

# A critical study on various City Resilience Strategies

Krunal. R. Shah<sup>1</sup>, Prof. Jagruti Shah<sup>2</sup>, Dr.Snehal popali<sup>3</sup>

1PG Scholar, Structural Engineering Department, Birla Vishvakarma Mahavidhyalaya, Vallabh Vidhyanagar,

<sup>2</sup> Assistant Professor, Structural Engineering Department, Birla Vishvakarma Vidhyalaya, Vallabh Vidhyanagar.

<sup>3</sup>Assistant professor, structural engineering department, G.H.patel engineering collage, Vallabh vidhyanagar

**Abstract :** This era has been a period of greatest warming in a least year. Such climate variability and change is likely to have an impact on the metabolism of the city. Also improper planning of city, services and basic amenities of cities affected to body of city. The capability to cope with hazard risk, especially climate changes and change risk, depends on number of critical factors this includes the city's baselines infrastructure and quality of services resource linkages especially water and energy, economic growth, poverty and employment opportunities, social safety nets, investment toward hazard mitigation and vulnerability reduction. So this study focusing on resilience city framework and its aim to reduce future shocks and reduction of various issues of cities of India .The framework provides an a clear vision and direction for improved delivery of the services by the stake holder and action to be undertaken by the communities. Framework of resilience is not only for preparedness for future issues but also helping out to get results from past historical challenges and applied this strategies for present victims like Bhopal gas tragedy. Also some key observations are carried out for various city resilience framework and take them out in focuses. Lastly In this paper city resilience strategies plan of Indore and surat critical study has been done and also reviewed some methodology for resilience framework.

**Keywords:** City resilience strategies, urbanization, vulnerability.

## I. INTRODUCTION

Nowadays the rapid expansion of Indian cities, driven by increase in population and urban development has expanded the already existing gap in demands and supply of necessary infrastructure services . This inefficiency of urban systems hinders their ability to adapt to climate change and affects the cities resilience An increasing concentration of population, coupled with extreme events, results in high damages to assets, interruptions in business continuity, loss of lives and displacement of populations. It further enhances economic and social vulnerability of the urban system. A Resilient City means one that has developed capacities to help absorb future shocks and stresses to its social, economic, and technical systems and infrastructures so as to still be able to maintain essentially the same functions, structures, systems, and identity.

This means that the major resilience challenges of our era, such as poverty reduction, natural hazards and climate change, environmental sustainability, and social inclusion, will be won or lost in cities. Mass density of people makes them especially vulnerable both to the impacts of acute disasters and the slow, creeping effects of the changing climate; all making resilience planning critically important.

The repercussions of each crisis depend on the city's preparedness to respond to specific predictable impacts, and the way citizens perceive and react to those impacts. If any crises or any disaster occur in future and we would already prepared with our strategy then we will absorb that all shocks with alternative strategy and without any harm on community and asset of city.

## II. NEED OF STUDY

Various example right now we have face that famine in zarkhand, fire in delhi and Mumbai, kedarnath flood also because of improper planning urban flood is occurred. Urbanization and increasing in concentration of population get infrastructure under pressures so improper planning and lake of services given by authority in study area so if any issues or disaster occur in future and we would already prepared with our strategy then we will absorb that all shocks with alternative strategy and without any harm on community and asset of city.

## III. OBJECTIVE

- 1)To study different cities resilience framework.
- 2)This literature review finds different issue and key observation containing of various cities.

## IV. LITERATURE REVIEW

The etymological roots of the word "resilience" stem from the Latin word '*resilio* 'A Resilient City is one that has developed capacities to help absorb future shocks and stresses to its social, economic, and technical systems and infrastructures so as to still be able to maintain essentially the same functions, structures, systems, and identity.'"Resilience means is the ability of a system to absorb disturbance and still retain basic function and structure. Developing the capacity for greater resilience will involve cities in a complex web of economic, planning, design and development decisions. To increase their capacities for resilience, we believe that cities will need to adopt urban planning and building design strategies that allow them to increase their abilities to better respond and adapt to the economic, social, and physical stresses they will face as they confront the challenges of increasing energy scarcity, climate change, and population change.

➤ **Vulnerability profile of Indian 20 cities(report2011)**

Integrated research and action for development(IRADe) and Asian cities climate change resilient network (ACCCRN) both discussed case study of 20 cities climate resilience and other factor. 20 cities shown in belowed map no 1. The two foundation covered also hilly, costal, and flat surface area for case study

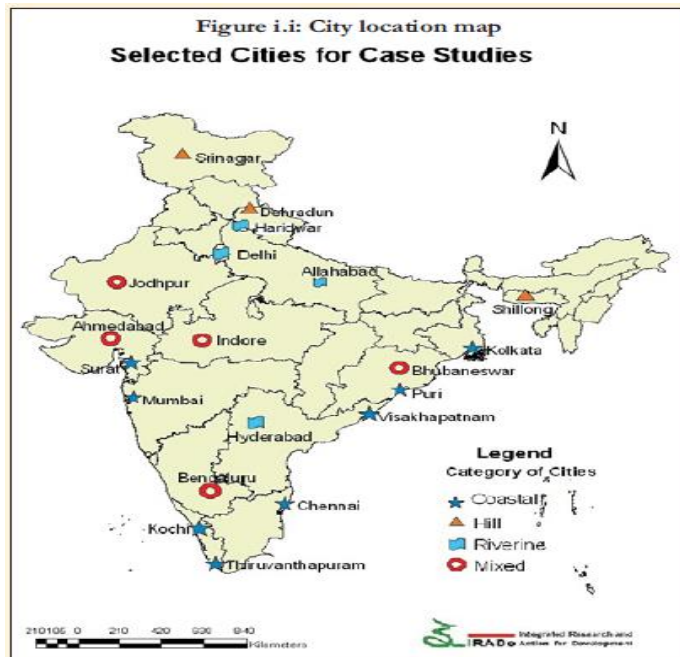


Fig.1 location of cities

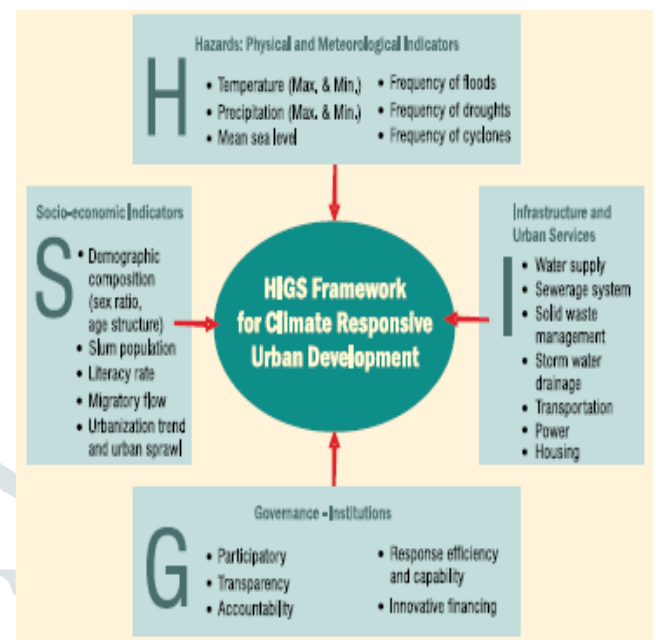


Fig.2 Methodology

Here these figure1 & 2 demonstrated that 20 location cities which is selected as a make an resilience cities. For make a resilience city it have flexible methodology to be used as shown in fig.2 they covered HIGS (hazardous, infrastructure for urban services, Governance of city, socio economic) indicators for determining strong framework. HIGS framework covered all factors which would be needed for making resilience city like solid waste management, transportation, all the core data of city likewise demographical environmental data, governance of local authority and all the urban services like a basic amenities.

Some key observation based on paper for research .

All 20 cities covered have city development plans.

10 cities active in the area of disaster management, which includes Delhi and Mumbai.

7 cities prone to cyclones, which may cause severe damage to residential and industrial infrastructure, if such event happens in near future

Delhi, Surat, Chennai, Indore, Kolkata, Ahmedabad and Kochi progressive cities with respect to climate change context.

Sewage treatment highest in Surat (100%) followed by Haridwar (79%) and Mumbai (78%). No such facility exists for Bhubaneswar and Dehradun.

Kochi generates highest per capita solid waste (0.76 kg/day) followed by Chennai (0.70 kg/day). Dehradun and Shillong produces the least municipal solid waste.

Kolkata has the highest population density (11 persons per household) while Haridwar has the lowest population density (2 persons per household).

➤ **Post disaster mitigation and rehabilitation measures for communities in Bhopal city**

This thesis of Shilpa Singh analysis based on the primary survey of the communities who have been affected in the 1984 Gas tragedy as well as the 2006 flood in Bhopal city. Three localities have been taken into consideration for the primary survey namely Firdaus nagar, Atal Ayub nagar and Shakti nagar. An attempt has been made to understand the coping mechanisms of the communities residing in these areas. Also Author describe some issue regarding gas tragedy like wise social issue, institutional issues, health issues, environmental issue etc. Also concern for pre flood measures and emergency state measures.

Here author mainly majore focuses on the solution of victims problems followed:

The local community based institutions should be given training to utilise the resources judiciously

Provision for free education and skill development programmes should be made to help in increasing the earnings of the family.

Provision for free education and skill development programmes

The skill development programmes should also provide financial assistance

The local community based institutions should work to raise the awareness levels of the residents

Majority of population is unable to work for long hours hence; flexible working hours for the victims should be kept.

Specialized physicians must be appointed to deliver the need specific treatment, Sensitization of professional and corporate bodies is required.

➤ **City Resilience Strategy: SURAT**

Surat municipal corporation is prepared this document with the aim of providing a framework for the development of a Climate resilience strategy for the city of Surat. Surat municipal corporation also prepare this document based on the current situation while also providing information that can be understood by people at large. They also covered some factors in study like environment, transportations, urban flood, solid waste, public health, energy sector etc.

Surat municipal corporation finds all the forecasting fore the water, transportation, precipitation data, population forecasting and main they were using a GIS software for the better planning in disaster or any challenges. They predicted all the situation for future disaster they have all the vulnerable plan which is carried out based on to the vulnerability assessment. Smc also provide strategies for long term so this city very well prepared for future challenges. The document of resilience has been divided into 4 parts :

Variability and Change collates the predicted changes that would affect the city.

Possible Impacts- analyzes the impacts of these changes on the city fabric.

Evaluations & Assessments, the cities vulnerabilities and capacities are assessed.

Strategies are discussed to counter or mitigate the negative impacts of climate change, poverty and urbanization.

➤ **City Resiliency Strategy : INDORE**

Taru leading edge is prepared report with the aim of providing a framework for development of Climate resilience strategy for the city of Indore. The strategy aims to reduce the impacts of climate change by identifying sectors and communities most vulnerable to the CVCC (climate variability and climate change) risk. Documents covered some content are Provides background information of the city, demography data, governance, livelihoods and economy , Outlines the current risks and vulnerabilities based on the sectorial study reports ,Provides an outlook of future variability and changes in climate, urban growth. They use GIS software to projected all the risk on slums area, epidemic of malaria. Their main focus is mostly on slum area and water scarcities of city are.



Fig.3 Critical uncertainty

Here these diagram no 3 display some constraint and strengthens of the city which is always generate a respectively problems and opportunities but this focuses always helpful in preparedness and how to mitigate that problems. So this figure is for the Indore city and they focused on the resource and infrastructure management so when resource and management are efficient then city have chance to be opportunities for better education ,employment infrastructure services, community cohesiveness etc. And it is poor then the city loosing his position in all placed. And if resource management will be efficient then migration is less and it is pulling condition toward city to outer people. So and so it could be self indulgent city and issues and risk should be decreases.

So Now this study focuses on the comparison between two study of city so it could be helpful in which they are lagging behind

	Indore	Surat
Population	1.6 million (2001)	2.4 million(2001)
	2.53 million(2011)	4.4 million(2011)
	3.67million(2021)	6.4 million(2021)
Area	530 km square	326.5 km square
Drainage	20%	100%
Water scarcity	60 % have seservices of water supply	94% attached with water supply
River / sea	Narmada River	Tapi river , Arabian sea
Water per capita	52-67 litre/day	135 litre/day
Solid waste (annually)	700 metric tonnes (70 % collection of disposal)	1000 metric tonnes (90 %collection of disposal)
Per capita disposal	0.4 kg/day	0.4 kg/day
energy	1642 units/year (per capita)	1203units/year(per capita)
commercial use of energy	0.3 million consumer	0.7 million+40000 shops
Transportation	0.98 vehicle per household(avrage)	0.35 vehicle per household(avrage)
weather hit in summer highest	44 c	46 c
precipitation	943 mm(annual) 90% of annual	950-1200mm(annual) 90% of annual
Geographic information system based Technology(M-governance)	No	Yes

#### Remark:

- The above table shows data of two cities which is already did resilience strategy on their city plan .
- Firstly we look for population growth so, Surat have double growth of population in comparison of Indore, just because of they have largest textile industries and diamonds industries so urban sprawl occurred largely.
- Surat have 326.5 km square of area and indore content 530 km square and after all that much area surat provide better and 100% drainage and Indore not give any strategy or solution if any flood or storm occurred and they have 20% drainage network.

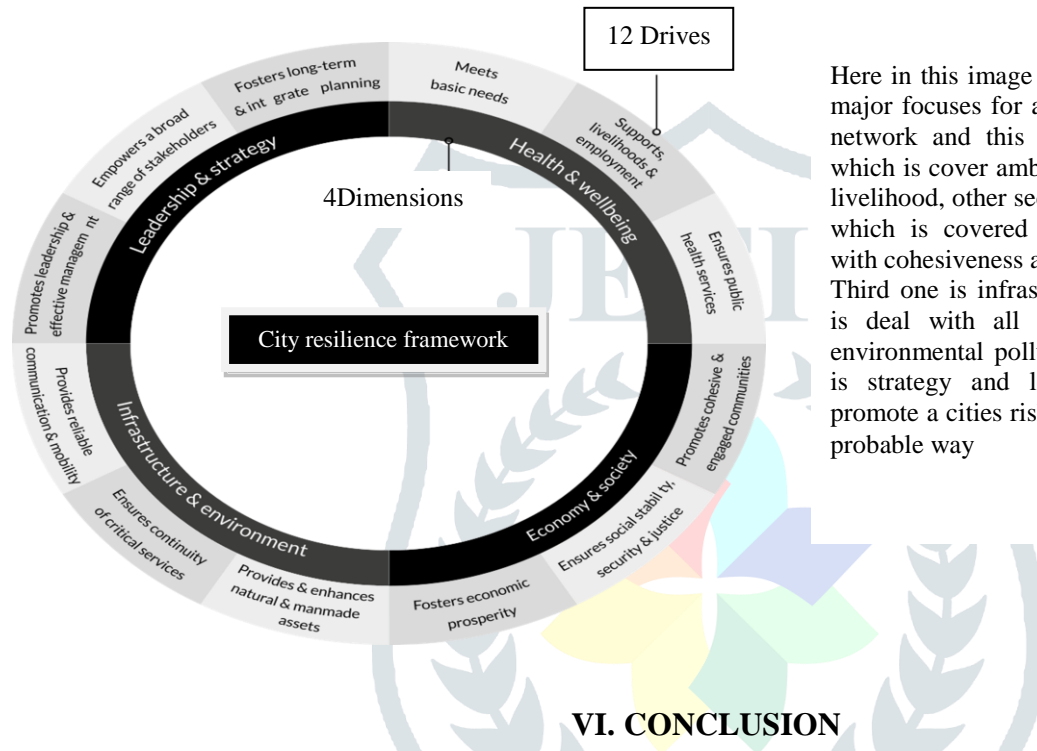


- Both have strong in solid waste management they give door to door services to residential. Surat municipal corporation 98% waste disposal collected and indore have also facilities to door to door collection about 70 %.
- Both cities has same rainfall but deficiency in harvesting or lagging behind supply services Indore is not provided satisfactory water supply to residential.  
Surat have alternative of energy production so there are two ways to provide energy DGVCL and TORRENT but Indore haven't any backup for that

## V. MAJOR FINDING

### 4 Pillars for achieving resilience city

Arup foundation provides 4 dimensions to direct a city toward resilience. 4 dimensions is health and wellbeing, economy and safety, infrastructure and environment, leadership & strategy and each dimension have 4 drive to achieve that dimensions goal completely.



Here in this image 4 dimensions and 12 drives are major focuses for accomplish to any city resilience network and this 4 dimensions are health being which is cover ambulance services, basic amenities, livelihood, other second one is economy and society which is covered combined all the communities with cohesiveness and wealthy economic prospect. Third one is infrastructure and environment which is deal with all the infrastructure services and environmental pollutions and care about it. last one is strategy and leader ship which is included promote a cities risk and findin alternative in all the probable way

## VI. CONCLUSION

- Disaster risk reduction plan to solve problems or issues of city.
- Rejuvenation of water bodies some rubber dams which are control water flows for flood.
- Proper resource allocation in context of city area .
- Program national mission to help for reduce poverty some provide basic amenities.
- Provide strong Decision support system in critical situation provide control over laws and rules .
- Emphasize optimal use of resources
- Generate more foreign investment and also a alternative investment in economic crises.
- Do with some privatization provide better services.
- With some good policy maker
- Consistent monitoring with technology all the area moments and growth of concentration of peoples.
- Improve quality of life with some regional agreement

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