South Asia’s Hotspots

The Impact of Temperature and Precipitation Changes on Living Standards
South Asia is highly vulnerable to climate change
One of world’s poorest regions
(in spite of significant recent gains)
Countries are taking action...

<table>
<thead>
<tr>
<th>Country</th>
<th>National Strategy/Policy/Action Plan</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Bangladesh Climate Change Strategy and Action Plan</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>Bhutan</td>
<td>National Adaptation Plan</td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>India</td>
<td>National Action Plan on Climate Change, State Action Plans</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>Maldives</td>
<td>Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>Nepal</td>
<td>National Framework on Local Adaptation Plans for Action</td>
<td>2011</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>Pakistan</td>
<td>National Climate Change Policy</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>National Adaptation Plan for Climate Change Impacts in Sri Lanka</td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>Intended Nationally Determined Contribution</td>
<td>2015</td>
</tr>
</tbody>
</table>
But there are challenges...

- Actions will incur a cost, there will inevitably be trade-offs, so that governments must prioritize efforts.
- The difficult questions that the governments are confronted are: Which interventions are warranted? Up to what cost? Where? When?
- Sometimes decisions must also be made with incomplete information
- Governments are often face with the dilemma of either not taking early action coupled with the risk of incurring very high future costs, or else acting early on and eventually realizing that such actions were redundant.
- Pressing need today is to provide decision-makers with the economic rationale for investing in resilience--about the most likely courses of the problem and assess the pros and cons — costs and benefits — of alternative actions
- Governments also require information on the types of interventions that will build resilience and the locations where the investments are most needed.
South Asia’s climate is highly diverse

Average Annual Temperature (1981-2010)

Average Monsoon Precipitation (1981-2010)
Unambiguous temperature increases (less so for precipitation)

Change in Annual Temperature (1951-2010)

Change in Monsoon Precipitation (1951-2010)

Temperature Change (°C)
-1.0 - 0.5
-0.5 - 0.5
0.5 - 1.0
1.0 - 1.5
1.5 - 3.0

Precipitation Change (%)
-40 - -20
-20 - 20
20 - 40
40 - 60
60+

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3 manifestations of climate change

Knowledge Gap
(analyzed in *South Asia’s Hotspots*)

- **Changes in temperature and precipitation**: Impacts on agriculture productivity, health, labor productivity, and migration
- **Changes in characteristics of extreme events**: Loss of property, assets and human life (analyzed in *Turn Down the Heat* and *Unbreakable*, World Bank)
- **Sea-level rise**: Coastal erosion and flooding, asset damage and habitat loss (analyzed in *Turn Down the Heat*, World Bank)

[worldbank.org/SouthAsiaHotspots](http://worldbank.org/SouthAsiaHotspots)
What the report does

✓ Helps fill an important knowledge gap by analyzing how rising temperatures and changing precipitation patterns affect living standards in South Asia.

✓ State-of-the-art climate modeling is combined with granular district and household data provide first estimates of this kind.

✓ A number of developing climate hotspots are identified, which are regions where living standards will be especially adversely impacted by climate change.
Questions

• Where will average climate changes occur most?

• Who will be the impacted by these climate changes?

• What needs to be done to build resilience?
Where will average climate changes occur?
Temperatures projected to increase

Annual Changes by 2050

Climate-sensitive (RCP 4.5)

Carbon-intensive (RCP 8.5)

Temperature Change (°C)

- 0.0 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0

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Precipitation may change in some locations, but projections are highly uncertain...

**Monsoon Changes by 2050**

Climate-sensitive (RCP 4.5)  
Carbon-intensive (RCP 8.5)
Hotspots

Who will be the most impacted by average climate change?
Climate Change and Living Standards

Increases in temperature and changes in precipitation → Health
Increases in temperature and changes in precipitation → Agriculture
Increases in temperature and changes in precipitation → Migration
Increases in temperature and changes in precipitation → Productivity
Health → Living standards (consumption expenditure)
Agriculture → Living standards (consumption expenditure)
Migration → Living standards (consumption expenditure)
Productivity → Living standards (consumption expenditure)

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Most countries will experience a decline in living standards...

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Climate-Sensitive (RCP 4.5)</th>
<th>Carbon-Intensive (RCP 8.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>8.3</td>
<td>11.9</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>-2.9</td>
<td>-6.7</td>
</tr>
<tr>
<td>India</td>
<td>-2.0</td>
<td>-2.8</td>
</tr>
<tr>
<td>Nepal</td>
<td>3.2</td>
<td>4.1</td>
</tr>
<tr>
<td>Pakistan</td>
<td>-2.0</td>
<td>-2.9</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>-4.9</td>
<td>-7.0</td>
</tr>
</tbody>
</table>
What are Hotspots?

- Region where living standards will be most impacted by average changes in temperature and precipitation

<table>
<thead>
<tr>
<th>Severity</th>
<th>Consumption Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>Consumption loss more than 8%</td>
</tr>
<tr>
<td>Moderate</td>
<td>Consumption loss 4% to 8%</td>
</tr>
<tr>
<td>Mild</td>
<td>Consumption loss less than 4%</td>
</tr>
</tbody>
</table>
Severe hotspots largely avoided under climate-sensitive development scenario

Climate-sensitive (RCP 4.5)  
2050  
Carbon-intensive (RCP 8.5)

Hotspots
- Severe
- Moderate
- Mild
- Non-Hotspots
- No Data

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Most Affected Districts

Pakistan
- Hyderabad
- Mirpur Khas
- Sukkur
- Larkana
- Bahawalpur
- Faisalabad
- Lahore
- Multan
- Dera Ghazi Khan
- Sargodha

Bangladesh
- Cox's Bazar
- Bandarban
- Chittagong
- Rangamati
- Noakhali
- Feni
- Khagrachhari
- Barguna
- Bagerhat
- Satkhira

India
- Chandrapur
- Bhandara
- Gondiya
- Wardha
- Nagpur
- Raj Nandgaon
- Durg
- Hoshangabad
- Yavatmal
- Garhchiroli

Sri Lanka
- Jaffna
- Puttalam
- Mannar
- Kilinochchi
- Kurunegala
- Trincomalee
- Gampaha
- Kegalle
- Mullaitivu
- Vavuniya
Almost half of South Asia’s population lives in areas that will become hotspots...

Over 800 million people living in hotspots
Vulnerable areas and vulnerable households

Hotspots districts have:
- Less road density
- Poorer access to markets
- Water stress

Most vulnerable households in The hotspots are:
- Predominantly agricultural
- Without electricity access in some cases
What needs to be done to build resilience?
Investing in education, enhancing non-agricultural activities and reducing water stress will mitigate negative impacts of climate change in India.
Promoting non-agricultural activities would significantly reduce burden of climate change in Bangladesh

<table>
<thead>
<tr>
<th>Consumption Change (%)</th>
<th>Status Quo</th>
<th>Non-Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-6.7</td>
<td>3.9</td>
</tr>
</tbody>
</table>

30% improvement
Improving access to electricity will reduce climate burden in Pakistan

- Status Quo: -2.9
- 30% improvement in Electricity: -2.5
Increasing share of non-agricultural activities, enhancing educational opportunities and improving market access will help reduce climate change burden in Sri Lanka.
Conclusions

- Helps fill an important knowledge gap by analyzing how rising temperatures and changing precipitation patterns affect living standards in South Asia.
- State-of-the-art climate modeling is combined with granular district and household data provide first estimates of this kind.
- A number of developing climate hotspots are identified, which are regions where living standards will be especially adversely impacted by climate change.
- Policies and actions will have to be tailored for specific and varied impacts and needs based on local conditions.
- No single set of interventions will work in all hotspots.
- The report provides a roadmap for potential interventions for building resilience including policies, investments in infrastructure and human development.
Thank you