After Disaster

Stage -1: Before Disaster

- i) Call DDMA meeting and discuss about natural disasters in the district and review of work progress and preparedness measures. DDMA meeting should be called in April or May month (before rain starts).
 - Give order to complete the pending work related to disaster management and relief
 - ADM, Khagaria will be in-charge of this work.
- ii) Identification of the vulnerable places and restoration of critical infrastructures
 - Raise awareness and alarm among the people of most vulnerable places to disaster
 - Repairing of the wells and tube wells, etc
 - Arrangement of sand bags and other essential items for flood control
 - DDC/ Executive Engineer, PHED will be in-charge of this work
- iii) Identification of places where there is scarcity of the essential items
 - Food items and consumables should be kept at the safe place in villages or gram panchayats
 - District Supply Officer, Khagaria will be in-charge of this work.
- iv) Ensure the availability of the boats and motor boats before the flood, their repairing, and ensure the availability of the boatmen
 - It will help in restoring the transportation network.

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- SDOs of respective sub-divisions will be in-charge of this work.
 - v) Arrangement for temporary safe houses
 - It is essential to provide disaster affected families temporary houses after their rescue
 - SDOs and BDOs will be the in-charge of this work.
 - vi) Keep 'essential life saving' medicines in safe stock to check the probable ailments.
 - Stock of medicines and immunization
 - Chief Medical Officer and Chief Animal husbandry Officer will be the in-charge of this work.
 - vii) Early warning and information dissemination is one of the most important mitigation measures before disaster
 - District Control Room (Flood Control Department), Television, Radio, Internet, Mobile, etc will be an important role in dissemination of information.
 - District Flood Control Room in-charge, District PRO, BDOs, COs, and members of the Information and Early Warning team will be the in-charge of this work.
 - viii) Arrangement for food
 - Arrangement for the cooked food for the flood affected people
 - SDOs, BDOs, and COs will be the in-charge of this work
 - ix) Availability of transportation facilities on time is important to transport the essential items, people from unsafe places, and other related works.
 - District Nazarat Deputy Collector and District Transport Officer will be in-charge of this work.
 - x) Keep stock of 75% Public Distribution System shops.
 - Review the stock situation in each block
 - District Supply Officer, Khagaria will be in-charge of this work.
 - xi) Public awareness to pre-disaster initiatives by the district administration
 - Reaching public awareness to the district, block, panchayat, and village levels
 - ADM and District Planning Officer at district level, BDO at block level, members of main panchayat committee at panchayat level, and Mukhiya at village level will be the in-charge of this work.
 - xii) Successful operation of the Emergency Operation Centre is an important for disaster mitigation, which will keep vigil on all the disaster related happenings and will release orders for the rescue of the affected people.
 - District Magistrate will be in-charge of this work.
 - xiii) There is an important role of the Indian Oil Corporation (IOC) in the district in pre-disaster preparation and mitigation measures. Khagaria district has oil refinery factories of IOC, which has its own disaster management plan that will be helpful in pre-disaster mitigation measures.
 - Work related to this will be discharged under District Magistrate's supervision
 - xiv) Monitoring of Work
 - District Magistrate will review the pre-disaster mitigation measures

Stage -2: During Disaster

- i) During disaster, Disaster Management Teams (DMT) formed for the purpose of relief and rescue at District, Block, Panchayat and village levels will conduct relief and rescue operation.
 - Establishment of linkages with the villages and Panchayats, recording of radio and television broadcast and other related functions
 - Work supervision by Divisional Officer, Circle Officer, and Block Development Officer.
- ii) Activate Control Room
 - Deputation of officers and staffs in the control room.
 - Deputy Collector will be in-charge.

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- iii) Operation of relief works in the affected areas
 - Relief centres to deal with disaster situation
 - Operation-in-charge: Divisional Officer, Circle Officer, and Block Development Officer.
 - iv) During the disaster, monitoring of relief work done by the other organizations, establishment of better coordination with them, and to keep abreast with their relief works is an important part of the mitigation plan.
 - Monitoring of relief operations by NGOs such as the Red Cross, financial institutions and private institutions and individuals
 - Deputy Collector will be in-charge.
 - v) It is important and sensitive to maintain the law and order situation during the relief operation for disaster
 - It is important to keep vigil on the anti-social elements and the black marketers.
 - In-charge: Superintendent of Police.
 - vi) Rescue and evacuation of victims
 - Depute trained Home Guards in the affected areas for rescue and evacuation operations
 - Operation in-charge: Superintendent of Police, Civil Defence Corps Commandant.
 - vii) Collection of information on the relief and rescue work being done in every Division / Block and quick action accordingly.
 - Obtain information on undergoing works from Block Control Room in the affected areas and send it to State Control Room.
 - Operation in-charge: officer-In-charge for the District Disaster Control Room.
 - viii) During the disaster, it is important to uplift the confidence and morale of the community at the time of when there is a delay and difficulty in the delivery of relief supplies and their relocation to the safer places.
 - Task in-charge: Panchayat representative of the affected areas, mukhia, Divisional/ Block officers.
 - ix) Preparation of reports and to contact with the media.
 - Publication of reports on operations with the help of related photographs in the state and district levels newspapers.
 - District Public Relations Officer will be in-charge.
 - x) Monitoring of works
 - Review of operations during disasters.
 - Operation in-charge: Deputy Collector, Divisional Officer.

Stage -3: After Disaster

- i) Arrangement of Relief Camps: -In disaster mitigation plan, first priority will be given to make arrangement for the relief camps in post disaster event.
 - Provision of help desk, daily need goods, health camps for general and veterinary purposes
 - Task in-charge: Deputy Collector, Chief Medical Officer, Chief Veterinary Officer, District Supply Officer.
- ii) Damage Assessment: - Correct assessment of damages during the disaster and their reconstruction in the affected areas is an important part of a disaster mitigation plan.
 - To give the correct information on the damages to the Government will be an important task.
 - Task in-charge: Deputy Collector assisted by the damage assessment team deployed in the affected areas.
- iii) To keep vigil on the help works undertaken by the NGOs and other external agencies and to ensure timely support to be reached to the affected people.
 - Task in-charge: Deputy Collector.

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- iv) To ensure proper supply of relief, shelter management and relocation from one place to another,
 - To strengthen and restore the communication system to run smoothly the undergoing works in the affected areas
 - To reduce the disruption in the road and railways and to open the alternative routes for them
 - To make arrangement of helicopter services in the accessible areas
 - Task in-charge: District Magistrate assisted by District Telecom Manager, Executive Engineer road construction, Station Superintendent
 - v) To facilitate and ensure epidemic prevention and access to safe drinking water supply, provision of health facilities, provision of toilets in the disaster affected areas is also an important part in disaster mitigation planning.
 - In-charge: Chief Medical Officer.
 - vi) To clean up the mess and disposal of wastes
 - To protect the environment.
 - Task in-charge: Gram Panchayat / Nagar Panchayat / Municipal Council.
 - vii) To stop ill-health and various types of difficulties, arrangement of nutritional foods and their distribution,
 - To take care of children, pregnant women, and aged people on priority basis by providing nutritious foods.
 - Task in-charge: Divisional Officer and Circle Officer, Child Development Project Officer.
 - viii) Monitoring of works:
 - Meeting of officers at district and area levels in every 72 hrs to keep abreast them on the progress of work and correct assessment of the situation.
 - Task in-charge: District Magistrate assisted by Deputy Collector

Monitoring functions in Mitigation Plan:

- Review of operations during disasters; Task in-charge- the District Magistrate assisted by Deputy Collector.

For Flood:

- To prepare plan to control land utilization in order to avoid unmindful use of flood plains for residential and commercial purposes.
- Retrofitting of building structures, flood resistant buildings, design of higher level of floor and construction of safer camps to withstand the current of flood water is a part of mitigation plan.
- Construction and strengthening of embankments and build alternate routes for drainage is also a part of mitigation plan
- Participation of people through awareness and education, afforestation programme along the river, effective early warning systems, change in cropping pattern, placement of storage and sleeping areas at higher levels from the ground, readiness for the evacuation of people at the time of flood, ban on cutting of forests in the flood prone areas, etc are among the important mitigation measures.

For Earthquake:

- Follow Bihar Building Bye-Laws, 2014 in all constructions to reduce the damages due to disaster.
- Focus on suitable engineering designs in the construction of buildings in public places, government buildings, schools, hotels, hospitals, etc.
- Lowering the concentration of population in the earthquake prone areas of urban areas.

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- Awareness among community about their roles at the time of construction of safer building for “What to do” and “what not to do” . .
 - To promote insurance schemes undertaken by government and non-governmental organizations to compensate for damage.
 - To provide trainings on techniques to construct earthquake resistant buildings to the district based masons.
 - Mock-drills for fire safety, first aid and rescue operations for earthquake safety to the community at regular basis.

Climate Change Adaptation and Mitigation Plan

Climate change is making extreme climate events even more frequent and the incidences of flash flood, drought, and landslide are on the rise. In the long run this is almost certain that it will adversely affect all sectors of the district’s economy. Thus, it is important to incorporate the climate change adaptation (CCA) in DDMP in line with the strategies outlined in the Bihar State Action Plan on Climate Change (BAPCC), 2015 (**Error! Reference source not found.**).

The State level governance framework and guidance to the climate agenda, the State has already constituted the State Steering Committee under the Chair of the Chief Secretary and consisting of key senior bureaucrats from various sectors, and other eminent persons.

The SSC, which was mandated the apex role of overseeing all aspects of the State’s preparations and initiatives to address climate change and its impacts, will be activated, and a specific terms of reference will be developed for it, including periodic mandatory meetings, and outlining other key responsibilities including review of all State policies and programmes and identify gaps, risks, opportunities, and possible corrective actions towards achieving the above outcomes.

Specific Strategies for Mitigation

The following strategies should be adopted at Gram Panchayat level.

Gram Panchayats within Embankments

- Construction of houses on raised platforms or stilts as per the community acceptance. Any Government or other stakeholder project on housing in these villages must have houses on raised platforms or stilts as a pre-requisite design;
- Each village/community should have boats, as per requirement, which can be kept in the space created by stilts;
- Public buildings like schools and health centres should be designed taking into consideration the amount of mud/sand deposited due to flood that may increase each year resulting in submergence of parts of building;
- Construction of safe shelters with tube wells and toilets on the embankments to house the population when the river spreads within the width of embankments;
- Crops that can be harvested before the onset of monsoon/flood season may be grown in the region to avoid loss due to recurring flood;

Gram Panchayats next to Embankments

- Embankments should be monitored, maintained and strengthened compulsorily;
- Conduct pre-monsoon checks through the DDMA to identify vulnerable pockets/points in the embankment and suggest necessary actions for strengthening them if required;
- Maintenance of sluice gates with the help of latest technologies to check/minimize accumulation of sand and silt in the passage of the river water;
- Clean the existing ponds and dig new ponds to store water coming through sluice gates, which could be used for agricultural or fisheries purposes. (This could be done utilizing

NREGA schemes and based on allocation available under NREGA in the village for the same);

- Promote crop insurance schemes in the vulnerable regions for damages to crops due to drought and recurrent flooding;

Gram Panchayats in low-lying areas

- Identify water-logged areas through the DDMA, which is caused due to road and other construction works and suggest necessary actions required to improve the situation;
- Promote flood resistant crops that grow well even in inches of water in the field;
- Create drainage systems as per the need of the villages by conducting a study by the concerned departments in terms of design and effectiveness;
- Sanitation schemes should be especially strengthened by PHED and health organizations as per the standard operating procedures in the region and special measures should be taken to prevent water borne diseases due to presence of stagnant water;
- People living in huts in the drainage line or within the water logged areas should be identified and should be relocated to different parts of the village;

Gram Panchayats away from the River

- Rainwater harvesting should be promoted and supported in the region;
- Tube wells and boreholes should be placed all over the villages so that the sources of clean water are secured even during disaster events;
- Use of irrigation channels and tube wells should be promoted amongst farmers;
- Crops having short gestation period, which can be harvested before the monsoon season can be promoted. Seasonal crops can also be harvested before the onset of winter season;
- Crop insurance should be promoted for the region to transfer the risk;

Preparedness Measures and DRR Plan of DDMA

DRR is the policy objective aimed at preventing new and reducing existing disaster risks and managing residual risks, all of which contribute to strengthening resilience.¹⁶ As per the Section 31 of Disaster Management Act, 2005, DDMA is constituted to ensure effective management and response to any disaster. The DDMA Khagaria has the following structure (Table 4-2):

Table 4-2 Structure of DDMA, Khagaria

Sl No.	Members	Designation in DDMA
1	District Magistrate, Khagaria	Chairperson (ex-officio)
2	Chairman of Zila Parishad, Khagaria	Co- Chairperson (ex-officio)
3	Superintendent of Police, Khagaria	Member (ex-officio)
4	Chief Medical Officer, Khagaria	Member (ex-officio)
5	Deputy Development Commissioner, Khagaria	Member (ex-officio)
6	Deputy Collector, Disaster Management, Khagaria	Member (ex-officio)
7	Chief Engineer, Water Resource Department, Khagaria	Member (ex-officio)

¹⁶ Based on updated Terminology on Disaster Management, United Nations Office in August 2015 after the Sendai Framework for Disaster Risk Reduction 2015-2030; and Bihar Government's DRR Roadmap 2015-30

Underlying disaster risk drivers are the processes or conditions, including development-related, that influence the levels of risk. During non-disaster periods, district administration needs to focus on the measures for disaster preparedness and mitigation to strengthen disaster resilient developmental planning in the district. It is important to mainstream DRR concerns into the developmental plans in the district.

DRR Mainstreaming Actions

Objective:

To ensure DRR concerns are mainstreamed in the developmental planning process and actions of all key stakeholders in the district.

Key Actions:

- Prepare a disaster management plan including district response plan for the district with active participation of all stakeholders;
- Coordinate and monitor the implementation of the National Policies, State Policies, National Plan, State Plan and District Plan in the district;
- Ensure that the guidelines for prevention, mitigation, preparedness and response measures as laid down by the NDMA, the SDMA and the DDMA are followed by all the line departments and the local authorities in the district;
- Give directions to different authorities at the district level and local authorities to take such other measures for the prevention or mitigation of disasters as necessary;
- Monitor the implementation of disaster management plans at district level;
- Lay down guidelines which are to be followed by all departments at the district level for the purpose of integration of measures for prevention and mitigation of disasters in their development plans and projects and to provide necessary technical assistance;
- Monitor the implementation of the measures recommended;
- EWS is an interrelated set of hazard warning, risk assessment, communication and preparedness activities that enable individuals, communities, businesses and others to take timely action to reduce their risks.¹⁷ Set up, maintain, review and upgrade the mechanism for early warnings, and dissemination of proper information to the people;
- Prepare, review and update district level response plan and guidelines as per the district requirement;
- Ensure that the various line departments at the district level and the local authorities prepare their response plans in accordance with the district response plan;
- Coordinate and guide the local authorities in the district to ensure that measures for the prevention or mitigation of disasters - natural or man-made, in the district are carried out promptly and effectively;
- Review development plans prepared by various Government departments, Statutory authorities or local authorities at the district level with a view to make necessary provisions in the plans for DRR concerns and actions in terms of prevention and mitigation of disasters;
- Ensure the compliance of the parameters set for building construction standards/building codes in the district keeping DRR concerns under consideration;
- Convene periodic meetings to emphasize on the importance and ways of mainstreaming DRR concerns in various national flagship programmes and development programs of the departments;
- Identify and analyze any potential risks arising due to developmental activities in the district and develop prudent strategies to address these potential risks and modify the program components accordingly;

¹⁷ Based on updated Terminology on Disaster Management, United Nations Office in August 2015

- Promote hazard resilient developmental designs and products in the district;

Climate Change Adaptation (CCA) Actions

Objective:

To enable the district administration, line departments, concerned stakeholders and communities to understand how climate change adaptation and DRR can be incorporated in policies and plans to achieve the desired objective.

Key Actions:

- Examine the roles and responsibilities of the governments in terms of land use planning and disaster mitigation strategies and their implications towards the future development of climate resilient communities, particularly in the context of a contentious resettlement process because of the application of a hazard-based zoning process.
- Incorporate risk reduction measures in reducing the vulnerability of the district to climate change and natural disasters that decrease the exposure through land use planning, hazard-based zoning, climate resilient building codes and retrofitting as well as innovative financial incentives.
- Mainstream CCA and DRR measures into the local government plans through the comprehensive land use planning and followed by its effective implementation.
- Incorporate a range of possible vulnerabilities driven by changing landscape, infrastructure, and socioeconomic conditions in land use planning.
- Ensure the use of technical knowledge such as national and regional climate projections and geo-hazards information in local decision-making. It is important to address the knowledge gaps in land use planning to support the adaptation capacity needs of the local government, generating partnerships with the scientific community, NGOs, and the private sectors.

Training and Capacity Building Actions

Objective:

To enable the line departments, concerned stakeholders and communities in building sufficient capacities to perform better the roles and responsibilities for DRR and Disaster Response in order to achieve the desired objective. Suitable trainings need to be provided to them time to time to develop their capacities.

In view to build the capacity of various stakeholders of Begusarai district following Training programme conducted by **Bihar State Disaster Management Authority**:

Sr. No.	Programme Name	No. of Participants
1.	Management of Animals in Emergencies Training of Veterinary Doctors	02
	Training of Livestock Assistant	05
2.	Training of PRI Memmbers on DRR	14
3.	Training of Master Trainers for Jeevika Didis Training	07

4.	Training of District Panchayat Officers	06
5.	Training of Engineers for construction Earthquake safe housing	125
6.	Training of Masons for construction Earthquake safe housing	205
7.	Training of Master Trainers for boatmen and boat owners training	05
8.	Training of boatmen and boat owners at community level	142
9.	Training of Surveyors and Registering Officers	49
10.	Training of master Trainers under safe swim Programme	31

Key Actions:

- Conduct a periodic needs analysis in terms of training requirements for the personnel of the Emergency Support Functions (ESFs), Emergency Operation Centres (EOC), Disaster Mitigation and Management Centre (DMMC), Quick Response Teams (QRTs), Disaster Management Teams (DMTs), Field Response Team (FRTs) etc;
- Plan, mobilize resources and facilitate trainings on the identified training needs;
- Review the capabilities of the line departments for responding to any disaster or impending disaster situation in the district and suggest suitable improvements in them;
- Develop a calendar for periodical mock drills, trainings and awareness programmes of the concerned stakeholders;
- Organize and coordinate specialized training programmes for different levels of officers, employees and voluntary rescue workers in the districts;
- Facilitate community training and awareness programmes for disaster prevention, preparedness and mitigation with the support of local authorities, government and non-governmental organizations;
- Provide necessary technical assistance or give advice to the local authorities in the district for carrying out their functions;
- Ensure communication systems are in order, and disaster management drills are carried out periodically;
- Maintain a roster of skilled manpower - technical and professional people, list of agencies, vendors, hospitals and other resources required at different levels (GP, block, sub-division and district level). The sub-division, block and GP level roster may be

maintained by the respective authorities at that level with clear instructions from the DDMA;

- Organize periodic mock drills for the personnel of ESFs, EOC, DMMC, QRTs, DMTs, FRTs etc. for different contingency situations;
- Put the DDMP in testing during such mock drills and compile the learning from the testing of the DDMP in the mock drills and update the DDMP accordingly;
- Make necessary liaising and networking with other neighbouring district authorities, State, national and, if appropriate, with international agencies;
- Analyze and incorporate past experiences and lessons learnt in terms of disaster response in DDMP updating annually;
- Develop an exhaustive inventory list of line departments and other stakeholders required for achieving minimum standards in disaster relief as per NDMA guidelines towards various services at district level;
- Develop a resource plan for all ESFs to achieve it over in next few years.

Functional Continuity Actions

Objective:

To ensure that the DDMA quickly recovers from any disaster event impacts and remains functional during disaster period.

Key Actions:

- Define guidelines and framework for functioning of the DDMA especially during disaster event period;
- Ensure nominee for the Vice-Chairman-DDMA to function as the Chairman-DDMA in his/her absence;
- Define protocol on convening the meetings in the absence of convener;
- Identify the safest building/location for operational work and meetings of the DDMA. The DDMA may start functioning from the alternate place if the main building/ office is not in usable condition after disaster;
- Secure important files and information of the DDMA by keeping periodic backups;
- Develop quick information sharing and exchange mechanisms among all concerned stakeholders during disaster occurrences through mobile networking and apps.

Emergency Preparedness Actions

Objective:

To identify potential emergency situations in the district and preparedness for the unified response by all concerned stakeholders including community.

Key Actions:

- Identify potential emergencies in pre-disaster assessment and refer the findings for contingency specific actions;
- Organize periodic meetings of the DDMA with EOC, ESFs, DMMC, DMTs and QRTs especially before pre-disaster seasons, e.g. flood season;
- Review the preparedness measures of various line departments for quick and effective response to any disaster event and suggest ways to address the gaps, if any;
- Review contingency action plans of the ESFs, DMTs, and QRTs and their preparedness;
- Take stock of essential equipment, materials and their locations in the district. Assess if there is a need to do additional procurements and preposition supplies in vulnerable areas and delegate actions for the same to respective ESFs and Block officials.
- Identify buildings and places used as disaster shelters and relief camps at the time of disaster events and make necessary arrangements, if required;

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- Establish stockpiles of relief and rescue materials or ensure preparedness to make such materials available in the district at a short notice;
 - Coordinate with Department of Disaster Management (DMD), Bihar, BSDMA, and other key agencies for any specific preparedness instructions and guidelines, supplies, mock drills, trainings, etc;
 - Instruct EOC team to monitor regularly the information on EWS from various sources and disseminate information to people of the region at the earliest in case of emergency.

Mainstreaming of DRR concerns in Developmental Plans

Mainstreaming of DRR concerns

Mainstreaming of DRR is a governance process enabling the systematic integration of DRR concerns into all relevant development spheres. In other words, responsive, accountable, transparent and efficient governance structures underwrite the environment where DRR can be institutionalized as an underlying principle of sustainable development.¹⁸

Mainstreaming is a process of integration of components of DRR into national and local development planning processes like the poverty reduction strategies and schemes, socio economic development plans and schemes, environmental assessments, etc which are taken up by the Government for long term development. All these processes are essentially aimed to reduce poverty and increase the socio economic resilience of the district and the community.

Benefits of Mainstreaming of DRR concerns in Developmental Plans

Mainstreaming DRR in development plans/programmes is considered an important dimension of sustainable development. Development activities that do not consider the DRR perspective fail to be sustainable. Hence, it is also necessary for disaster mitigation components to be built into all development projects. This will save larger outlays on reconstruction and rehabilitation in future. Therefore, all development schemes in hazard prone areas should include a vulnerability analysis, whereby the feasibility of a project is assessed with respect to vulnerability of the area and the mitigation measures required for sustainability. Research has shown that it is better to spend a little extra today on steps and components to prevent and mitigate which reduces the cost involved in restoration and rehabilitation and provides co-benefits to both development schemes as well as protection of the local communities.

National and State governments are implementing numerous and varied development and poverty reduction programmes across the country including the hazard-prone areas. Disasters disrupt progress and destroy the hard-earned fruits of painstaking developmental efforts at the community level, often pushing families and communities, back by several decades thus negating the gains of development. The question arises whether it is possible to protect the gains of development in the aftermath of disasters at the community level.

There is a paradigm shift, from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness driven approach for conserving developmental gains and to minimize loss of life, livelihood and property. Different development departments implement many schemes/programmes in the local areas that can be linked with mitigation and preparedness measures/initiatives. These schemes/programmes, if properly coordinated, can provide the framework, key actors and support efforts of families and communities to minimize the impact in the aftermath of a disaster. Mainstreaming DRR with these development programmes will strengthen the linkage between disaster preparedness and development and ensure that the impacts of disasters are reduced and

¹⁸ Based on Draft National Policy Guidelines on CBDM, NDMA, 2014

thereby protecting the gains made by sustainable development programmes at the community level.

- 1) All developmental plans and projects of Government and various agencies in the district should have taken care of DRR concerns. DDMA and other concerned stakeholders should be consulted on how to mitigate any adverse disaster risks involved in these development initiatives.
- 2) All developmental plans approved by the State or district authorities and national flagship programmes in the district should have a special component for disaster mitigation. Additional budget should be earmarked for the same, if required.
- 3) Infrastructure development like construction of irrigation channels, sluice gates, metalled roads, and multi-purpose safe shelters should be given a priority as it aids in both disaster mitigation and overall development of the village/district.
- 4) MGNREGA should be strengthened for the district so that most of the mitigation-cum-development projects could be locally completed, which ultimately provides local employment.
- 5) DDMA/ESF shall make recommendations to all the district departments about possible mitigation-cum-developmental projects.
- 6) All district departments to take lead for mainstreaming mitigation aspect in their projects and earmark at least 10% budget for the same in their plans.
- 7) MPs and MLAs under the MP Local Area Development Scheme and MLA local area development fund should sanction:
 - (a) Projects that have taken into account the disaster mitigation and disaster resilience components,
 - (b) Projects for disaster mitigation.
- 8) Continuous planning & execution of developmental plans for providing sustainable livelihood to the most vulnerable communities.

Advocacy of Emerging Issues for Strengthening Disaster Management Plan

- District authorities should be empowered to decide on mitigation and development projects suitable to the district on priority basis with a flexibility to design and utilize the budget allocated.
- Designing and budgeting of the flagship programs such as Indira Awas Yojna and Sarva Siksha Abhiyan should be flexible so that necessary mitigation measures for the particular district could be incorporated in the design as per the requirements of the district.
- Projects necessary for mitigation and development in the village should be given preference to ensure sustainable livelihood and inclusive growth.

Awareness Measures

Awareness generation and sensitizing the communities and other stakeholders towards preparedness can help save lives and assets in the case of a disaster. The awareness of the community is basically educating on dos and don'ts in case of any disaster and awareness should be tailored group specific and hazard specific. It is important to sensitize line department as well regarding their roles and responsibilities during emergency situations. Various methodologies can be used for imparting awareness generation and sensitization. Following awareness generating activities can be imparted at department and community level for preparedness and mitigation activities.

At department level:

- Conduct mock drills involving line departments and communities
- Mainstreaming DM in development activities
- Use of field staff of various line department for imparting community awareness and sanitation hygiene activities
- The VAOs should constantly interact with DMC and DMT so that they are active in the locality
- Using audio visual mobile units of various departments like - health department and electricity department for awareness development
- Conduct street plays through NGOs and CBOs
- Coordinate with academic organisations for knowledge development and sharing
- Documentation of success and failure stories specific to awareness use these learning for the learning future awareness activities

At community level:

- Awareness should be a continuous process and should be intensified based on the disaster calendar of district/state
- Posters on dos and don'ts should be displayed in public places
- Awareness and incorporating DM in school curriculum
- Training of masons in hazard resistance building
- Use of audio visuals
- Broadcasting awareness messages in FM radios TV and local cable network and sending bulk SMS to cell phones
- Use VKCs as hubs for knowledge dissemination and awareness

Table 4-3 Awareness generation process

SI No.	Task	Activities	Responsibility
1	Information	Advertisement, hording, booklets, leaflets, banners, shake-table, demonstration, folk dancing and music, street play, and exhibition, TV Spot and Radio spot, Audio-visual and documentary	Information and Public Relation Department (IPRD); District Disaster Management Section (DDMS); BSDMA;
2	Education	School campaign	Education Department; BSDMA;
3	Communication	Planning and Design; Execution and Dissemination	District Magistrate; All line Departments; Local Bodies; BSDMA;

Specific Actions for Line Departments and other Stakeholders

Coordination and Integration

- All concerned line departments shall prepare their own specific action plans in respect of their responsibilities. Emergency responses teams will be kept ready by each department so that they can move to disaster site/affected area on short notice.

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- All concerned line departments shall designate a Nodal officer for emergency response and will act as the contact person for that department. She/he shall essentially coordinate and consult with EOC, ESF nodal and support agencies, officer-in-charge of IRS sections, Inter agency group, and community level committees especially in the affected areas and other important stakeholders of the department.
 - Ensure establishment of fail-safe two-way communication with the State, district and other emergency control rooms and within the department.
 - Emphasis on communication systems used regularly during non-disaster time with more focus on the use of VHF's with automatic repeaters, mobile phones with publicized numbers, VHF radio sets etc. It should be remembered that phones fail during prolonged emergencies and electric failure if the phones cannot get recharged.
 - Work under the overall supervision of the Incident Commander/ District Magistrate during emergencies.
 - The departmental efforts integrate with overall planning and actions at district level through mechanism like Incident Response System (IRS) and Unified Response of Inter Agency Group.
 - Ensure preparedness checklist is duly followed by each front line department and status of the same is discussed in monthly meetings.

Accountability

- The head of the department, officers at various levels and the nodal officer appointed for the disaster management by the department shall be responsible for all plans and implementation of plans and decisions taken from time to time for the same.
- The nodal officer shall submit periodic reports to EOC.

Department of Agriculture

Department of Agriculture consists of three divisions- agriculture, horticulture and soil conservation. The department looks after certain tasks such as development of agriculture with suitable crop breeding, strategies to prevent soil erosion due to overuse, salinization, acidification, or other chemical soil contamination. Agriculture is the mainstay of the district and any flood or drought disaster event can have direct implication on agriculture.

Composition

- District agriculture officer and District soil conservation officer at district level.
- Block Agriculture Officer and Assistant soil conservation officer at block level.
- Village level worker at GP level.
- Kisan Sewak at GP level.
- District horticulture officer at district level.
- Horticulture officer at block level.
- Horticulture Sewak at GP level.

Accountability:

The head of the department, officers at various levels and the nodal officer appointed for the disaster management by the department shall be responsible for all plans and implementation of plans and decisions taken from time to time for the same. The nodal officer shall submit periodic reports to the EOC.

Coordination and Integration:

The department shall appoint a nodal officer for coordination with other agencies. He shall essentially coordinate and consult with DEOC, ESF nodal and support agencies, officer in charge of IRS sections, and community level committees especially in affected areas and other important stakeholders of the department. The departmental efforts integrate with

overall planning and actions at district level through mechanism like Incident Response System (IRS), etc.

Recommended activities

- Prepare an updated Agriculture Contingency Plan.
- Constitute a Crop Weather Watch Group at district level (as per “A Model Manual for Drought Management”, Government of India) with representatives from Meteorological Department and concerned officers dealing with agricultural inputs, credit extension, etc to keep a close watch on the monsoon situation, extreme weather conditions such as temperature, strong wind storm, hailstorms, etc.
- Identify vulnerable areas that are prone to flood, drought, pest infestation and other hazards affecting agriculture.
- Ensure protection of embankments to reduce damage to agriculture due to breach.
- Ensure awareness generation in farmers regarding various plant diseases, alternate cropping practices in disaster-prone areas, crop insurance, provision of credit facilities, proper storage of seeds, etc.
- Provide training to farmers in alternate cropping techniques, mixed cropping and other agricultural practices which not only minimize crop losses during future disasters but also improve agriculture productivity.
- Ensure surveillance for pest infestation and crop diseases.
- Ensure availability of stock for immediate replacement of broken/non-functioning gadgets/equipment.
- Ensure availability of adequate stock of seeds and other agro inputs particularly for areas vulnerable to hazards.
- Prepare trained and equipped team for assessment of damage to soil, crop and impact on other agricultural activities.
- Ensure sufficient capacities within the department staff and other stakeholders to be built to better perform the roles and responsibilities for disaster risk reduction and emergency response.
- Prepare for establishment of public information booths, with appropriate and modern means of communication, to assist farmers in providing information regarding insurance, compensation, repair of agro equipment and restoring of agricultural activities at the earliest in post-disaster restoration and rehabilitation plan.

Department of Animal Husbandry and Fisheries

Department of Animal Husbandry and Fisheries has three divisions namely the animal husbandry, dairy and fisheries. The department looks after certain tasks such as livestock health and care, growth in milk productivity, developing pond aquaculture, conservation of water in ponds, lakes etc. Any disaster event such as flood and drought affects livestock population as well. Therefore, it is imperative to prepare specific action plan for large population of livestock and fisheries which support livelihood of the people.

Disaster Specific Actions

- Prepare a database of veterinary hospitals, clinics and organizations working for animal care.
- Ensure availability of road map and maps showing veterinary hospitals and dispensaries at disposal.
- Ensure fully functional mobile veterinary unit at disposal.
- Ensure availability of stocks of mineral and feed supplements, life saving drugs, electrolytes, vaccines, etc.
- Ensure sensitization of farmers about protection of their feed and fodder prior to the onset of monsoon.

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- Locate feed and fodder banks in view of submergence situation due to flood in consultation with agriculture department.
 - Identify source for procurement of fodder in consultation with agriculture department.
 - Identify safe locations for fodder depot and cattle camps within the district.
 - Artificial insemination centers must be strategically located and flood resistant.
 - Ensure assured source of water or canals for drinking and growing fodder along with the above locations with the help of Irrigation, PHED & PRIs.
 - Prepare for necessary arrangements of tents, gunny bags and tarpaulin sheets to cover the sheds during heat and cold waves.
 - Ensure availability of sprinklers/ foggers in shed/camp during heat waves period.
 - Prepare for special care for productive, lactating and pregnant animals; also supplement them with additional concentrates and fodder.
 - Ensure proper administration of de-worming and vaccinations for cattle, sheep and goats, pigs and other relevant measures for disease management during any disaster situation.
 - Prepare for alternate arrangement for keeping, feeding and watering of diseased animals due to contagious diseases to prevent spread of disease among healthy animals.
 - Prepare for separate arrangements for transportation of sick/ infected and dead animals due to contagious diseases in post-disaster situation.
 - Identify space for burial of animals and ensure proper disposal of dead animals.
 - Ensure regular sensitization of farmers regarding animal related issues and diseases and related preparedness.

Bharat Sanchar Nigam Limited

Bharat Sanchar Nigam Limited (BSNL) is nodal organization to provide telecom services and network. It is one of the largest & leading public sector units providing comprehensive range of telecom services throughout the country. It has become an important means of communication in the community. Any kind of disruption in its services will hamper quickest mode of communication in any disaster event.

Disaster Specific Actions

- Procure recovery plans from private communication service providers for their recovery time objectives.
- Prepare and develop alternate communication system.
- Direct the officers of all levels in the department, for high level preparedness to ensure the safety of buildings of department and other assets.
- Establish a flood and drought warning cell in the department and a nodal officer for disaster management.
- Direct the officers of all level in the department to provide support and regular help to the sub division officers, district magistrate, disaster management agencies and other local administration.
- Informing the relevant offices and people about daily weather and also issuing the electronic message on this matter.
- Support in dissemination of Early Warning information once approved by DDMA.
- Issuance of early warning to the society through the means of telecommunications.
- Ensure all the BSNL offices or any establishment is earthquake resilient.
- Earthquake and flood resistant technology in the construction of BSNL towers or setups.
- Fire resistant cables and instruments.
- Assess disaster risks due to any new construction, installation or maintenance of towers or any other setup.
- The flood specific designing of the towers and poles which are located in the flood prone areas or low lying areas.

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- Build awareness among the departmental staff, communities and the key stakeholders engaged with the department on potential disaster risks and measures to reduce the risk.

Department of Building and Construction

Department of Building constructs the govt. buildings and institutions, house allotment work of Government buildings, etc. and provides an important role of architectural support in the construction work. The department provides all necessary services and facilities to the govt. buildings, site evaluation and assessment, structural assessment and renovation options.

Disaster Specific Actions

- Ensure availability and functioning of all equipment like cranes, JCB, etc.
- Prepare a data base of availability of heavy equipment like cranes, JCB with private agencies also.
- Ensure the list of vulnerable buildings be at disposal.
- Prepare for prompt clearance of debris after disaster occurrence.
- Prepare the demolishing squad for prompt demolition of unsafe buildings.
- Prepare for prompt clearing and repairing of essential infrastructures such as damaged roads, culverts, bridges and flyovers.
- Prepare for construction of new temporary roads at short notice for diverting traffic from the affected area.
- Prepare for construction of temporary facilities like that of medical post, temporary shelters etc. at short notice.
- Prepare for prompt establishment of helipad near the affected site for VVIP visits.
- Prepare for restoration of government buildings damaged during disaster.
- Ensure all construction is earthquake resistant.
- Adopt modern technology suitable to the climate of the area.
- Ensure the construction of new buildings on high plinth in the flood prone areas or flood resistant structures.
- Retrofitting to the govt. buildings at district, block, and Panchayat levels.

Department of Education

Department of Education aims to create facilitative environment in which youth, women and others would explore their knowledge and skills by pursuing primary, secondary, higher and mass education. With the implementation of the Right to Education Act (RTE), the DoE aims to ensure free and quality primary education to all children in the age group of 6-14 years. For this purpose, infrastructures and buildings have been developed which need to be protected to the disaster occurrences. At the time of floods, the schools or institutional buildings in high elevated areas are used as shelters as well.

Disaster Specific Actions

- Organize awareness generation programs in schools and colleges for students, teachers, administrative staff and other helpers. These programs should focus on dos and don'ts for various hazards and safe evacuation in case of any emergency.
- Ensure that new school constructions in are done after taking risk and vulnerability analysis of the area.
- Ensure that all new constructions are disaster resilient and old constructions are retrofitted for disaster resilience through structural mitigation activities (following national as well as Bihar State building codes/laws).
- Ensure preparation of first aid and disaster management kit in each school and college.

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- Ensure preparation of school and colleges disaster management plan.
 - Identify safe schools and colleges to serve as relief shelter in case of any emergency within that area, only for short period of time.
 - Ensure buildings of schools, colleges and institutions be earthquake resistant

Department of Electricity

Department of Electricity is responsible for providing electricity in the area. It is one of the most important drivers of development. It is important to ensure that the electricity supply and related infrastructures should be safe to disaster events.

Disaster Specific Actions

- Ensure transmission map at disposal.
- Prepare a database of critical and lifesaving infrastructure in the district and prepare for providing uninterrupted power supply to them.
- Prepare for providing continuous power supply to the affected area.
- Ensure availability of solar panels, solar lights/ lanterns for emergency periods.
- Prepare to provide electrical connections and system at short notice in affected areas for purpose of pumping flood water and illumination of the area.
- Prepare for prompt replacement or re-commissioning of affected power supply system.
- Ensure availability of adequate stock of important equipment like transformers, poles, conductors, cables, insulators, etc for prompt action whenever required.
- Ensure trained construction and maintenance staff at disposal.
- Ensure the departmental resources like equipment, construction material, energy/electricity resource material, finances etc used for emergency purpose are accounted and recovered as soon as possible.
- Ensure all construction is earthquake resilient.
- Repairing and retrofitting of the old power generation units and adopting disaster resilient technology in the process.
- Based on previous disaster event experience the department should frame an outline of future action plan including disaster risk reduction preventive measurements.
- Allocation of separate fund for disaster management, so that the essential reconstruction work can be started early after any disaster event.
- Define benchmarks to measure department's performance on risk reduction activities and emergency response capacities.
- Build awareness among the departmental staff, communities and the key stakeholders engaged with the department on potential disaster risks and measures to reduce the risk.
- Ensure sufficient preparedness is there to support quick response to disaster events.

Department of Fire Services

Department of fire service is established to protect and maintain an efficient and effective operational fire service. The services of the fire fighters not only helpful in rescuing the lives and property during fire breaks but also support during any other disaster such as floods, earthquake etc .

Disaster Specific Actions

- Ensure proper functioning of all fire fighting equipment, appliances and respiratory equipment.
- Make a database of existing fire fighting services and facilities provided with private agencies.
- Be aware of potential hazardous installations and level of possible emergency required.

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- Prepare to deal with leakage of flammable toxic substances.
 - Review the adequacy of existing fire prevention arrangements
 - Ensure the list of adverse effects of chemicals and antidotes/ methods to deal with emergency involving each chemical should be at disposal.
 - Identify roads and routes of access and escape to and from potential hazardous units.
 - Ensure all important buildings should have sketch map and their escape route with glowing signs.
 - Ensure evacuation drill as per evacuation plan periodically in all important buildings, shopping complex, hospitals, schools, etc.
 - Ensure fire fighting arrangements during festivals, religious events, etc.
 - Ensure to install fire safety measures like fire alarm, hydraulic pump, sprinkler etc.
 - Ensure that the fire fighters are equipped with effective and modernized weapons, safety measures like fire proof gloves and suits etc.
 - Train the fire fighters to tackle during CBRN and other disaster specifically.
 - Identify the vulnerable areas, buildings etc and make an action plan to reduce its risk.
 - Assess the risk vulnerability of the areas and promote fire safety measures according to the need.
 - Conduct regular mock drill, training and awareness camp on fire safety measures and DRR to the fire fighters and among the masses.

Department of Health

The health department in the district provides health care in the district with establishments at block, and village levels. The aim is to build healthy people, not only by providing access to quality medical facilities for every citizen in the remotest corner of the district, but also by providing medical facilities of the highest order, keeping pace with rapid technological developments in the field of medicine. The department's role gets increased during disaster occurrences and in post disaster recovery phase.

Disaster Specific Actions

- Prepare trained team of paramedics.
- Develop dos and don'ts and IEC materials regarding health and hygiene.
- Organize awareness camps with help of CHC/ PHCs and Development and Panchayat Department for hygiene promotion and public health issues.
- Ensure availability of trained mobile medical teams at disposal.
- Prepare psychological and psychosocial care teams.
- Ensure availability of generator sets and buffer stock of fuel at disposal.
- Ensure availability of adequate supply of life saving equipment and stock of medicines, portable supplies including portable oxygen cylinders, portable X-ray machine, portable ultrasound machines, triage tags, etc.
- Ensure availability of adequate space with suitable facilities for storage of medicines.
- Prepare a database of private hospitals and nursing homes with services and facilities available.
- Prepare a database of doctors registered with Indian Medical Association (IMA).
- Prepare a database of available ambulance services from government, private agencies and District Red Cross Society, if any.
- Ensure, at disposal, list of MAH units and hazardous chemicals stored in them.
- Ensure, at disposal, the list of antidotes for various hazardous chemicals. This list is prepared by Department of Industrial Safety and Health. (refer Annexure-III)
- Ensure availability of adequate supply of blood units.
- Prepare database of blood donors in the district and update the same in DDMRI.

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- Prepare a database of providers of refrigerated vehicles for transportation of vaccines, blood, blood products, etc.
 - Prepare database of halwai sanghs, caterers, restaurants, hotels etc. through Food Safety Officer.
 - Train drivers and attendants of ambulance and mobile medical units in first aid and basic life saving techniques.
 - Prepare a decontamination ward in view of any possible chemical or industrial hazard.
 - Prepare for prompt establishment of temporary hospital, mobile surgical unit, etc at short notice, near the affected area.
 - Ensure proper and safe mechanism for medical waste disposal.
 - Prepare for proper disease surveillance system.
 - Make proper arrangement and mechanism for mass casualty management.
 - Prepare for distribution of water purifying tablets and ensure chlorination of open water sources, if required.

Department of Information and Public Relations (IPRD)

Information and Public Relation Department is the nodal agency of the Government of Bihar for disseminating information on various activities of the Government to the people through the media and providing feedback to the Government on important matters reflected in the media. IPRD plays a vital role in disseminating information and building capacity of general public to face any emergency situation. It helps in generating the feeling of responsibility among public to support the affected people.

Disaster Specific Actions

- Prepare for proper public address system ensuring rumour control.
- Prepare for media management.
- Ensure database of dos and don'ts of all possible hazards in the district.
- Ensure distribution of IEC material to community for awareness generation about the same.
- Publicize the information in the interest of public awareness through booklets, pamphlets, radio, television, film shows, newspapers, documentary films, door to door campaign, meetings and folk media units.

Department of Panchayati Raj Institutions

The department of Panchayati Raj Institutions envisages strengthening the three-tier system in the state with elected bodies at the Village, Block and District levels. It ensures greater participation of people and more effective implementation of rural development programmes.

Disaster Specific Actions

- Develop prevention/mitigation strategies for risk reduction at community level.
- Training of elected representatives on various aspects of disaster management
- Public awareness on various aspects of disaster management
- Organize mock drills
- Promote and support community-based disaster management plans.
- Support strengthening response mechanisms at the G.P. level (e.g., better communication, local storage, search & rescue equipment, etc.).
- Clean drainage channels, trimming of branches before cyclone season.
- Ensure alternative routes/means of communication for movement of relief materials and personnel to marooned areas or areas likely to be marooned.
- Assist all the government departments to plan and priorities prevention and preparedness activities while ensuring active community participation.

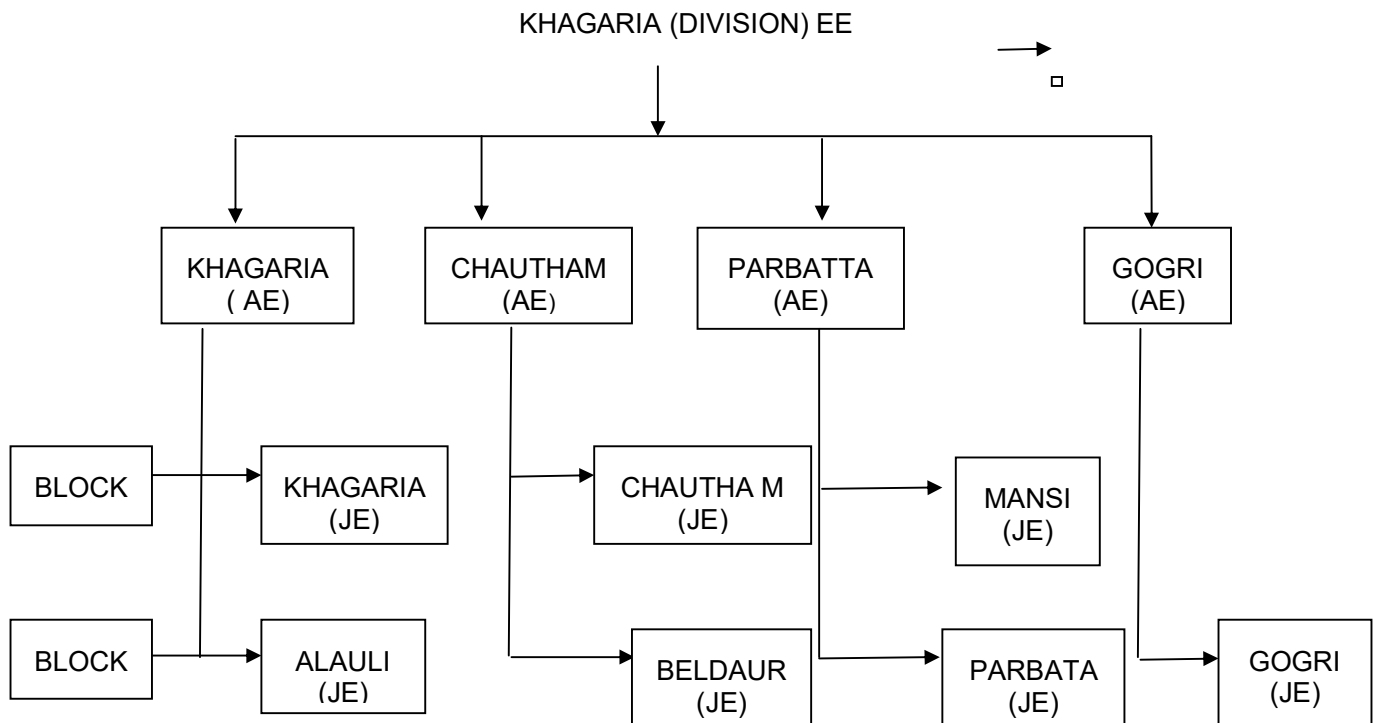
- Train-up the G.P. Members and Support for timely and appropriate delivery of warning to the community.
- Clearance of blocked drains and roads, including tree removal in the villages.
- Construct alternative temporary roads to restore communication to the villages.
- PRIs to be a part of the damage survey and relief distribution teams to ensure popular participation.
- Operation emergency relief centers and emergency shelter and Sanitation, drinking water and medical aid arrangements.
- IEC activities for greater awareness regarding the role of trees and forests for protection during emergencies and also to minimize environmental impact which results owing to deforestation like climate change, soil erosion, etc.
- Increasing involvement of the community, NGOs and CBOs in plantation, protection and other forest protection, rejuvenation and restoration activities.
- Plan for reducing the incidence, and minimize the impact of forest fire.
- Assist in road clearance.
- Provision of tree cutting equipment Units for tree cutting and disposal to be put under the control of BSDMA, SRC, Collector during Level 1.
- Provision of building materials such as bamboos etc for construction of shelters
- Take up plantation to make good the damage caused to tree cover.

Department of Public Health Engineering (PHED)

The PHED department aims at improving the public health and sanitation in the district. The department adopts specific engineering practices while implementing various activities such as safe drinking water, solid waste management, sanitation etc.

Clean drinking water is no less than a challenge in Khagaria district. Excess of arsenic and iron in drinking water is affecting water quality

Water Pollutant Quality Affected Zone Vulnerable Area
normal level harmful level.



PHED FUNCTIONS

Seven Nishchay-2 Har Ghar Nal Jal Yojna, 129 (current-113) gram panchayats of Khagaria district and 268147 houses of 1899 wards (present-1602) of Municipal Council have been connected with home water, pure drinking water in these houses is being supplied.

In view of the abundance of water exploitation, water conservation also becomes an essential aspect.

The implementation and monitoring of the scheme is being done continuously by the IoT device. The details of which are as follows.

Water Pollutant	Quality		Affected Anchal	Vulnerable Area
	Normal Level	Dangerous Level		
Arsenic	<10 PPB	10> PPB	Parbatta, Gogri, Khagaria, Mansi.	Sahadatpur Aguwani (90 PPB >)
Iron	<1 PPM	>1 PPM	Alauli, Gogri, Mansi, Khagaria, Beldaur, Parbatta, Chautham.	Alauli, Beldaur (3 PPM)

Capacity Building

Pump operators working at district, block and panchayat level have been trained. Pump operators, plumbers, electricians, fitters etc. are to be trained by the Skill Development Mission and Government Industrial Training Institutes related to the scheme.

In Jal Chapal-Har Ghar Nal Jal Yojana, a detailed discussion is held about the prevention of diseases caused by contaminated water, proper use of drinking water, maintenance, protection as well as grievance redressal system.

CLF meeting- Jeevika didis are being trained through CLF meeting.

Purity check- WQMIS report and field test kit FTK test is being used for monitoring and monitoring of water quality. Training of field works is proposed for this work.

I.O.T Device	Target	Established	Offline	Working
	1918	1746	182	1502

Disaster Specific Actions

- Ensure availability and well functioning of all equipment and vehicles.
- Prepare for distribution of water purifying tablets, bleaching powder and chlorination of public water resources, if required.
- Prepare for arrangement of safe drinking water supply for surviving community in the affected areas and also in relief camps and shelters. Also prepare for provisioning of water for other purposes.
- Prepare a database of suppliers and distributors of packaged drinking water.
- Prepare for prompt repair of pipelines supplying potable water.
- Prepare for prompt repair of sewerage systems and water works.
- Make standby arrangements of generators for running the water pumps.
- Ensure cleaning of drains before the monsoon season.
- Ensure installations of tube wells, if needed, before the monsoon to provide underground water to the livestock during flood period.
- Ensure availability of adequate number of water tankers, drums, jerry cans or identify their private suppliers to prepare for supply of water, in scarcity period and in emergency.
- Ensure availability of water supply/ filling points for fire tenders, water cannons, hospitals and other necessary life saving infrastructure.
- Prepare for prompt provision of temporary toilets/ trench latrines in the affected area and relief camps.
- Ensuring filling of water ponds/ lakes in the district with canal water/ tube wells prior to the onset of summer.
- Prepare for the arrangements of clean drinking water for affected livestock and poultry.
- Prepare mechanism for proper solid waste management and disposal of waste in shelter and relief camps, feeding centres and affected villages.

Department of Planning and Development

The function of Planning and Development Department of Bihar Government is to formulate, scrutiny and adjustment of State Five-Year Plan and to coordinate with FYPs and Annual

plan. The operation of department is to assess the allocation of resources for the plan and evaluate the general progress of plan projects and formulation of plan to develop the backward areas.

Disaster Specific Actions

- Ensure and direct the officers of all level in the department to provide support and regular help to the sub division officers, district magistrate, disaster management agencies and other local administration.
- High level preparedness to ensure the safety of buildings of department and other assets.
- Identify potential emergency situations and make references to contingency specific action plans.
- Ensure sufficient stock of material resources and infrastructure in the disaster prone areas.
- Analyze the damage assessment and recovery package announced by the government.
- Implement recovery plans.
- Ensure the departmental resources like equipment, seeds, food, fertilizer, agriculture resource material, finances etc used for emergency purpose are accounted and recouped as soon as possible.
- Support recovery and rehabilitation efforts to help communities recover from the disaster impact and in build back better.
- Incorporate lessons learnt into future planning and preparedness actions.
- Mainstream DRR into new development programs and refer to DRR actions to minimize future risks.

Department of Police

Police department, in Bihar is one of the major establishments of Government of Bihar protecting the rights of the citizens under law. The field of operations of police department is maintaining law and order in the state even during and post disaster events.

Disaster Specific Actions

- Ensure proper functioning of all equipment.
- Develop dos and don'ts for road safety, terrorist attack, bomb blast and stampede.
- Ensure proper mechanism in place for early warning of different hazards through police stations and police posts.
- Arrange for public address system and siren.
- Prepare for temporary installation of wireless systems between district and sub-divisions in case of any damage to existing wireless system with the department.
- Train the communication wing of police in setting up control room at short notice at a required site.
- Prepare contingency plan for response to bomb blast, riots, terrorist attack and other law and order emergencies.
- Prepare deployment plan of home guards and other volunteers for protection of property of affected community.
- Prepare for proper arrangement for custody of recovered belongings and property from dead bodies and affected sites.
- Police personal and staff, who are in PCR vans, should keep basic first aid box and ensure equipment kept in van in proper working condition.
- Train police personnel and staff of PCR vans in first aid and basic life saving techniques.
- Prepare for proper protection to women, girls and children to avoid cases of human trafficking.
- Prepare for protection of dead bodies to avoid their theft and false claims.

-
- Prepare for safety and security of food and other commodities.
 - Prepare for protection against hoarding, black marketing of relief material.
 - Prepare for safety and security arrangements for evacuated area, affected area, transit camps, relief camps, hospital, medical centre, cattle camps and feeding centres.
 - Ensure availability of road map and maps showing police stations with their jurisdiction at disposal.
 - Ensure availability of check points at crowded places.
 - Keep telephone Nos. and database of BDS and Dog Squad Team in police control room and update in three months.
 - Keep telephone Nos. and database of reserve battalion of police located in nearby for reinforcement.

Department of Rural Development

District Rural Development Agency (DRDA) is the principal organ at the district level to oversee the implementation of the rural development programmes of the Ministry of Rural Development. Created originally for implementation of Integrated Rural Development Programme (IRDP), the DRDAs were subsequently entrusted with a number of programmes, both of the Central and State Governments.

Disaster Specific Actions

- Direct the officers of all levels in the department, for high level preparedness to ensure the safety of buildings of department and other assets.
- The nodal officer for disaster management in the department shall be responsible for coordination with EOC, ESF nodal and support agencies and other departments. Appoint additional staff to support him as required for the situation.
- If EOC at district level declares it as an emergency situation and Unified Response is activated, disseminate the information to all staff, key stakeholders etc.
- In consultation with EOC and ESF nodal and support agencies, plan response actions as per immediate, short term and long term needs.
- Coordinate with DDMA, respective GP disaster management committee and search and rescue committee to shift the equipment, people, resource material etc. to the safe places during floods.
- Identifying alternate sources of water during drought.
- Regular monitoring of the embankments and other key points and immediate repairing through various programmes of the department.
- Generating employment opportunities for the displaced people or people who have lost their means of livelihood.
- Support with search and rescue, relief programs etc by connecting with nodal agencies for different essential support functions.
- Ensuring adequate facility of efficient and monitoring force in the affected areas.
- Keep a vigil also on the areas not affected by disaster.
- Check if all the immediate life saving measures is in place and there is no further risk to life, property and environment due to infrastructure and responsibilities of rural department. Give status report to EOC and ESF nodal agencies.
- Initiate planning to recover the disaster loses to the department, immediate recouping the resources (materials and finances) used during the emergencies.
- Initiate planning for early and long term recovery actions as per the damage assessment.
- Incorporate lessons learnt into future planning and preparedness actions.
- Mainstream DRR components into new development programs and refer to DRR actions to minimize future risks.

Department of Social Security and Welfare

The department of Social Security, Welfare and Disability focusing on three categories of people: persons with disabilities, older persons, and destitute steering welfare and development programmes and schemes. It undertakes disability-related welfare efforts.

Disaster Specific Actions

- Direct the officers of all levels in the department, for high level preparedness to ensure the safety of buildings of department and other assets.
- Arrangement of WASH, food and shelter for the persons with disabilities, older persons, and destitute.
- The physical, social, economic and psychological rehabilitation of Persons with disabilities.
- Generating employment opportunities for the displaced people or people who have lost their means of livelihood.
- Check if all the immediate life saving measures is in place and there is no further risk to life, property and environment due to infrastructure and responsibilities of social security department. Give status report to EOC and ESF nodal agencies.
- Ensure the maintenance of social security infrastructure has been owned by trusts, private bodies and adequate monitoring mechanisms are in place.
- Evaluate disaster response in consultation with community, DMTs, ESF nodal agencies, EOC and other stakeholders.
- Ensure the monetary assistance and pension is given to the weaker section regularly.
- Regular follow-up of the old age homes, day care centers etc.
- Location of old age homes, day care centers at safe places. The social security department must ensure there is inclusion of DRR features in old age homes, day care centers and mobile Medicare units.
- Under various schemes, the state government must propose for trainings in DRR to the persons with disabilities, older persons, and destitute.
- The social security department must train or arrange trainings for the dos and don'ts.
- Allocation of separate fund for disaster management, so that the essential reconstruction work can be started early after any emergency situation.
- Define standards/ benchmarks to measure department's performance on risk reduction activities and emergency response capacities.
- Build awareness among the departmental staff, communities and the key stakeholders engaged with the department on potential disaster risks and measures to reduce the risk.
- Ensure sufficient preparedness is there for emergency response.
- Ensure the temporary construction work or retrofitting has been done to the vulnerable buildings.
- Arrangement (specific vehicles and equipment) to move the persons with disabilities, older persons, and destitute during emergencies.
- Keep the equipment, telephone, telex, wireless etc. functional and ready.
- Awareness to the officials for the safety of life, material, equipment and for this placement of the items at safe places.

Department of Statistics

The Directorate has to play a vital role in compiling macro parameters for monitoring of the State Economy under operational guidelines of the Central Statistical Office, Government of India. It has also to create data-base for this purpose as well as existing and emerging data requirement of the State Government and that of the Central Government in Bihar. The Directorate of Economics and Statistics (DES), Bihar has the special significance being the Office of the Chief Registrar of Birth and Death for Bihar. For all these purposes the major activities of the DES, Bihar is as follow: - Agriculture and Allied Statistics; Economic &

Miscellaneous Statistics; Civil Registration System; Ad-hoc Survey; and Census Publication & Training, etc.

Disaster Specific Actions

- Direct the officers of all levels in the department, for high level preparedness to ensure the safety of buildings of department and other assets.
- Analyze the damage assessment and recovery package announced by the government and implement recovery plans.
- Ensure the departmental resources like equipment and resource material, finances etc used for emergency purpose are accounted and recouped as soon as possible.
- Ensure the statistical department's building is earthquake resilient.
- Flood resistant technology in the construction of office building which are located in the flood prone areas.
- Assess disaster risks due to any new construction or maintenance activity.
- Installation of alternate sources of energy for the power back up.
- Water resistant and fire resistant infrastructure in the office.
- For accurate and up to date statistics, improved technology in computer section and data collection must be inducted as they are essential for obtaining an objective picture of a country's/state's/ district's economic and social condition.
- Ensure the inclusion of DRR components in the infrastructure of the office.
- Functioning of statistical office from safe building in order to provide the unhindered statistical services to the line departments, private organisations and the NGOs.
- Identify the vulnerable geographical locations and its demographic data and produce the statistical information for the same.
- Allocation of separate fund for disaster management so that the essential reconstruction work can be started early after any emergency situation.
- Produce the statistics in various fields (agriculture and allied statistics, economic and miscellaneous statistics, civil registration system, Ad -hoc survey and census etc.) for planning, monitoring and evaluation.
- Ensure the temporary construction work or retrofitting has been done to the vulnerable buildings.
- Collection of Rainfall data and sharing with the other departments.
- Creating the statistical data regarding Area and Production of Horticulture Crops, Irrigation Statistics in flood and drought prone areas.
- Keep the equipment, telephone, telex, wireless etc. functional and ready.
- Awareness to the officials for the safety of life, material, equipment and for this placement of the items at safe places.

Department of Transport

The department acts as the apex regulatory body that controls the entire gamut of activities that go into the operation of passenger & goods transport motor vehicles - both private & commercial. Through these regulatory activities, the department of Transport is one of the major revenue earners and facilitator of transportation services to the people. It is important to make transport department aware of disaster management and is well prepared to handle any emergency situations.

Disaster Specific Actions

- Make a database of private vehicles available with schools, colleges and other private agencies.
- Ensure proper functioning of filling station, vehicles and equipment including fire extinguishers, first aid kits, etc.

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- Prepare for prompt deployment of vehicles at short notice for various purposes like mass evacuation, transportation of response teams, relief items, victims, etc.
 - Prepare mechanical team for prompt repair of equipment and vehicles.
 - Train drivers and conductors in first aid and basic life saving techniques.
 - Identify the vehicle for rescue operations.
 - Be familiar with routes of potential hazardous installations and follow incident traffic plan.
 - Ensure proper functioning of all equipment.
 - Ensure that all vehicles are in good working condition before coming on the road.
 - Ensure that there is disaster risks arising out of motor vehicles are assessed and measures are taken to minimize those risks.
 - Ensure that measures are taken to minimize pollution from motor and vehicles.

Department of Water Resources

The Water Resources Department, formerly known as Irrigation Department is one of the major establishments of Government of Bihar. It protects the right of State in sharing Water of Inter State Rivers/ Basins. Its important functions include construction, maintenance and regulation of major and medium irrigation projects, embankments, flood control and drainage works in State and districts.

Disaster Specific Actions

- Monitor the flows and levels of important rivers and channels to build information on flood and drought early warning, Share the information with DDMA for approval.
- Ensure proper early warning mechanism in place for flood by monitoring water level of surface water bodies.
- Ensure proper and timely inspection of conditions of bunds, siphons, regulators, embankments, inlets, drains, channels etc.
- Ensure safety of embankments
- Ensure timely de-silting and dredging of rivers and canals, if required
- Ensure sufficient storage and availability of the repairing materials such as empty bags for sand, gunny bags, boulders, bullies, etc
- Ensure prompt repair of drains/channels, if required and inform immediately to the concerned authorities in case of any break, hole and damage to the embankment
- Ensure proper functioning of all equipment including dewatering pumps.
- Ensuring filling of water ponds/lakes in the district with canal water/ tube wells prior to the onset of summer.
- Prepare for the arrangements of clean drinking water for affected livestock and poultry.



06. PROPOSED DISASTER RISK REDUCTION PLAN

(DRR 2022-2026) KHAGARIA

Reference-NDMF/SDMF-56/2020/197/A.P, Dated: 22.01.2020 SDMA/DMD BIHAR PATNA

Geographical position: Khagaria

FUND SOURCE:- As recommended by XV-FC

Prepared By

DDMA KHAGARIA

- **Objectives**

Strengthening, equipping and maintenance of CATC (Community Awareness, Training Center) from the district levels to flood affected area with requisite facilities along with the latest technologies to enable situation awareness, deployment of teams, command and monitoring.

- **The Project**

This plan is focused on promote disaster awareness, education, research and use of technologies. Early Warning systems, preparedness and response mechanisms across t Local level and community based interventions towards preparedness and capacity building along minimum support.

- **Scope**

Preparedness and capacity-building is an important area of Disaster Management Cycle, and includes a wide range of activities. While developing proposals and programmes through this funding window, the indicative activities listed herewith would provide a useful reference.

- **Methodology**

- 1) Improving capacities for Multi- Hazard Early Warning systems:
 - (i) Detection, monitoring, analysis, forecasting and warning of the hazards and possible consequences
 - (ii) Dissemination and communication, for timely, accurate and actionable warnings and associated information
 - (iii) Mechanisms and capacities at all levels to respond to the warnings received.
 - 2) Preparedness for Response:
 - 3) Search & Rescue Capacities
 - (a) Training and equipping of responding teams to respond in various hazards and emergencies as well as to serve at-risk communities and people with special needs and to respond to the livestock
 - (b) Arrangement of resources and essential equipment for mobility and protection of the responding teams in saving lives and properties
 - (c) Resource-sharing arrangements with volunteer networks and private entities
 - (d) Maintenance of Digital inventory of equipment and resources.
- (i) Specialized Response Teams
- (a) Strengthening of National Disaster Response Force and State Disaster Response Force
 - (b) Training and equipping of Fire Services, Civil Defense, and community volunteers at all levels including specialized training to first responder
 - (c) Setting up, training and equipping of Village Task Force for dissemination of early warning, first aid, evacuation, shelter management etc.

Timeline

PHASE	DESCRIPTION	END DATE
Planning Phase	Discussion of the procedures potential risks of the project	31 March, 2026
Training Phase	To be Organized at GP Level	31 March 2030
Deployment Phase	Installation of the product	March 10, 2026

○ **Team Action Plan**

Emergency Communication Network -Supporting the Emergency Communication Networks at National, State and district level for improved response, dissemination of messages to the people, and outreach to the remote locations , Conducting mock drill, exercise at regular interval.

(3) Risk Management Planning:

- (i) Training and capacity building activities for preparation of DM Plans at different levels
- (ii) Training and capacity building on Hazard Risk and Vulnerability at all level
 - (ii) Training & Capacity Building for Preparation of Hazard-specific Contingency Plans and Standard Operating Procedures.
 - (iii) Training & Capacity Building for preparation of preparedness plans for protecting physical and critical Infrastructure such as hospitals, schools etc. in the partnership of the concerned departments
 - (iv) Develop partnerships with critical infrastructure agencies to improve safety of their assets and operations
 - (v) Training and capacity building for preparation of Preparedness Plans to support the socially marginalized groups, people with disabilities, elderly etc. which can be utilized in case of emergency response.
 - (vi) Training & Capacity Building for preparing different types of Plans that may encompass the followings:
 - (a) Continuity Planning for all key Public Offices;
 - (b) Simulation Planning, Tabletop Exercises, Mock Drills & Joint Exercises;
 - (c) Setting up and strengthening of Partnerships and Coordination Platforms with NGOs/ CSOs.
- **Disaster Databases:**
 - (i) Development and maintenance of databases on Hazard, Vulnerability and Exposure from local to national level based on various aspects of disasters: mortality, damage, loss, and disaster assistance

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- (ii) Maintenance of national online databases such as India Disaster Resource Network (IDRN) and National Disaster Management Information system (NDMIS)
 - (iii) GIS-based Decision Support Systems, related to disasters.



- **Capacity Building Trainings:**

- (i) Training Government functionaries, PRIs, Urban Local Bodies, Public Representatives and Experts in Disaster Management
 - (ii) Training for developing community based Disaster Risk Reduction (DRR) systems for their specific needs in view of the regional diversities and multi-hazard vulnerabilities
 - (iii) Training to increase capacity for local risk and vulnerability analysis.
 - (iv) Training Police/ Civil Defence/ Home Guards/ NSS/ NCC /NYKS / Bharat Scouts & Guide in Disaster Management
 - (v) Skill Development – training of masons and other artisans for disaster resilient construction and retrofitting
 - (vi) Training on CBDRR and preparedness at local levels
 - (vii) Training and sensitization programmes at different levels of governance
 - (viii) Training and sensitization programmes for health care workers, youth organizations, school children, etc
 - (ix) Training Community Volunteers as First Responders and Capacity-building Support to Local Governments and Communities
 - (x) Trainings to Assessment teams
 - (xi) Training for psycho-social support for the disaster-affected people as well as frontline
 - (xii) Awareness Generation and development of IEC material
 - (xiii) Awareness generation and Information, Education and Communication activities to support disaster management
 - (xiv) Website development of dissemination of awareness generation and IEC activities
 - (xv) Curriculum development for schools and educational institutions
-

OBJECTIVE 1

- Reduce the effect of the disaster.

ACTION	ASSIGNED TO	END DATE
Orient employees about the plan to ensure awareness	DDMA Resource Person	December 30, 2026
Minimize service interruption after a disaster occurs.	DDMA Resource Person	December 30, 2026

OBJECTIVE 2

- Ensure rapid response and recovery of computer data after a catastrophic event.

ACTION	ASSIGNED TO	END DATE
Assess and repair the damage and activate the repaired computer center.	DDMA Resource Person	March, 2026
Conduct a drill with the IT personnel to ensure preparedness.	DDMA Resource Person	March, 2026



SDMF PROJECT MASTER PLAN UNDER DDMA KHAGARIA.

SPECIFICATIONS:-

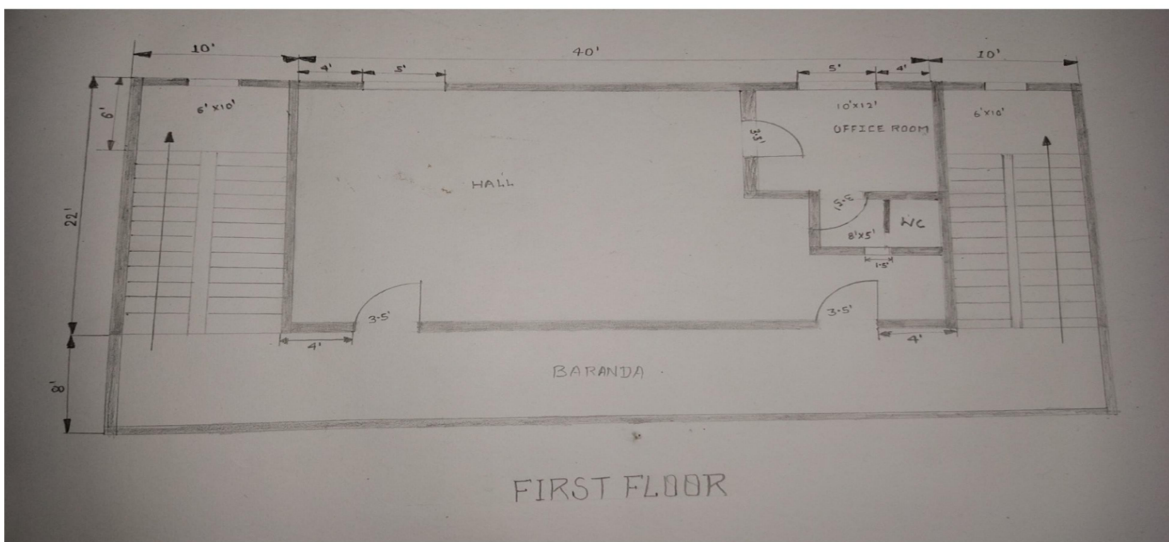
SNO	Item Parameters	Qty	Est.Amount	location	Remarks
01	CATC(Community,Awareness, Training Center-co-shelter) Khagaria	07	35000000	All 07 blocks of Khagaria Dist.	Refer Para2.1
02	Rescue Operation cum Training Center HTRC	02	240000000	Rahimpur South(Block-Khagaria)& Anandpur Maran (Allauli)	Refer Para2.2
03	Boat of Hope(Emergency Hospital)	07	8400000	All 07 blocks of Khagaria Dist.	Refer Para2.3
04	Community Kitchen on Boat	07	8400000	All 07 blocks of Khagaria Dist.	Refer Para2.4
05	Boat of searching ,information & Patrolling	07	10500000	All 07 blocks of Khagaria Dist.	Refer Para2.5
06	Rescue Boat	07	5600000	All 07 blocks of Khagaria Dist.	Refer Para2.6
07	Hospital On Van	05	25000000	Khagaria Dist	Refer Para2.7
08.	Trauma Center	01	50000000	Khagaria Dist	Refer Para2.8
09.	Sadar hospital Fire Safety System	01	6000000	Khagaria District.	Refer Para2.9
10.	Safety tower Grid of Vajrapaat	200	10000000	All 07 blocks of Khagaria Dist	Refer Para2.10
11.	DDMA/DMD Office & Emergency response centre	01	25000000	Khagaria District.	Refer Para2.11
12.	Emergency Operational Vehicle	02	3000000	All 07 blocks of Khagaria Dist	Refer Para2.12

	Total:-	426900000		
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- ❖ **Estimated Project Cost: 426900000.00**
- ❖ **Forty two crore Sixty nine lakh's only.**

CATC(Community,Awareness, Training Center-cum-shelter site)

The CAT-C-cum-shelter site is envisaged with the establishment of training-cum-shelter site in full flood affected panchayats. Where it will be established in the school premises, training / sensitization of the community (especially children, women, elderly, volunteers, PRIs etc.) will be done in this training center, this training center will be sheltered at the time of flood. will also work as



SHELTER/TRAINING AND RESEARCH CENTER (HAVEN, TRAINING AND RESEARCH CENTRE) HTRC

Khagaria is a flood affected district, which has its own identity due to seven rivers (Ganga, Budhi Gandak, Bagmati, Kamala, Kareh, Koshi, Kali koshi) which also gives it a geographical uniqueness because human beings learn from nature and adapt to it. It's the law of life.

Apart from being a high level training and research center, HTRC will also serve as a temporary shelter and flood pilot training site. For its construction, it is appropriate to establish Anandpur Maran (Alauli) Koshi Belt and in Diara area Rahimpur Dakshin (Khagaria Zone) Will stay Because Rahimpur Dakshin is a panchayat completely affected by Ganga and Budhi Gandak, where human life gets disturbed due to floods, due to which there is also a need for high level study on flood management.

This is a temporary refuge in the time of flood. Highland (fort) with an area of 600x500x6, which will be built from the river bed, deposited sand and will be protected from geobags and side plantation, on the banks of this highland, 5 cement seats / tin shed and camp office. , Training site, Temporary kitchen, Water tank, Toilets, Police post, Agriculture, Animal husbandry, SDRF/NDRF, FCD Office, Emergency Hospital, Provision has been made for water movement. CCTV/Drone and Rescue Boat will be tagged. A helipad has been arranged to deal with adverse situations, in which people can be rescued even in the event of severe floods with the help of NDRF.

It has often been seen that due to the rural economy, animal love is emotional in flood affected people towards animals as well as being part of the economy, due to this they are not able to leave the animals, so a high road is also proposed along with a temporary shelter. Which will also act as a temporary shelter for the animals, the Animal Husbandry Department will look after the disease and fodder arrangements of the animals.

Capacity building will be done for training boat owners, sailors, volunteers, NCC, NSS, PRIS's/ULV's representatives as well as administrative officers as training sites.

On the other hand, it is proposed to set up high level HTRC in Anandpur Maran Panchayat, a remote area under the influence of Kamla, Kareh, Koshi, which will manage the nature, flow, erosion of Koshi river as well as provide easy livelihood for the people living in that area. A study will also be done on how the means and transport system can be made high level, what are the possibilities of agricultural development in the flood affected area.

Both these centers will work as temporary housing with basic services at the time of flood, people trapped in the flood will be kept here. Arrangements will be made for accommodation and food for two thousand people each in both the refuge places, cleanliness toilets, bathroom, kitchen, water tank and high level arrangement of lighting will be done. Education will also be provided to the children of the flood affected families, all the necessary services including health care will be available 24x7.

As a training site on normal days, there will be a system of residential training of two hundred people in both HTRCs, in which understanding of floods, methods of rescue of flood affected people, challenges and solutions will be based on this training work with the cooperation of Nini Patna, DMI Patna and It will be conducted under the direction of

BSDMA/DMD Patna. In future it will also be developed as a high level Flood Management Center Diploma Course.

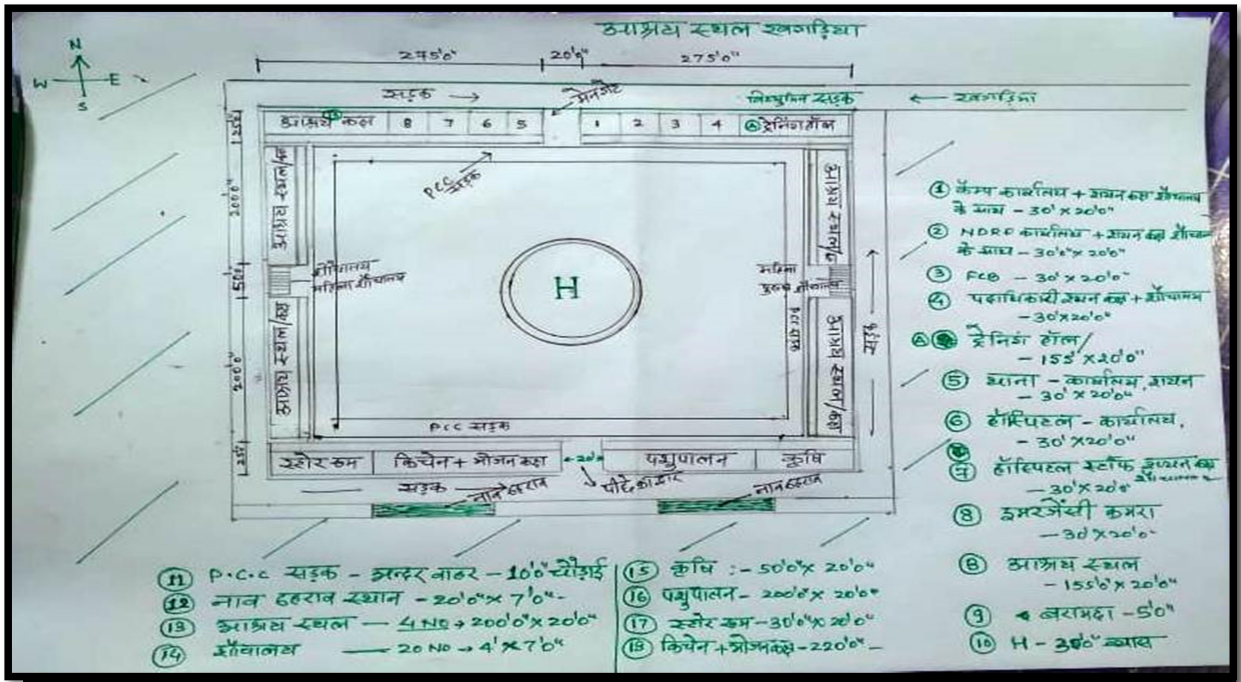
HTRC center management and operation will be done under the direction of District Disaster Management Authority Khagaria, District Magistrate will act as Chairman, Co-Director while the officer nominated by DDMA will act as Assistant Director.

The Assistant Director will be responsible for the entire arrangement of training and research and the budget provision will be made from the capacity building item received by DMD.

The map and map of the above project is attached. In which all the arrangements are clearly shown.

LAY OUT PLAN OF HTRC

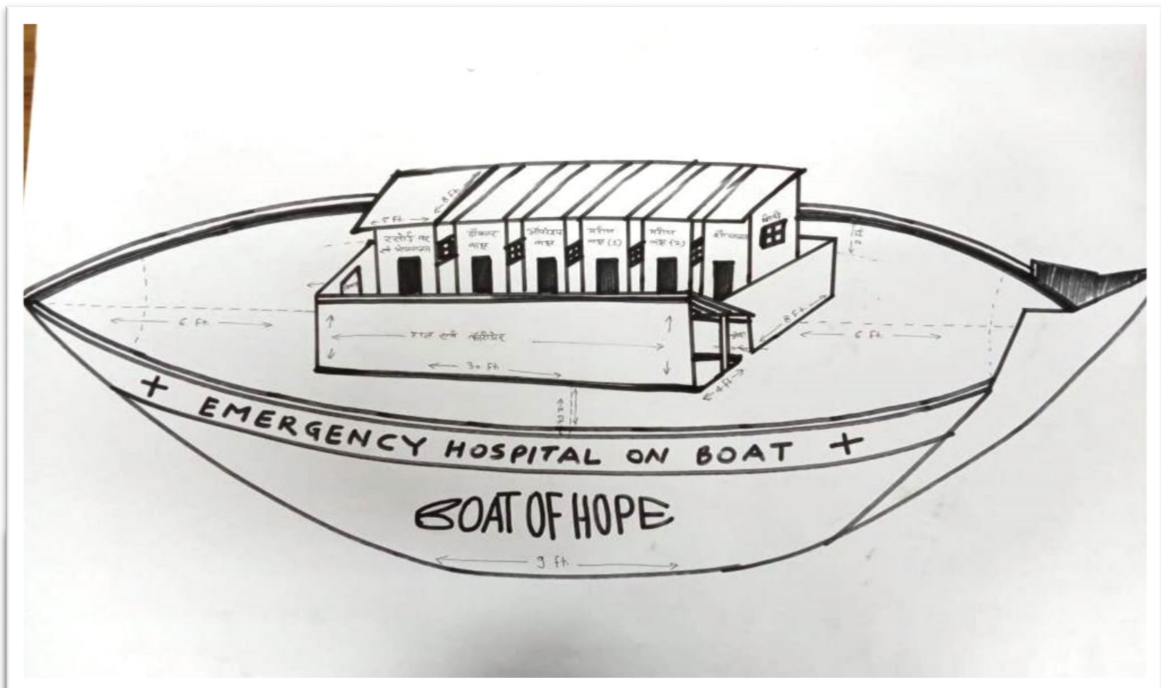
Pictorial TOP View of HTRC



Refer Para 2.2

Boat Of Hope (Emergency Hospital)

People life is badly affected in flood prone and diyara areas where access to health system is not less than a challenge. There is a danger to the lives of pregnant women in the flood-affected areas. For that, there are proposals of Boat of Hope (Emergency Hospital), Which will not only provide better healthcare in the flood affected area but will prove to be a milestone in the direction of reducing maternal mortality and child mortality as per the requirement of Sendai Framework. It will be built on a boat and will function as a mobile hospital.

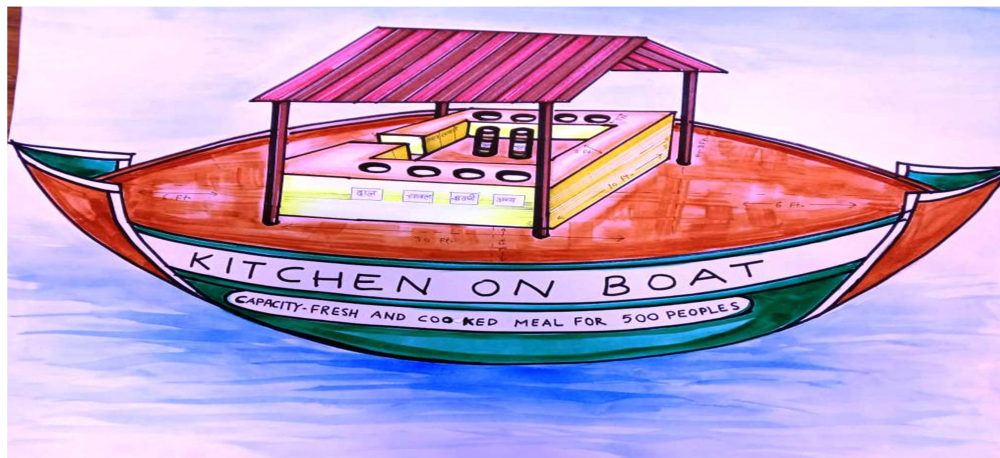


Refer Para2.3

COMMUNITY KITCHEN ON BOAT

In the flood-prone and Diara areas, people have problems with food and drink. There are such low-lying areas where people cannot leave their homes. People living in such marked flood prone and diara areas where it is not possible to run a community kitchen. For there, the kitchen will be arranged on the boat itself. Due to which the flood affected people

can be provided fresh and cooked food (fresh and cooked meal) for 500 people on the boat itself. There is a decline in the nutritional level of the children due to the flood affected and water submerged everywhere in the Diara areas for months.

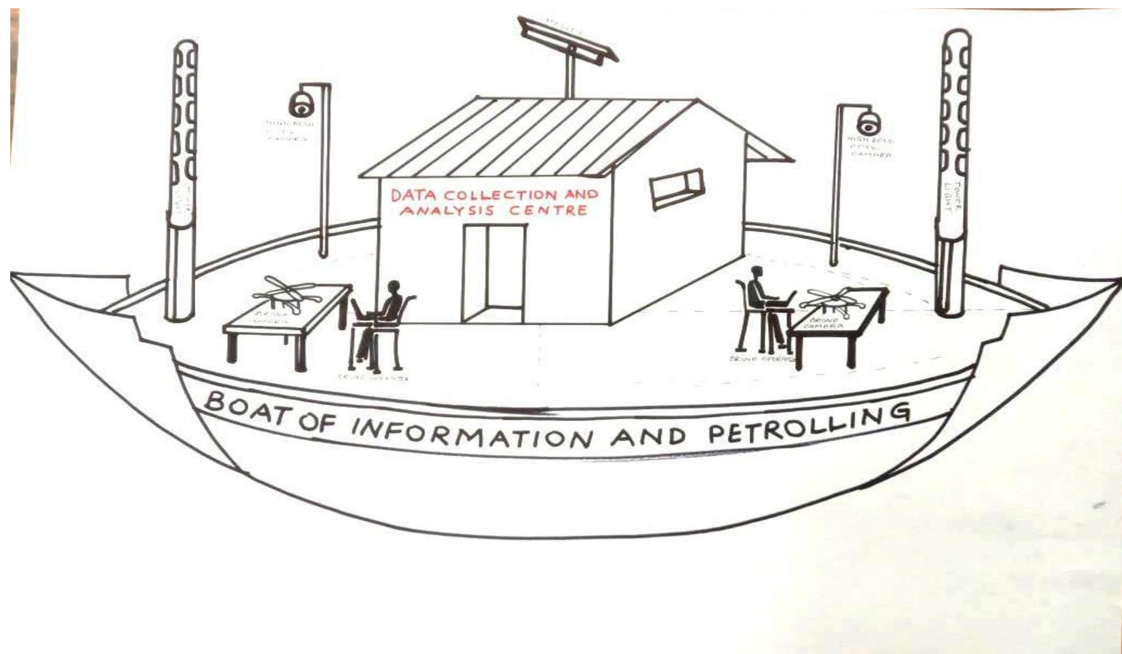


Refer Para2.4

Boat of Information and Patrolling

Khagaria is known as a flood-affected district, which is known due to the impact of seven rivers and the special geographical structure, at the time of flood, people's life is affected on a large scale, there is also a danger of life and property lives. Due to the sudden rise in water level, it is a challenging task for the administration to transport the people to a safe place. The editing of this work is done in coordination with the available resources, in such a way that boat of information and patrolling is proposed. Which will not only act as a patrolling boat in the flood-prone areas, but will also do high-level photography/data collection and communication with the help of drones and CCTV cameras, along with disseminating warnings and paving the way for people to go to a safe place Will do.





HOSPITAL ON VAN

This concept Hospital on van service is proposed to ensure access to accessible health services to the people in road accident and remote backward areas where maternal and child mortality is high. In view of the frequency of road accidents in Khagaria, Maheshkhunt Chauraha (Junction Point) Gogri, Karua Mor Chauraha (Junction Point) Chautham, Satish Nagar Chauraha (Junction Point) Parbatta, are considered susceptible, three proposed Hospitals on Van for these three Red Zone areas. In the event of any kind of accident in the 15 km area around it, the service of better treatment will be given within the golden hour time limit.

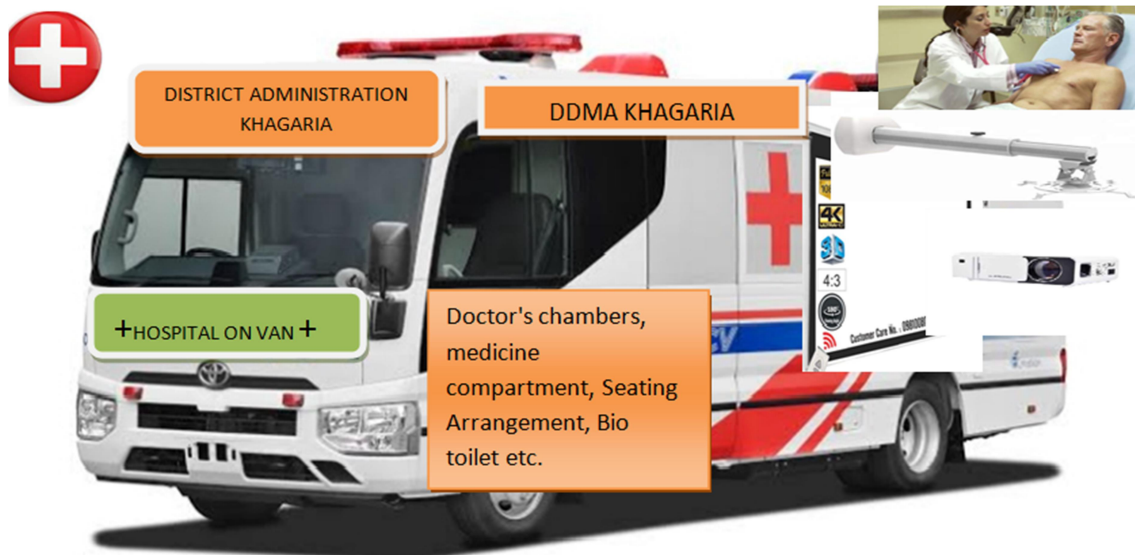
Maternity vans are proposed for the treatment of pregnant women, children etc. in backward and remote areas of Khagaria district where there is lack of health services and

maternal and child mortality is high. It will function as a mobile hospital with all modern facilities, in which the facility of safe delivery will also be available.

The operation of all these vans will be done by Civil Surgeon Khagaria in coordination with DDMA, the operational expenses will be the responsibility of the civil surgeon, disaster department and the arrangement of medicines and doctors, staff, nurses, etc., operation of all vans, monitoring, information gathering and The communication will be done by the District Health Control Room under the direction of DDMA as per the roster.

Other features- Hospital vans will be made specially in coordination with companies based on Japan and Korean technology, in which there will be arrangement of doctors chambers, medicine compartment, seating arrangement, Bio toilet etc. There will be a high level system of treatment and surgery, this van will be equipped with a special type of projector and the side wall will be used as a projector screen, so that the documentary publicity related to health and accident will also Provide. All facilities of tele-medicine will also be available in the van. All these facilities will also be available in Maternity and Child Van. They can also be used as OPD vans in the area at the time of seasonal diseases, virus fungus, causative diseases, as well as in case of major road accident or train accident or earthquake, all the hospital vans will work in an integrated manner under the direction of DDMA.

To conclude, the concept of Hospital on Van will prove to be a milestone in providing high quality healthcare and reducing the death rate In Khagaria.



KEJER PARAZ. /

Trauma Center

Khagaria district is also the transit area of NH-31 and NH-107 along with the influence area of seven rivers. The district is prone to various diseases as well as road accidents, it is proposed to set up a Trauma Center at Rahimpur North on NH-31. Because there is not a single trauma center in Khagaria. Rahimpur North which is situated on the bank of NH-31 and suitable for road connectivity and transit. Therefore, in view of the need of a trauma center, it is proposed. So that road accidents and other serious diseases occurring in Khagaria district and surrounding areas can be treated.



Imaginary Diagram

Trauma Centre
KHAGARIA

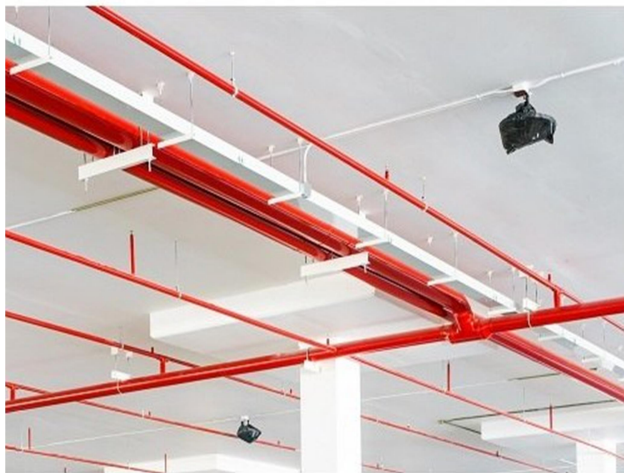
Refer Para2.8

Hospital Fire Safety System

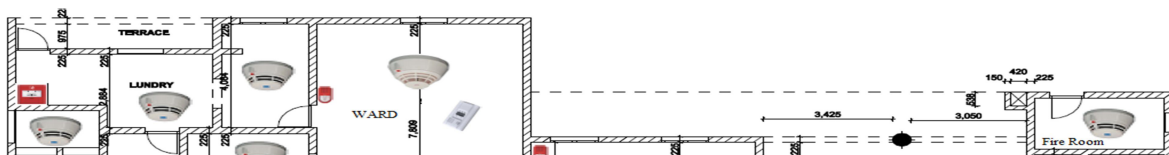
Sadar Hospital Khagaria is running 100 bedded, where there is a system of admission of patients, as well as OPD patients are also seen according to the roster. Oxygen plant is also installed in the hospital for oxygen supply.

Due to all the above reasons, Sadar Hospital comes in the vulnerable category from the point of view of fire safety. Therefore a three-tier fire safety system is proposed for Sadar Hospital Khagaria. Where the hospital will be equipped with three types of pipe mesh. Which will be based on self operated technology. In case of fire, fire can be extinguished by water and gas with the help of automatic machines. There will also be a facility to take out the smoke or dangerous gas carbon monoxide etc. in the said process by adjusting system.

So that people can also be saved from deaths due to suffocation. A large size monitoring hall and office will also be built in it. Which will also be equipped with CCTV and monitoring of the entire hospital will be done from this safe room. Where all necessary fire equipment will also be kept.



Refer Para2.9



Refer Para2.9

Imaginary Diagram of fire safety system

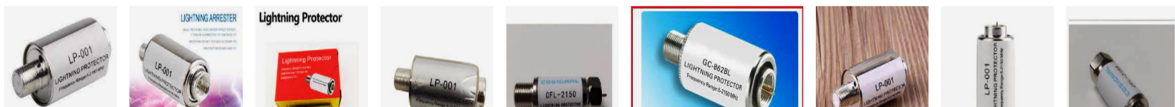
Lightning/Thanka

Khagaria district is considered a vulnerable district from the point of view of thunderbolt/thanka. Where in the last two years, 5 people, 6 animals died and 11 people were injured due to thunderstorms.

It is proposed to set up Lightning Conductor on tall towers/buildings in coordination with various public/private institutions in Khagaria district to deal with thunderstorms/thankas, which will help people by absorbing thunderstorms/thankas for maximum distance. Will prove useful in saving life and property. There is a need to install 200 such device sets with neutral grid for Khagaria district. All these devices will be installed in mobile towers, power towers, high public/private buildings/schools etc.



Imaginary Photo of Building, Tower's & Devices



Refer Para2.11

DDMA/DMD Office & District Emergency response centre.

The natural and local nature of Khagaria district is considered vulnerable according to the disaster category.

In case of disaster, information gathering and dissemination is a challenging task. The community is the first responder to any event. It needs to be integrated with the latest technology to ensure that the District Emergency response centre which is regulate by DDMA/DMD Khagaria reaches the community.

In the District Emergency Responce Center and DDMA Office, it is proposed for the necessary institutions for information collection, updating, and transmission such as CCTV, LED, Computer, Drone, TV, PC and basic needs etc., so that the District Emergency Responce Center works 24x7 continuously during disaster flood drought virous diseases as example COVID-19 etc, And exchange of information from community level to national level can be done in minimum time frame.



Imaginary Photo of DERC

Refer Para2.12

Emergency Vehicle

The District Disaster Management Authority requires an emergency vehicle. In case of any disaster, the district administration has to respond quickly. Necessary action has to be ensured to reach the spot of incident in minimum time. For this work one vehicle is proposed for authority and one loader vehicle is proposed.



Conclusion

In the light of the Sendai Framework for Disaster Risk Reduction and DRR-2020-30, most of the deaths in Khagaria district are due to drowning. After that, most of the road accidents have resulted in loss of life, maternal mortality rate and child mortality rate comes in third and fourth place. People's lives have also been lost due to thunderbolt/thanka.

All these proposals/action plans have been prepared on the basis of observation/analysis of disaster-related incidents in Khagaria district, which will prove to be a milestone in the field of disaster risk reduction for Khagaria district. Therefore, on the basis of the intention of the Disaster Management Department, Patna, please accept the proposals used.

