GREENING INDIA'S GROWTH

COSTS, VALUATIONS AND TRADE-OFFS

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Storyline 1: The economic success story

- India enjoyed an unprecedented economic growth exceeding 7% a year for almost a decade

- India in 2012 became the world's third largest economy (in purchasing power terms), surpassing Japan and now behind only China and the United States ($4.7 trillion).

Storyline 2: Growth delivered development outcomes

- Poverty rates have almost halved
- Employment opportunities created for millions
- Social indicators are much improved
- India is in line with meeting most of its Millennium Development Goals

Storyline 3: Growth fails to deliver on environmental outcomes

- In a recent survey of 132 countries whose environments were surveyed, India ranked 125th overall (only behind Kuwait, Yemen, Uzbekistan, Kazakhstan, Turkmenistan, Iraq, and South Africa)
- India ranks last in the 'Air Pollution (effects on human health)' ranking
- Recent WHO survey of G-20 economies showed that 13 of the 20 most polluted cities are in India and over 50% of the sites studied across India had critical levels of PM10 pollution

Question

India's stellar economic performance not matched by its environmental performance

- Is India's economic growth sustainable?
- What is sustainable growth and sustainable development for India?
- Why is it important? How do we measure it? How do we ensure it?
- Where might the balance lie between rising GDP and declining environmental assets?

Growth vs. Environment Debate

- *"Economic policies designed to promote growth have been implemented without considering their full environmental consequences, presumably on the assumption that these consequences would either take care of themselves or could be dealt with separately. These are serious consequences, and it has become clear today that economic development must be environmentally sustainable"*

Dr. Manmohan Singh, Prime Minister of India
Workshop on Green National Accounting for India in New Delhi, April 2, 2013

An extract from the MoEF (GOI) request for the study

- The study will help identify the key environmental challenges that are likely to emerge by developing a framework to:

  - Identify future and current problem areas, in the field of conservation of critical environmental resources, efficiency in environmental resources use, application of the principles of environmental good governance and enhancement of resources for environmental conservation; and

  - To assess costs, benefits, and trade-offs of alternative policies to the extent possible using CGE framework

Background: Previous WB studies

- India Country Environment Analysis (CEA) Report – Strengthening Institutions for Sustainable Growth (2007) (industry, power and highways)
- Economic Impacts of Inadequate Sanitation in India (WSP, 2010)
- Energy Intensive Sectors of the Indian Economy: Path to Low Carbon Development (2011)
- Deep Wells and Prudence: Towards Pragmatic Action for Addressing Groundwater Overexploitation in India (2010)
- Improving Management of Municipal Solid Waste in India - Overview and Challenges (2006)

Study Objectives

- Provide estimates of social and financial costs of current environmental damage in India;

- Assess tradeoffs between economic growth and environmental sustainability for India using a Computable General Equilibrium (CGE) approach;

- Identify conservation "hotspots" and provide an economic valuation of the ecosystem services across the country using quantified estimates of landscape types.

Economic growth at what cost?

COST OF ENVIRONMENTAL DEGRADATION

Total cost of environmental degradation in India at about Rs. 3.75 trillion (US$ 80 billion) annually, is equivalent to 5.7 percent of GDP in 2009
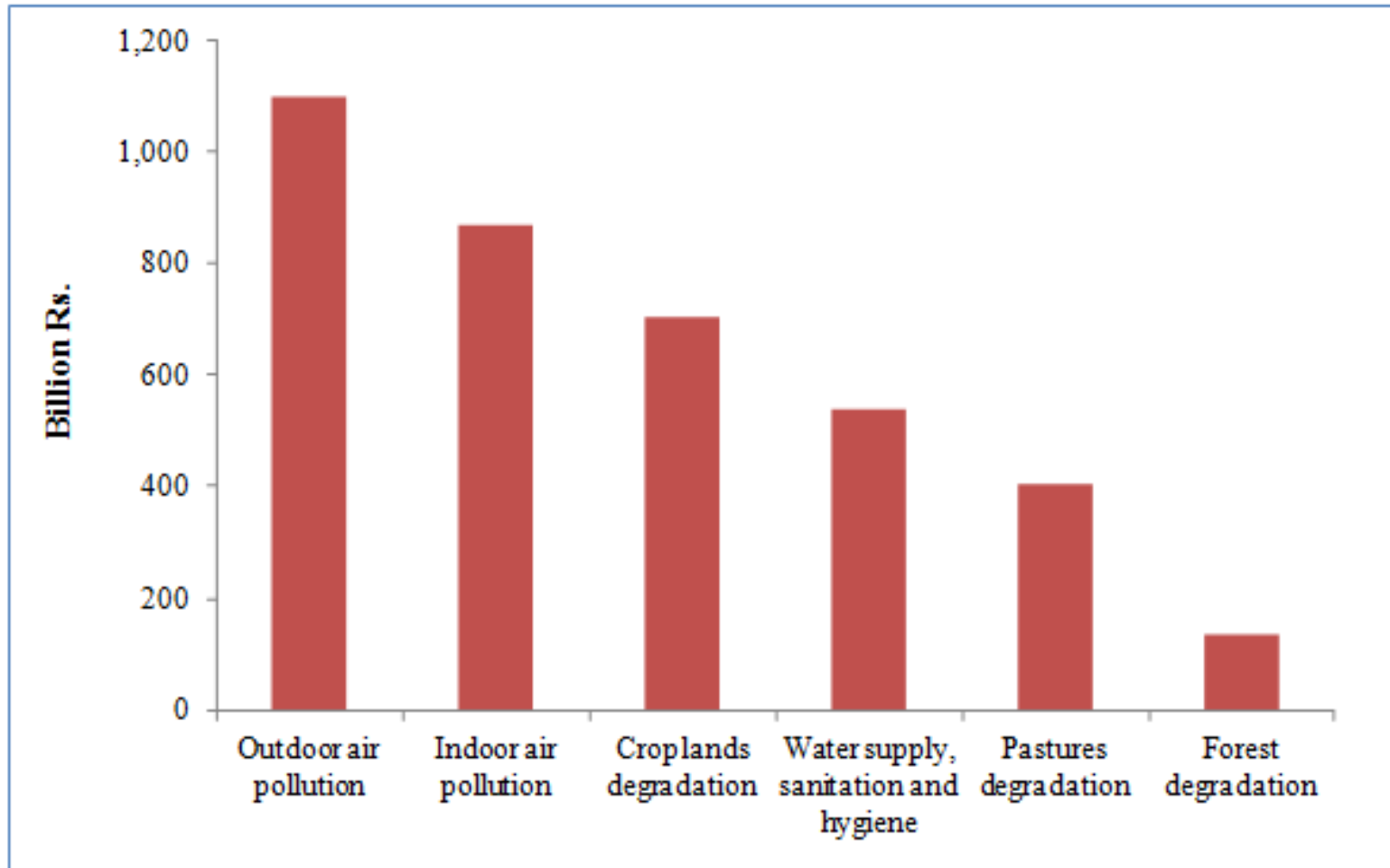
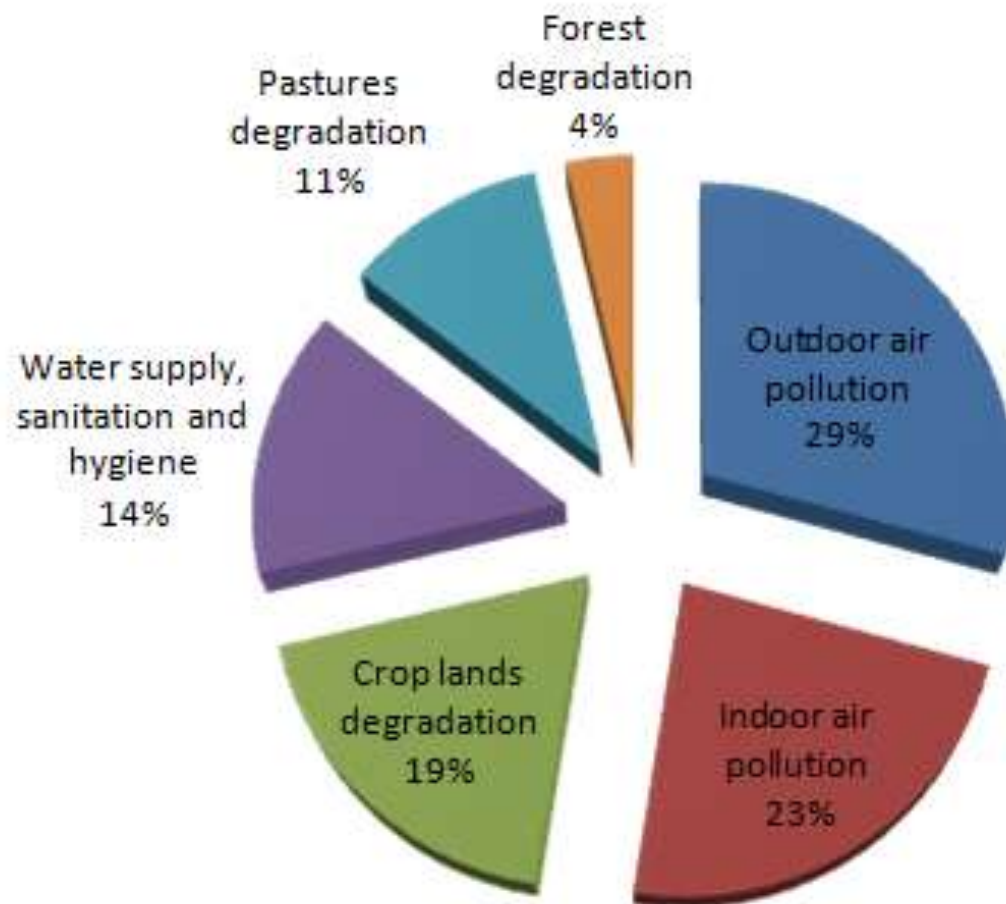# How does India compare with other countries?
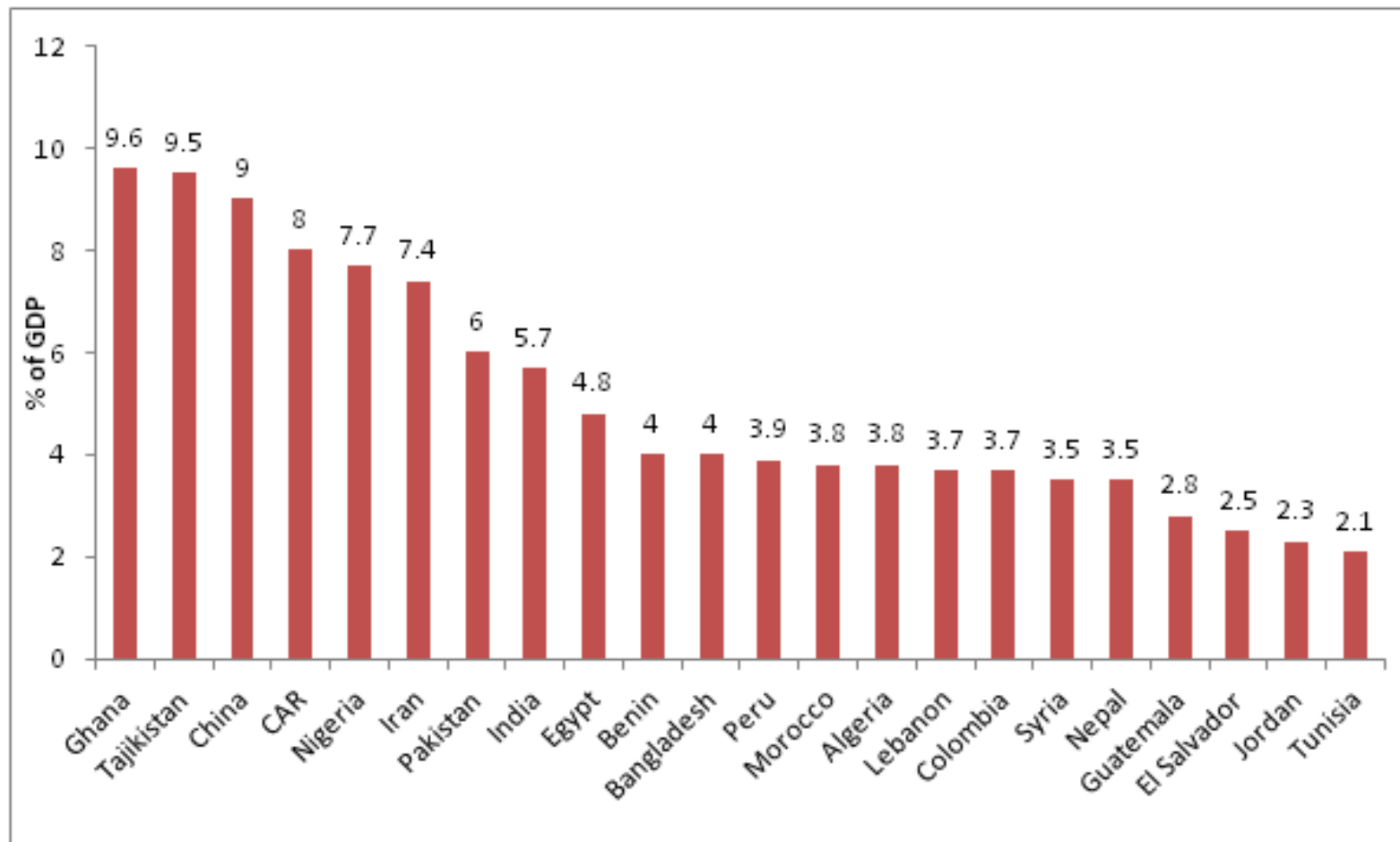
Cost of Environmental Degradation

- Estimation of Health Damages (air pollution, water supply, sanitation and hygiene)

- Estimation of Natural Resource Damages (land degradation, rangeland degradation, forest degradation)
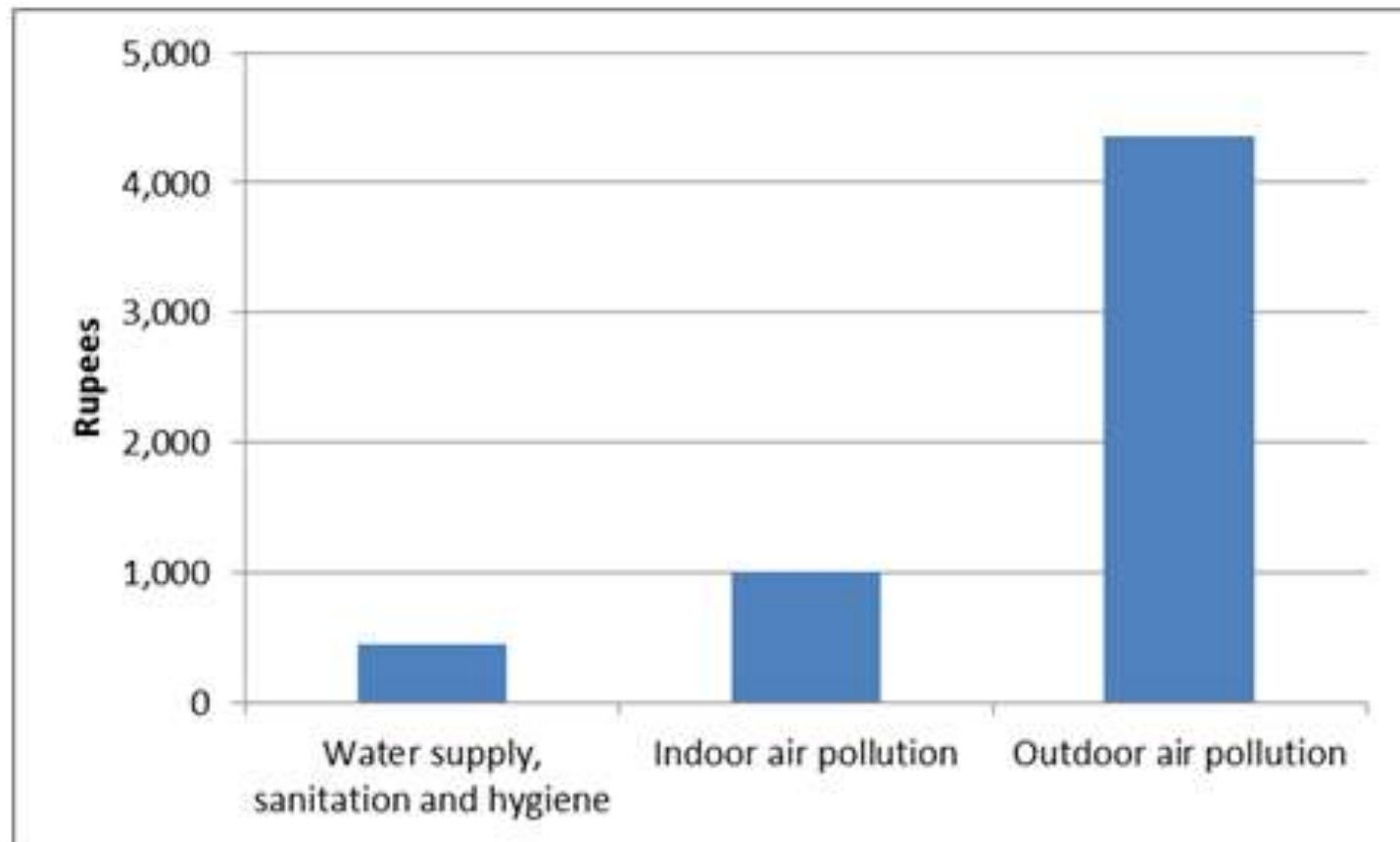
Relative share of Damage Cost by Environmental Category
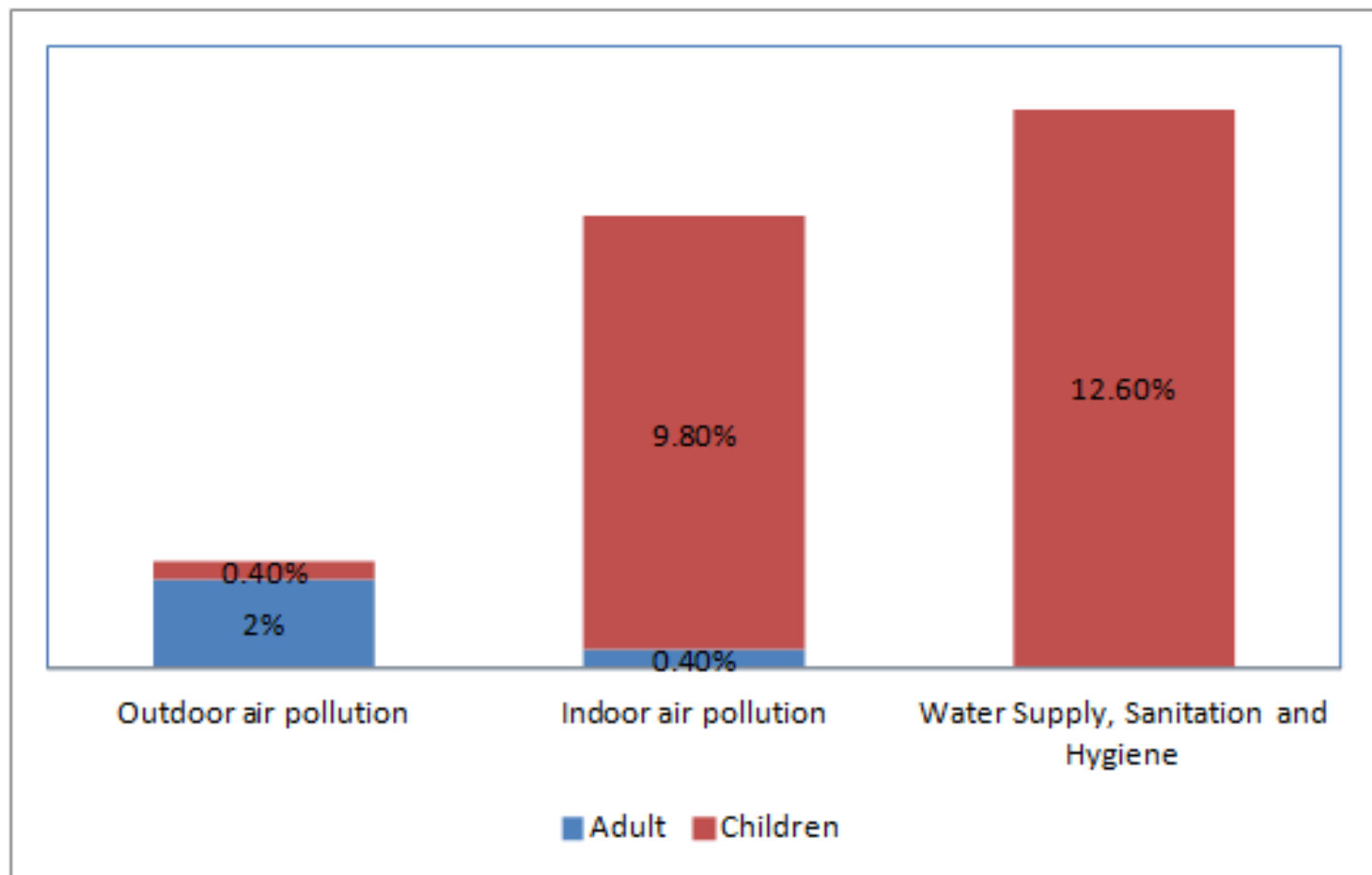
Relative share by category (%)

Annual Environmental Health Losses per Person of the Exposed Population

Who bears the costs?

Health Categories	Total Annual Cost (Billion Rs.)	Percentage of Total Cost
Mortality		
Adults	1,018	92.2%
Children under 5	13	1.2%
Morbidity		
Chronic bronchitis	1	0.1%
Hospital admissions	3	0.3%
Emergency room visits	8	0.7%
Restricted activity days (adults)	46	4.2%
Lower respiratory illness in children	14	1.3%
Total Cost (Mortality and Morbidity)	1,103	100%

Environmental degradation a major factor in child (Under 5) mortality

Bar chart comparing Adult and Children mortality percentages across three environmental factors:
- Outdoor air pollution: 2% (Adult), 0.40% (Children)
- Indoor air pollution: 0.40% (Adult), 9.80% (Children)
- Water Supply, Sanitation and Hygiene: 12.60% (Children)

Legend: ■ Adult ■ Children

Annual Cost of Crop Losses Due to Land Degradation
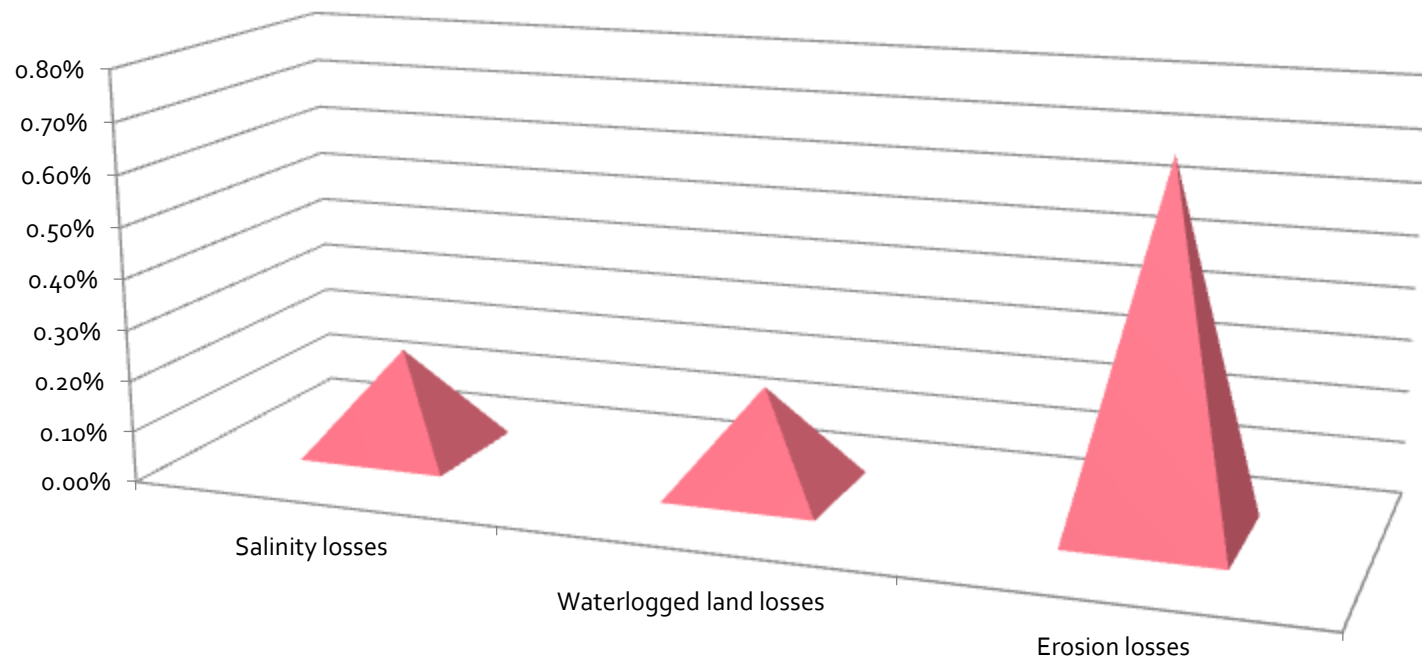
Natural Resources Degradation and GDP of the Poor
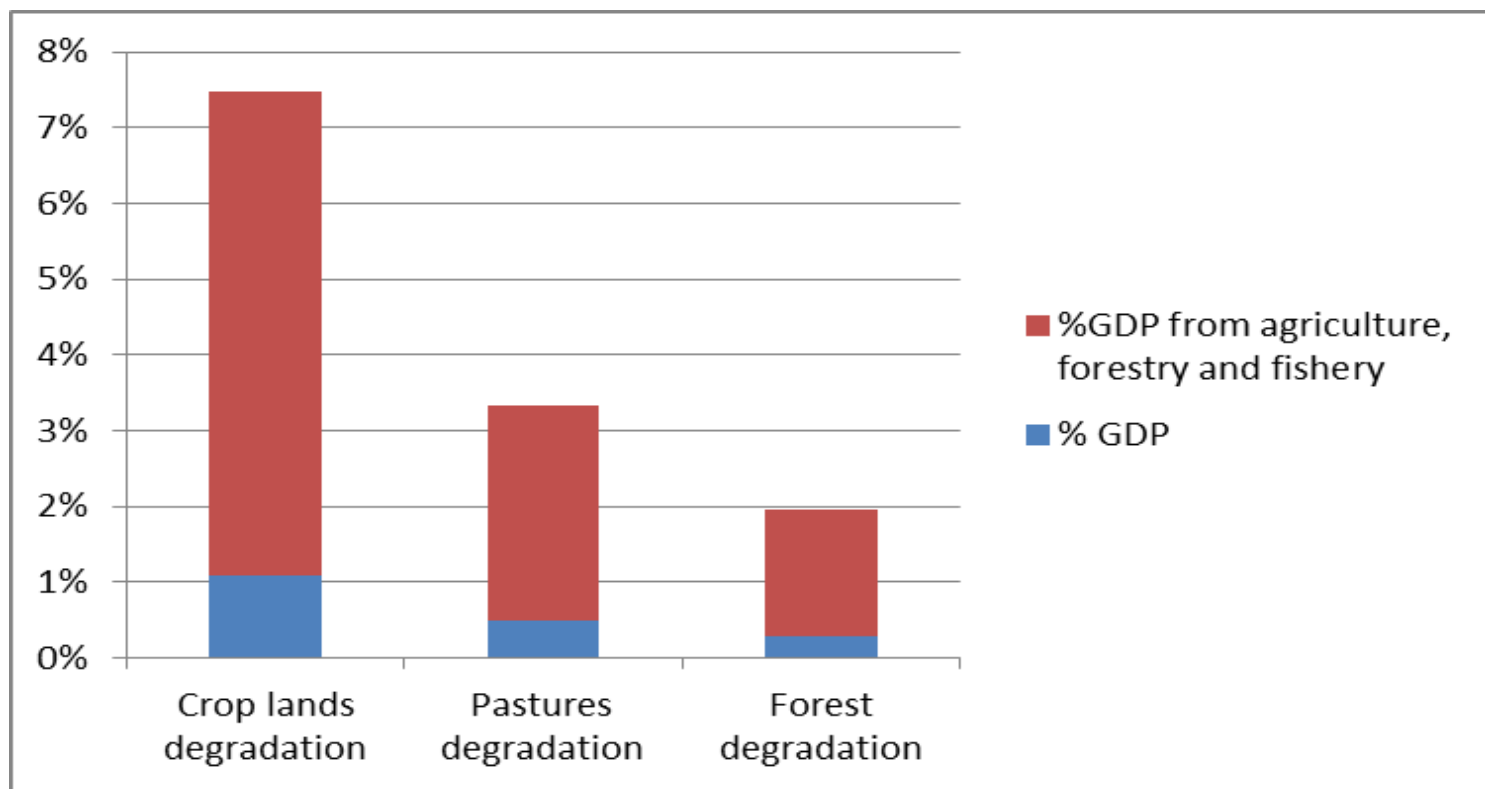
Conclusions on COED

- The damages caused by environmental degradation in India are significant and especially so for the poor, who are more affected in terms of their health and livelihoods
- To sustain a high and sustainable pace of economic growth in the future, India needs to focus on green growth strategies that can prevent large-scale environmental degradation and natural resource depletion

Is Green Growth Affordable?

Focus on Particulate Emissions

Highest damages in terms of the economic costs

India's national average of 206.7μm/m3 of Suspended Particulate Matter (SPM) in 2007 was well above the National Ambient Air Quality Standard (NAAQS) of 140 μg / m3 for residential areas.

Average annual concentration of PM10 (RSPM) in Delhi for example is about 120 μg / m3, as against a residential of 60 μg / m3 and World Health Organization (WHO) guidelines of 20 μg / m3

New NAAQS since 2009

Eliminated the distinction between industrial and residential areas.

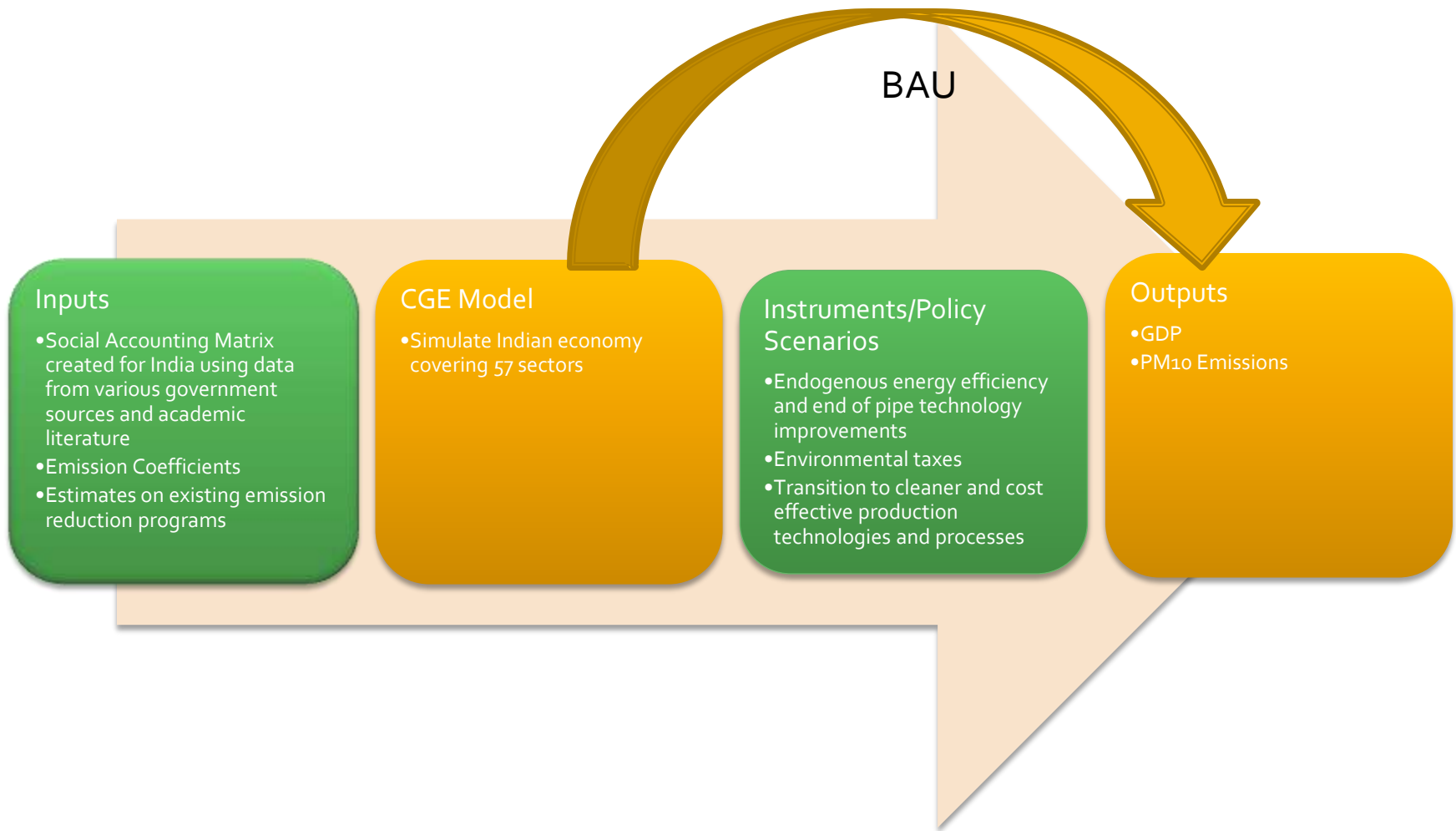Shift from regulation of ambient SPM to RSPM (PM 2.5)

MoEF brought new pollutants under regulation (Ozone, Arsenic, Nickel, Benzene and Benzopyrene)

A pilot emissions trading scheme has been launched in three states to improve air quality and help the states meet the new NAAQS. XIIth Plan commits to reducing particulate emissions by 2017

CGE Model - Features

- A CGE model describes inter-sectoral linkages and the pattern of income and expenditure in the economy

- Model tracks economic growth path for India given internal and external parameters such as world economic growth, investment and trade regimes

- Open economy with 57 sectors modeled to include input and process emissions

- Module to capture Health impacts of PM10

How this CGE Model is used?

BAU

Inputs
- Social Accounting Matrix created for India using data from various government sources and academic literature
- Emission Coefficients
- Estimates on existing emission reduction programs

CGE Model
- Simulate Indian economy covering 57 sectors

Instruments/Policy Scenarios
- Endogenous energy efficiency and end of pipe technology improvements
- Environmental taxes
- Transition to cleaner and cost effective production technologies and processes
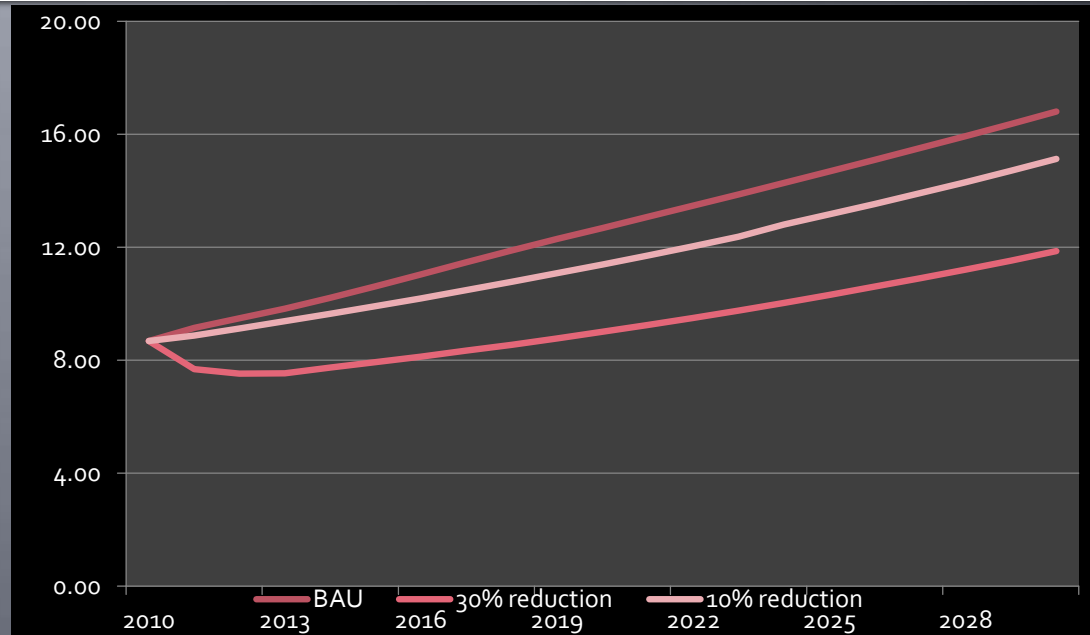
Outputs
- GDP
- PM10 Emissions

How much will it cost to reduce particulate emissions?

Business As Usual (BAU): Conventional Growth with existing policies

Scenario 1 : 10% reduction in PM10 emissions in 2030 wrt BAU

Scenario 2 : 30% reduction in PM10 emissions in 2030 wrt BAU

Policy options: Incentivizing technology upgradation through economic instruments, securing efficiency improvements, strengthening enforcement, enhancement of technology and efficiency standards

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Is Green Growth Affordable?

	% Loss in GDP wrt BAU in 2030	% Loss in Average Annual GDP Growth wrt BAU
10% reduction in PM10	0.33	0.02
30% reduction in PM10	0.70	0.04

Other Co-Benefits

Savings from Reduced Heath Damages	CO2 Emission Reduction
10% PM10 reduction (US$ Billion)	
$24 - 54$	10-20%
30% PM10 reduction (US$ Billion)	
$47 - 105$	30-60%

Conclusions

• A low emission, resource-efficient, greening of the economy should be possible at a very low cost in terms of GDP growth. This makes the Green Growth scenarios attractive compared to the BAU scenario

• A more aggressive low emission strategy comes at a slightly higher price tag for the economy while delivering higher benefits

Why is Green Growth desirable?

Economic growth has implications of use of natural capital but its full value is not often factored in the development context.

Given that India is a hotspot of unique biodiversity and ecosystems, it is necessary to have a more structured approach to such valuation to assess trade-offs in the context of rapid growth

There are tools available now to estimate the significant contribution of natural capital in the form of ecosystem services.

Issues and Challenges

- While we have a number of pieces of anecdotal evidence, and there are several studies that look at the value of biodiversity in specific contexts, no one has estimated the value of the loss of biodiversity as such at a national or global level.

- Millennium Ecosystem Assessment (MEA, 2005), shifted the focus from biodiversity to measuring ecosystem services, which are related to biodiversity and are derived from the complex biophysical systems. The MEA defines ecosystem services under four headings: provisioning, regulating, cultural, and supporting.

- The Economics of Ecosystem and Biodiversity (TEEB) made a global assessment using a framework building on MEA approach

Valuing Biodiversity and Ecosystem Services

- The study undertook a first ever comprehensive assessment of value of ecosystem services from various biomes across India (Forests, Wetlands, Mangroves, Coral Reefs, Grasslands)
- The values of ecosystem services from the major biomes in India amounts to about 3.0 to 5.0 percent of GDP

Valuing Biodiversity and Ecosystem Services (by biomes as a % of total)
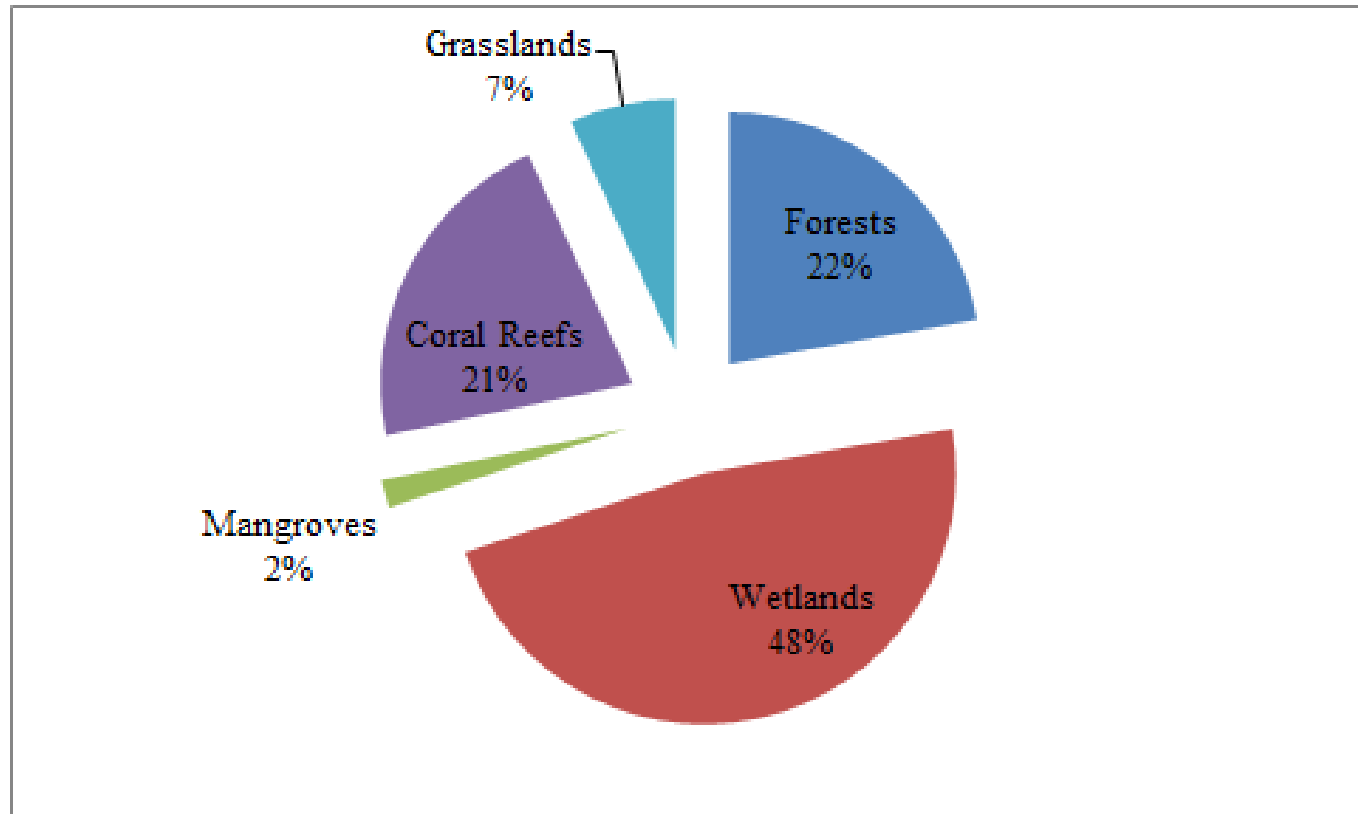
Key Finding 3

- Natural capital in the form of ecosystem services makes a measurable contribution to output and should be accounted for, invested in, exploited efficiently and increased in value

Key Findings

- **Green Growth is necessary:** At current rate of degradation, environmental sustainability could become the next major challenge as India surges along its projected growth trajectory
- **Green Growth is Affordable:** A low-emission, resource-efficient greening of the economy should be possible at a very low cost in terms of GDP growth. It also promises to deliver greater co-benefits
- **Green Growth is Measurable:** For an environmentally sustainable future, India needs to value its natural resources, and ecosystem services to better inform policy and decision-making

Thank you