



# City Resilience Road Map

## Saharsa 2030



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# List of Abbreviations

GEAG	:	Gorakhpur Environmental Action Group
DRR	:	Disaster Risk Reduction
ACCCRN	:	Asian Cities Climate Change Resilience Network
SAPCC	:	State Action Plan on Climate Change
O&M	:	Operations and Maintenance
WASH	:	Water, Sanitation and Hygiene
DFID	:	Department of International Development, UK
TCPO	:	Town and Country Planning Organisation

# 1 Introduction

Climate change and disaster risk reduction are increasingly being adopted in the larger policies and programs of the Government of India. The Smart cities guidelines<sup>1</sup> mention climate resilience while some of the winning cities in the Smart Cities competition have highlighted their plans and actions for building resilience to climate change and disasters. Given the rapid pace of city development in India and the fact that most of the urbanization is taking place in small and medium towns it is pertinent to look at the institutional setup within these towns and revise the norms, regulations, planning mechanisms, institutional arrangements and even policies to regulate and channelize development of these towns. The Saharsa Town<sup>2</sup> Road Map for resilience is a case in time that not only highlights problems faced by the urban population from similar cities but also attempts to address urban pressures and lack of planning and implementation in towns in India. Since most of the infrastructure of future will be built in these cities it is all the more important that resilience is introduced and practiced as a norm.

This roadmap draws from the previous work carried out by GEAG<sup>3</sup> in association with Nav Jagriti where climate vulnerability analysis(2014, Navjagriti and GEAG)<sup>4</sup> was conducted and a city resilience strategy<sup>5</sup> was drawn up. The project is part of the Rockefeller Foundation Asian Cities Climate Change Resilience Network(ACCCRN )<sup>6</sup> and adds to some 30 cities where this initiative was taken up in India.

The broad objective of this roadmap is to direct action towards the implementation and adoption of the Saharsa resilience strategy and draw up a Vision for the city for 2030. The roadmap draws extensive linkages from the Bihar DRR roadmap and the Bihar State Action Plan on Climate Change ( 2015, BSAPCC)<sup>7</sup>. The roadmap will also act as a lighthouse for other towns in Bihar and will help other cities align their city plans with the Bihar DRR road map and the State Action Plan on Climate Change.

1 <http://smartcities.gov.in/writereaddata/SmartCityGuidelines.pdf>; The Smart Cities Guidelines were released at the time of the launch of the Smart Cities Mission by the Ministry of Urban Development, Government of India. The guidelines draw up the entire scheme in detail and present the vision, intent and mechanisms under the Smart Cities

2 Saharsa town is the district HQ and it is also the Kosi Commissioner's HQ comprising of the districts of Madhepura, Supaul and Saharsa. The city of Saharsa is spread over an area of 21.13 sq. km. and has a population of 1,55,175 (2011 Census).

3 <http://geagindia.org/content/about-us.aspx> established in the year 1975, GEAG- Gorakhpur Environmental Action Group is an NGO that undertakes development initiatives to impact positively the lives of the poor, deprived and marginalized sections of the society through a people-centred approach focusing on their participation, awareness and empowerment for sustainable development.

4 2014. "A report on vulnerability Assessment of Saharsa Town". Navjagriti and Gorakhpur Environment Action Group.

5 2014. "Resilience Plan for Saharsa." Gorakhpur Environment Action Group.

6 <https://www.rockefellerfoundation.org/our-work/initiatives/asian-cities-climate-change-resilience-network> Asian Cities Climate Change Resilience Network (ACCCRN ) was launched by the Rockefeller Foundation in the year 2008 with a view to help cities strengthen their capacity to prepare for, withstand, and recover from the projected impacts of climate change.

7 2015. Bihar Action Plan for Climate Change, "Government of Bihar. [http://www.moef.gov.in/sites/default/files/BiharState%20Action%20Plan%20on%20Climate%20Change%20\(2\).pdf](http://www.moef.gov.in/sites/default/files/BiharState%20Action%20Plan%20on%20Climate%20Change%20(2).pdf)

# 2 Saharsa City

Saharsa district of Bihar State is the district Head Quarter. It is also Kosi Commissioner's Head Quarter comprising of the districts of Madhepura, Supaul and Saharsa. Spread over an area of 21.13 sq. km. and a population of 1,55,175 (2011 Census), the city is located 240 km north-east of Patna, the State capital of Bihar. It has direct rail-link with Kolkata and Delhi and National Highway 107 passes through Saharsa town.

Like most of the medium towns of India, Saharsa is dealing with double pressure of urbanization and poor capacity of the city administration and a crackling almost non-existent infrastructure that can support a growing city and its population (2014, GEAG)<sup>8</sup>. The unique geographical location of the town poses additional pressure. It is located along the bank of Kosi river that is prone to regular flooding and has changed its course several times. Climate change will not only have impact on the city's liveability but will also have direct bearing on the infrastructure and services and city planning strategies in the coming future.

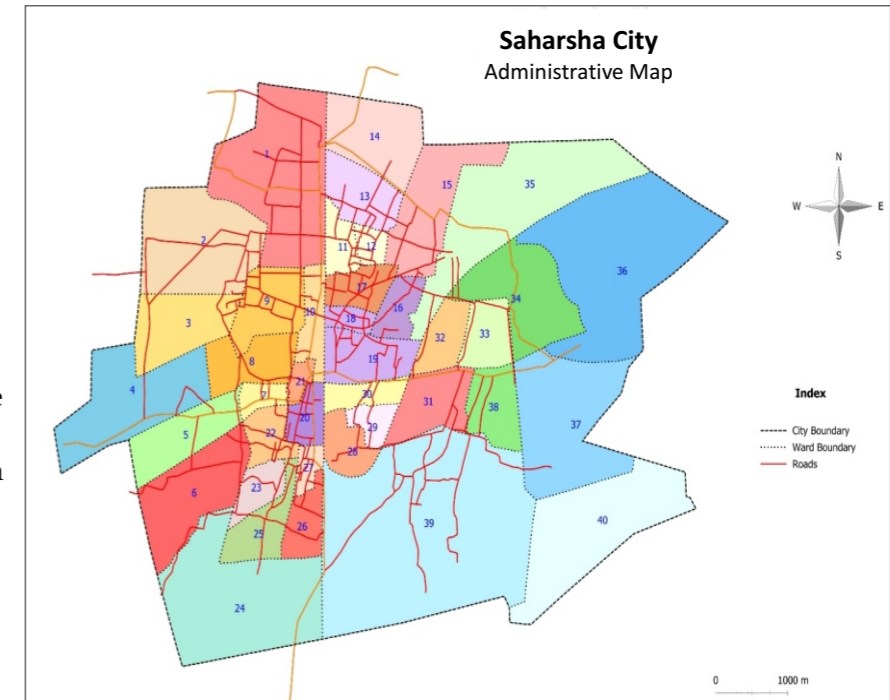
## 2.1 Urban hazards

Urban hazards are defined as problems and situations that can be directly attributed to poor planning and upkeep of infrastructure, lack of investment in basic services and problems emanating from poor planning and lack of enforcement of regulations and norms. These in turn have a close bearing on the scale at which a climate related event will hit a city or the impact in absolute

measures. The city of Saharsa grapples with acute infrastructure deficit:

- 1. Drainage :** 50 % of the city is devoid of drainage. Where there are drains, they are open, clogged and pose health hazards as they become breeding grounds to mosquito and harmful bacteria.
- 2. Solid waste management :** Lack of solid waste management and poor waste disposal and collection practices lead to advent of diseases, dirty sites and water logging or prolonged periods sometimes ranging from 3-4 months. The sewerage system, sanitation and solid waste management are very poor and Saharsa emerges as one of the poorer cities on these services. Lack of staff, lack of adequate O&M budget, and similar other institutional problems undermine the proper development of this critical sector.
- 3. Water quality :** About 90-95% of the city is dependent on the hand pumps for drinking water, the rest being served by the packed water containers. The quality of water though is a concern due to bad sanitation practices and non-existent faecal management system at place. The Soak pit led faecal management leads to infiltration and contamination of ground

water. The Bihar State Action Plan for Climate Change also highlights the poor state of basic services in the urban areas of the state. Saharsa has been mentioned as one of those cities that fare badly on all three water related national as well as state level standards(2015, BSAPCC)<sup>9</sup>.



## 4. Migration and poverty

The migration levels to the city are very high; particularly from adjoining rural areas in search of livelihood and also students because of large number of coaching institutes coming up in the town. Saharsa is the hub for entire kosi basin .It is the only city which is connected with railway from other parts of the country and huge number of poor people migrate in search of livelihood in Gujrat, Punjab etc. About 41% of the population lives in slums and 32% of the population is living below poverty line(2014, GEAG)<sup>10</sup>. These are the worst affected in the advent of a disaster or extreme climate event like heavy rainfall and floods.

- 5. Air and Noise pollution**
- 6. Problems related to Transport**
- 7. Ecosystem and environment degradation**

## 2.2 Climate hazards

The results revealed that Significant wide warming in both maximum and

minimum temperatures over the last century<sup>11</sup>. However, the changes are not equal for all the months and season spatially and temporally. Trend in temperatures showed a much higher degree of spatial coherence and statistically significant warming, reflecting increases in both maximum and minimum temperatures. Though rainfall trend is not significant in all the seasons, where as there is spatially coherent decrease in annual rainfall, particularly in monsoon and winter season is a cause of worry. Saharsa is one of the 5 most severely flood affected districts of Bihar out of the total of 27 districts that are affected by floods every year. Almost 70% of the Saharsa district is said to be affected by floods(2015, BSAPCC)).

The problem of floods is said to be aggravating over the years mainly because of encroachment on flood plains and deforestation in upper catchment areas of Kosi basin.

8 2014. "Resilience Plan for Saharsa." Gorakhpur Environment Action Group.

9 2015. "Bihar Action Plan for Climate Change," Government of Bihar. [http://www.moef.gov.in/sites/default/files/BiharState%20Action%20Plan%20on%20Climate%20Change%20\(2\).pdf](http://www.moef.gov.in/sites/default/files/BiharState%20Action%20Plan%20on%20Climate%20Change%20(2).pdf)

10 2014. "Resilience Plan for Saharsa." Gorakhpur Environment Action Group.

11 2014. "Resilience Plan for Saharsa." Gorakhpur Environment Action Group.

# 3

## City Resilience Strategy's Highlights

Since the city is under lot of pressure due to urbanization and climate change is poised to add to these challenges, it seems to be pertinent to look at and address one of the current urban problems of the city and as a next step pursue future climate proofing of the city in terms of planning and infrastructure design and provision. The city resilience strategy outlines critical sectors for addressing resilience of the Saharsa town, these being;

### A. Drainage Channelization and Solid Waste Management

The city highlights the need for implementation of a solid waste management plan for the city. Specific road and Landfill site allocation for waste disposal are required and identification of designated serviced spaces for vendors and informal markets are required.

### B. Basic Services

There is gross need for the development of basic service provision in the town in terms of proper sanitation facilities, hygiene and safe and quality drinking water. The vulnerability assessment highlights that there is no dearth of water as a resource but clean and safe drinking water is an issue in the town, the Bihar SAPCC highlights that most of the cities in Bihar do not have piped water supply because of the long distance channels that have to be created to bring Ganga Water/ River water to these towns. Saharsa town also depends on ground water. However, as per the SAPCC, the ground water is

contaminated due to fluoride and arsenic contamination and also due to bad and non-existent sanitation facilities leachate leads to contamination of ground water. Also, growing urban population and resultant demand on water resource will soon render the ground water depleted and hence there is a dire need to consider water conservation.

### C. Housing

As highlighted in the vulnerability analysis report and the city resilience strategy, great percentage of the city lives in slums. There is growing demand for housing and particular attention to the urban poor for shelter and basic services. Also, due to perpetual problem of floods, there is a need for proper design and planning of housing and habitation pattern.

### D. Industries and Economy

The city resilience strategy highlights the need for planned Industrial development to achieve pollution free environment, safe work places for household-based livelihood activities and adequate and good quality housing for industrial workers.

### E. Health

Since the problem of floods, water logging and lack of drainage and solid waste management system poses health risks and epidemics, the resilience strategy highlights augmentation of quality and affordable health services while also deploying

preventive health and health surveillance mechanisms

### F. Energy/ Electric Town

Continuous supply of electricity is an issue in the city, theft, illegal connections and no service provisions in the slums leads to many underlying problems some of which are the effect on education and livelihoods of the poor people. Particularly during monsoon, this causes a lot of problems. Considering the growing demand for electricity, there is also a need for exploring use of alternate energy like solar energy.

### G. Transport

The vulnerability analysis and the resilience strategy document highlight noise pollution, traffic congestion and air pollution as one of the menace in the city. This is atypical of medium sized cities in India and multiple reasons can be attributed to these problems like encroachment on roads, ill planned cities, mixed modes of transport, use of private vehicles and poor conditions of the vehicles. The cities do not have a

public transport system at place and fail to cater to the mobility needs of the citizens. Therefore, the effective transport mechanisms, proper traffic management, road design are required to ensure pollution free environment, and effective mobility in the town. Besides this, transport is one of the major sectors responsible for CO<sub>2</sub> emissions in the cities and hence, these measures will also lead to mitigating climate change and reducing pollution.

### H. Ecosystems

The resilience strategy highlights conservation of public land and water bodies.

Besides the critical sectors, the strategy calls for necessary capacity building of the town government functionaries and technical assistance for implementation of the resilience strategy.

# 4

## Saharsa Road Map in the Context of the State Action Plan on Climate Change and DRR Road Map

The Bihar Disaster Risk reduction roadmap, identifies different components of resilience. Some of the important components identified and elaborated upon in the Bihar DRR that are relevant to the city level resilience road map are:

- i. Critical infrastructure and services
- ii. Resilient livelihood
- iii. Resilient cities

### 4.1 Critical infrastructure and services

The Bihar DRR, covers each of these in detail and provides suggestions on institutional support and mechanisms required to achieve the same. The infrastructure identified as critical in the Bihar DRR are

Telecommunications, Roads and Bridges, dams embankments and reservoirs, transport systems, energy and power, industries and natural ecosystems. Similarly, the services identified are WASH (Water, Sanitation and Hygiene) and Waste Management, Food and Nutrition, health, education, housing, safety security and protection and emergency support functions.

Each of these infrastructure and services are governed and managed by state level entities which is highlighted within the DRR. The Saharsa road map has to align with these infrastructures and the services at the level of the town and have additional infrastructure and services within the roadmap to bring

on a city level road map for resilience. The functional continuity and the restoration of critical services and infrastructure is important for resilience. This will entail both structural and non-structural measures including building better, regular maintenance as well as capacity building (2015, Bihar DRR). Besides this identification and demarcation and maintaining a data base of these infrastructure assets is critical in building resilience. Risk informed planning and capacity to respond in an integrated and coordinated fashion is an essential pre requisite to ensure infrastructure continuity after a disaster (2015, BIHAR DRR).

### 4.2 Resilient livelihoods

The Bihar DRR highlights planning for risk-informed livelihood choices for various sectors. For urban areas, where most of the urban poor and low income groups are engaged in informal activities, livelihood options and diverse source of income generation would ensure minimising the impacts of a disaster or an event driven by extreme climate. It is also essential that Government is able to provide the capacities and opportunities to access various livelihood options, financial products, and markets to help diversify income generation. It calls for support from the Government on timely availability and access to raw materials/inputs,

technologies, financial inclusion and means for quick recovery. While the state DRR highlights the safe guarding of marginalised groups and includes the landless and women, at the level of the city it will be about inclusion in Government schemes and employment generation schemes. Urban poor and people living in the slums, migrants engaged in the informal sector will have to be identified and brought in the mainstream.

Relevant departments that would be critically involved in the livelihood resilience for a city system as defined by the Bihar DRR will include Water Resources, Urban Development, and Small and Medium Industries Departments.

The Saharsa roadmap has to include inclusive planning and should provide an action plan for livelihood restoration and where the people of the city have no means of livelihood, provide support to mainstream this population in productive engagement.

### 4.3 Resilient Cities

Some of the key points that the BIHAR DRR highlights include ward level resilience planning and integration of Disaster Risk Reduction measures into the city development plans. It also calls for a vibrant community led system that helps build the resilience. Land zoning and urban planning that considers ecosystem as well as the natural drainage and geo-morphological patterns of the cities. The resilient city should also have well

developed early warning systems and access to safety, health and other services during a disaster. The Government of Bihar is poised to engage with UN on Resilient Bihar program where between the year 2015-16 and 2030, cities in Bihar will be developed in phased manner into resilient cities. A very detailed action plan involving all key Government agencies have been spelt out in the Bihar DRR which has important bearing on the Saharsa Road Map. The Government of Bihar had prepared City Development Plans for 28 cities in Bihar, including Saharsa town under the DFID supported program on "Support Program for Urban Reforms in Bihar".

The City Development Plan for Saharsa(2010, CDP)<sup>12</sup> prepared by the Urban Development and Housing Department, State Government of Bihar is prepared for the time line of 2010-2030 and well coincides with the Roadmap's time line. It is therefore, necessary that the Saharsa Road Map is integrated with the City Development Plan and implemented by building climate resilience parameters to the infrastructure planned for the city.

<sup>12</sup> 2010. "City Development Plan(2010-2030) SAHARSA", Urban Development and Housing Department, Government of Bihar. <https://drive.google.com/file/d/0B8mmUAWHlF-NGEITeHkMnhQdWc/view>

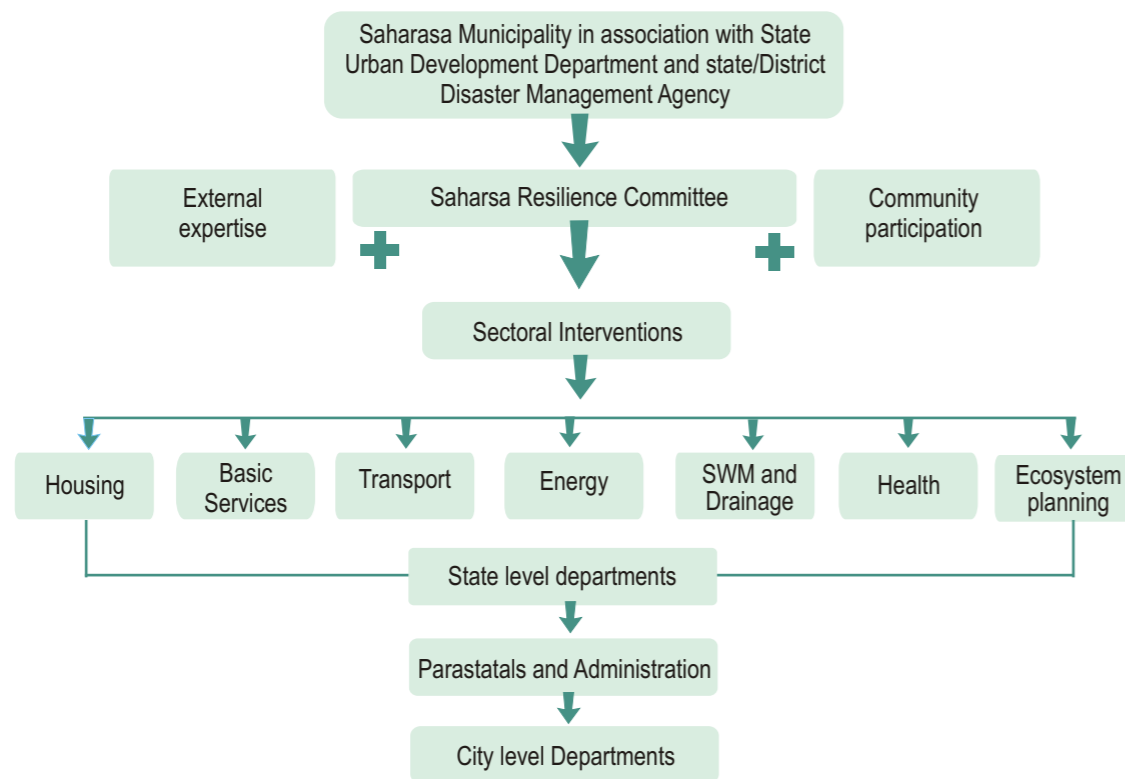
# 5 Saharsa Road Map 2030

The road map for Saharsa for 2030 should broadly take up an exercise of data management on the all the critical sectors spelt out in the Saharsa city resilience strategy. Overall on the lines of the Bihar DRR map and the SAPCC, a committee should be constituted in the city with representation from State level entities, community and city level departments that draws up detailed action plans and progress reporting mechanisms for the development and implementation of Saharsa Resilience strategy.

With what it seems, while there are many synergies with Bihar DRR and the objectives spelt out by the State Action Plan on Climate Change, the city of the size of Saharsa would not fall in the immediate priority of the State Government's plan for

resilience building. Therefore, financing of the resilience strategy has to be detailed out and implemented with support from the State Government.

Capacity constraints have to be addressed and proper planning mechanisms have to be put in place. Again like other cities in India who have planned for resilience, inter departmental coordination and jurisdictional confusions hamper the implementation of resilience plan. This can be addressed by involving representation and support from State Government at the highest level. The sector specific action points have been detailed out in the following sections and the overall proposed implementation mechanism is depicted in the following flowchart:



# 6 Action Points and Areas of Interventions (Sectors)

## 6.1 Housing

Housing Boards of the State Government are mainly responsible for the construction/ implementation of public residential schemes. Mostly the private construction industry, the real estate dealers are responsible for housing in cities. While the housing for poor has to be the states' responsibility, the housing for the middle income group and higher has been captured by the private construction companies. At both fronts, the effective implementation of housing standards, norms and regulations is required. There has to be strict adherence to regulations on encroachment, setbacks and building safety. Flood resistant housing construction and planning has to be adopted in the planning manuals of the

state, the programs for housing the poor in the city and made compulsory for all private and public designers/ architects and civil engineers to adhere to. Make it mandatory to carry out a 'Risk Impact Analysis' for the present and future housing projects.

The Bihar DRR suggests that the Urban Development Department of the state must develop a multi-hazard based checklist to assess the resilience of buildings and undertake a drive to assess all houses in Bihar using a mix of Rapid Visual Survey, Self-Assessment, as a part of Masons' Training, GP level risk analysis, and participatory exercises in partnership with Civil Society Organizations to determine the current status. The

Sector Action Plan : Housing

S.N.	Action	Timeline	Stakeholder
1	Risk and Impact analysis of housing stock of the city and preparation of a database	Short term	Saharsa municipality (Engineering Department)
2	Drawing up Disaster Resilience building norms and making them term implementing it strictly for building construction and design and also building permissions	Medium	State/District Disaster Management department and the Municipality of Saharsa
3	Integrating resilience parameters in the projects identified in the Saharsa CDP	Medium term	Municipality of Saharsa with interventions from urban development and housing department, state/district disaster department management department, respective departments within the SaharsaMunicipality like en gineering, health, water and sanitation.
4	Integrating resilience measures in the housing construction of Saharsa		Engineering department of the Saharsa Municipal Corporation, state urban development and housing department



urban local body in Saharsa could take up this task along with the State Nodal agency -The Bihar Housing Board or the Urban development and Housing Department. In Saharsa the Engineering Department of Saharsa Municipality is responsible for the construction of public buildings and government housing. The integration of resilience measures by the Saharsa municipality will be a first step towards resilient Saharsa. The following table provides inputs on sector specific actions, associated timelines and key stakeholders.

## 6.2 Basic Services

Since multiple agencies will be involved in the provision of basic services, a Committee could be constituted at the level of the Urban Local Body that draws up a plan for 'resilient basic services' for the city of Saharsa. This would also mean that individually the problems related to clean water supply, sanitation and drainage system augmentation and putting up a solid waste management system is taken up. Besides these health systems need to be augmented for catering to the population during a disaster event.

### Sector Action Plan : Basic Services

S.N.	Action	Timeline	Stakeholder
1	Augment basic service provision in the city at all levels	Medium term	Within Saharsa municipality- health department, sanitation department, engineering department, state urban development and housing department for financial and implementation support
2	Prepare a financing plan for the above	Medium term	Department of finance and accounts- Saharsa municipality association with urban development and housing department
3	A resilient basic service plan to be drawn up with monitorable milestones and action plans	Short term	Saharsa Municipality as per the provisions in the CDP and as required by the resilience strategy document

Financing the augmentation of current basic services has to be taken up at priority and the resilient basic services plan must elaborate on the section on finance, listing down all viable and possible solutions. Time lines and milestones to achieving the desired level of basic services has to be drawn up and monitored.

Bihar DRR suggests preparation of a Service Delivery Continuity Plan to better equip the city during disasters. However, for the city of Saharsa, where the current service delivery systems are weak, there has to be a plan for alternate source of water supply, electricity while paying concerted effort on augmentation of basic services.

## 6.3 Transport

Transport as problem and challenge to the city has two important aspects. One; augmentation of mobility in the city including traffic management and dealing with the problems of encroachment of roads and parking; and two, preparation of safe evacuation, road safety norms for the time when disaster has hit the district.

Road safety Audits as mandated in the Bihar DRR would be a good way to assess disaster preparedness of the Roads. Besides this proper traffic management and investment in traffic planning and traffic management devices and road construction. For example; proper zebra crossings, traffic lights and even construction of traffic circles has found to help in traffic management effectively.

For smaller roads, it is advisable to consider implementation parking restrictions/ parking planning besides conducting regular encroachment drives. Besides this augmenting the public transport system by introducing

clean vehicles like battery operated autos and introducing better buses along with planned routes and management will go a long way in curbing problems related to air pollution, noise pollution and giving the city higher scores on livability.

Transport plays an important role in disaster evacuation and response planning. At district level the transportation of people to safe places and to medical facilities is utmost important. Any infrastructure related to the provision of these services should be at place and ready before the onset of monsoon.

### Sector Action Plan : Transport

S.N.	Action	Timeline	Stakeholder
1	Gradual improvement in public transport system- buses and green vehicles like electric rickshaws and autos	Medium term	Saharsa municipality to plan and augment with financial aid under central government and state government grants.
2	Develop parking infrastructure	Medium term	Saharsa municipality to plan and augment with financial aid under Central Government and state Government grants.
3	Anti-encroachment drives and parking norms to be put in place	Immediate	Saharsa municipality in association with the Traffic Police department.
4	Developing traffic management infrastructure and road safety infrastructure	Medium	Saharsa municipality in association with State Transport Department
5	Prepare and conduct road safety audits for disaster management	Short to medium term	Saharsa municipality in association with the State/District Disaster Management department
6	Prepare and provide infrastructure for safe evacuation of people, transport of medical facilities and food to disaster affected areas	Short to medium term	Saharsa municipality in association with the State/District Disaster Management department

## 6.4 Solid Waste Management and Drainage

Substantial problems related to urban flooding are related to lack of solid waste management, and storm water drainage management in the urban areas. Due to the fact that most part of the built environment is covered with construction and most of the water catchment areas have been now converted into built up, there is a gross need for proper planning of drainage systems in the city of Saharsa. The city resilience strategy puts lot of importance to this infrastructure in the city.

The Bihar DRR lays importance of assessment of the natural drainage systems of the city and planning of drainage on the basis of this. It also suggests deputation plan for clearing of existing drainage and solid waste in urban areas before monsoon. Sewage treatment and water treatment plants are suggested to be installed and the treated waste to be integrated with the natural drainage system. Proper drainage development plans are suggested to be prepared and implemented.

### Sector Action Plan : Solid Waste Management and Drainage

S.N.	Action	Timeline	Stakeholder
1	Putting at place the Solid waste management plan in the city. Identification of a landfill site and installation of scientific disposal system is required.	Medium term	Follow MSW rules Saharsa municipality
2	Developing of a drainage plan for the city base on the natural drainage system of the city	Medium term	Saharsa municipality
3	Gradual augmentation of drainage systems and installation of sewage	Medium term	Saharsa municipality

Under the resilient cities program, the Bihar DRR suggests land zoning and urban planning in sync with the ecosystem as well as with the natural drainage and geo-morphological patterns.

## 6.5 Energy

Energy infrastructure is critical to resilience planning. As per the Bihar DRR and the SAPCC, the energy infrastructure mapping exercise will help ascertain fall out and plan better. On the basis of the mapping exercise, undertake corrective actions, including strengthening or relocation of power generation units, sub-stations, transformers, transmission towers, installation of towers in selected areas, reinforcing through specialized materials, underground cabling.

Also, given the high demand on energy, the city should look at using alternate sources of energy and may consider installing solar energy in the public buildings to start with and later facilitate solar based products like water heaters, street lighting etc.

### Sector Action Plan : Energy

S.N.	Action	Timeline	Stakeholder
1	Augment energy infrastructure such that it is constructed and located using safety norms.	Short to medium term	Bihar power company
2	Facilitate and mandate use of solar energy	Medium to long term	Bihar power company

## 6.6 Health

The city needs to urgently address the water logging problem. Not only is this a hazard for mobility, for buildings and to quality of life but poses serious health hazards. Also during floods, especially the children and the elderly fall prey to epidemic diseases. Affordable and quality health services are lacking in the city and they need to be augmented over a period of time. Also preventive health mechanisms have to be promoted and health surveillance systems have to be put in place.

Health and medical facilities during a disaster have to be augmented.

## 6.7 Ecosystem Planning

The city resilience strategy, the Bihar DRR both lay utmost importance to ecosystem based planning. For flood prone areas like Saharsa, the peri urban areas also play a major role in building resilience of the city as they can act as major buffers for the city. The peri urban areas provide major ecosystem services to the city and there is a dire need to conserve peri-urban areas around the city of Saharsa.

Besides this like most of the growing Indian cities, ecosystem damage and encroachment on water catchment areas has aggravated the problems of floods and every year with growing population and city development, the

### Sector Action Plan : Health

S.N.	Action	Timeline	Stakeholder
1	Augmenting existing health facilities	Medium term	State Health Department
2	Instituting a health surveillance system involving community participation has to be developed and implemented	Short term	State Health Department
3	Planning for health during a disaster has to be carried out by the city while preventive health mechanisms have to be promoted	Short to medium term	City Health department within the municipality with support from BSDMA

### Sector Action Plan : Ecosystem Planning

S.N.	Action	Timeline	Stakeholder
1	Peri urban conservation and resilience planning-ward level and city level	Short to medium term	State town and country planning department, Saharsa municipality with community participation and support
2	Integrating resilience planning in the land use planning and master planning exercise drawing from the city resilience strategy for Saharsa and the Bihar DRR plan	Medium term	State town and country planning department, Saharsa municipality
3	Ecosystem based planning that conserves major water bodies and water catchment areas		State water resource department/ irrigation department, state town and country planning department, Saharsa municipality with community participation and support

problem is becoming severe. The Resilient City Program of the Bihar Government a spelt out in the Bihar DRR, suggests ward level resilience planning. Also the land use planning

and master planning process has to bring in the resilience planning measure and integrate them in the overall planning process.

# 7 Conclusions

The road map for Saharsa city resilience envisages to be a lighthouse for other smaller cities. The size and scale of the city has an advantage because at this level the community coherence is much more pronounced within the cities and it is easier to gather citizen participation, interest and involvement in the affairs of the city. The relationship between city and community is easier to develop and regular communication can be maintained. With this, the Resilience roadmap gives utmost importance to community involvement in implementation and strategizing the roadmap for 2030. Community participation and voice in the planning mechanisms will also make sure that laws and mandates are developed and implemented.

However, there are challenges that the implementation of the roadmap will have to address. The main challenges and ways to address them will be:

A. Overall policy and institutional requirements for the implementation of the Saharsa Resilience strategy Like other cities, it is usual found difficult to implement policies and strategies that have multisectoral orientation. The roadmap proposes an implementation mechanism (figure 1 in this document), however, this implementation mechanism has to formalised within the State, district and city level authorities. It is less likely that with the limited resources, capacity and manpower and functional autonomy, the Saharsa Municipality alone can take up the task

of implementing the strategy. Some of the action points described also need long term vision and planning and may call for amendments in Policies and even brining in new policies. It is assumed that the Saharsa Resilience Roadmap will be welcomed and supported by the State Government given that it aligns itself with the provision of the Bihar DRR and the State Action Plan on Climate Change.

- B. Addressing lack of norms and mandates and integration with Urban planning mechanisms- Since the city is a municipality, the development plans are being prepared by the State Town and Country Planning Authority. The landuse planning is also a function of the TCPO department and hence some of the norms and mandates required for the implementation of the strategy, particularly related to ecosystem based planning will have to brought in as special provisions.
- C. Peri urban planning as a tool for effective resilience management in Cities-Peri urban areas of the cities play an important role in the city resilience to disasters particularly those like floods. It is said that Peri Urban areas if managed and planned properly can act as buffers and also as outlets to floods in their adjoining urban areas. However, with changing mindsets these areas are being looked at potential real estate land markets and hence fall prey to poor speculative

tactics and land mafia. It is therefore necessary and very apt for a scale of city like Saharsa to value its peri urban lands and promote rural economy and agricultural practices to maintain the sanctity and ecosystems of these highly valuable land stocks (2016. GEAG ). The maintenance of peri urban areas is also necessary for ascertaining sustainable development in terms of food, nutrition and livelihood opportunities to people living in these areas. These areas supply major ecosystem services to the adjoining cities and hence have to be conserved.

D. Finance and Capacity Building- Often the new and progressive plans and schemes are vetted on the question of financing them. More often it is seen that after the challenge of lack of mandates and policies, cities and regions face problems in financing their resilience plans. Also there is less capacity in the local bodies both technical and financial to support some of the activities outlined in the

resilience strategy that is multidimensional and multisectoral in nature. However, with planned effort and involving local expertise and academic institutions and support from the state level expert agencies regular and planned capacity building can be achieved in medium to long term time horizon. Besides this integration of resilience parameters in infrastructure design and land use planning will lead to preparation of DPRs that already account for resilience and will not overburden the city finances with additional financial requirements. Besides this the city must update its financial management mechanisms and revenue streams to be able to update and improve its financial capacities.

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