

Second Indo- German Conference on Research for Sustainability
27-28 April 09, Bonn, Germany

“Cities Adaptation for Climate Change- Action at the Local
Governance Level”

Divya Sharma

Transport and Urban Development Area
Energy Environment Policy Division
The Energy and Resources Institute (TERI)
New Delhi, INDIA



I thank the German Federal Ministry of Education and Research for having granted this opportunity to me to travel to Bonn and make this presentation

Structure of the presentation

1	Why Cities
2	Climate change & cities
3	Adaptation
4	Local Level Action
5	Adaptation for Indian cities
6	Governance Framework for Adaptation

1

Why cities

2

Climate change & cities

3

Adaptation

4

Local Level Action

5

Adaptation for Indian cities

6

Governance Framework for
Adaptation

Why Cities?

- **Cities are energy intensive and transform land use in and around them**
- **Cities play an important part in the overall phenomena of emissions of green house gases, in turn leading to global warming and subsequent climate change as they house great industries, automobiles and vehicles.**
- **Our world is increasingly becoming urban**
- **The growth of our cities is inevitable in the near future. Technological advances, comfortable lifestyle, new and better job opportunities and a popular notion that cities can always sustain ones life will continue to lure more and more people towards cities.**

The need is to regulate the growth and the working of a city such that development is environment friendly and sensitive.

Why Cities? **C**ities Source GHGs

- **C**oncentration of carbon Dioxide has been attributed to burning of coal, oil and gas and land use changes (*Fuel to run industries and vehicles; energy to fulfill the growing demands of the city; and the land use changes to support ever increasing population and development activities for a urbanized settlement*).
- **M**ethane is an outcome of agriculture and leakage and use of natural gas.
- **O**zone is the byproduct of vehicle exhaust

1

Why cities

2

Climate change & cities

3

Adaptation

4

Local Level Action

5

Adaptation for Indian cities

6

Governance Framework for
Adaptation

Some Facts

- 1/2 the globe is urban today
- 3/4th CO₂ released in the world is from the urban areas
- Cities are responsible for 26% of direct greenhouse gas emissions

➤ Research from all over the world has proved that urban development is a key contributor to climate change

➤ Current urban development patterns encourage sprawling and auto dependent development leading to increase in the GHG emissions and consequent climate change

Risk from climate change and what causes these risks

- **F**looding Risks- Sea level Rise, Glacial Lake outburst, Rainfall extremes
- **S**ome regions would face reduced rainfall
- **I**ncrease in incidences of extreme events
- **H**eat waves-Particularly enhanced heat island effect
- **I**mpact on coastal cities – loss of coral reefs, beaches, loss in tourist activities, floods, storms
- **T**ropical areas with warmer temperature would be facing incidences of malaria, dengue and filariasis.

Poses challenge to resource management and infrastructure planning and urgency of the need to adapt city level operations to both current climate variability and future climate change.

1

Why cities

2

Climate change & cities

3

Adaptation

4

Local Level Action

5

Adaptation for Indian cities

6

Governance Framework for
Adaptation

Adaptation

Adaptation is adjustment in natural or human systems in response to actual and expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities (IPCC 2007)

➤ **Types of Adaptation Intervention(IPCC 2007)**

Anticipatory

Autonomous

Planned

➤ **At an Operational level(Hannah,2007)**

Technological

Behavioral

Policy

➤ **Areas of intervention**

Land use

Infrastructure

Transport

Social security

Economic security

Adaptation

Cities need to;

- **Relocate residential population and economic activities to less vulnerable parts of the urban area**
- **Channel investments and new land-uses towards less vulnerable areas**
- **Assist poor and informal settlements to vacate vulnerable areas**
- **Sea surge protective barriers and dams**
- **Reconstruction of harbor facilities**
- **Flood barriers and tsunami prevention facilities**
- **Land Use Planning and building codes that internalize climate change constraints**

Cities would require:

- **Use of vegetation and light colored surfaces-reduce heat island effect**
- **Use of suitable design techniques to reduce energy consumption**
- **Climate proofing of infrastructure systems**
- **Protection/relocation of waste management facilities**
- **Hydro-geological consolidation work -flood defense system**
- **Emergency preparedness mechanisms**
- **Health facilities**

1

Why cities

2

Climate change & cities

3

Adaptation

4

Local Level Action

5

Adaptation for Indian cities

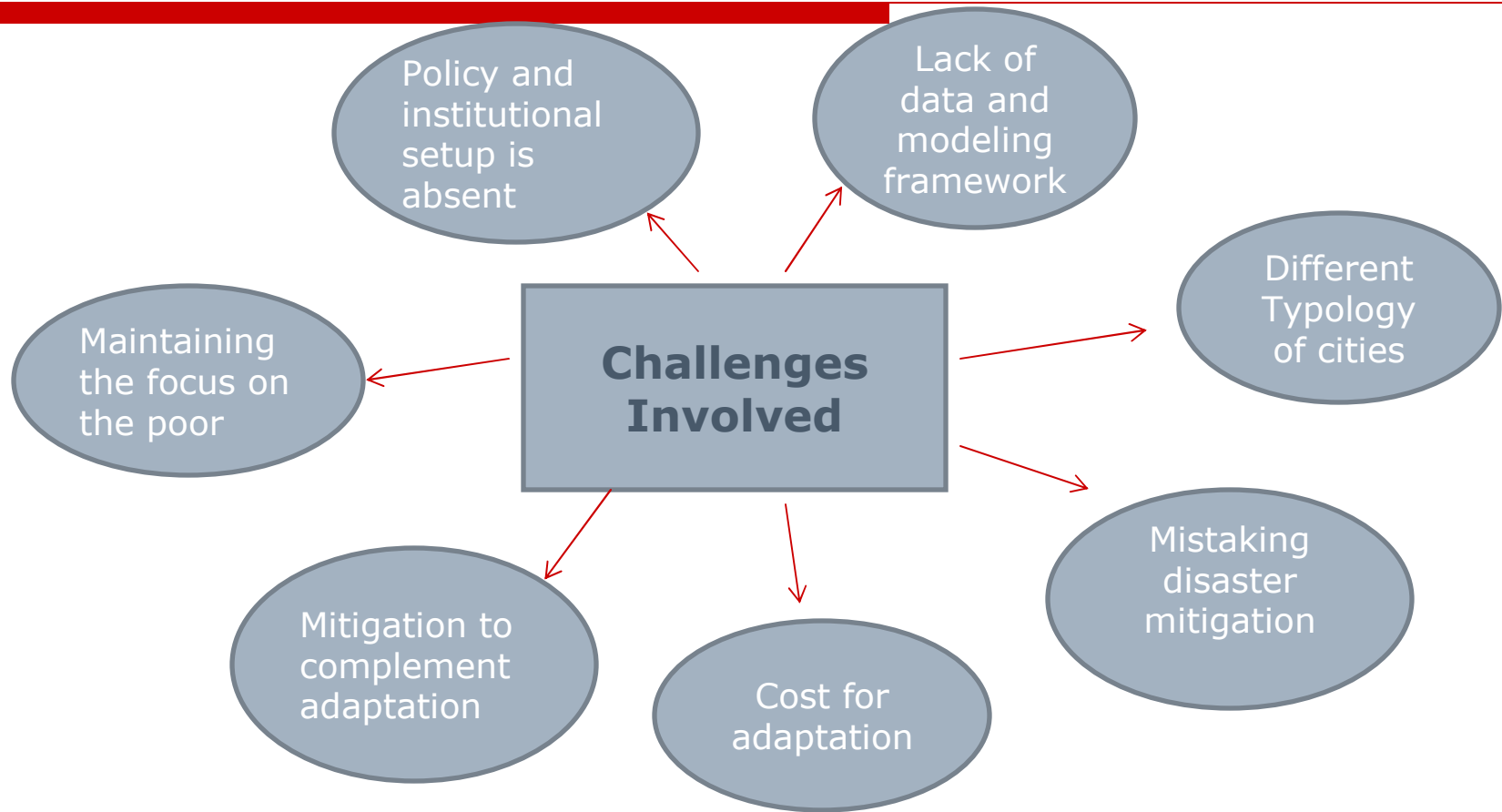
6

Governance Framework for
Adaptation

Local Level for Action

- Mitigation VS Adaptation
- The issue of institutional setup to support Adaptation
- Spatial and Societal scales for intervention
- Municipal Scale?

Local Level for Action



-
- 1 Why cities
 - 2 Climate change & cities
 - 3 Adaptation
 - 4 Local Level Action
 - 5 Adaptation for Indian cities**
 - 6 Governance Framework for Adaptation

Adaptation for Indian Cities-

Risk due to climate change

- **Expected 500 million people to be added in 7000 urban settlements by 2060(Mc Grahan et.al, 2007)**

- **Predicted temperature rise would alter monsoon system.**
 - 5 -25% decrease in semiarid and drought prone central India.(Revi et al, 2005)
 - Decline in winter rainfall in Northern India(Rupa Kumar 2006)
 - Extreme precipitation events near the west coast(including Mumbai) and central India (Rupa Kumar 2006)

- **Sea Level Rise**
 - A mean SLR upto 0.8 meter over the century(Agarwal,2001)

- **Expected cyclones and storm surges**

- **Glacial Melt**

Adaptation for Indian Cities- Vulnerability

- **Increased incidences of drought –increased seasonal migration to urban areas,adding to the vulnerable population**

- **Extreme precipitation led floods have caused large economic losses , particularly in State of Gujarat, city of Mumbai**

- **Earlier such events caused great losses of people, buildings, lifeline infrastrcuture and economic assets across 10 coastal and 6 inland districts including number of towns and cities(TARU,2000)**

Adaptation for Indian Cities-

Vulnerability

- **Cyclones and storm surges, could have devastating impact on coastal metropolitan cities of Mumbai and Chennai, million plus cities of Vishakhapatnam, Surat, Bharuch, Bhavnagar, and Jamnagar**
- **Vulnerable stretches to sea level rise –lie along the western coast , Mumbai, parts of Konkan coast and South Kerala.**
- **Significant settlements would be lost in the deltas of Ganga, Krishna, Godavari, Cauvery and Mahanadi on the eastcoast**

Current Plans and Policies in India

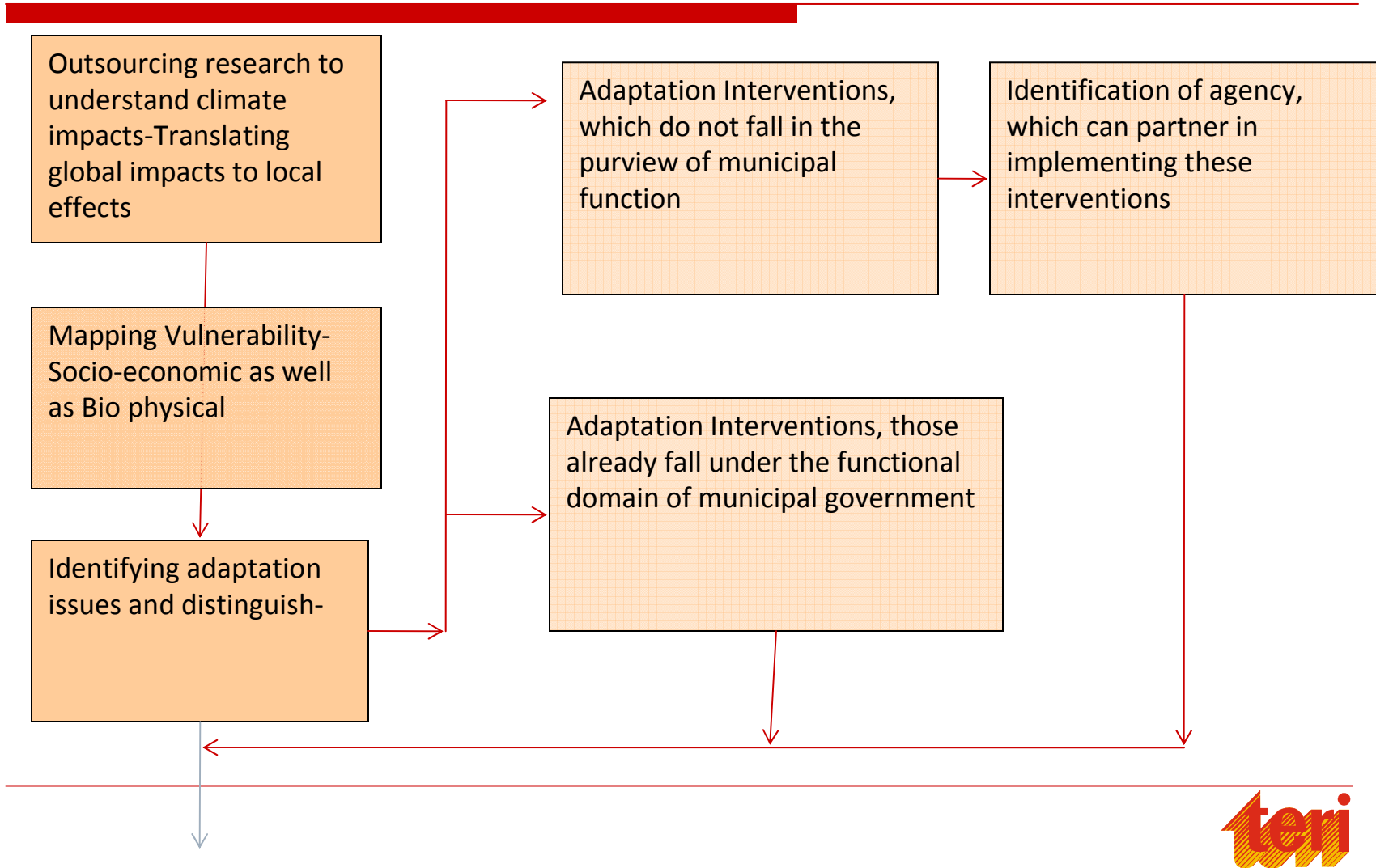
- **ALGAS**
- **Climate impact assessment study(DEFRA)**
- **India's NATCOM**
- **Disaster Management at Central and State Level**
- **JNNURM-The Urban Renewal Mission**
- **National Action Plan for Climate Change(NAPCC)**

Institutionalizing Climate Adaptation in Indian Cities

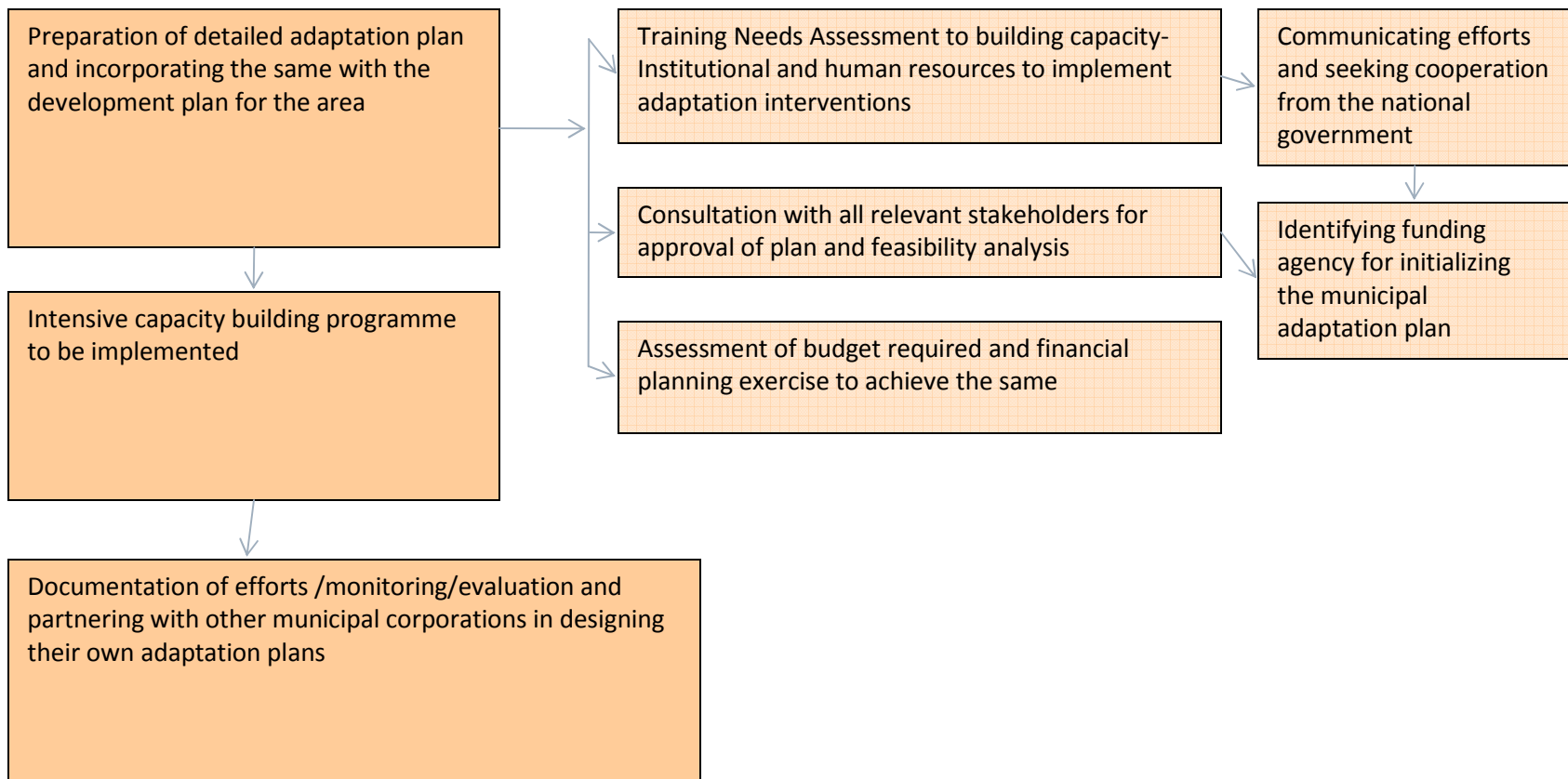
- Lack of understanding of the impacts of climate change and the fact that adaptation interventions are best employed and covered at local level.
- Creating awareness amongst the local government that adaptation is synonym to their functions and their development goals
- Translation of global impacts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

-
- 1 Why cities
 - 2 Climate change & cities
 - 3 Adaptation
 - 4 Local Level Action
 - 5 Adaptation for Indian cities
 - 6 Governance Framework for Adaptation**

Understanding Impacts and assessing Interventions



Mainstreaming Adaptation in local governance



Way Forward

- Need to understand what adaptation planning entails and how its components are in line with the development priorities of an urban area
- Adaptation planning at city level is not a hindrance rather it is an essential component of sustainable development and growth
- National Governments should come forward and motivate city governments in taking up adaptation planning
- State government could play a pivotal role by introducing adaptive planning in one or more cities and then extending the same to others

Thank You !
divyas@teri.res.in