Strategies for addressing climate change in Urban Development and Energy Management

Gujarat Institute of Disaster Management
March 26, 2018

Cities and climate risk – Why does it matter?

Urban areas are concentration of large population, economies, infrastructure: central to growth of the nation or the region

Over 50% of India's GDP is derived from cities - Climate change impacts can wipe out development gains and significantly reduce quality of life

Focused investments in urban areas – Smart Cities, AMRUT - More than 70% of India's infrastructure is yet to be built

Urbanization has lead to increased pressure on…

- Resources
- Infrastructure
- Services

…leading to emerging concerns and discourse on Sustainable cities

Climate change impacts pose additional pressures on cities

Floods

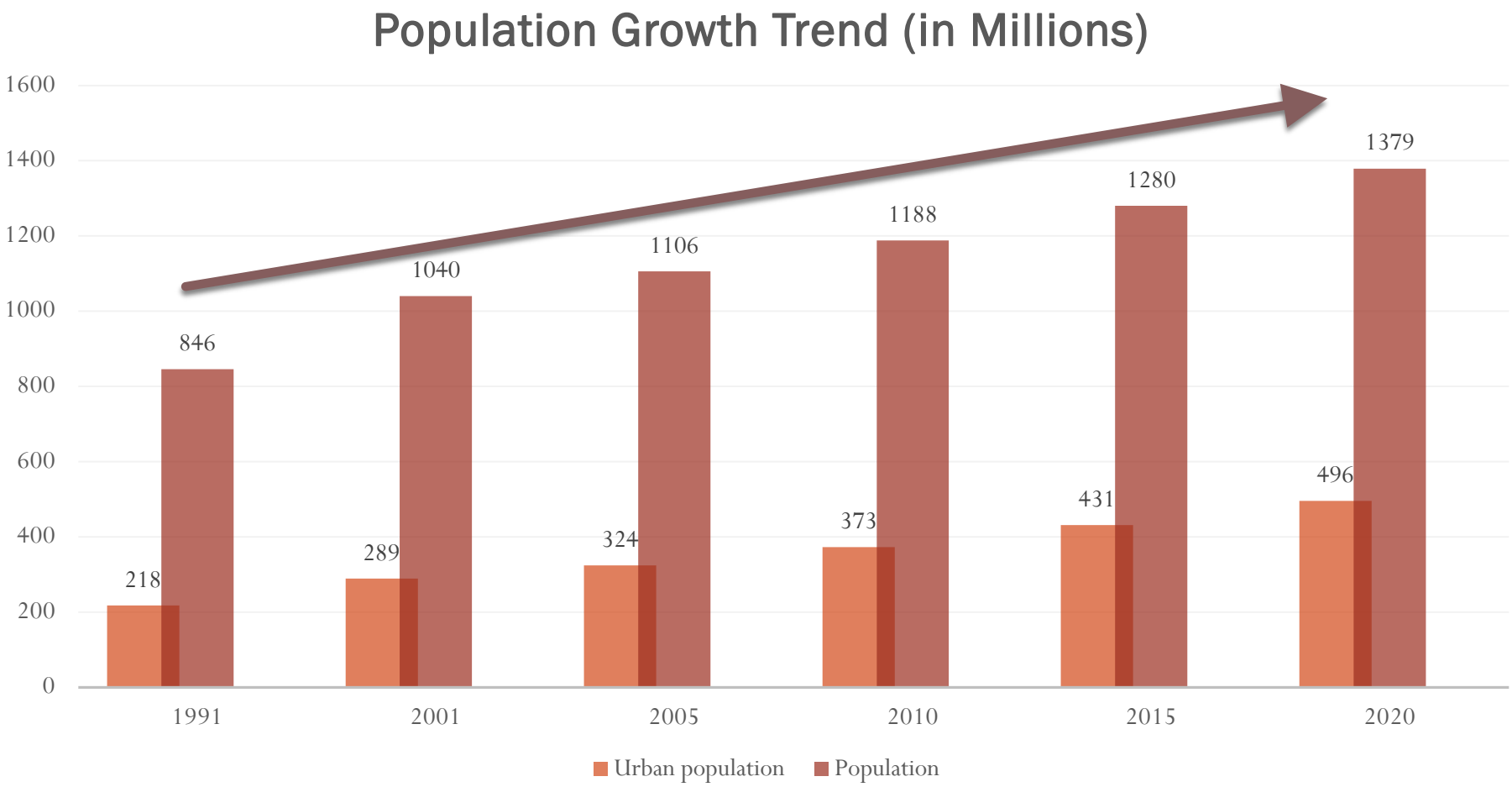
Sea Level Rise & Storm Surges

Cyclones

Water Scarcity

Heat Waves

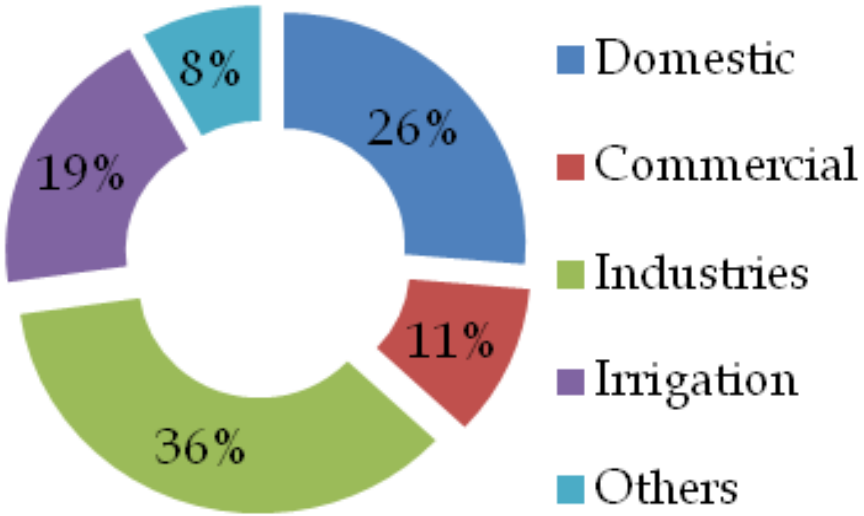
Urbanization in India – the other story !



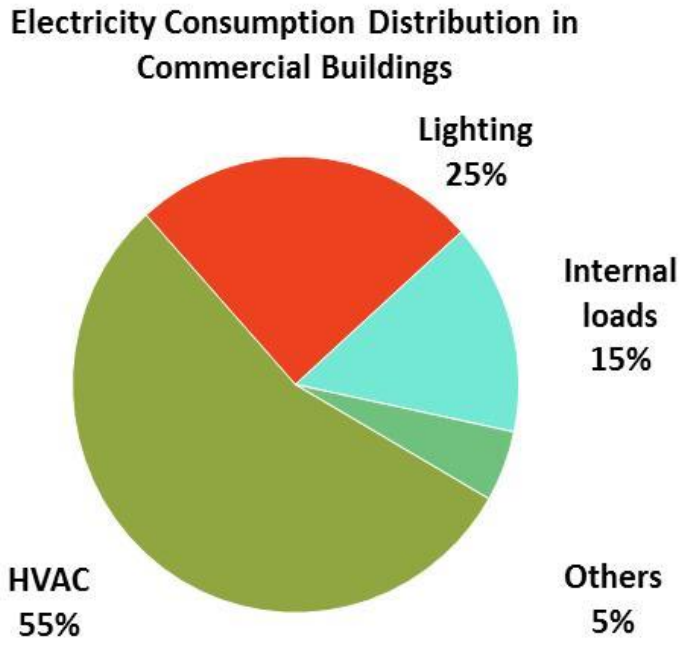
70% of India's infrastructure and buildings are yet to be built

Source: http://www.unfpa.org/publications/state-world-population-2007

Sector Wise Electricity Consumption



Source : 18th EPS, CEA



Residential & Commercial Buildings consume 37% of total electricity

55% of electricity consumption is due to HVAC

25% of electricity consumption is due to lighting

Promoting Green and Energy Efficient Buildings in Indian Cities

Smart Cities Mission

80% of all new buildings to be 'green'

Focus on 'roof top solar'

Smart City
MISSION TRANSFORM-NATION

अमृत
Atal Mission for Rejuvenation and Urban Transformation

Pradhan Mantri Awas Yojna (Urban)

India's Nationally Determined Contributions

- To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level.

- To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).

Need for a two pronged approach to climate risk management in urban areas

Strategies focusing on climate change mitigation as well as adaptation and resilience building

Gujarat State Action Plan on Climate Change

- Though cities are not identified specifically as a 'vulnerable' sector, water, health and infrastructure had been addressed

- Chapter on urban development highlights need for disaster preparedness and risk management

- Focus on residential and commercial buildings for GHG emission reduction
  - initiatives on energy efficiency in building construction and operation, renewable energy.
  - GHG emissions inventories
  - Landfills for MSW

- Importance of community participation and institutional and governance mechanisms

Climate Resilient Urban Development

Building Resilient Cities

Make cities and human settlements inclusive, safe, Resilient and sustainable

- ✓ Prepare the cities to withstand climate change related gradual impacts like change in precipitation, temperature and sea level rise
- ✓ Equip the city equally to respond to disasters and extreme events
- ✓ Drive the city towards sustainable development encompassing environmental benefits

ACCCRN

apan asia pacific ADAPTATION NETWORK

PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

IUC INTERNATIONAL URBAN COOPERATION EU - India

Responding to Climate Change : From Reactive to Proactive Action

Reactive (driven by actual perceived climate variability)

Proactive (driven by climate forecasting / future scenarios)

Disaster mitigation/ response (post extreme event)

Disaster preparedness measures (based on current variability)

"Climate proofing" at project level

Mainstreaming climate forecasts into sectoral policies and processes

Strategic multi-stakeholder adaptation and mitigation planning

Key actors:

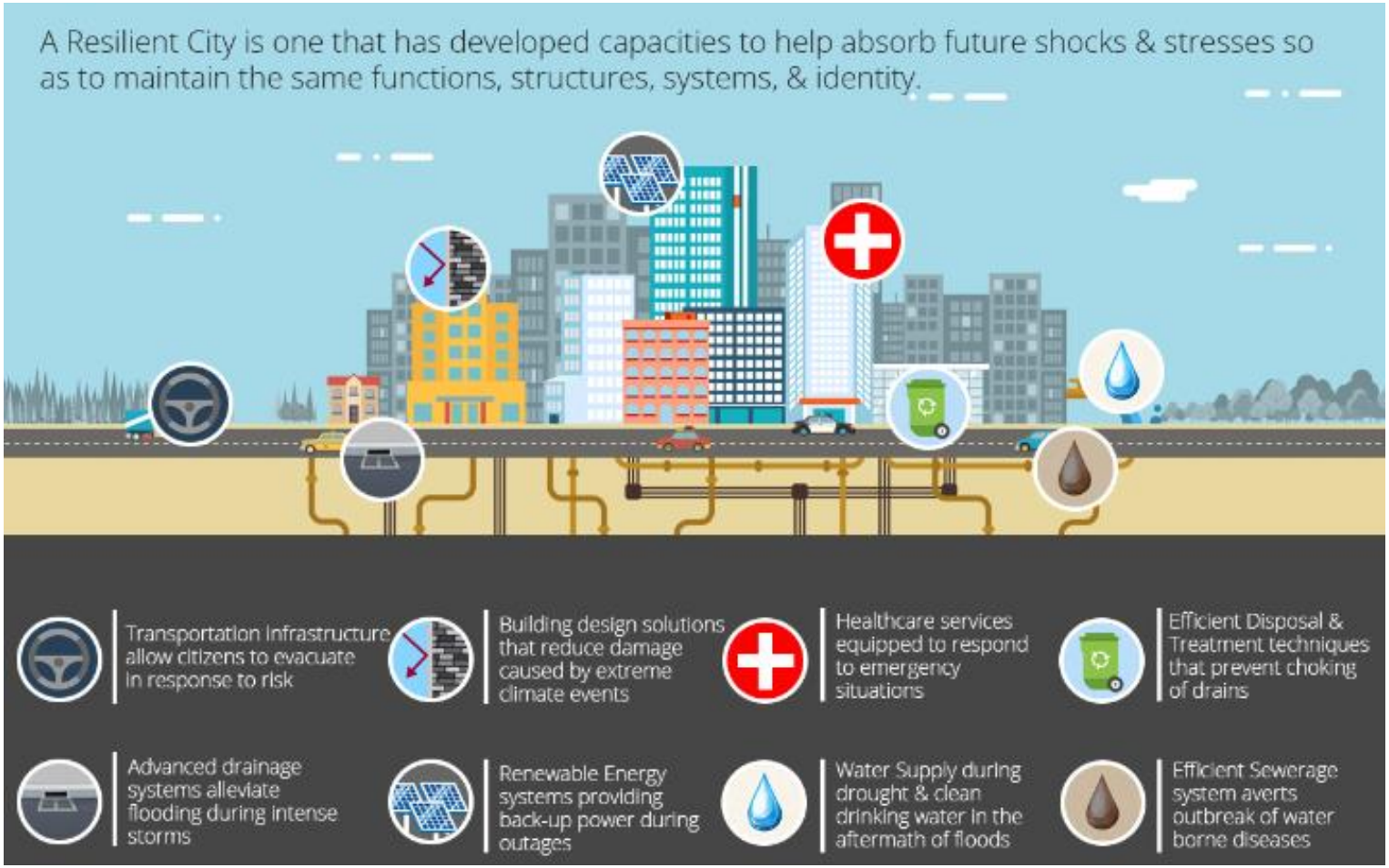
Households, CBOs, aid/relief organizations

Private developers, insurers, development NGOs

Sectoral agencies (environment, water, housing, etc.)

Centralized unit ("climate czar") with strategic planning authority

Climate resilience is not about development in new way….



….it is about adding climate variability and change considerations in the planning and development framework to ensure long term sustainability and preparedness to climate change

Urban Flood Management

Causes

- Increase in extreme rainfall events
- Expanding impervious urban land cover
- Storm water management engineered to meet past rainfall scenario
- Poor maintenance of existing structures/Poor water and sewage management
- Encroachment of river beds and wetlands

Solutions

Green and open spaces

Pervious surfaces

Replacing old infrastructure

How to plan for climate resilient cities? Are there general rules to follow?

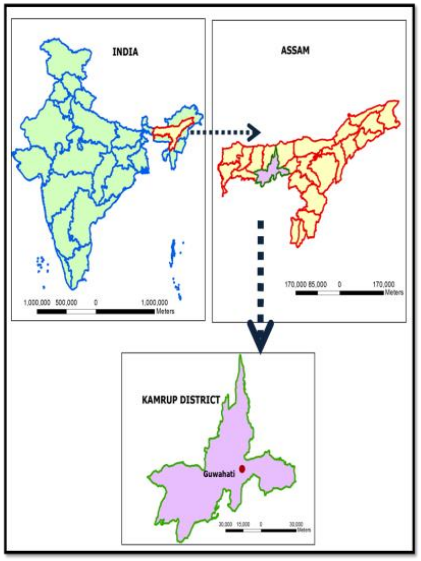
- Key steps:
  - Urban profiling
  - Identification of current and future climate stressors
  - Understanding risks and vulnerabilities
  - Identification of strategies to reduce vulnerability and manage risks- develop resilience
  - Steering governance processes, regulations and institutions for long term benefits
  - Locating finance
  - Involving community throughout

Contextualization is an important element of urban resilience process. It allows for identification of most appropriate process and means for resilience planning considering the geo-topographical, governance, socio-economic as well as climate elements unique to an urban space.

Case studies

- **Preparing a climate resilience plan**
  - Guwahati
- **Mainstreaming Climate Resilience**
  - Uttarakhand
  - Surat

Guwahati



- Location-26°10′ N and 92°49′ E
  Located on the left bank of Brahmaputra River, in Kamrup Metropolitan District
- Population: 11.9 lacs
- Topography- Undulating
- Climate- Humid Sub-tropical
- Capital city of the State of Assam
- Gateway to North Eastern region of India.

MAJOR ISSUES

PUBLIC HEALTH AND SANITATION ISSUES

PRONE TO LANDSLIDES

Source: english.samaylive.com

PRONE TO URBAN FLOODING

Source: ibnlive.in

DRAINAGE ISSUES

DEGRADATION AND ENCROACHMENT OF WETLANDS AND WATERBODIES

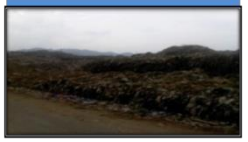
GUWAHATI CITY

Source:http://rahconteur.wordpress.com/2010/12/20/dispur-is-thatpur/

LACK OF SEWERAGE SYSTEM

UNPLANNED AND UNREGULATED GROWTH OF THE CITY

LACK OF WASTE DISPOSAL SYSTEM



UNAUTHORISED AND INFORMAL SETTLEMENTS

Asian Cities Climate Change Resilience Network(ACCCRN)

- Risk and vulnerability assessments
- Climate resilience strategies
- Policy analysis and mainstreaming climate resilience

APPROACH

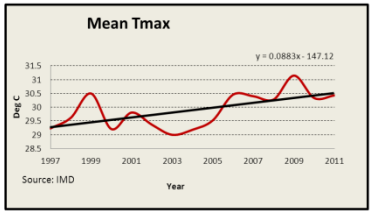
HAZARDS AND CHALLENGES

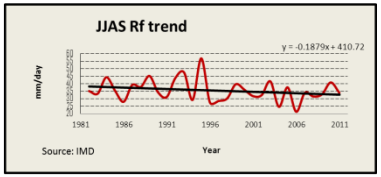
- URBANIZATION AND URBAN SPRAWL
- FUTURE CLIMATIC PROJECTION
- DISASTERS AND EXTREME EVENTS
- PAST CLIMATE TRENDS

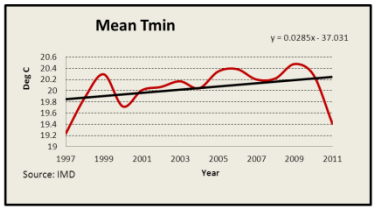
VULNERABLITY

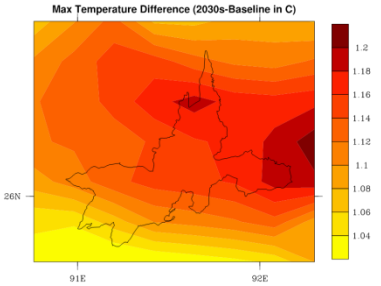
- Urban Services and Infrastructure
- Poverty and Livelihood
- Emergency Response Capacity
- Housing and Urban Planning
- Informal Settlements and Slums
- Ecosystem and land-use

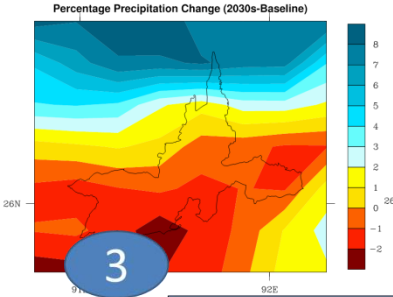
1 CLIMATE PROJECTIONS

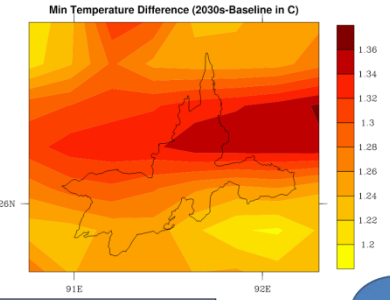




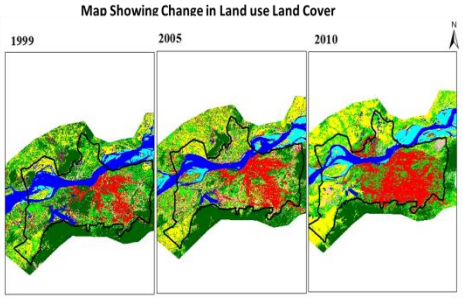


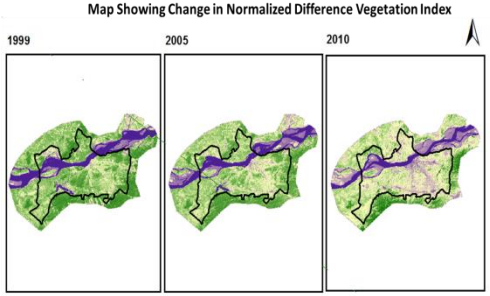


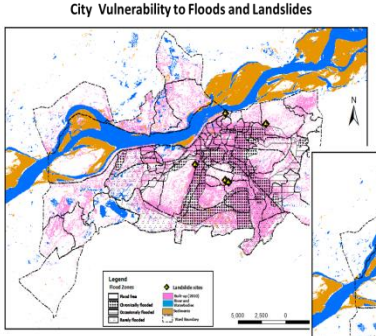


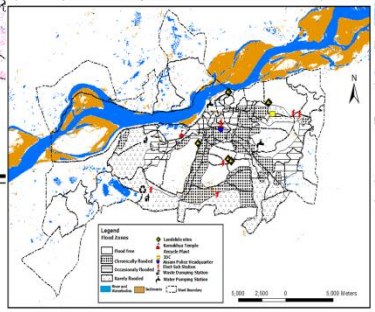


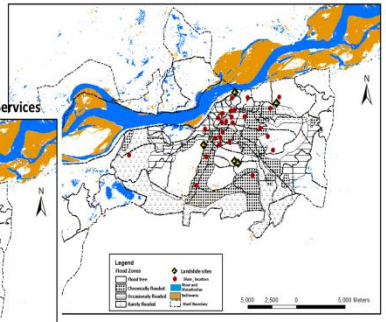
2 VULNERABILITY TO CLIMATIC AND ENVIRONMENTAL HAZARDS



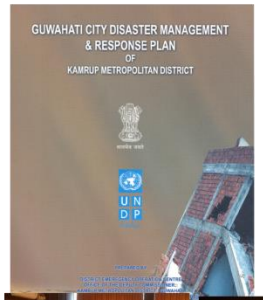


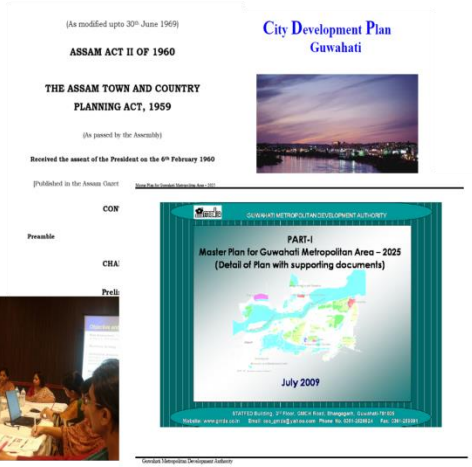




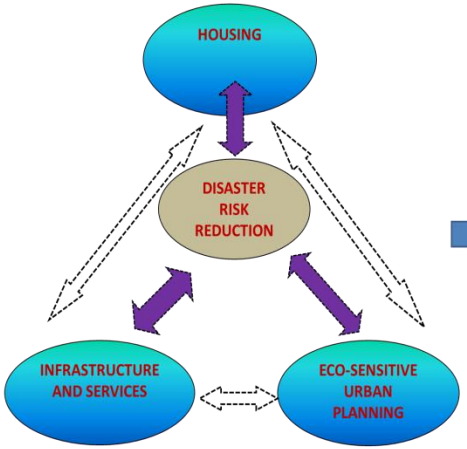


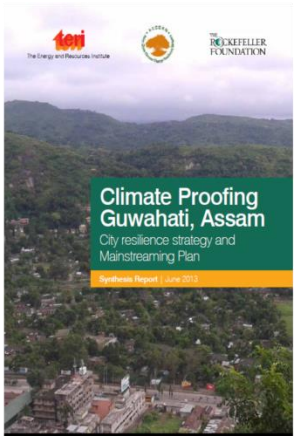
3 INSTITUTIONAL ANALYSIS





4 RESILIENCE STRATEGY FOR THE CITY





Policy Engagement at State level for mainstreaming urban climate resilience – Uttarakhand

OBJECTIVES

- ✓ Facilitating a dialogue on the need to bring forth urban climate change resilience agenda
- ✓ Supporting state governments in identifying entry points and preparing a framework and policy
- ✓ Support state government in identifying capacity needs and institutional support mechanisms to implement resilience projects in cities

Asian Cities Climate Change Resilience Network(ACCCRN)

1. Multi stakeholder engagements
2. State specific proposals
3. Working paper
4. State specific policy briefings
5. Stat level PDFs
6. National Policy Forum
7. Pilot Training at LBS National Academy of Administration
8. Media outreach and engagement

Policy engagements

Policy Road maps:

- ✓ Outline emerging opportunities to foster climate-resilient development
- ✓ Recommend integrating urban resilience in the existing polices and regulations
- ✓ Recommend for the formulation of a specific new policy pertaining to urban climate resilience
- ✓ Include a discussion on institutional and governance mechanisms necessary for this process
- ✓ Overarching recommendations for operationalization

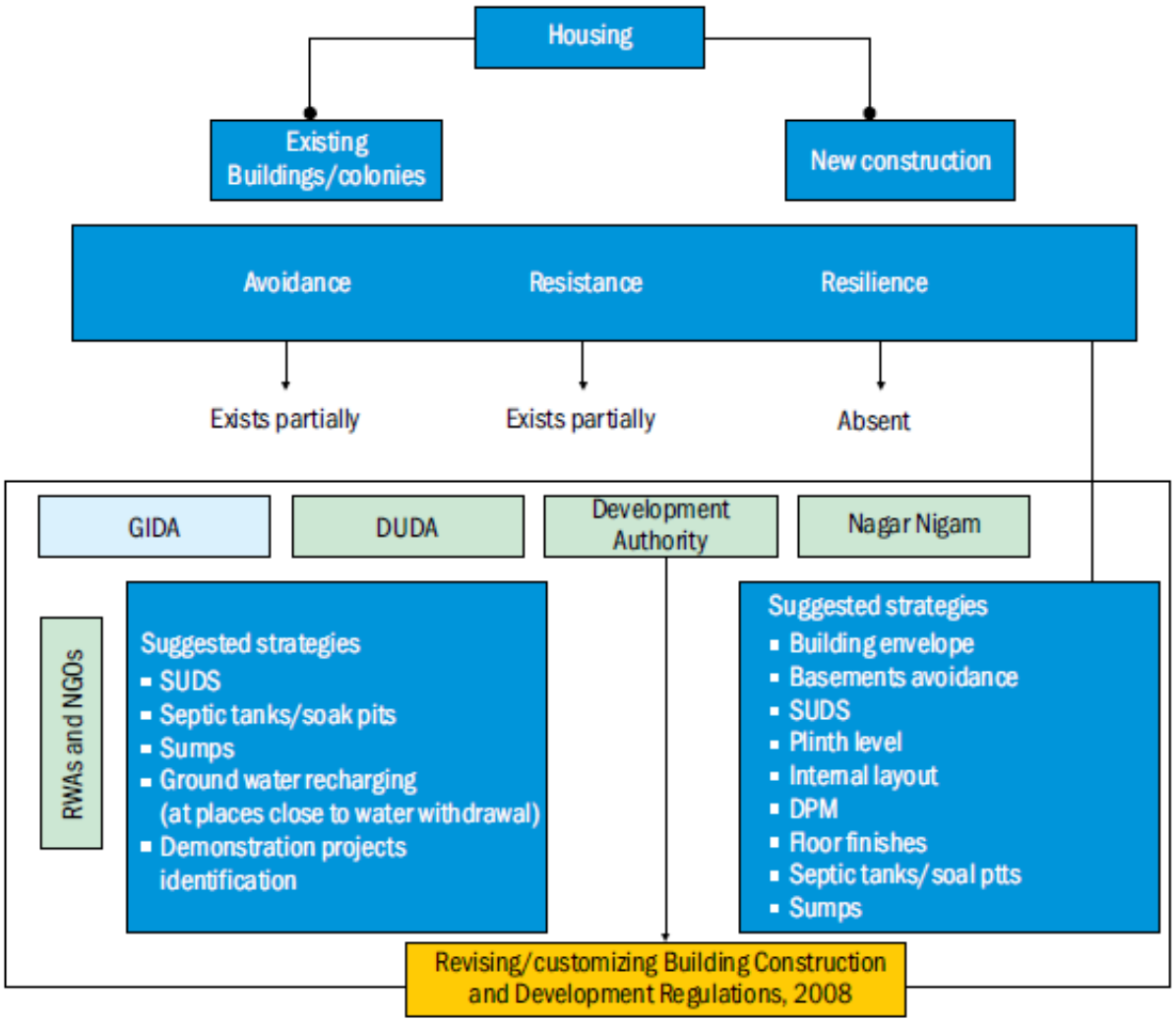


FIGURE 9 TERI's proposal on housing

Surat – Institutionalizing resilience

- Before resilience strategy formulation
  - First meeting lead by South Gujarat Chambers of Commerce and Industries(SGCCI)
  - The constitution of city advisory committee housed in the municipal corporation of Surat
  - Active involvement of Municipal Commissioner and her office and SGCCI throughout the process.
- After resilience strategy formulation
  - Urban Health and Climate Resilience Centre (UHCRC) and the Surat Climate Change Trust (SCCT).

Asian Cities Climate Change Resilience Network(ACCCRN)

http://uhcrc.org/home

Surat – Institutionalizing resilience

SCCT

- SCCT is a city level multi-stakeholder public trust, having its office at the City Engineer's Office
- Formulated with the objective of addressing problems arising out of urbanization and climate change and to facilitate capacity building of Surat to address these challenges

S C C T
Surat Climate Change Trust

UHCRC
URBAN HEALTH & CLIMATE RESILIENCE CENTER

UHCRC

- Establishing the UHCRC in order to provide support to the state and central-level urban health support systems to incorporate climate change resilience issues
- Established within SMC's Health Department, this first-of-a-kind institution in the country aims to address public health and climate change adaptation issues
- In February 2013, the SMC announced that it would allocate INR 10 million to UHCRC for its functioning

Surat – Institutionalizing resilience

CITY RESILIENCE OFFICE

- Chief Resilience Officer (CRO) housed in the Municipal Corporation
- Formulated with the objective of coordinating and facilitating dialogue and partnerships for building urban resilience

PIONEERED BY THE ROCKEFELLER FOUNDATION

100 RESILIENT CITIES

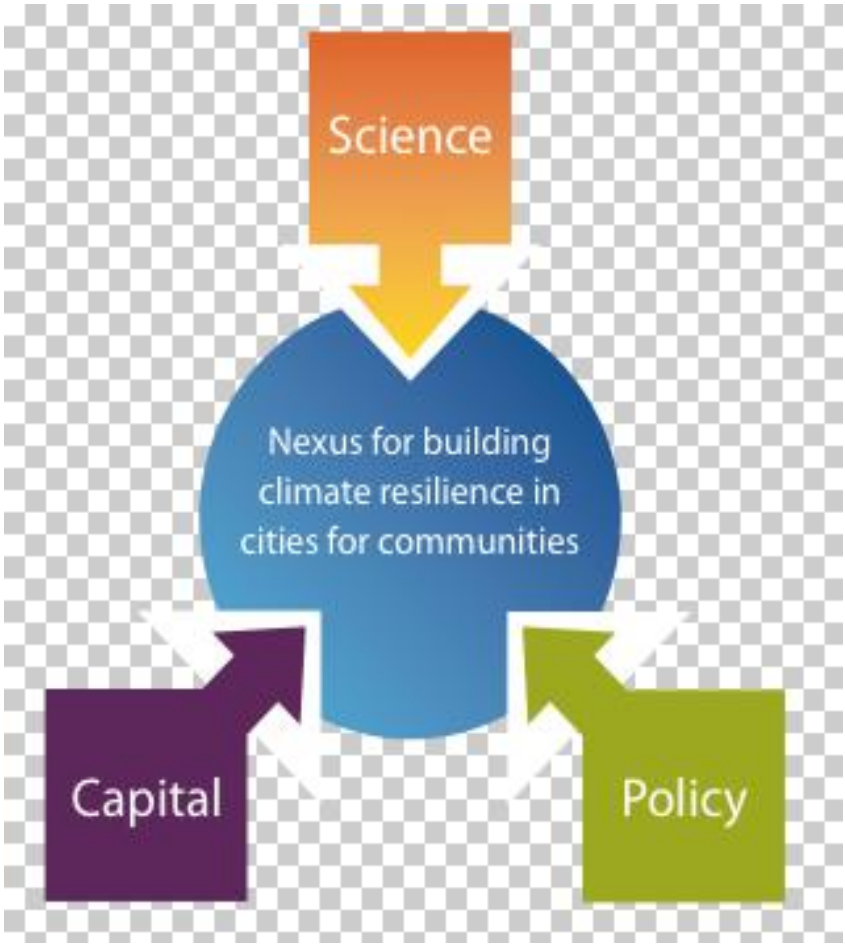
Surat Unveils India's First Comprehensive Urban Resilience Strategy

04.18.2017 | BY 100RC

Created in conjunction with 100 Resilient Cities – Pioneered by The Rockefeller Foundation, the Surat Resilience Strategy will aid the city in fostering a robust and thriving community that is healthy, equitable, economically viable and environmentally sound

Climate Risk Management – Key Challenges and Enablers

- ✓ **Policy and mandate** at national and state level
- ✓ **Integration of climate agenda** with city development agenda
- ✓ **Institutionalization** of urban climate resilience planning.
- ✓ **Local expertise** to generate context specific locally driven solutions
- ✓ **Capacity building and awareness generation** to generate momentum and facilitate action at all levels
- ✓ **Access to knowledge** on climate variability and change
- ✓ **Data management** and updating to facilitate decision making



Source: www.ceres.org

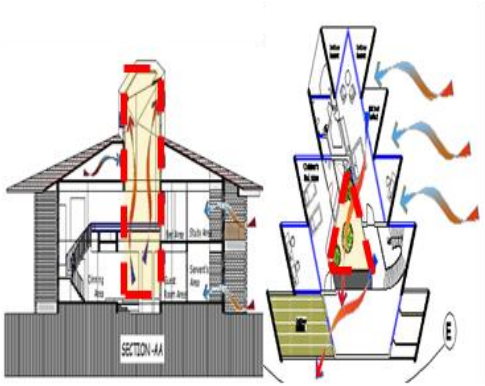
Promoting energy efficiency for carbon neutral and sustainable habitats

Sustainable Building Design

- **Bio Climatic/ Solar Passive Design**
- **Wall Window Ratio (WWR)**
- **Building Fenestration Design**
- **Day Lighting**

Reducing hard paving at site

Enhancing Mutual shading



Increasing cross ventilation

Increasing day light integration

Sustainable Site Planning

- Conservation of natural resources, vegetation & biodiversity
- Prevention of pollution to air, water and land
- Preventing soil erosion and promoting water conservation
- Reducing the heat island effect

Staging of soil

Maintaining Natural Drains at site

Sedimentation tank at Site

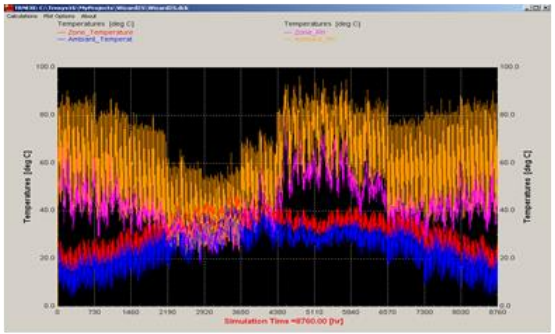
Storing material at site

Energy Performance Optimization

- **Outdoor Lighting Design**
- **Indoor Lighting Design**
- **Heating Ventilation and Air Conditioning (HVAC)**

Automatic switched for outdoor lighting

Improved and energy efficient lighting design



Improved and energy efficient HVAC Design

Reducing the building operating energy dependence by 40%

Renewable Energy Integration

Suggesting Site Specific recommendation to integrate RE at Site- Reducing grid connected energy dependency by minimum 20%

Low Energy Material Construction

STRUCTURAL

- Cement
- Concrete
- Steel

NON-STRUCTURAL

- Bricks
- Glazing
- Façade Treatment

INTERIORS

- Sub-assembly
  - False Ceiling
  - Partitions
- Flooring
- Door, Windows & Frames
- Paints

Reducing embodied energy consumption and embodied co2 emission by 15%

Water, Waste Water and Solid Waste Management

Plumbing Fixtures & Fittings

Water Use Measurement

Water Efficient Landscaping

Rainwater Harvesting

Water Reuse & Recycle

Reducing the building water demand by 30%

Green Rating for Integrated Habitat Assessment

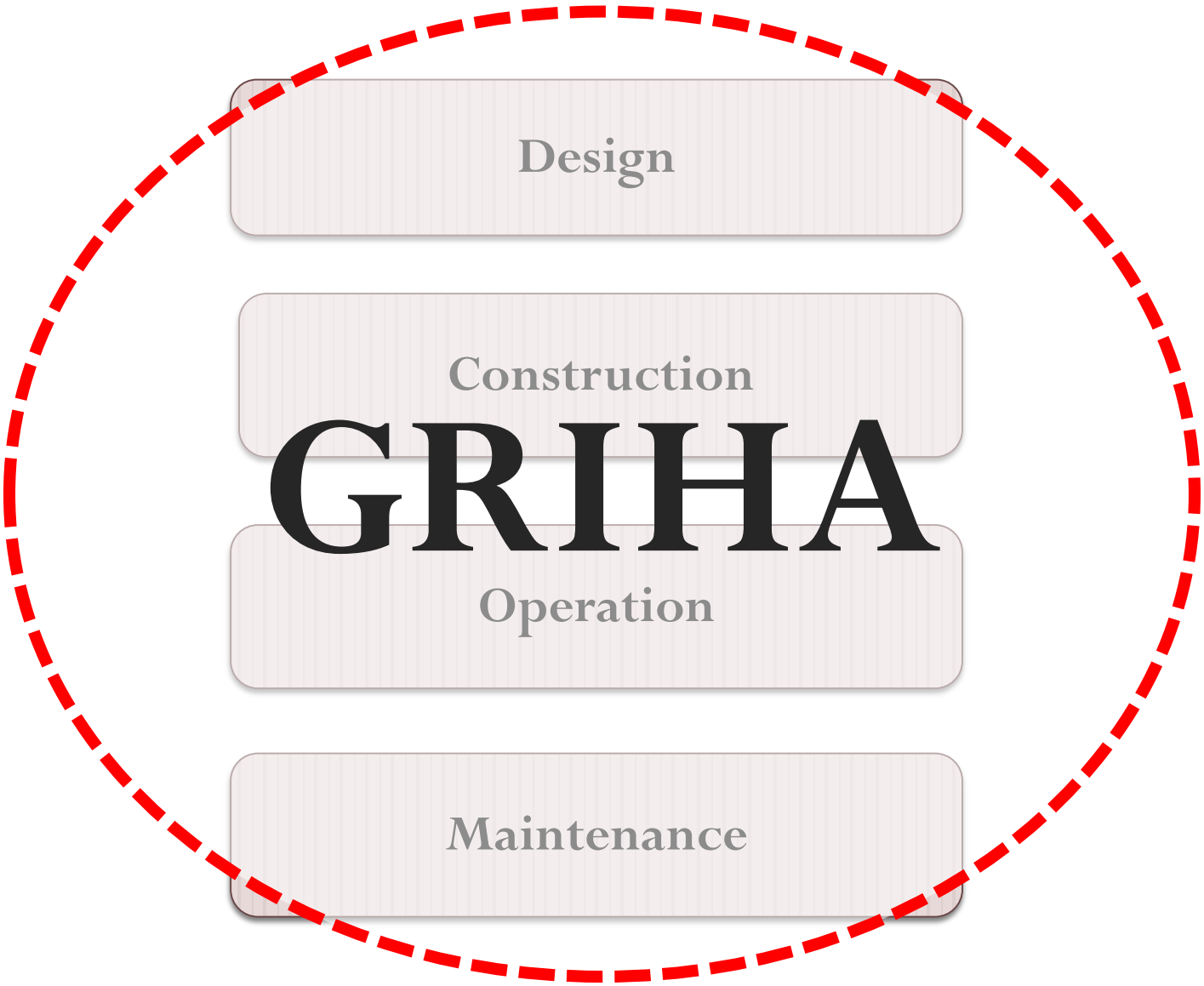
Tool to facilitate design, construction, operation of a green building, and in turn ….measure "greenness" of a building in India

सत्यमेव जयते

GRIHA

What gets measured gets managed

Stages involved in project



GRIHA

Promoting sustainable, green & cost-effective buildings

GRIHA

GRIHA LD

SVAGRIHA

Minimal impact on site and surroundings & Pollution control

17%

Less water demand (in building and for landscape) & recycling and reuse of water

17%

Minimal negative impact on people & Healthy and productive work environment

18%

Solid waste segregation, management & generation of resources from waste

6%

Energy Efficiency & Maximized use of renewable sources of energy

20%

Thank you!

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http://www.teriin.org/resilient-cities/