Climate Change and India
Science, Politics and Policy

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Centre for Policy Research

“Introduction to Audit of Environmental and Sustainable Development Issues”

International Centre for Environmental Audit and Sustainable Development (iCED)
September 18, 2014
Why Care About Climate Change?

• Strong scientific consensus
• Linkage to other environmental outcomes
  – Physical linkages
  – Policy linkages
• Outline
  – Science
  – Global Politics
  – Indian Policy
Complexities of Climate Science
It’s not that simple...

IPCC (2007)
Observed Temperature Increase 1850-2012

Source: IPCC, 2013
CO2 is increasing steadily

Source: IPCC, 2013
Pace of increase in GHGs not occurred for 10,000 years

Source: IPCC, 2007
Models with CO2 forcing better track recent trends in temperature, ocean heat and ice.

Source: IPCC, 2013
Projections of late 21st Century Effects

Source: IPCC, 2013
Examples of Climate Impacts

<table>
<thead>
<tr>
<th>Source: IPCC, 2007</th>
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<table>
<thead>
<tr>
<th>Global average annual temperature change relative to 1980-1999 (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<table>
<thead>
<tr>
<th>WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased water availability in moist tropics and high latitudes</td>
</tr>
<tr>
<td>Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes</td>
</tr>
<tr>
<td>Hundreds of millions of people exposed to increased water stress</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>ECOSYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 30% of species at increasing risk of extinction</td>
</tr>
<tr>
<td>Most corals bleached</td>
</tr>
<tr>
<td>Widespread coral mortality</td>
</tr>
<tr>
<td>Terrestrial biosphere tends toward a net carbon source as: ~15%</td>
</tr>
<tr>
<td>~40% of ecosystems affected</td>
</tr>
<tr>
<td>Ecosystem changes due to weakening of the meridional overturning circulation</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>FOOD</th>
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</thead>
<tbody>
<tr>
<td>Complex, localised negative impacts on small holders, subsistence farmers and fishers</td>
</tr>
<tr>
<td>Tendencies for cereal productivity to decrease in low latitudes</td>
</tr>
<tr>
<td>Productivity of all cereals decreases in low latitudes</td>
</tr>
<tr>
<td>Tendencies for some cereal productivity to increase at mid- to high latitudes</td>
</tr>
<tr>
<td>Cereal productivity to decrease in some regions</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>COASTS</th>
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<tbody>
<tr>
<td>Increased damage from floods and storms</td>
</tr>
<tr>
<td>About 30% of global coastal wetlands lost</td>
</tr>
<tr>
<td>Millions more people could experience coastal flooding each year</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>HEALTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing burden from malnutrition, diarrhoeal, cardio-respiratory and infectious diseases</td>
</tr>
<tr>
<td>Increased morbidity and mortality from heat waves, floods and droughts</td>
</tr>
<tr>
<td>Changed distribution of some disease vectors</td>
</tr>
<tr>
<td>Substantial burden on health services</td>
</tr>
</tbody>
</table>

† Significant is defined here as more than 40%. ‡ Based on average rate of sea level rise of 4.2mm/year from 2000 to 2080.
### POLAR REGIONS
- Risks for Ecosystems
- Risks for Health and Well-Being
- Unprecedented Challenges, Especially from Rate of Change

### NORTH AMERICA
- Increased Risks from Wildfires
- Heat-Related Human Mortality
- Damages from River and Coastal Urban Floods

### THE OCEAN
- Reduced Fisheries Catch Potential at Low Latitudes

### CENTRAL AND SOUTH AMERICA
- Reduced Water Availability and Increased Flooding and Landslides
- Reduced Crop Productivity and Livelihood and Food Security
- Vector- and Water-Borne Diseases

### SMALL ISLANDS
- Loss of Livelihoods, Settlements, Infrastructure, Ecosystem Services, and Economic Stability
- Risks for Low-Lying Coastal Areas

### AFRICA
- Compounded Stress on Water Resources
- Reduced Fish Productivity and Livelihood and Food Security
- Vector- and Water-Borne Diseases

### EUROPE
- Increased Flood Losses and Impacts
- Increased Losses and Impacts from Extreme Heat Events
- Increased Water Restrictions

### ASIA
- Heat-Related Human Mortality
- Increased Drought-Related Water and Food Shortage

### AUSTRALASIA
- Significant Change in Composition and Structure of Coral Reef Systems
- Increased Risks to Coastal Infrastructure and Low-Lying Ecosystems

### polar regions
- Very Low
- Medium
- Very High

### Risk Level with High Adaptation
- Potential for Additional Adaptation to Reduce Risk

### Risk Level with Current Adaptation
- Unprecedented Challenges, Especially from Rate of Change

#### Present
- Near Term (2030-2040)
- Long Term (2060-2100)
Example of Impacts in India

• Sea level rise in Tamil Nadu
  – 1 m rise => 1000 Km sq
  – Replacement cost of infrastructure = Rs. 500000cr

• Apple cultivation in Himachal Pradesh
  – Apple yields declining at low altitudes, increasing at high altitudes

Source: INCCA, 2010
Take Away Messages…

• Climate change is occurring and will likely accelerate
• Information on specific regional impacts remains limited
• India is one of the more vulnerable countries
  – Monsoon
  – Water scarcity
  – High temperature climate
Why is Tackling Climate Change so Hard?
Contextualizing Climate Change

- **Scale and scope**
  - Current patterns of industrial development depends on fossil fuels

- **Global collective action problem**
  - Uncoordinated action by a few nations cannot solve the problem
  - Breaches policy silos: trade, finance, environment, technology cooperation, energy, forests

- **Political context: Rise of the Global South**
## A Numbers Game

<table>
<thead>
<tr>
<th></th>
<th>Cumulative Emissions (1850-2005) % of total</th>
<th>Rank</th>
<th>Annual emissions (2008) – from energy % of total</th>
<th>Rank</th>
<th>Per capita emissions (2008) from energy – tonnes CO2</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>29%</td>
<td>1</td>
<td>19%</td>
<td>2</td>
<td>18.6</td>
<td>9</td>
</tr>
<tr>
<td>EU (27)</td>
<td>30%</td>
<td>2</td>
<td>13%</td>
<td>3</td>
<td>8.0</td>
<td>39</td>
</tr>
<tr>
<td>China</td>
<td>8%</td>
<td>3</td>
<td>24%</td>
<td>1</td>
<td>5.4</td>
<td>61</td>
</tr>
<tr>
<td>Russia</td>
<td>8%</td>
<td>4</td>
<td>5%</td>
<td>4</td>
<td>11.5</td>
<td>16</td>
</tr>
<tr>
<td>Germany</td>
<td>7%</td>
<td>5</td>
<td>3%</td>
<td>7</td>
<td>10.0</td>
<td>25</td>
</tr>
<tr>
<td>India</td>
<td>2%</td>
<td>9</td>
<td>5%</td>
<td>5</td>
<td>1.3</td>
<td>121</td>
</tr>
<tr>
<td>Brazil</td>
<td>1%</td>
<td>23</td>
<td>1%</td>
<td>17</td>
<td>2.1</td>
<td>104</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>0.05%</td>
<td>83</td>
<td>0.3%</td>
<td>44</td>
<td>0.3</td>
<td>152</td>
</tr>
</tbody>
</table>

Source: Adapted from CAIT
The Global Pathway and the South’s Dilemma

GDR, EcoEquity and SEI, 2009
THERE IS NO PLANET B
UN Climate Negotiations
A Quick History

• UN Framework Convention on Climate Change 1992
  – Common *but* differentiated responsibility and respective capabilities

• Kyoto Protocol mid 1990s
  – “Annex 1” or developed countries to act
  – US did not ratify

• Copenhagen 2009
  – BASIC countries emerge

• Durban 2011
  – Durban Platform to negotiate an agreement

• The next step: Paris 2015
UN Climate Negotiations
Key Issues for Paris 2015

• Bottom up ‘contributions’ or pledges by all countries – “Intended Nationally Determined Contributions”

• What is the legal nature of contributions
  – Is legal nature the same for all or is it differentiated by developed/developing country?

• How will they be reviewed – monitoring reporting and verification (MRV)?
  – Adequacy
  – Equity

• How much finance will be on the table?

• What agreement will there be on technology?
Big Increase in National Plans and Strategies

Source: Dubash et. Al. Climate Policy, 2013
India’s Dual Interests in Climate Change

• India needs to steeply increase energy consumption in the future to achieve development aspirations =>
  
  *A climate agreement should not unduly restrict our ability to expand energy consumption*

• India is among the most vulnerable countries to climate impacts =>
  
  *An effective climate agreement is strongly in India’s interests*
What Strategy Might India Adopt?

• Prepare for adaptation at home
  – Climate change is an inescapable part of the context for sustainable development

• Mitigation as part of a co-benefits development focused approach

• Leverage domestic actions to argue for a stringent and effective global global agreement

• Develop our auditing systems and capacity to prepare for “MRV”
Mainstreaming Climate Change
Development, Politics, Governance
Climate and Development Linkages

• Energy efficiency
  – Improves energy security
  – Avoids land and resettlement disputes over mining
  – Lower cost than new power plants

• Water and agriculture
  – Large dams versus small structures?
  – Demand versus supply solutions?
  – Groundwater versus surface water focus?

• Transport
  – Rail versus road freight?
  – Private to public transport?
  – Role of non-motorized transport?
National Action Plan on Climate Change

• A “co-benefits” approach
  – “Actions that promote our development efforts while yielding climate benefits…”
  – How do we “mainstream” climate change?

• Eight missions
  – Solar, Energy Efficiency, Green India mission, Habitat, Water, Sustainable Agriculture, Himalayan, Strategic Knowledge

• Mix of focused objectives and broad goals
  – Solar and energy efficiency most advanced

• No identification of key transformative changes
  – Business as usual mindset
  – Unclear mix of current or future

• No integrative structures but existing silos
NAPCC (Continued)

• Co-benefits, but no clear articulation of how to achieve these
  – No clear sustainable development goals or targets
  – Challenges for audit

• Action items are like a wish list
  – No prioritisation of actions

• Bottom line: A few missions have moved forward but several are ineffectual
SAPCCs: A ‘Door Opener’

• SAPCCs were treated as sustainable development (SD) plans
  – Science of climate change impacts needs to inform SD

• Mitigation was downplayed
  – Concerns about sending wrong signals in negotiations
  – But this risks missing linkages between SD and energy

• Process of plan formulation followed departmental silos in most but not all cases
  – Substantial role for consultants due to limited capacity
SAPCCs: Hard to Implement

• Recommendations are a mix of objectives and actions
  – Driven by departmental knowledge, not integrative thinking
  – Unprioritized and unmatched to clear objectives

• Weak internal capacity for follow up
  – Monitoring implementation
  – Mainstreaming recommendations into functioning of line departments
  – Vague cost estimates
Toward Improved Mainstreaming

• Use plans to identify a ‘directional shift’ in development
  – Include energy in planning
• Ensure plan process breaks silos and enables external inputs
• Use plan process to build in-state capacity
• Experiment with implementation approaches
  – Check-lists, analytical reports of departments
  – Better integrate with development planning process
• Toolkit to systematically apply co-benefits
  – Explicit consideration of developmental goals and their priorities
  – Explicit consideration of trade-offs and synergies
An Analytical Approach to Co-benefits

- Achieving low carbon development strongly depend on realisation of other non-carbon benefits – co-benefits
  - Local air pollution and indoor air pollution
  - Energy security
  - Sustainable transport
- But analysing and operationalising co-benefits based policies are a challenge
- Need policy tools and techniques with which to shift from rhetoric to operationalisation
Operationalising Co-benefits

• Systematic approach to co-benefits based policy making
• Embed consideration of low carbon goals within mainstream development planning
• Explicit consideration of developmental goals and their priorities
  – Attention to hard-to-quantify goals
• Explicit consideration of trade-offs and synergies
• Embed in consultative procedure
**Co-Benefits Analysis**

**E.g. Modal Shift in Transport**

Description of Policy: Induce modal shift in urban transport from private to public and non-motorized transport

<table>
<thead>
<tr>
<th>Co-benefit</th>
<th>Description of benefit or cost</th>
<th>Score 1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>Negative:</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Decreased vehicle manufacturing and road infrastructure may decrease growth.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Decreased fuel demand and imports</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Public health gains and reduced congestion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reduced losses from fatalities and casualties</td>
<td></td>
</tr>
<tr>
<td>Inclusion</td>
<td>Improved access to mobility services for low income groups</td>
<td>5</td>
</tr>
<tr>
<td>Local Envt.</td>
<td>Lower emissions =&gt; lower health risks</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Reduced paved surface =&gt; less land pressure</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>Lower GHG per passenger-km</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>
Growth
Inclusion
Local Environment
Carbon Mitigation

Modal Shift - Urban Transport
Promoting Bio-Ethanol
Promoting Bio-diesel
Final Thoughts

• Science is sufficiently clear to act
  – Insurance policy
• Climate is not only a diplomatic problem, it is a developmental problem
  – Cannot continue business-as-usual development strategies
• Negotiations moving toward national ‘contributions’ plus assessment
• India is well served by
  – Adaptation preparation
  – Co-benefits based mitigation
  – Clear monitoring, reporting and verification
Thank you!
ndubash@gmail.com