

IMPACT OF CLIMATE CHANGE ON CITIES

TRAINING PROGRAM ON
URBAN CLIMATE CHANGE RESILIENCE

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- Vulnerability of Cities
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Urbanisation in India

- The urban population in India grew from 286 million in 2001 to 377 million in 2011.
- Nearly 30% of the population in India is now living in the urban areas.
- It is estimated that by 2030, more than 40% of the population would be living in the urban areas.

Vulnerabilities of Cities

- Cities house
 - More than half of the world's population,
 - Trade, businesses, economic activities
 - Built assets
- Cities are the centres of economic growth generating more than 80% of the global GDP
- Urbanization and economic growth go hand in hand.
- Cities also responsible for a significant share of the GHG emissions and consequent climate change.
- Due to high concentration of people, economic activities, business, property and livelihood.

Cities will be hit hard by Climate Change

Imperative to look at the agenda of climate resilience and sustainability in terms of climate change.



Direct Physical Impacts

Sea level rise



Increase of cyclones



Increase of heavy precipitation events



Climate Change
A unique
challenge
for cities.



Increase of extreme heat events & droughts

SEA LEVEL RISE

- Impact on large population and crucial economic assets.
- Impact on coastal and port cities.
- Flooding of wetlands and tidal flats.
- Erosion of beaches, sedimentation of river floors in estuarine zones.
- Decreasing coastal aquifers affect fresh water supply and peri-urban agriculture.



INCREASE IN HEAVY PRECIPITATION EVENTS



Landslides



Flooding

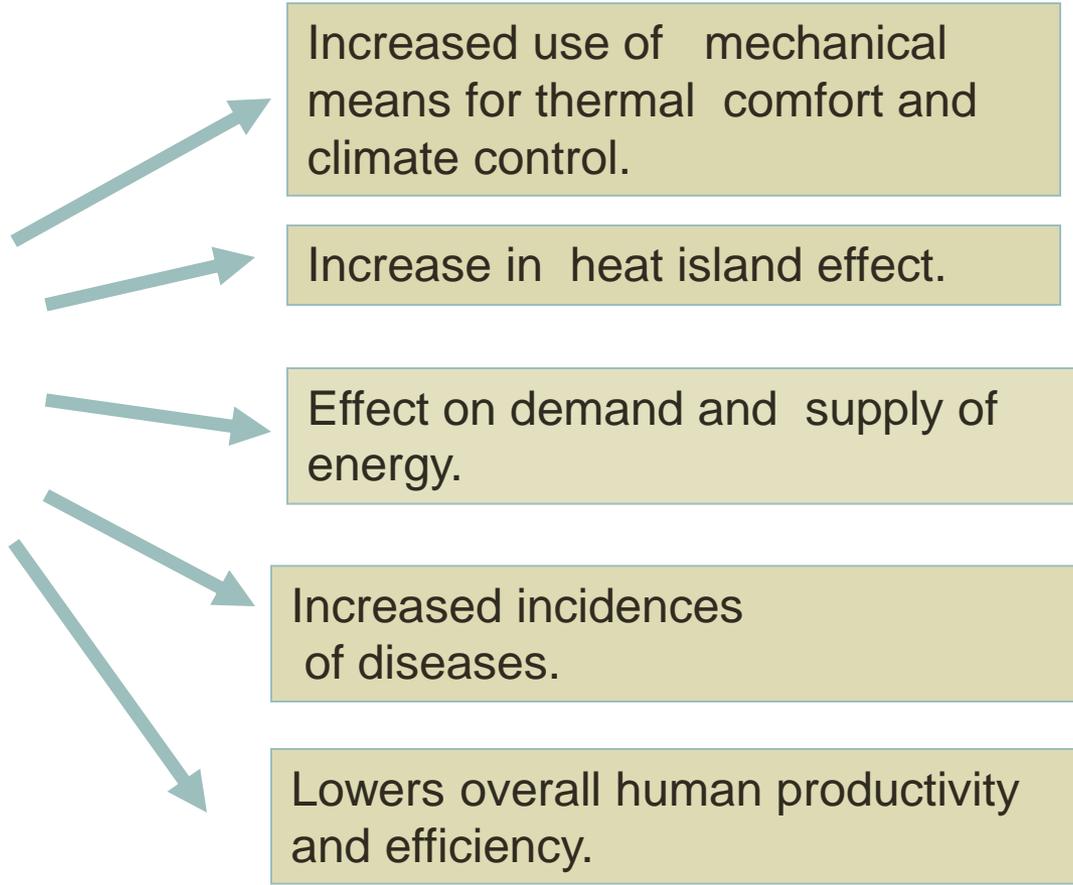


Disruption of Traffic



Massive destruction of lives and property

INCREASE IN EXTREME HEAT EVENTS



INCREASE IN EXTREME DROUGHT AFFECTED AREAS

- Water shortages due to changes in precipitation.
- Water stress due to increased water demand
- Decline of water quality.
- Reduced food supplies.
- Raised food prices & food insecurity.
- Frequent power outages (when hydropower source of electricity)



INCREASE IN FREQUENCY AND INTENSITY OF CYCLONES

- Large scale destruction of lives, property and assets and ecosystems.
- Inundation and Power shutdowns
- Disruption of normal lives, business, and economic activities for several days.
- Heavy financial burden to bring the city back to normalcy.
- Vulnerable to the outbreak of water borne diseases.



Maharashtra's Climate Vulnerability



- The Western Ghats and the Coastal region are among the most vulnerable regions of India from climate change perspective.
- The west coast region exhibits a wide variability in the change in precipitation under the 2030s scenario and Maharashtra, shows an increase in precipitation varying from 4% to over 25% (MoEF, 4x4 Assessment Report)

Maharashtra's Climate Vulnerability

KEY CHANGES AND IMPACTS

Rising temperatures could lead to severe drought, water scarcity, and reduced crop yield.

Increased precipitation resulting in extreme flooding events, drastically reducing the productivity of agricultural industry, promote the presence of waterborne diseases.

Altered Seasonal Cycle widens this maximum rainfall period to both July and August, the threat of localized and severe flooding events is further intensified.

Sea level rise, a 1m rise in sea level would put more than 1.3 million people at risk, coastal communities face a serious threat from rising sea levels.



Associated Impacts on Urban Systems

- Complex systems with extensive interlink ages.
- Impacts on a broad spectrum of city functions, infrastructure and services:
 - Impacts on economic activities
 - Impacts on physical infrastructure
 - Damage of lives and property
 - Impacts on urban poor
 - Health
 - Air Pollution
 - Nutritional issues
- Aggravates the existing stresses in the city
- Disruption of physical infrastructure impairs the functioning of the city.
- Eventually impacts living conditions, economic activities and livelihood of the city.
- Damage particularly severe in low lying coastal cities where most of the worlds' largest cities are located



Cities need to...

- Identify risks and vulnerabilities
- Tackle the impacts of climate change and direct the focus on developing climate resilient urban systems.
- Consider both current and future climate risks as well as other likely changes in the urban environment for climate resilient urban planning

- There is a strong need therefore, to incorporate climate resilience considerations into
 - City systems (Infrastructure, services, sectors)
 - City planning (Development norms, land-use planning)

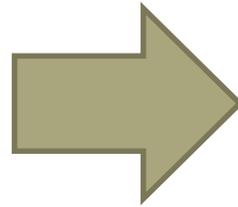
Resilient cities in the light of climate change should be able to develop plans for future development and growth bearing in mind the climate impacts that the urban systems are likely to face*.

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

Cities across the world are engaging in planning for climate resilience.....

.....transforming their systems to address climate variability and change without compromising on present development challenges.

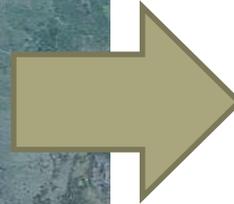


Sea walls, bunds and dykes



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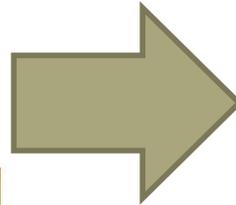
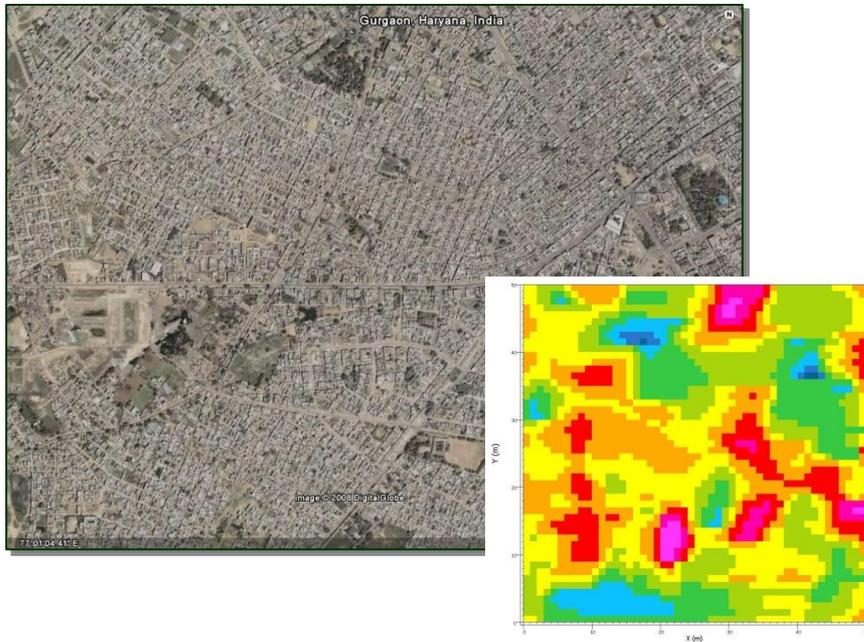


safe and affordable housing



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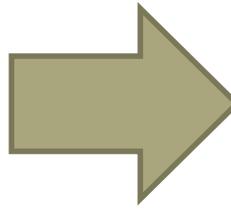
.....transforming their systems to address climate variability and change without compromising on present development challenges.



cool roofs for thermal comfort

Cities across the world are engaging in planning for climate resilience.....

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urban greenery

How are climate resilient cities different or better?

- Climate resilient cities have the capability to reduce and manage the negative impacts of climate change because they have planned and factored these changes in their development goals and planning by:
 - Utilizing climate information (past and future) to identify climate stressors typical to their cities/region
 - Preparing and implementing strategies to reduce vulnerability of population and city systems.
 - Adapting to change, preparing and responding to disasters, mitigating GHG emissions

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

- **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

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



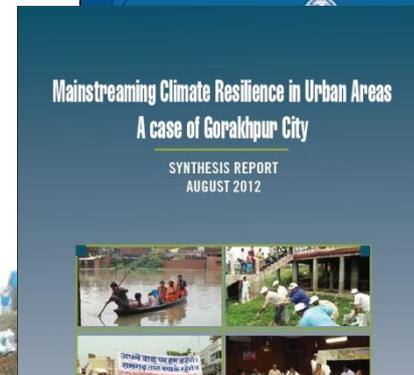
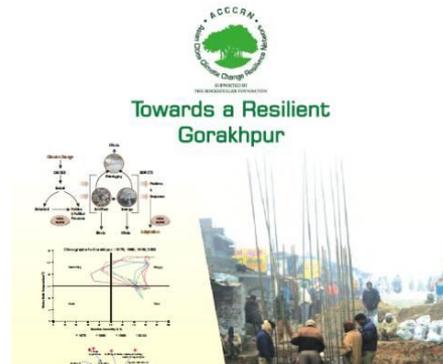
International Programs supporting Resilience

- Asian Cities Climate Change Resilience Network
- Cities Development Initiative of Asia
- UNHABITAT's cities and climate change initiative
- Rockefeller Foundation's recent 100 resilient cities program
- USAID's Climate Change Resilient Development(CCRD) program have been working towards addressing knowledge gaps with improved mechanisms to support cities to be climate resilient.
- Global Resilience partnership
- ADB's Urban Climate Change Resilience Partnership(UCCRP)

.....to name a few

Indian cities planning for resilience

- Surat, Indore , Gorakhpur , Guwahati, Shimla, Mysore, Bhubaneswar under ACCCRN
- Kanpur and Meerut under WWF initiative
- Delhi and Mumbai under Clinton Foundation Initiative
- Climate roadmaps for 41 Indian cities supported by ICLEI-SA
- Surat, Bangalore, Chennai under 100 Resilient Cities

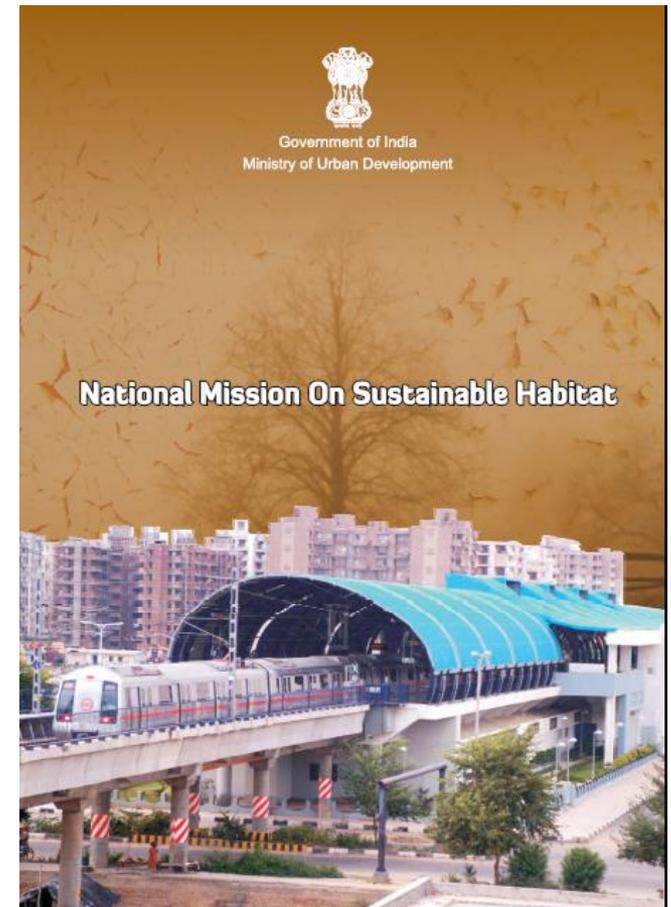


- Need to scale up these interventions
- Learn from each other
- Mainstream policies

National Programs –existing and Future opportunity

- **National and state level:**
 - National Mission on Sustainable Habitat
 - State action plan on climate change
 - National schemes like UIDSSMT, RAY, BSUPS
 - Smart cities program

- **Local level**
 - Master planning process
 - District disaster management plans
 - Zoning regulations/ building bye laws
 - CDPs/ DPRs



Challenges

- Lack of understanding of the impacts of climate change and the fact that adaptation interventions are best employed and covered at local level.
- Creating awareness amongst the local government that adaptation is synonym to their functions and their development goals
- Integrating adaptation at municipal level would be difficult because of the perception of contest for budget.
- Lack of capacity within the local government .
- Development plans of cities do not factor climate change related factors in a targeted way.
- Translation of global impacts of climate change to local level (downscaling) has been missing
- Lack of data and modeling framework at the city level

Need for a robust 'Institutional and Policy Arena' To be made available to support city resilience building

Key Enablers

- ❖ **Policy and mandate** at national and state level
- ❖ **Integration of climate agenda** with city development agenda
- ❖ **Institutionalization** of urban climate resilience planning.
- ❖ **Strong Political leadership** at local and state level
- ❖ Use and involvement of **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

Mainstreaming Resilience planning

- Would enable including climate variability and change considerations in the urban planning and development framework
- Would ensure addressing current and future risks and hazards for long term sustainability

THANK YOU