



Climate Impact, Risk, Vulnerability and Adaptation

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Integrated Research and Action for
Development (Iradе), New Delhi

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Introduction

Climate Change: Nature of Problem

- Impacts can be avoided, reduced or delayed by mitigation, but adaptation is also necessary
- Physical impacts as rising temperature, rising sea levels, extreme events
- Natural balance of local and global ecosystems infringe on human settlements
- Levels of vulnerability due to Inequity





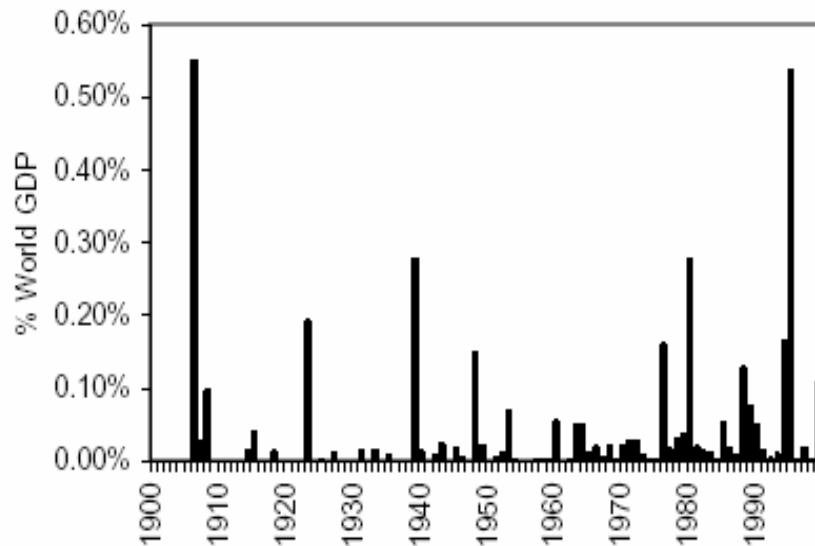
Adaptation to Major Risks

- Temperature and precipitation variability
- Sea-level rise
- Environmental health risks
- Disasters and Extreme Events
 - Droughts
 - Floods and extreme rainfall
 - Cyclone and storm surge

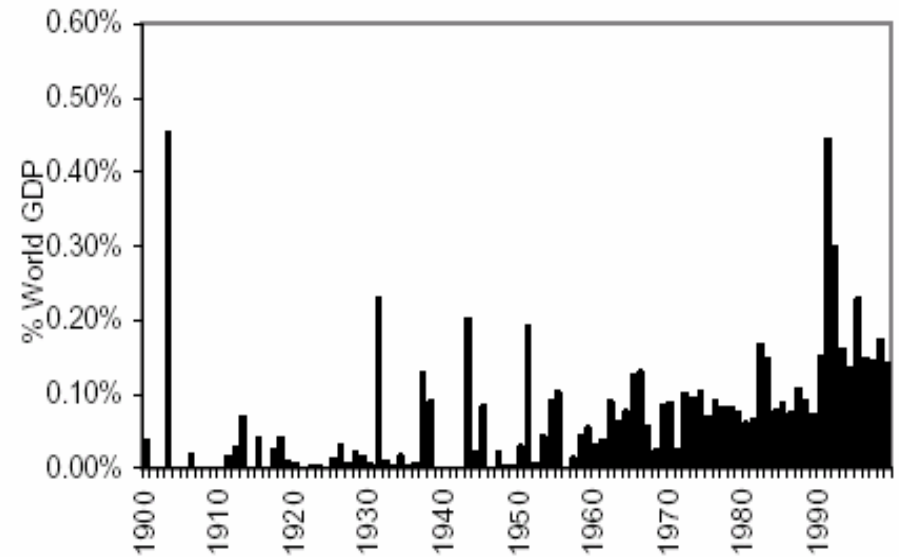


Increasing Vulnerability

Earthquake- and volcano-related disaster damage

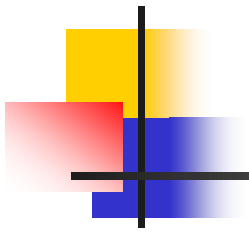


Climate-related disaster damage



Data sources: CRED 2004; Maddison, 2001





Adaptation

Natural Resources and Ecosystems

Risks & vulnerability

Agriculture

Water Resources

Urban Areas

Health

Basic Needs & Livelihood

Forests & Mountain Ecosystem

Coastal Zones

Extreme events





Agriculture and Food Security

➤ *Food security*

- Some project up to a 9% decrease in potential agricultural land by the 2080s and a reduction in yield of up to 10 and 18% for cereals and maize, respectively, by 2050.
- Poor engage in subsistence food production.
- Developing countries most affected
- Weak institutional capacity and precarious financial situation.
- Credit and capacity needed for farmers to engage adaptive farming practices.
- Small farms owned and operated by the poor, often women, who use locally-hired labour.



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Water and Other Resource Shortages

Climate change may exacerbate existing shortages of water, like -

- Women, largely responsible for water collection
- Water quantity
- Accessibility: time-consuming collection.
- **40-60% reduction in the water level** in the large river basins of the Niger, Senegal, Lake Chad and in South Asia (UNEP).
- Water harvesting and storage systems to deal with shortages will be needed.

Strengthening water resources and delivering systems will be done best with women's help and involvement.



Coastal Zones

- Rise in sea level affects fishermen and fisherwomen
- Seawater gets into fresh water.
- Livelihoods are affected
- Lands inundated
- Infrastructure is damaged, such as road and houses.
- Large scale migration is expected.
- The National and the State Governments have to build embankments to protect the population and infrastructure in danger.

Poor can be protected and also help protect themselves.



Forests

- Forest resources a major source of livelihood for an increasing number of poor.
- Source of nutritional and food supplement providing **alternative nutrients, minerals** and **vitamins** to the usual staple food.
- Shortage of non-timber forest products (NTFP)
- **Malnutrition**
- **Infant mortality.**
- Forest management programmes in Burkina Faso, Mali, Nepal and India contributing to agricultural and community forest management.





Risks and Insurance

- Hundreds of new insurance initiatives to tackle climate change and rising weather-related losses in the U.S. and globally.
- However, most insurance companies are still not focused on the climate change issue and fewer still are offering climate-related products.
- **Climate Insurance:**
 - Crops insurance – Draughts/Floods
 - Buildings & Insurance – Draught/Floods
 - Health Insurance - Heat stress, vector born diseases
 - Life Insurance

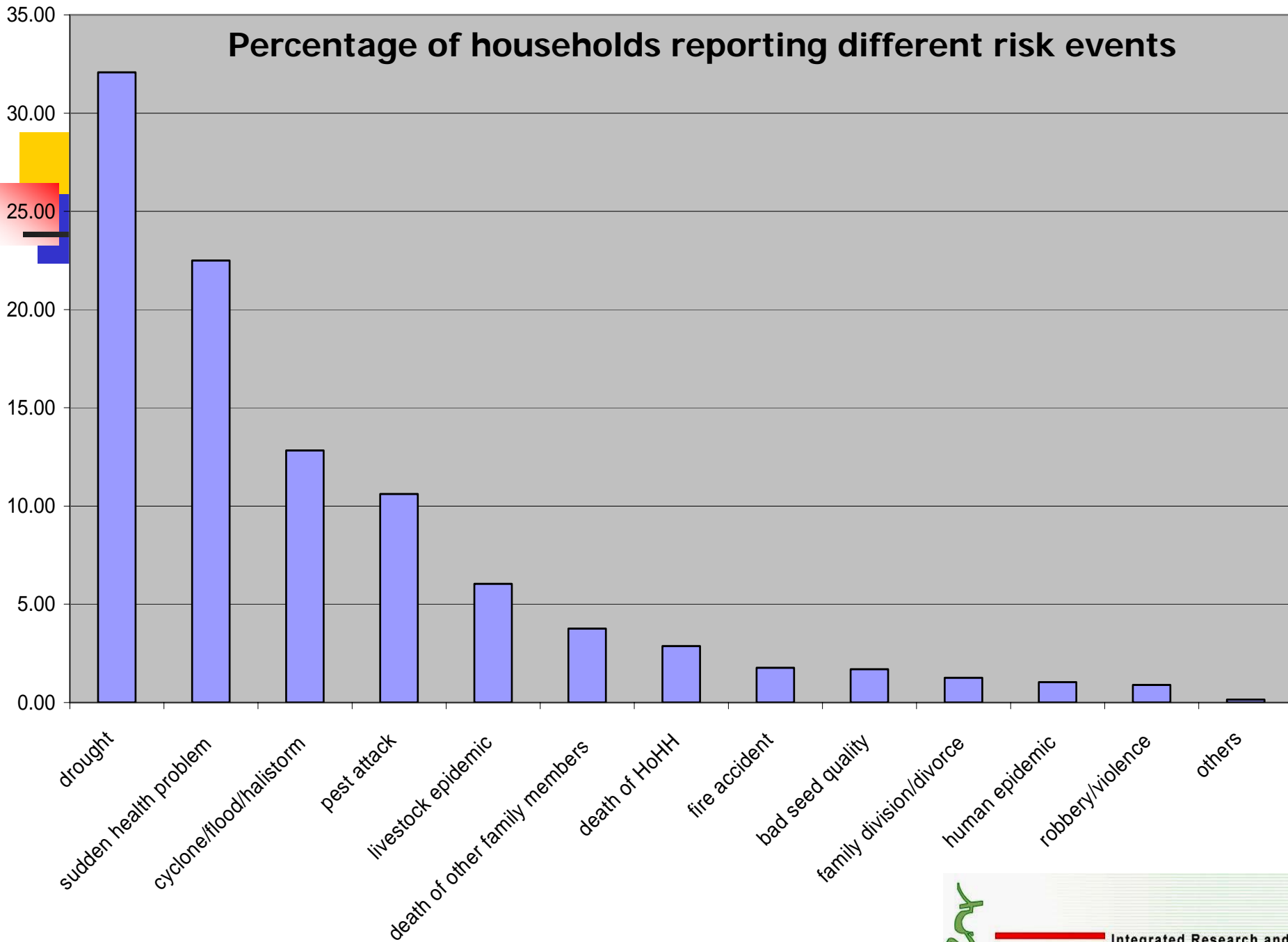




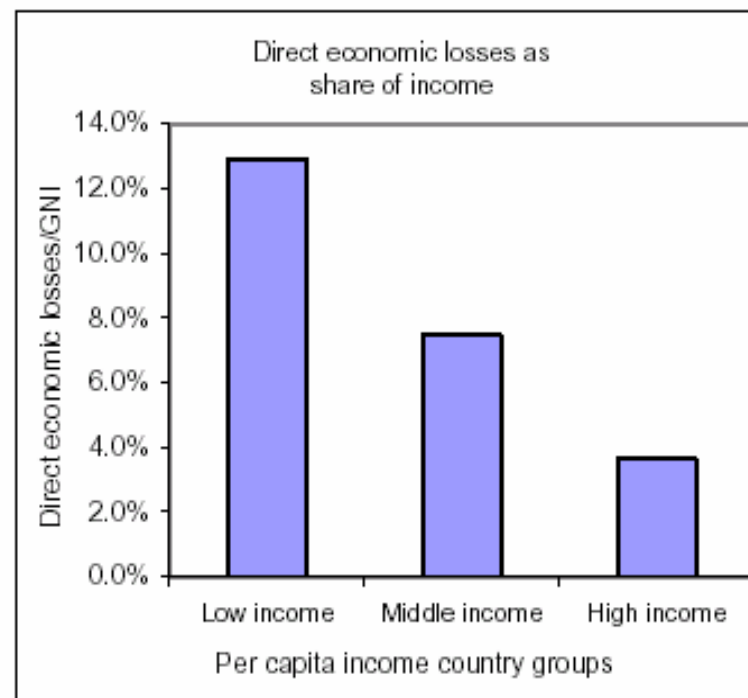
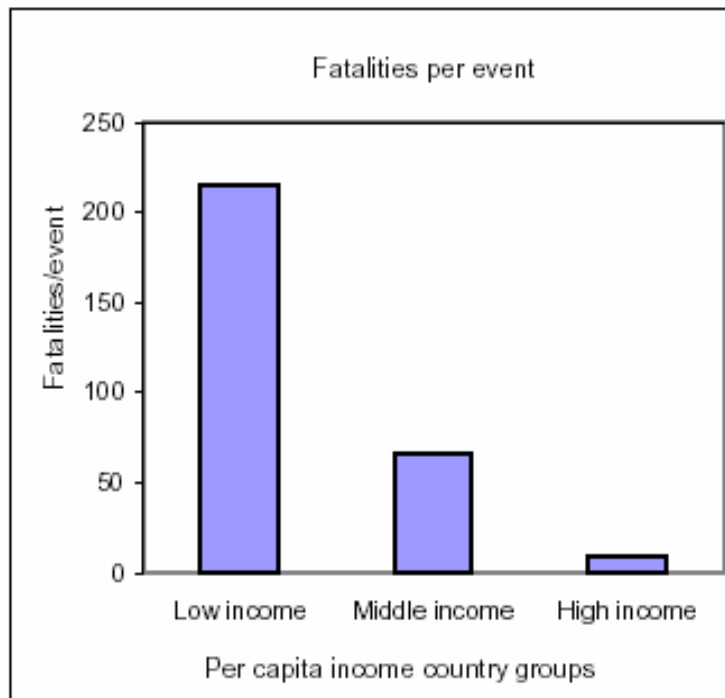
Climate change and poverty

- Climate change more likely to affect more likely to those who hardly emit.
- People without electricity or LPG, Kerosene etc. likely to suffer more from heat stress, shortage of food, fuel and water.
- Fundamental problem – equity in terms of emissions, impacts and abilities to deal with it.

Percentage of households reporting different risk events



Poor suffer disproportionately



Source: Munich Re, 2005



Increasing extreme events – an example of Orissa, India

- In the last four years, calamities have claimed more than 30,000 lives.
- Monsoon of 2001 lead to the worst ever flood recorded in Orissa in the past century. Suffered one of its worst droughts in the same year, affecting earlier drought free districts like Sundergarh and Kendrapada.
- The frequency of cyclones has increased on the Orissa coast. In 1999, two cyclones hit the state in quick succession.





Cities and Climate Change



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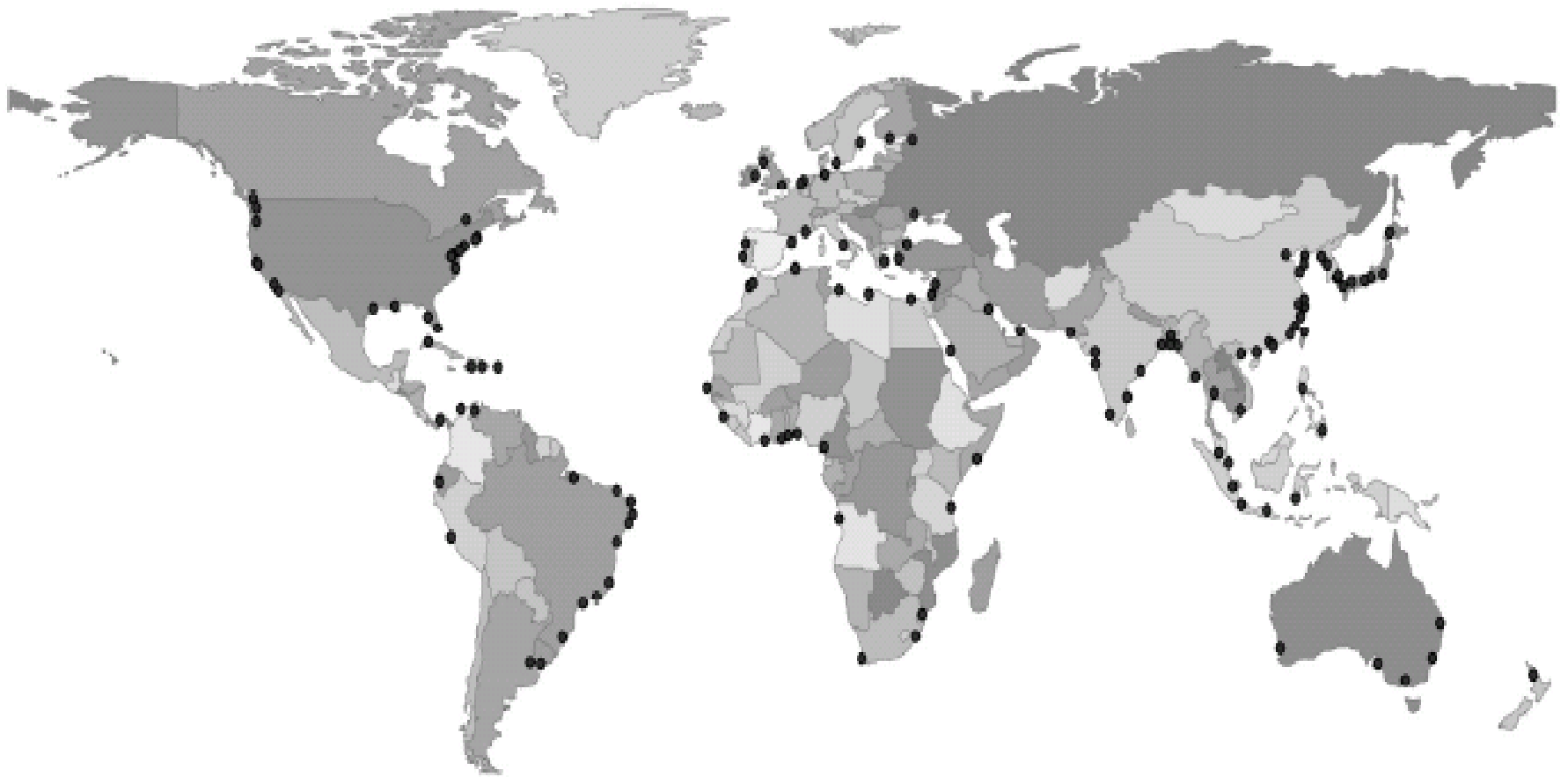
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Why Cities Matter?

- In 1800, 2% of world's population lived in cities. Currently, it is 50% and heading towards 60% by 2030. Urban populations are expected to grow by **2 billion** people within 30 years
- Cities in **developing countries** are expected to absorb 95 percent of this increase.
- Over 1 billion people live in urban **slums**. In the least developed nations, slums house 70% of the urban population.
- Droughts and floods in rural areas have increased **migration** to cities. By 2030, if nothing is done, slum population will reach 2 billion.

136 PORT CITIES around the World have more than 1 Million Inhabitants (2005)



RANKING PORT CITIES WITH HIGH EXPOSURE AND VULNERABILITY TO CLIMATE EXTREMES By R.J. Nicholls (1), S. Hanson (1), Ç. Herweijer (2), N. Patmore (2), S. Hallegatte (3), J. Corfee-Morlot (4), J Chateau (4), R. Muir-Wood (2)



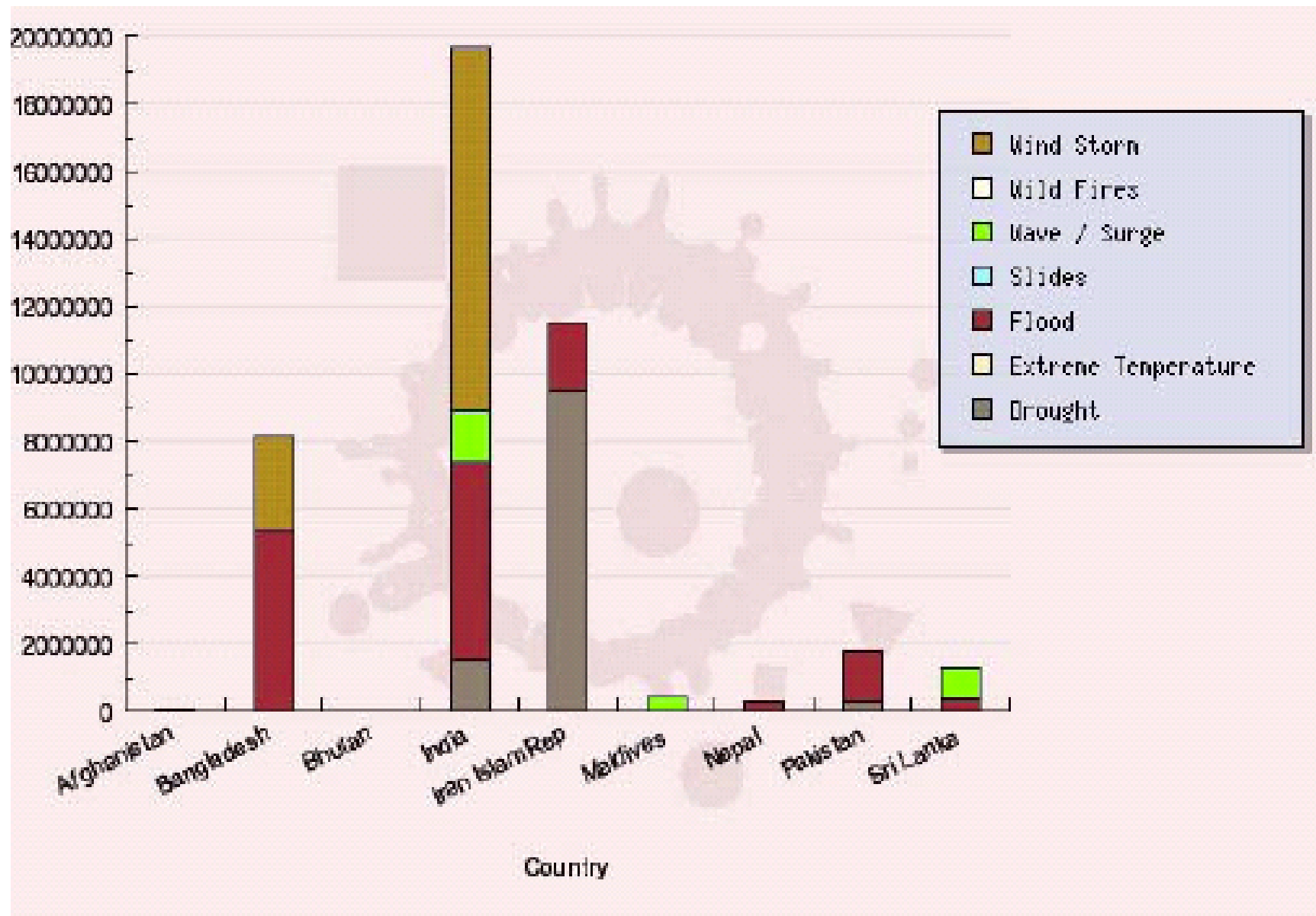
Risk and Vulnerabilities of Urban Ecosystems

Cities represent sites of high concentration of

- Population
- Energy Consumption and GHG emissions
- Production of waste
- Income and Valuable property
- Poverty



Figure 4. Damages due to extreme climate events in Asia



Source. Human Development report 2007



Most vulnerable populations and elements in a city

- Slums
- Settlements in low-lying areas
- Industrial and informal service sector workers
- Buildings
- Industrial units
- Lifeline public and private infrastructure
- Ecosystems and the natural environment

Source: Aromar Revi



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Adaptation Infrastructure and Framework

Disaster management: Floods and Cyclones

- Building shelters
- Changes and Regulation in land use
- Embankments of Inundation areas

Infrastructure: engineering/architectural

- Inflatable boots for floods
- Flyovers, Bridges, Dykes
- Drainage systems, storm sewers
- Green roofs
- Storage of flood waters for drought periods



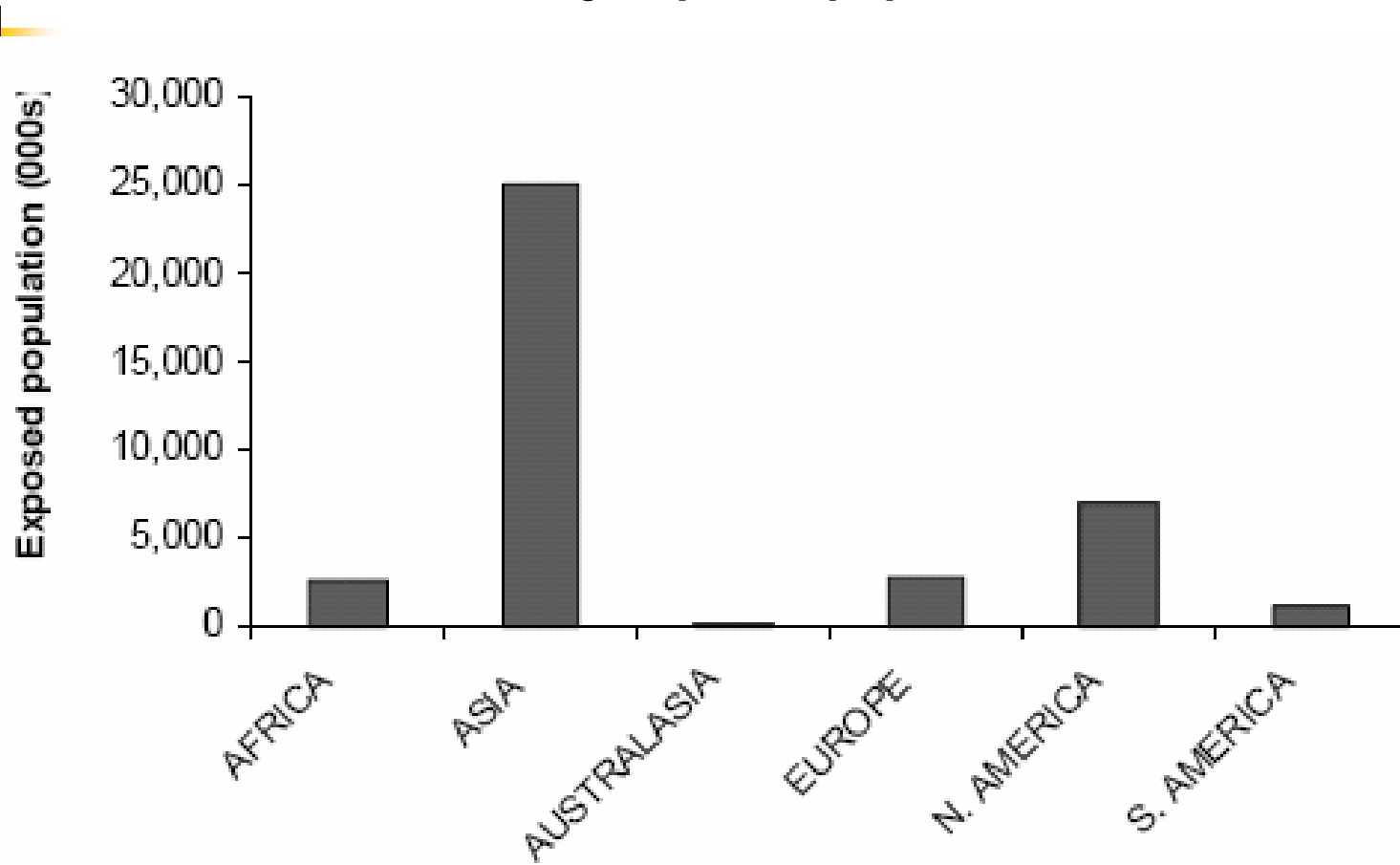
MITIGATION

GHG emission reduction strategies

- Lighting
- Buildings
- Energy
- Transportation
- Waste management
- Water



Currently exposed population



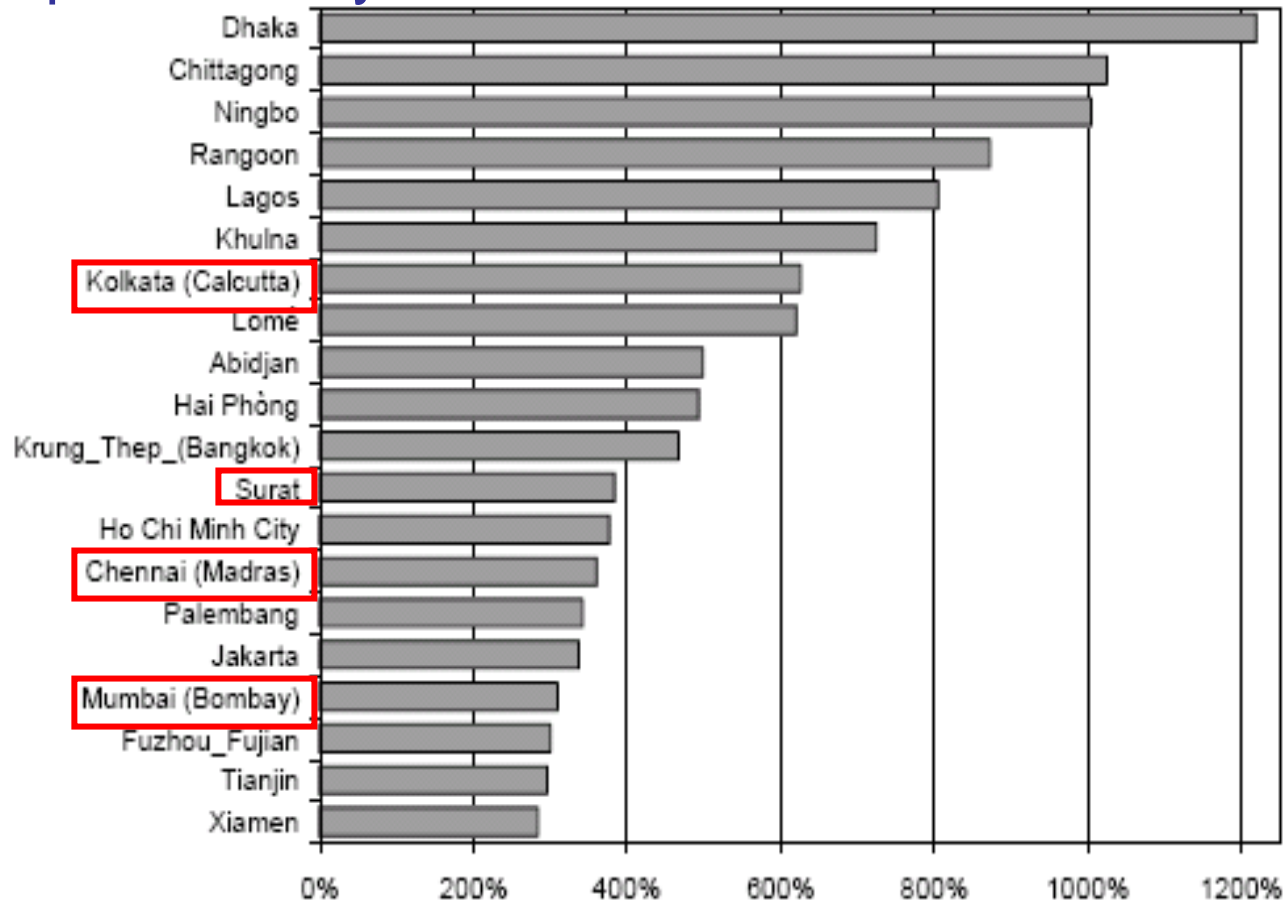
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Top 10 countries by population currently exposed to a 1:100 extreme event compared to potential to protect

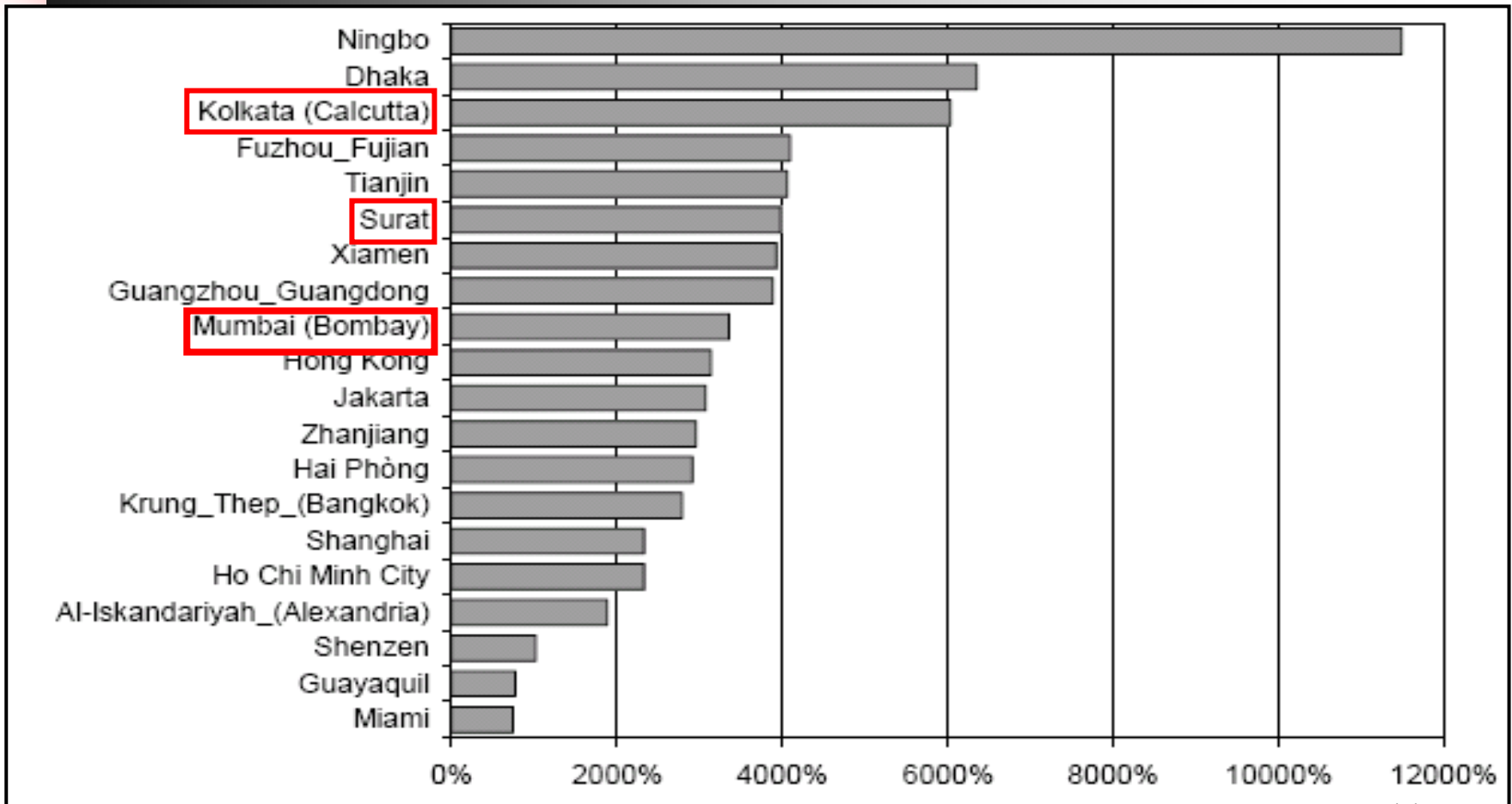
Number of cities	Exposed population (000s)	Country	GDP CLASS
15	8,154	CHINA	MEDIUM
17	6,538	UNITED STATES OF AMERICA	HIGH
6	5,412	INDIA	LOW
6	3,683	JAPAN	HIGH
2	2,725	VIETNAM	LOW
2	1,591	NETHERLANDS	HIGH
3	1,540	BANGLADESH	LOW
1	1,330	EGYPT	MEDIUM
1	907	THAILAND	MEDIUM
4	700	INDONESIA	MEDIUM

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Twenty cities with the greatest increase in population exposed out of the top fifty cities most exposed to present-day extreme sea levels.



CITIES THAT WILL EXPERIENCE HIGH PROPORTIONAL INCREASES ON ASSETS EXPOSED



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International responsibilities to help poor and National Action Plans



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Mitigation Vs free ride?

- Regardless of specifics of negotiations countries should be accountable for their cumulated emissions, say 1990 (or 2000) onwards.
- When final negotiations are concluded, those countries which have taken early action will be rewarded and the others will have to do a lot more later.
- Those who do not mitigate should pay for adaptation say for global insurance





Paradigm shift: Not Cost but Risk Minimization

- The primary focus on **Risk reduction, rather than costs of mitigation to the developed countries.**
- To this extent, a paradigm shift is necessary from the cost-minimization to risk-minimization.
- Risk is not due to India's emissions alone (4%). Therefore, others should also share burden.





UN and Climate insurance

- Article 4.8 of the United Nations Framework Convention on Climate Change (UNFCCC) and the supporting Article 3.14 of the Kyoto Protocol call upon developed countries to consider actions, including insurance, to meet the specific needs and concerns of developing countries in adapting to climate change
- Access to insurance and other safety net mechanisms.
- Initiative by UN WFP to cover Eithopian farmers against drought.





Independent and voluntary schemes in India contd..

- Since 2004, All India Disaster Mitigation Institute (AIDMI), has been offering a disaster insurance program – Afat Vimo – covering households and microbusinesses in the state of Gujarat.
- In the coastal Andhra Pradesh region, microinsurance services have been provided since 2004 as part of the Disaster Preparedness Program.
- In 2003 the first index-based weather scheme in a developing country was launched by the rural microfinance organization BASIX and marketed by the rural bank Krishna Bhima Samruddi (KBS). The scheme is insured by the Indian insurer ICICI Lombard.
- Micro insurance by SEWA & WWF.





Programmes, Institutions and Policies

- Integrated approach to climate change monitoring & adaptation based on livelihoods of vulnerable communities shall:
- Make and demonstrate a compelling case for **alternative approaches to climate change** adaptation based on vulnerability reduction.
- Promote **natural resource based approaches** for the reduction of vulnerabilities and mitigation.
- Offer convincing demonstrations of how on-the-ground **livelihood activities can be linked with policy processes to reduce existing and future climate related vulnerabilities of poor.**
- Identify **multi-stakeholder, participatory processes** those for selection, implementation and appraisal of adaptation strategies.



Learning for all

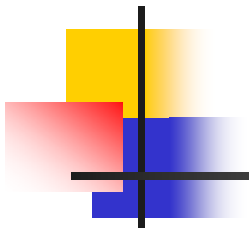
- Critique and analyse the prevalent policy approach for addressing adaptation on global rather than local processes.
- Implement a **model on socio-economic field for sustainability** as well as poverty reduction and conservation of biological diversity.
- Adaptation and vulnerability need to be mainstreamed into **partnerships** while maintaining **tempo for mitigation**.
- **Poor are absent institutionally** in climate decision making, in semantics and in financial allocations and budgets.
- Challenge in terms of **land degradation, drought, loss of biodiversity**, etc, and hence, vulnerability, adaptation and mitigation issues are very important.



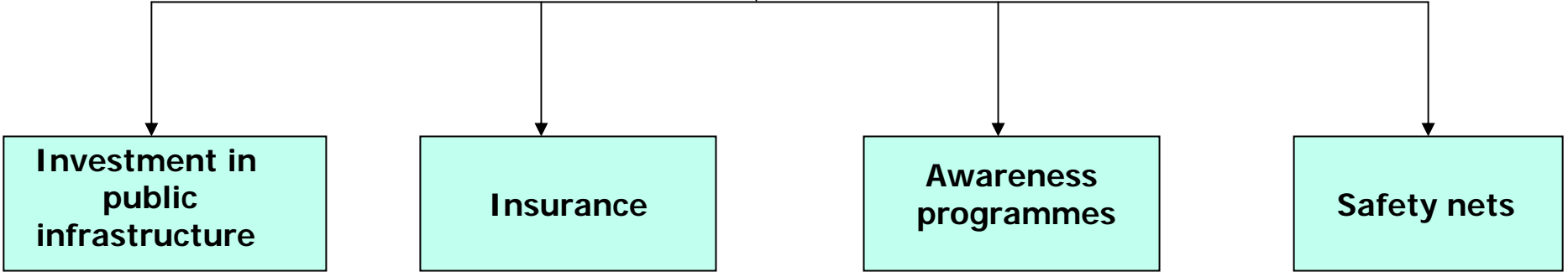
Country-level response

- Support pilot projects at local, national and regional levels that make affordable insurance available to vulnerable individuals and governments.
- Facilitate improved information-sharing and more relevant information collection.
- Promote pro-poor insurance conditions.
- State level analysis and case studies.





Climate Risk Reduction





Way Forward

- Orient Existing Safety net programmes for climate adaptation
 - PDS for food security
 - Indira Awas Yojana – Climate proof houses locations, Climate Variability.
 - MSP – Crop Insurance
 - Watershed programmes, Irrigation, Energy, Infrastructure all will be impacted.



Conclusion

- Benefits of strong and early action outweigh economic cost of not acting.
- Stronger involvement of Planning and Finance.
- Policies need to encourage public-private sector collaboration.
- Action must be directed at both mitigation and adaptation.





Climate Missions: Adaptation

- Agriculture
- Water Resources
- Himalayan ecosystems
- Sustainable Habitat
- Greening India
- Strategic Knowledge



Thank you

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