Urban Development and Climate Adaptation

Center of Excellence
26 July, 2010

IRADe Integrated Research and Action for Development

IRADe's Mission Statement:

Carries out multidisciplinary research from multistakeholder perspectives

- Research with local, national and global perspectives of sustainable development;
- Use scientific and technological methodologies in all research and analytical tasks;
- Conduct stakeholder consultations;
- To explore opportunities opened up by new technologies for climate resilient socio-economic growth;
- Identify potential entry point of project results in existing governance policies, programs & decision support system;
- Be a catalyst for growth, and effective governance.

IRADe Integrated Research and Action for Development

Areas of Specialization

- **Environment and Climate Change**
- **Impact of Policy Reforms**
- **Urban and Rural development**
- **Energy and Power System**
- **Poverty Alleviation and Gender**

Support Activities

- Action Projects with Communities
- Policy Analysis and Knowledge Dissemination
- Training and Capacity Building

DECISION SUPPORT PROVIDED BY IRADe TO NATIONAL ORG.

NATIONAL

- Min. of Environment and Forests (MoEF)
- Min. of New & Renewable Energy (MNRE)
- Min. of External Affairs (MoEA)
- Min. of Power (MoP)
- **Min. of Urban Development (MoUD)**
- Rural Electrification Corporation (REC)
- **Department of Science and Technology (DST)**
- The Planning Commission
- Central Statistical Office (CSO)
- **Technology Information, Forecasting and Assessment Council (TIFAC)**
- Min. of Chemicals and Fertilizers

Others

- Delhi State Govt.
- Govt. of Manipur
- Govt. of Rajasthan

Introduction

Cities and climate change

- **Climate change impacts felt locally—in cities, towns, and other human settlements.**
- **Due to rapid urbanization, cities are more at risk given the existing environmental, economic and social problems.**
- **Cities with large concentration of population, property and crucial economic assets and infrastructure are highly vulnerable**

Adaptation in the urban areas

Cities need to adapt for future floods, droughts, storms and heat waves whose frequencies and intensities will change through following:

- **Remodeling drainage system that can accommodate sudden downpour.**
- **High Capacity water supply and storage systems for drought periods.**
- **Embankments of low-lying areas especially for coastal cities.**
- **Stable Infrastructure: Transportation and other**

  Stronger buildings, bridges, flyovers, also water supply and treatment plants that withstand storms.

Objective

Integrating various urban development efforts in the light of climate change adaptation in Indian cities

- To Identify key elements in urban areas for mitigation and adaptation
- To Develop a Rapid Assessment Framework for preparedness of State Government and ULBs (Urban Local Bodies)
- To suggest best practices and policy level prescriptions that could be understood and adapted by local administration of vulnerable areas
- Link climate issues with the existing programmes such as JnNURM, UIDSSMT and Service Level Bench Marks

Key Deliverables

- **Phase I 2009-2010**

A. Macro level Perspective:
Rapid Vulnerability Assessment for 14 cities
Irade Methodology: sectors include
water supply

B. City level work: Two Case Studies
Surat and Haridwar

All deliverables completed
100% Utilisation of funds

Expenditure Incurred Phase I 2009-10 in Rs 1000

Item	Total
Project Staff Salary	5,84
Contractual Staff Salary	3,60
Travel Expense	68
Other Expense	2,76
Contingency Expense	29
Overhead Charges	2,63
Total	15,81

Climate Change Impacts on Cities

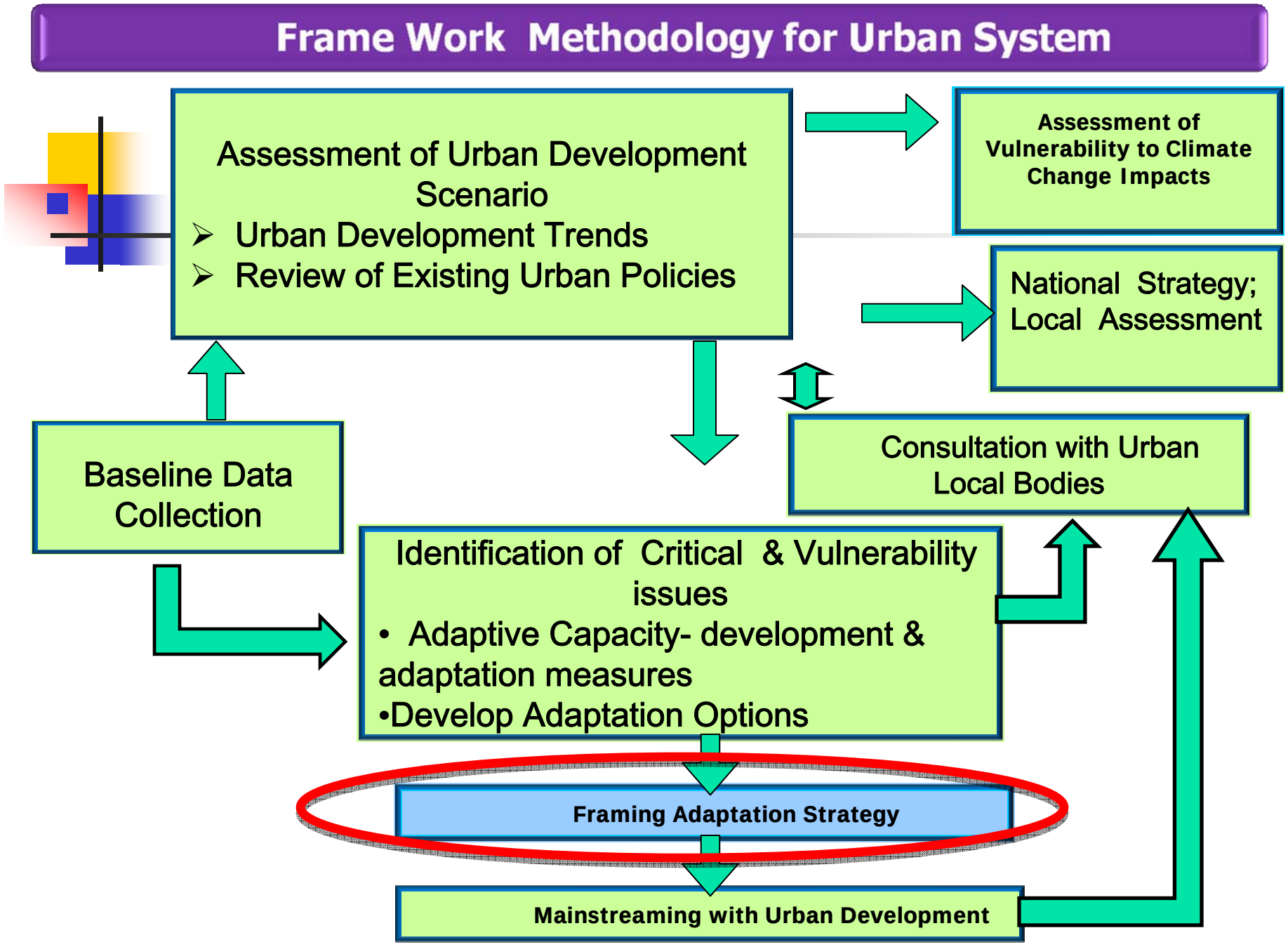
Framework

For

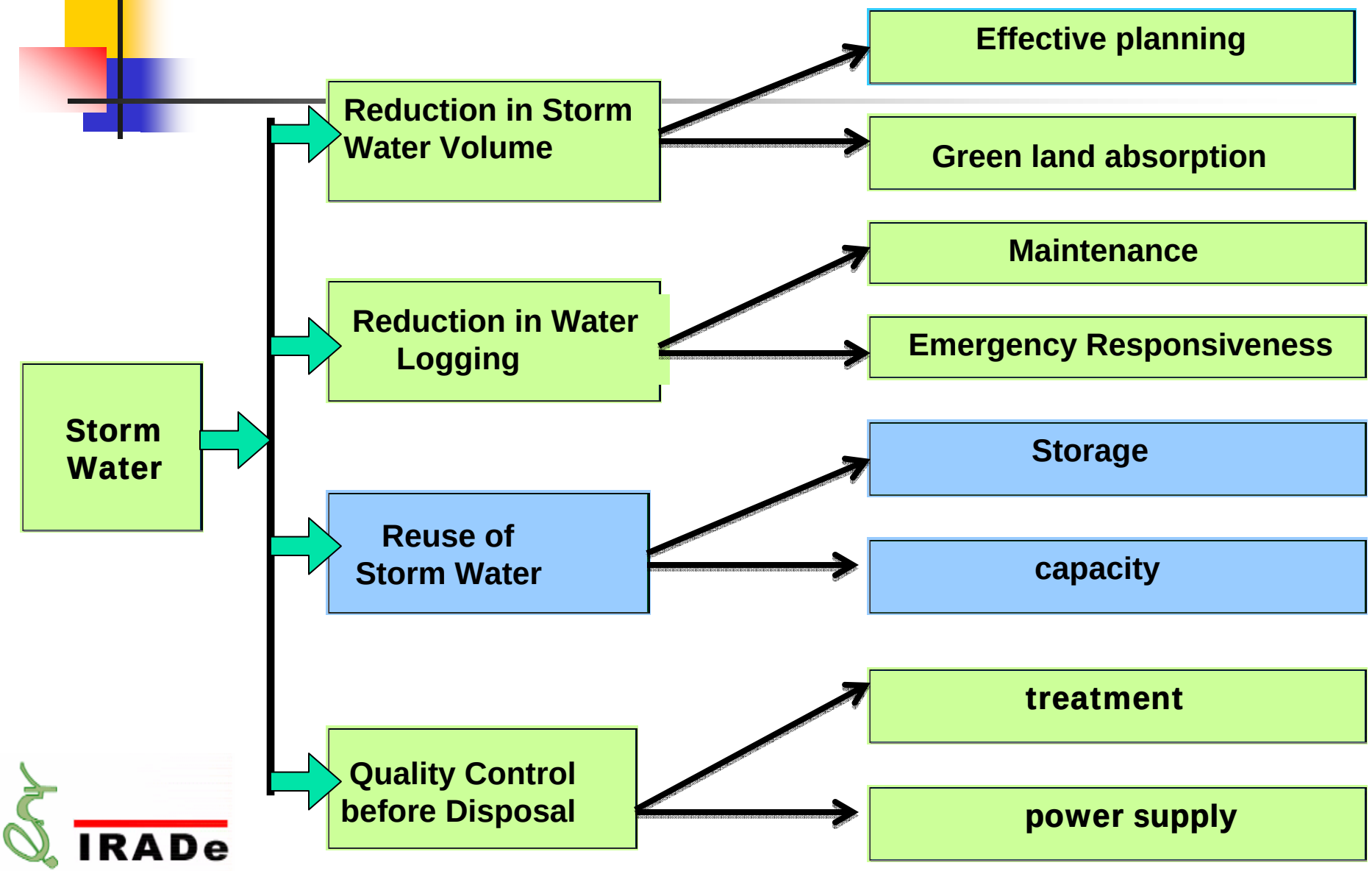
Cities and Climate Adaptation

IRADe

Frame Work Methodology for Urban System



Limit Storm Water Impact and Reuse It



IRADe

Rapid Assessment of Vulnerabilities of Indian Cities to Climate Change

- To identify the key elements of adaptive capacity of Indian cities
- To develop a Rapid Assessment Framework based on indicators of vulnerability to climate change, so as to strengthen national policy framework as well as its capacity to progress further.
- 14 Indian cities out of 65 under JNNURM have been selected for vulnerability assessment in the first phase of the study
- Ranking according to
  - Equal weights for all variables
  - Principle component analysis (PCA)
  - Relative ranking method

IRADe Approach for RVA

It involves key elements of Urban Socioeconomy for mitigation and adaptation

- Climate
  - Temperature
    - Maximum & Minimum
    - Temperature Increase 2030 & 2080
  - Rainfall
    - Average
    - Precipitation Increase 2030 & 2080
- Topological
  - Altitude
- Demographical
  - Population density
- Social
  - Slum Population
  - Literacy Rate
- Economic
  - Employment

IRADe

Relative ranking method: weights Assigned to the Variables of Vulnerability

	Unit	1 Low	2 Medium	3 High
Climate variables				
Temperature	Max(ºC)	less than 35	35-40	more than 40
Temperature	Min(ºC)	less than 15	20-15	more than 20
Temperature (2030)	(ºC)	less than 0.7	less than 0.9	more than 0.9
Avg. Rainfall	mm	less than 700	700-1400	more than 1400
Precipitation (2030)	%	less than 1	01 to 02	more than 2
Topological				
Altitude	meter	200-900	40-200	0-40
Demographic				
Population Density	Per/Sq. Km	less than 15000	15000-25000	more than 25000
Social				
Slum Population	%	0-5	5 to 15	15-25
Literacy Rate	%	>80	80-65	<65
Economic				
Employment	%	above 35	32-35	less than 32

Ranking of Indian Cities by IRADe

	Range		PCA		Relative Ranking	
Cities		**Rank**	**Score**	**Rank**	**Score**	**Rank**
G. Mumbai (Thane)		**1**	**0.0479**	**1**	**2.7**	**1**
Kanpur		**2**	**0.0452**	**4**	**2.6**	**7**
Ahmedabad		**3**	**0.0436**	**2**	**2.2**	**3**
Surat		**4**	**0.0351**	**3**	**2.2**	**2**
Pune		**5**	**0.0300**	**6**	**2.1**	**5**
Hyderabad		**6**	**0.0286**	**10**	**2.1**	**10**
Mysore		**7**	**0.0267**	**12**	**2**	**14**
Jaipur		**8**	**0.0266**	**7**	**2**	**12**
Delhi		**9**	**0.0200**	**5**	**2**	**11**
Cochin		**10**	**0.0199**	**14**	**1.9**	**8**
Chennai		**11**	**0.0162**	**9**	**1.9**	**4**
Bangalore		**12**	**0.0157**	**11**	**1.9**	**13**
Thiruvananthapuram		**13**	**0.0096**	**13**	**1.7**	**9**
Kolkata		**14**	**0.0058**	**8**	**1.7**	**6**

Ranking according to a) equal weightage to all variables, b) Principal Component Analysis, c) Relative Ranking

Vulnerable Surat

- Coastal City on the river bank vulnerable to flooding during heavy rains especially when incessant precipitation coincides with high tide.
- Climate change leads to fluctuations in intensity and rainfall pattern thereby aggravating the vulnerability of cities
- Global warming will result in sea-level rise.
- water release from upstream Ukai dam (100 Km east), and high tide etc.
- Population and industrialization: Floods disrupt economic activity of the city, livelihood of common people.

Surat

The city is vulnerable to extreme weather events (cyclones, flooding, and drought), sea level rise and salinity, and increased temperature.

- These climate impacts may result in significant economic, social, and environmental costs to city, in part because of the physical exposure of populations, natural resources, and infrastructure to climate impacts.

- Multiple non-climate issues are expected to exacerbate costs:

1) The poor are at greater risk due to location, low quality of dwellings, and limited access to public services;
2) Social and economic safety nets related to disaster response and recovery are nonexistent or inadequate;
3) Lack of backup systems (e.g., energy, water and sanitation, food reserves, and medical supplies); and
4) Absence of and/or weak enforcement of policies on land use, building codes, and environmental regulations.

Cont . . . .

Numerous adaptation options for Surat are being studied. Priority areas for adaptation response being considered are the following:

- *Urban flood management* – Clearing of channels; improved solid waste and drainage management; structural controls (e.g., dikes, flood barriers); flood adapted design and relocation into lower risk areas (with careful consideration of the political, social, and cultural sensitivities of relocation); and post-disaster reconstruction planning.
- *Water supply* – Improved access to water for the informal sector, policies to address cost inequities, and access to emergency supplies; demand-side management; protection of private and public groundwater supplies.
- *Public services* – Increased awareness and assistance redundant/emergency energy and water services, transportation, and communications

Disaster Management

- Incorporate Disaster Management Plan as part of the Master Plan
- Build stronger database for the city to increase preparedness
- Frame higher safety standards for contractors and builders

- **Flood control initiatives**
- No Encroachment /Construction in risk area
- Protective hard embankment
- River trenching
- Emergency response centre
- Emergency plan – Place & training

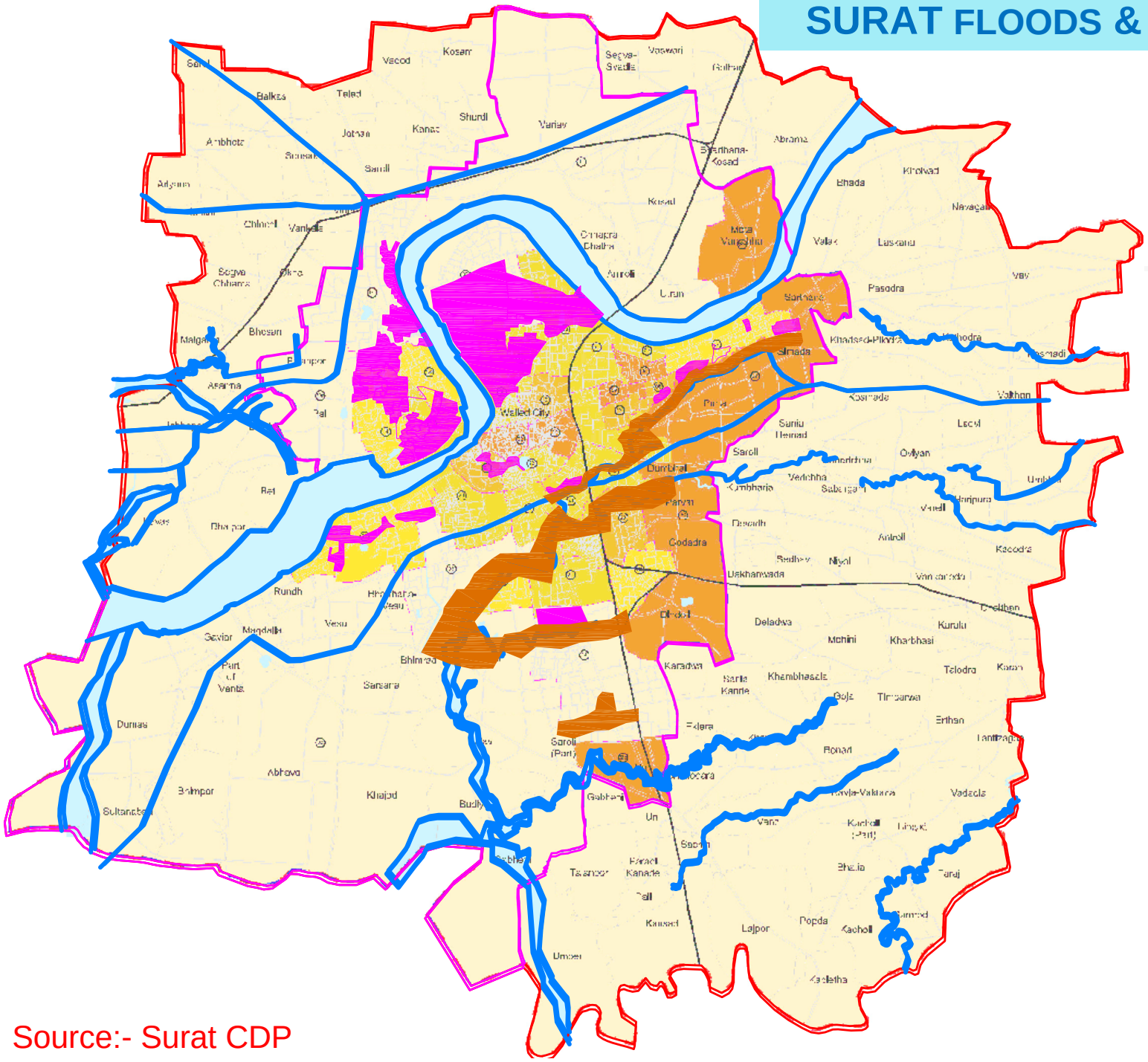
Plan & actions for ULB's to address CC impacts

- This preparation includes risk assessments, prioritization of projects, funding and allocation of both financial and human resources, solution development and implementation, and rapid deployment of information sharing and decision support tools as part of climate risk management and disaster preparedness and

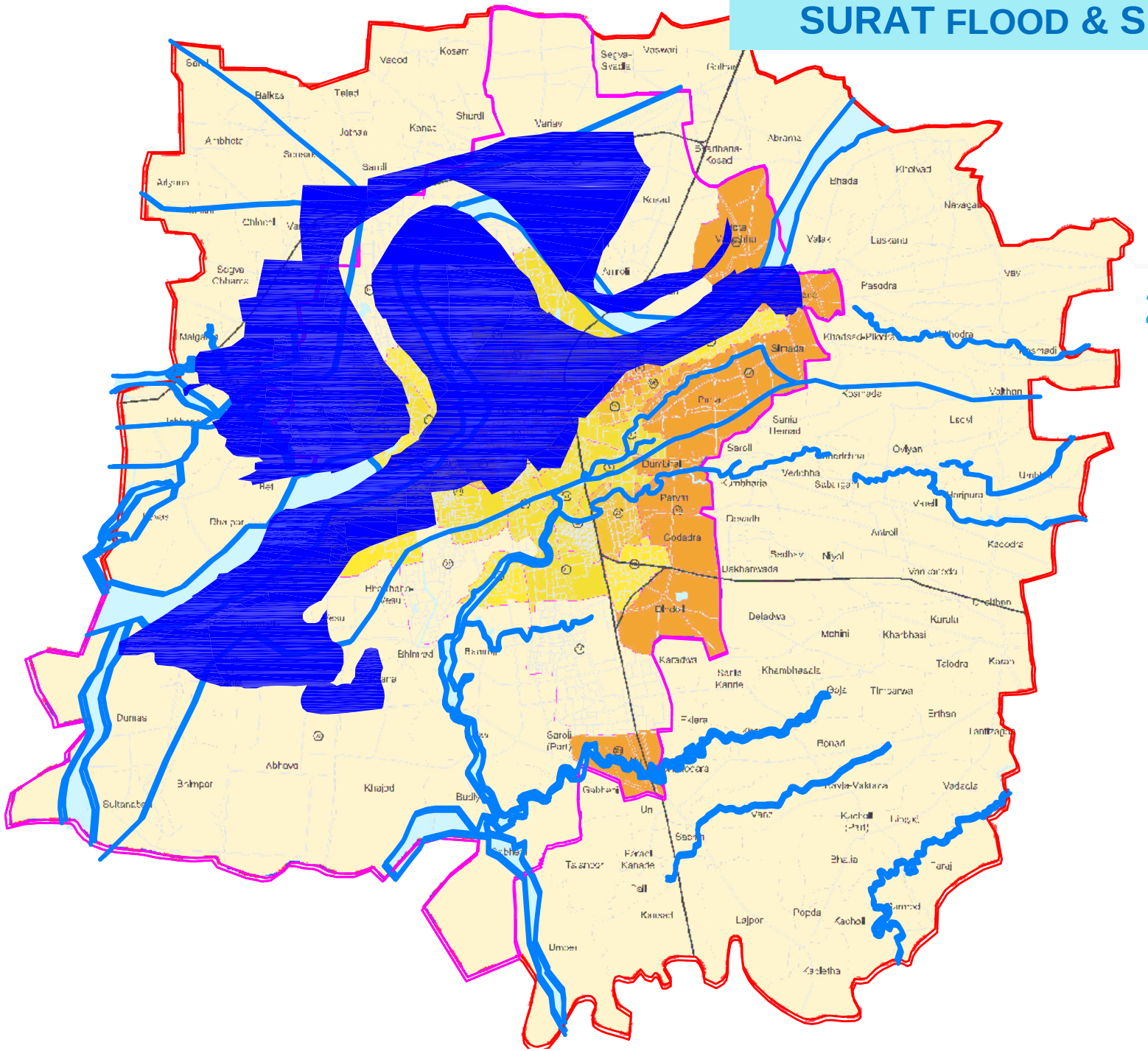
- This should be mainstreamed into development plans like City development Plans and / master plans.

  - **This will help people understand the economic, social and environmental costs of not taking appropriate action to reduce risk**

SURAT FLOODS & SUBMERGED Areas



SURAT FLOOD & SUBMERGED Areas

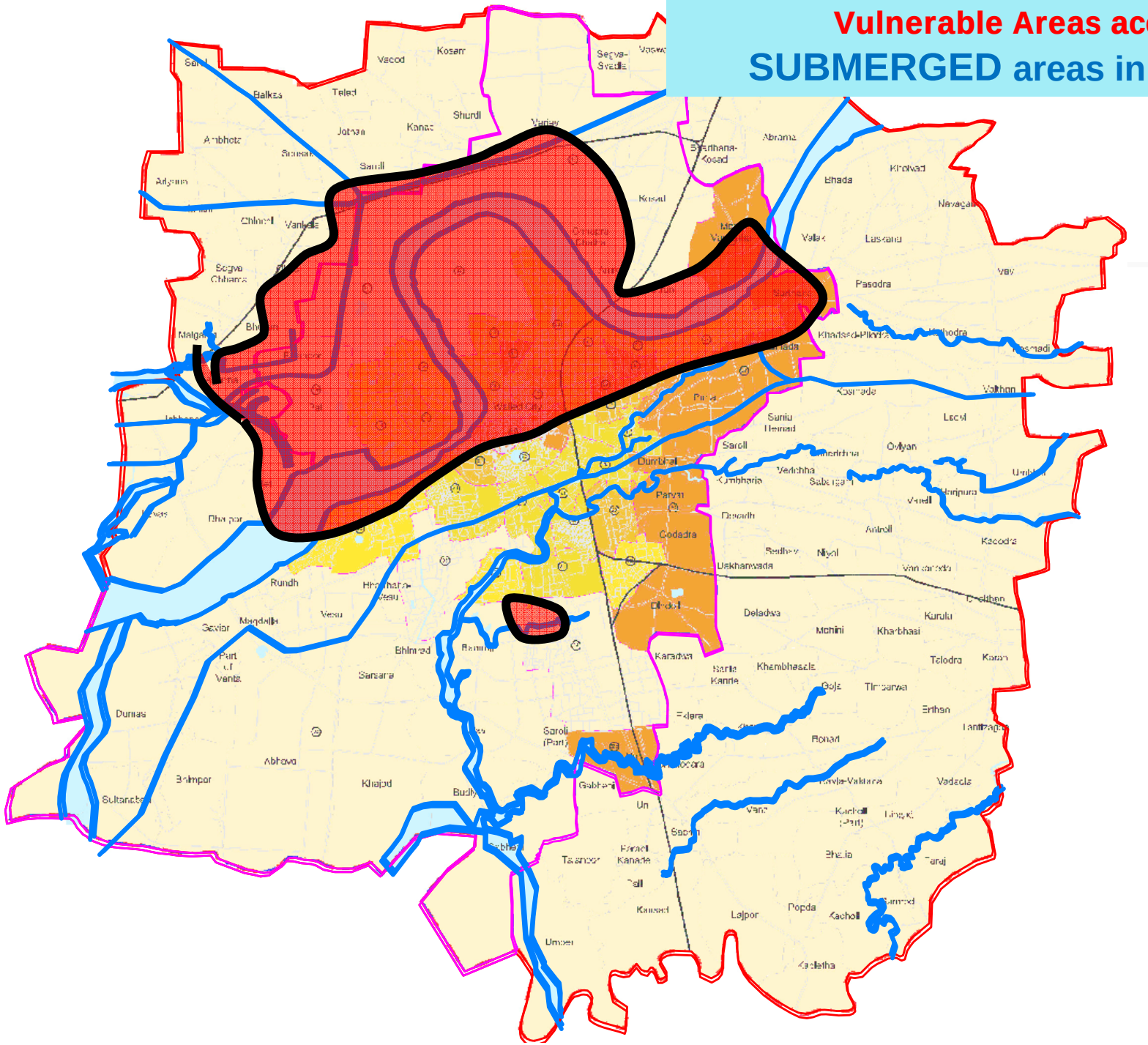


2006 Flood

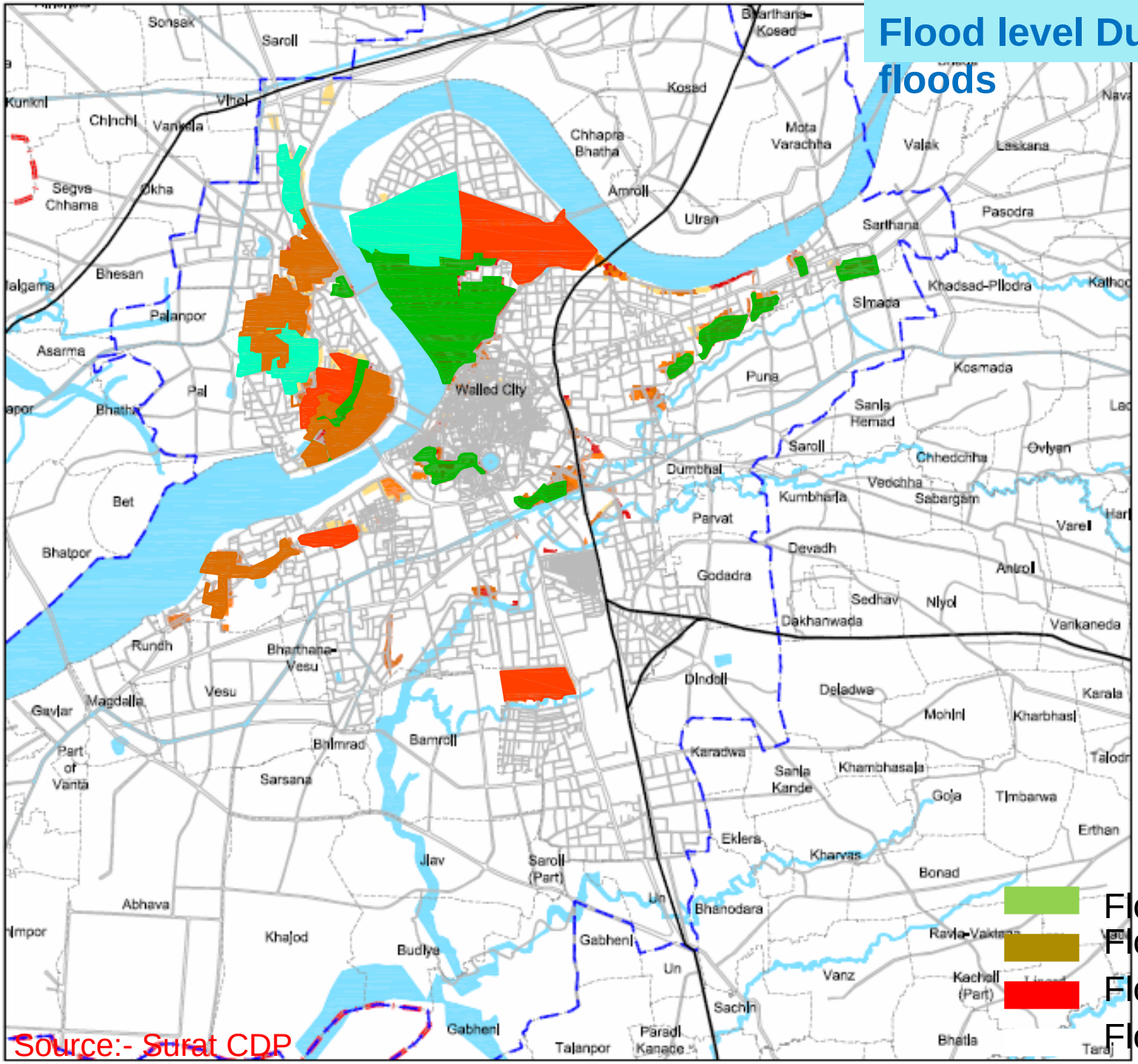
Vulnerable Areas acco. to FLOOD

SUBMERGED areas in year 1994, 199

and 200



Flood level During 1998 floods



Challenges

- Lack of databases
- New subject for which capacity building is needed
- Climate mission got approved only last month

Haridwar

To identify the problems and risks created by climate change to city,
To analyze the city development plan and suggest the measures to adopt with climate change induced vulnerabilities

Data Base and Methodology

- Quantitative and Qualitative methods
- Data from City Development Plan and JNNURM, 2007
- Field Survey

Vulnerability to Climate Change

- **Haridwar** is vulnerable to multiple effects of the climate change. This includes the risks of flooding, air, water pollution, water deficit and increased spread of diseases, land slides, etc.

- Overall temperature has risen from 1°C to 3°C over the last 100 years,
- Precipitation patterns have changed, the number of extreme weather events is increasing.
- Erratic behavior of monsoon with melting of Himalayan glaciers is also the cause of floods for Haridwar city.
- Extreme events going to affect the city are cloud burst and landslides.
  - Landslides of Mansa Devi hill takes place at regular interval.

Threats to City's Infrastructure

- The condition of the city are further deteriorated due to rapid population growth and rapid increase in land price, habitation has extended to low lying areas which do not have basic infrastructure.

- There are about 31 registered and 10 unregistered slums in Haridwar and are about 47 % of total population of the town. In these slums 10 % population do not have legal right over their land and also do not have basic services and infrastructure

Continued....

- At present, around 80 % of the population is covered with sewerage system.
- A storm water drainage system exists in the town. Drains are mostly pucca and open. Proper drain is absent in slums.

- Sweeping and Solid Waste Management services are irregular and overall primary collection is poor and 43 % dispose garbage in the open.
- The river Ganga in this city is polluted due to; discharge of untreated waste water into river, waste disposal from cremation ground close to bank of river, bathing and washing and disposal of agricultural, industrial and domestic pollutants from upland.

Second Phase work plan 2010-13

Focused on Implementation of NMSH

- Resource Center of information on Climate Change and Urban Development in India;
- National Assessment of Vulnerability of cities and steps for Climate Change
- Provide inputs for City Development Plans and state level actions
- Identify Climate Change related issues/activities in various Government funded urban projects/ missions such as JNNURM, National Urban Sanitation Policy, Service level Benchmarking
- Collaboration with Other Centres of Excellence

Current Status (Continued in this year)

- Steering Committee Formation

  A steering committee is set up and meeting was organized to enhance the work on Urban Development and climate adaptation and to add effectiveness in ongoing program

- Capacity Building

  Summer intern training for eight students of Faculty of Planning and Public Policy, CEPT was conducted to orient the upcoming professional for urban planning and Env. Planning towards the problems posed by unplanned development and CC

Expenditure Incurred for FY-2010-11 in thousand Rs.

Item	Q1
Project Staff Salary	2,96
Contractual Staff Salary	75
Travel Expense	8
Other Expense	1,88
Contingency Expense	5
Overhead Charges	99
Total	5,95

National Mission on Sustainable Habitat

- **Implement recommendations into City Development Plans (CDPs) for Surat and Indore**
- **Bring case studies under existing national framework for climate change**
- **Empower ULBs to integrate climate change policy interventions with on-going development plans**
- **Expand Rapid Vulnerability Assessment to 35 to 40 cities.**
- **Case studies to focus on specific conditions in cities like**
  - **Coastal Cities- like Surat**
  - **Semi-arid – like Indore**
  - **Mountain city- Haridwar**
  - **East (cyclone prone)**
  - **Gangetic Plain- like Gorakhpur**

National Mission on Sustainable Habitat

- Develop Implementation Plan and execution of the same for cities studied in Phase II
- Prepare a generic framework of policies that can be implemented in various other cities sharing similar profiles and challenges with the cities studied in Phase II
- Develop a common Rapid Vulnerability Assessment tool for direct application by Urban Local Bodies in India


THANK YOU