Climate Change Impacts and Energy Security

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Contents

- Observed impacts shown an adverse trend
- Dangerous impacts are coming to us
- Adaptation may reduce the adverse impacts and delay the “dangerous level”
- Challenges and Policy Implications for Mitigation and Adaptation Mainstreaming
2006’s Disasters

- Warming 1 °C than average ✓
- More than 20 days with 38 °C high and without rain in Chongqing ✓
- Super Typhoon SAOMAI and Bilis Landed ✓
- Severe dust storm surprise Northern China
- Flood in Dry Ningxia
- Autumn drought in Shandong
Observed Impacts

Since the 1950s, the runoffs to six large rivers in China have all been observed to experiencing a decreasing trend, with the largest decrease, 36.64%/decade occurred along the Haihe River, while large flooding events occurred along the Yangtse, Pearl, Songhua, Huai, and Yellow rivers as well as the Tai lake in the 1990s.
Climate Change and sea level rise have already affected China’s coastal areas, where the economic losses from storm surges, flooding, heavy rain, drought and other serious climatic events were most significant.

Yellow river delta, Yangtse delta and Zhujiang delta are the most vulnerable to storm surge, coastal flooding, shoreline erosion, and exacerbate saltwater intrusion.
Observed Impacts

- Glacier degeneration

Glacier areas in northwest China have decreased by 21% since the little ice age

Qin DH, 2005
**Simulated annual increase (°C) in mean temperature (Tmean) for 2071–2079 under SRES A2 & B2 scenarios from PRECIS relative to baseline (1961–1990)**
Possible Impacts on Agriculture

Rice yields 2080s

- By 2030, the overall crop productivity in China can decrease 5~10% if no action is taken. By the second half of the 21st century, climate change can cause yield reduction in rice, maize and wheat up to 37%. In the next 20~50 years, agricultural production may be seriously affected, compromising long-term food security in China.
Regions with different Vulnerabilities

Agriculture

Coast Zone

By 2030, the sea levels along Chinese coastal areas could rise by 0.01~0.16m, increasing the possibility of flooding and intensified storm surges.

Could exacerbate the instability of water resources distribution and the gap between water demand and supply
Impacts on different regions

- **NE. China:** wetland and permafrost would deteriorate or disappear.
- **N. China:** water demand would increase significantly, water shortage would get worse.
- **NW:** water shortage could reach about 20 billion m$^3$/a between 2010~2030.
- **E. China:** the 1/100 frequency of flood occurrence in one hundred years would increase.
- **C. China:** would decrease the yield of double-harvest rice.
- **SW:** the strength, scale, scope and frequency of land disasters are expected to increase over time resulting in more severe losses.
- **S. China:** Sea level rise, estimated to be between 0.60 m~0.74 m by 2100, mangrove areas would move northward and the scope of coral bleaching would expand.
## A Framework of Impacts in China

<table>
<thead>
<tr>
<th>Warming</th>
<th>1~2°C(2020)</th>
<th>2~3°C(2050)</th>
<th>3~5°C(2080)</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>All regions balance</td>
<td>N China: -2% NW China: -3%; others: balance</td>
<td>N China: -1% NW China: -4%; others: balance;</td>
</tr>
<tr>
<td>Agriculture</td>
<td>additional water requirement; Cold disaster alleviated in NE China</td>
<td>Crop yield decrease 5~10%, variation among regions and crops; 550 ppm CO2 increases C3 crop yield 17%; Adaptation increases all crops above baseline yield</td>
<td>CO2 fertilization effect of 560<del>720 ppm will set off a decrease of crops production due to the warming climate in 3.2</del>3.8°C,</td>
</tr>
</tbody>
</table>
What Emission Caused

■ 1750-1950  95% of CO2 Emission from Developed Countries
■ 1950-2000  77% of CO2 Emission from Developed Countries
■ 1950-2002, China’s emission accounts 9.33% of the world accumulated emission only
■ This period China’s CO2 emission per capita accounts 92nd order only
IPCC New Scenarios
(Representative Concentration Pathways: full range of radiative forcing 3w/m², 4.5w/m², 6w/m², 8.3w/m²)
<table>
<thead>
<tr>
<th></th>
<th>1990(94)</th>
<th>2004</th>
<th>2020</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EU</strong></td>
<td>4005Tg</td>
<td>3880Tg</td>
<td>-20~30%</td>
<td>-60~80%</td>
</tr>
<tr>
<td><strong>Annex I</strong></td>
<td>17148Tg</td>
<td>16267Tg</td>
<td>-20~30%</td>
<td>-50%</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td>3650Tg</td>
<td>5600Tg</td>
<td>-inc. rate</td>
<td>Consider emis. reduc</td>
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<tr>
<td><strong>P</strong></td>
<td>1.259</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>1.314</td>
<td></td>
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</tbody>
</table>
A time to Act

- Re-assess adaptation function and revise 2 degree target
- Assess the possible integrated impacts of the new proposal
- Persuade key policy makers to accept the new proposal of cooperation for energy security and GHG emission reduction
- Who can lead to establish a low carbon develop pathway and make a great contribution to the new world
Looking Forward
New Cooperation on Energy Security