Climate Change in Asia: Issues and Challenges

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Outline

I. Five key issues
   2. Rising share of Asia in global GHG emissions
   3. Increasing severity of current and projected impacts
   4. Escalating costs of inaction vs. action
   5. Continuing low priority to climate change in Asian policy

II. Five main challenges
   1. Integrating climate change concerns in development plans
   2. Streamlining of market mechanisms to facilitate SD
   3. Developing regional and local strategies for adaptation
   4. Deploying low carbon technologies
   5. Financing and capacity strengthening

III. The way forward
Fact 1: Climate is changing in an unprecedented manner. Warming of the climate system is unequivocal (IPCC, 2007).

Global mean temperatures are rising faster with time.

Source: IPCC, 2007

Human-induced warming is significant over the past 50 years in all continents.

Source: IPCC, 2007

Proportion of heavy rainfalls: Increasing in most land areas

Source: IPCC, 2007
## Sea levels are rising
(Trends in various Pacific island countries)

<table>
<thead>
<tr>
<th>Nation</th>
<th>Year of Gauge Installation</th>
<th>Trend (mm/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook Islands</td>
<td>1993</td>
<td>+2.5</td>
</tr>
<tr>
<td>Fiji</td>
<td>1992</td>
<td>+2.5</td>
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<tr>
<td>Federated States of Micronesia</td>
<td>2001</td>
<td>+21.4</td>
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<tr>
<td>Kiribati</td>
<td>1992</td>
<td>+5.7</td>
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<tr>
<td>Marshall Islands</td>
<td>1993</td>
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<td>1993</td>
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<tr>
<td>Papua New Guinea</td>
<td>1994</td>
<td>+8.1</td>
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<tr>
<td>Samoa</td>
<td>1993</td>
<td>+6.9</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>1994</td>
<td>+6.8</td>
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<tr>
<td>Tonga</td>
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</tr>
<tr>
<td>Tuvalu</td>
<td>1993</td>
<td>+6.4</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>1993</td>
<td>+3.1</td>
</tr>
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</table>

Source: Australian Bureau of Meteorology, 2006

## Sea level rise protection costs (% GDP) in various scenarios

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Micronesia</td>
<td>7.4</td>
<td>10.0</td>
<td>5.0</td>
<td>13.5</td>
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<tr>
<td>Palau</td>
<td>6.1</td>
<td>7.0</td>
<td>3.9</td>
<td>9.1</td>
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<tr>
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<td>1.4</td>
<td>1.7</td>
<td>0.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>0.9</td>
<td>1.3</td>
<td>0.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Mozambique</td>
<td>0.2</td>
<td>0.5</td>
<td>0.1</td>
<td>0.8</td>
</tr>
<tr>
<td>French Polynesia</td>
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<td>0.8</td>
<td>0.4</td>
<td>1.0</td>
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<tr>
<td>Guinea-Bissau</td>
<td>0.1</td>
<td>0.3</td>
<td>0.0</td>
<td>0.6</td>
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<tr>
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<td>0.3</td>
<td>0.4</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Guyana</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.4</td>
</tr>
<tr>
<td>New Caledonia</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Estimated no. of people to be flooded per year in the 2080s (in case of BAU scenario of growing emissions)

Glaciers all over the world are receding fast since the early 1990s

Retraction of the Gangotri Glacier terminus (Himalayas) since 1780 (Source: NASA, 2001)

Source: IPCC, 2007
Record of retreat of some Himalayan glaciers

<table>
<thead>
<tr>
<th>Glacier</th>
<th>Period</th>
<th>Retreat of snout (meter)</th>
<th>Average retreat (meter/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pindari</td>
<td>1845-1966</td>
<td>2840</td>
<td>135.2</td>
</tr>
<tr>
<td>Milam</td>
<td>1909-1984</td>
<td>990</td>
<td>13.2</td>
</tr>
<tr>
<td>Porting</td>
<td>1906-1957</td>
<td>262</td>
<td>5.1</td>
</tr>
<tr>
<td>Gangotri</td>
<td>1977-1990</td>
<td>364</td>
<td>28.0</td>
</tr>
<tr>
<td>Gangotri</td>
<td>1985-2001</td>
<td>368</td>
<td>23.0</td>
</tr>
<tr>
<td>Triloknath</td>
<td>1969-1995</td>
<td>400</td>
<td>15.4</td>
</tr>
<tr>
<td>Chota Shigri</td>
<td>1986-1995</td>
<td>60</td>
<td>6.7</td>
</tr>
<tr>
<td>Bara Shigri</td>
<td>1977-1995</td>
<td>650</td>
<td>36.1</td>
</tr>
<tr>
<td>Zemu</td>
<td>1977-1984</td>
<td>194</td>
<td>27.7</td>
</tr>
</tbody>
</table>

Source: IPCC, 2007

Fact 2:
Changes in climate are largely associated with increases in **human-induced GHG emissions**, which occurred mainly since industrial revolution. **Share of Asia** in global GHG emissions is increasing and is projected to increase further in the 21st century.
GHG concentrations

Concentrations of Greenhouse Gases from 0 to 2005

- Carbon Dioxide ($CO_2$) 36%
- Methane ($CH_4$) 17%
- Nitrous Oxide ($N_2O$) 151%

Source: IPCC, 2007

Emissions of $CO_2$ from burning fossil-fuels have risen rapidly since 1950

Source: World Resources Institute, CAIT
Recent past (1970-2004)

Total GHG emissions

GtCO₂-eq/yr

70% increase

29


Immediate future (2000-2030)

25-80% increase

GtCO₂-eq/yr

2000 A1F1 A2 A1B A1T B1 B2

2030

Source: IPCC, 2007

Share of GHG emissions in 2000 and 2050

<table>
<thead>
<tr>
<th>Country</th>
<th>Per cent of global emissions in 2000</th>
<th>Per cent of global emissions in 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>20.6%</td>
<td>15.1%</td>
</tr>
<tr>
<td>China</td>
<td>14.7%</td>
<td>22.9%</td>
</tr>
<tr>
<td>EU25</td>
<td>14.0%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Russia</td>
<td>5.7%</td>
<td>2.8%</td>
</tr>
<tr>
<td>India</td>
<td>5.6%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Japan</td>
<td>3.9%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Canada</td>
<td>2.0%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>1.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Mexico</td>
<td>1.5%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Australia</td>
<td>1.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>South Africa</td>
<td>1.2%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>23.8%</td>
<td>29.9%</td>
</tr>
</tbody>
</table>

Share of Asian developing countries to global GHG emissions is rising rapidly.

Sources: World Resources Institute, 2005; Matyszek et al., 2006
To stabilise at below 550 ppm, emissions must start to fall soon & all countries must be part of the solution.

Global GHG emissions scenarios (2001-2050)

- Developed countries reduce emissions by 50%, developing countries reduce growth of emissions to 1% per annum
- Developed countries reduce emissions by 50%, developing countries maintain 'business as usual' emissions growth
- World 'business as usual'

Source: Department of Industry, Tourism and Resources, developed from ABARE data
However, GHG emissions per capita are much low in Asian developing countries

2002 CO₂ Energy Emissions only

<table>
<thead>
<tr>
<th>Country</th>
<th>CO₂ Emissions (tonnes per person per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America</td>
<td>20</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>11</td>
</tr>
<tr>
<td>Japan</td>
<td>10</td>
</tr>
<tr>
<td>European Union (28)</td>
<td>9</td>
</tr>
<tr>
<td>World</td>
<td>4</td>
</tr>
<tr>
<td>China</td>
<td>3</td>
</tr>
<tr>
<td>Brazil</td>
<td>2</td>
</tr>
<tr>
<td>India</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: World Resources Institute, CAIT

Fact 3: CC Impacts on livelihoods are already serious in Asia, and will worsen further in future.

- Floods
- River bank erosion
- Droughts
- Cyclones & tidal surges
- Waterlogging
- Salinity
Vulnerability of Asia/Pacific sectors to climate change

Based on 186 studies

Source: CSIRO, 2006

Key Projected impacts in Asia

<table>
<thead>
<tr>
<th>Sector</th>
<th>Projected Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>• High risk of hunger in South Asia by 2050 due to 30% decline in cereal yields</td>
</tr>
<tr>
<td>Water</td>
<td>• Disappearance of Tibetan Plateau glaciers of &lt;4km length with 3°C rise</td>
</tr>
<tr>
<td></td>
<td>• Decline in water availability from ~1820 m³/yr to as low as ~1140 m³/yr in India by 2050; May adversely affect &gt;1 billion people.</td>
</tr>
<tr>
<td>Health</td>
<td>• Increase in Cholera in South Asia, and diarrhoea all over Asia</td>
</tr>
<tr>
<td>Coastal/Marine</td>
<td>• Loss of 2500 km² mangroves in Asia with 1 m sea level rise;</td>
</tr>
<tr>
<td></td>
<td>• Flooding of 5000 km² of Red river delta and 15-20,000 km² of Mekong River delta</td>
</tr>
<tr>
<td></td>
<td>• Loss of ~30% of Asia’s coral reefs in next 30 years</td>
</tr>
</tbody>
</table>

Source: IPCC, 2007
Fact 4: Costs of addressing climate change are many times less than the costs of inaction.

1. IPCC: Global macro-economic costs for the stabilization between 450-650ppm are between -1 to 5% of global GDP

2. Stern Review: Cost of action: ~1% GDP
   Cost of inaction: 5-20% GDP

Fact 5: Climate change is still a low policy priority in most of Asia.

- Many countries recognize the importance of climate change but have not pushed it as a high policy priority for many years due to several institutional, technical and financial barriers.
  - China did not include climate change in top 10 priority subjects for funding in National Environment Action Plan for a long time
  - No mention of climate change impacts in national agricultural and water policies of India
  - No mention of climate change in Poverty Reduction Strategy Papers of Cambodia, Lao PDR, Pakistan, Vietnam
  - No comprehensive sub-regional frameworks despite considerable opportunities (Nepal-Bhutan-India, Lao PDR-Thailand-Vietnam)
Good news but patchy progress...1

- Most countries submitted national communications to UNFCCC & established DNAs for CDM implementation
- Release of major documents on national strategies (China); Formation of Climate Change cell (Bangladesh); National Climate Change Commission in India (2007)
- Mainstreaming climate concerns in operational decisions of development banks (ADB), national governments (Kiribati), infrastructure design (e.g., FSM), coastal zone management (Bangladesh and the Philippines)
- Five (Bangladesh, Bhutan, Cambodia, Kiribati, Samoa) out of 14 LDCs in the region submitted NAPAs.

Good news but patchy progress...2

- **Energy efficiency and renewable energy**
  - China: 11th 5-year plan: 20% reduction in energy consumption per unit of GDP by 2010; 60GW renewable power capacity by 2010
  - India: Bureau of Energy Efficiency, RE to account for 10% of new power generating capacity by 2010
  - Indonesia: Fuel price restructuring & off-grid renewable energy development
- **Transportation:**
  - CNG vehicles; Biofuels; Emission standards for passenger cars;
- **Carbon sequestration and deforestation avoidance:**
  - Afforestation and reforestation in India, China
  - Deforestation avoidance: Indonesia, Papua New Guinea
- **Low carbon technology initiatives:**
  - Coal gasification; IGCC; coal bed methane recovery;
- **CDM:** Most Asian counties established DNA, but geographic inequity and lack of developmental benefits are of some concern.
- **Adaptation:** Policies to address climate variability exist and they can be sound basis for policies to address climate change
Selected region-wide initiatives

- ADB CDM facility/Clean energy framework
- ASEAN Climate Change Initiative
- SAARC Action Plan on Climate Change
- Asia-Pacific Network on Global Change Research (APN)
- Asia-Pacific Seminar on Climate Change
- Asia-Pacific Partnership on Clean Development and Climate (China, India, Japan, ROK)

Part 2: Five main challenges

1. Integrating climate change concerns in development plans
2. Streamlining of market mechanisms to facilitate SD
3. Developing appropriate adaptation strategies
4. Deploying low carbon technologies
5. Financing and capacity strengthening
Climate challenge is serious but developmental challenge is also huge.

- **Economic security** (poverty alleviation):
  - 1.3 billion people with <1$ a day;
  - 3 billion people with <2$ a day
- **Energy security**:
  - 2 billion people without access to electricity
- **Food security**:
  - 800 million people on the verge of starvation
- **Water security**:
  - 1.3 billion people without clean water
- **Health security**:
  - 1.4 billion people exposed to dangerous levels of outdoor pollution
  - 2.2 billion people exposed to dangerous levels of indoor pollution

Climate Change & Development - 1

- Since climate change can negate developmental efforts to date, future discussions must consider complementarities among climate change, energy security and sustainable development more proactively.
- Assessment of 20 top-down, bottom-up and/or mixed proposals indicated that efforts to reflect Asian concerns on energy security and development needs in climate negotiations have been far from satisfactory.
- Identification of policies and measures for transforming the region’s social & economic structure toward low carbon society while addressing genuine developmental priorities of each nation is the challenge.
Climate Change & Development - II

- Implementation of climate-friendly development policies - through sharing good practices like setting RE/EE targets & standards, developing guidelines for integration of climate concerns in energy policies, building adequate human and institutional capacities, and initiating new partnerships.

- Focus more on developmental benefits of mitigation policies and energy access

- Effective support to mainstream climate risks in development agenda at both policy and operational levels is crucial.

Streamlining of market mechanisms
Rationale - 1

Registered CDM projects by type (July 2007)

While projects with developmental benefits are generally well represented...

Source: IGES CDM Database
Streamlining of market mechanisms
Rationale - 2

Expected amount of CERs by project type (July 2007)

most CERs come from projects with low developmental benefits.

Source: IGES CDM Database


Streamlining of market mechanisms
Rationale - 3

Geographic inequity in CDM in Asia

Several countries with the greatest developmental needs have the fewest CDM projects...
Streamlining of CDM - I

- CDM, despite many shortcomings, is a good tool to mobilize climate-friendly policies and investments.
- Identify pragmatic options for integrating CDM in national energy and development policy
- Provide an early, credible signal on continuity of CDM and ensure the value of CERs after 2012
  - unilateral declaration by Annex I countries to extensively utilize post-2012 CER
  - extension of the period of the next commitment to 10 years or more, and
  - proactive support for post-2012 CERs by multilateral financial institutions.

Streamlining of CDM - II

- Widen the scope of CDM to sector-, programme- or policy-based CDM from 2012
- Register small-scale projects expeditiously; provide support for bundled projects; and create carbon funds targeting micro-scale CDM activities in LDCs and SIDS - to improve geographic equity.
- Quantify and provide financial support for developmental co-benefits of CDM - so that total value of projects with high SD but low CERs could compete well with those yielding high CERs.
- Employ innovative financing approaches to cover underlying finance needs of CDM
3. Developing appropriate strategies for adaptation

Areas for improvement

- Vulnerability and adaptation assessments
- Adaptation policies and measures
- Mainstreaming adaptation into national development planning
- Adaptation financing
- Sub-regional strategies (e.g., Himalayas, Mekong)

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Coverage on adaptation policies and measures as reflected by number of pages in National Communications of selected Asian countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Total number of pages</th>
<th>No. of pages describing impacts and vulnerability</th>
<th>No. of pages discussing adaptation policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhutan</td>
<td>63</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Cambodia</td>
<td>79</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>China (HIC1)</td>
<td>112</td>
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<td>4</td>
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<tr>
<td>India</td>
<td>293</td>
<td>48</td>
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<td>Indonesia</td>
<td>116</td>
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<td>3</td>
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<tr>
<td>Japan (HIC4)</td>
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<td>Lao PDR</td>
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<td>Maldives</td>
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<td>Mongolia (HIC1)</td>
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<td>Nepal</td>
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<td>Papua New Guinea</td>
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<td>2.5</td>
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<td>The Philippines</td>
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<td>20</td>
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<tr>
<td>Viet Nam</td>
<td>135</td>
<td>17</td>
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</tbody>
</table>
A comparison of the mitigation and adaptation regimes under the UNFCCC

**Mitigation**
- Clearly defined
- Clearly stated objective
- Standard measures and objectives (emissions and concentrations)
- Baseline (1990 emissions)
- Global environmental benefits
- Incremental costs calculable
- Clear financial arrangements
- Legal instrument (Kyoto)

**Adaptation**
- No clear definition
- No objective stated
- No standard measures (hardly any measures at all)
- No baseline
- Absence of/limited global environmental benefits
- Incremental costs not possible or very difficult to calculate
- Multiple, inconsistent and insufficient funding
- No legal instrument

Source: Burton & May, 2004 IDS Bulletin

**Adaptation Financing – some estimates**
- Future impacts & their costs are still uncertain (Stern, 2006)
- Climate disaster losses could exceed US$ 1 trillion/year by 2040 (Oxfam)
- Costs of climate-proofing investments in developing countries: US$ 9-41 billion per year (World Bank)
- Additional costs of coverage of CC impacts
  - $50-100bn/year (UNDP)
  - 100bn/year (Christian Aid)
- Minimum cost of adaptation: At least $50 bn/year (Oxfam)
- US$50-170 billion/yr (AWG4, 2007)
## Adaptation financing in the current regime

<table>
<thead>
<tr>
<th>Status as of August 2007</th>
<th>Total funds mobilized</th>
<th>Unpaid contributions and pledges</th>
<th>Cumulative funds collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Special Climate Change Fund (SCCF)</td>
<td>US$62.1m</td>
<td>US$9.1m</td>
<td>US$53.0m</td>
</tr>
<tr>
<td>2. Least Developed Countries Fund (LDC Fund)</td>
<td>US$115.8m</td>
<td>US$53.6m</td>
<td>US$62.2m</td>
</tr>
<tr>
<td>3. Strategic Priority on Adaptation (funded by GEF Trust Fund)</td>
<td>US$50m</td>
<td></td>
<td>US$50m</td>
</tr>
<tr>
<td>4. Adaptation Fund</td>
<td>Best estimate of US$450m by 2012 (US$ 80-300 m per year between 2008-2012)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Best estimate of 1+2+3: US$ 275 million (AWG, 2007)*

Source: GEF status report on the climate change funds as of April 30, 2007
UNFCCC workshop on the Adaptation Fund (2006)

## 4. Deploying low carbon technologies

No single technology can alone fill the “gap”.
⇒ A broad portfolio of technologies is required.

[Diagram showing technologies to fill the gap]

Challenges for deploying low carbon technologies

- Ensuring to avoid locking in carbon-intensive technology in emerging economies
- Building synergies between UNFCCC and non-UNFCCC initiatives
- Avoiding shift of energy intensive industries to developing countries
- Removing financial barriers to technology transfer and support endogenous technology development
- Moving forward with a new IPR regime

5. Financing & capacity strengthening

- Additional estimated investment and financial flows needed in 2030
  - Mitigation:
    - Global: 200-210 billion USD (0.92% of projected global investment and 0.26% of global GDP in 2030)
    - Developing countries: 76 -77 billion USD (0.86% of investment and 0.29% of GDP in 2030)
  - Adaptation: Developing countries: USD 28 to 67 billion in 2030
  - Private-sector investments constitute the largest share of investment and financial flows (86%) for mitigation, while public resources are expected to play a predominant role in adaptation

- Options for enhancing financial flows in the future regime
  - Expanded carbon markets
  - Adaptation Fund
  - Financial mechanism / ODA
  - New sources (International air travel levy, Global carbon tax, etc.)

- Capacity strengthening of researchers, policy makers, negotiators, financial and legal institutions
III. The Way Forward

- **International cooperation is crucial** to address climate change & win-win opportunities for cooperation are enormous.

- With greater economic & technological resources, developed countries should do the most to reduce GHG emissions, but everyone has a role to play. (Potential vs. capacity)

- Adaptation **should be given equal focus** to that of mitigation. More resources must be mobilized to avoid/minimize dangerous impacts on vulnerable communities and regions.

- Rapid deployment of low carbon technologies and mobilization of adequate finances are crucial to achieve low carbon society in Asia.

- Creation of **awareness among all stakeholders and strengthening of institutional and human capacities** is vital.