Approaches to Address Loss and Damage Associated with Climate Change Impacts Related to Slow Onset Events

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An Overview

- Slow onset events according to the Cancun Agreements
- Examples of slow onset events and their impacts in Asia
  - Increasing temperatures
  - Sea level rise
  - Salinization
  - Glacial retreat
  - Ocean acidification
- Slow onset events in a national context
  - Sea level rise in Bangladesh
  - Salinization in Bangladesh
- Addressing the risk of slow onset events
- The way forward

Slow onset events

According to the Cancun Agreements

Decision 1/CP.16

"recognizes the need to **strengthen international cooperation and expertise** in order to **understand and reduce loss and damage** associated with the adverse effects of climate change, including impacts related to extreme weather events and **slow onset events"**

Slow onset events include: sea level rise, increasing temperatures, **ocean acidification**, **glacial retreat** and related impacts, **salinization**, land and forest degradation, loss of biodiversity and **desertification**.

FCCC/CP/2010/7/Add.1

Increasing temperatures

- **Increased temperatures throughout Asia** leading to more frequent and prolonged droughts
- **Central Asia highly vulnerable** due to greater warming and less precipitation[1]
- Limited water supplies and increasing temperatures could reduce crop yields by up to 30 percent in the region[2]

1. Christensen, J.H. et al. (2007). "Regional Climate Projections." In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* S. Solomon et al., eds. Cambridge: Cambridge University Press.
2. Cruz, R.V. et al. (2007). "Asia: Climate Change 2007: Impacts, Adaptation and Vulnerability." In: *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. M.L. Parry et al., eds. Cambridge: Cambridge University Press.

Sea level rise

- Even at lowest emissions scenario **global mean sea level rise likely to be ~ 1 m**[1]
- **SLR in coastal Asia predicted to be 0.1 m above global mean**[2], leading to loss of livelihood, reduction in agricultural productivity, negative health impacts and displacement
- In **Viet Nam a 1 m rise in sea level would impact 10.8 percent of the population** and reduce both GDP and agricultural productivity by 10 percent[3]

1.Vermeer, M. et al. (2009). "Global Sea Level Linked to Global Temperature." *Proceedings of the National Academy of Sciences* 106(51):21527-21532.

2. Nicholls, R.J. et al. (2007). "Coastal systems and low-lying areas." *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*." M.L. Parry et al., eds. Cambridge: Cambridge University Press, Cambridge.

3. Dasgupta, S. et al. (2007). "The Impact of Sea Level Rise on Developing Countries: A Comprehensive Analysis." *World Bank Policy Research Working Paper 4136.* Washington, DC: World Bank.

Salinization

- Resulting from SLR, but reduction of fresh water from groundwater and upstream supplies contributes
- Coastal **Asia particularly vulnerable** to salinization:
  - Sea level rise can induce **salt water intrusion up to 3 km inland** from China's Zhujiang estuary
  - Salt water from the Bay of Bengal can travel **up to 100 km inland**
- Significant **implications for food and livelihood security and health** in affected communities

Nicholls, R.J. et al. (2007). " Coastal systems and low-lying areas." In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. M.L. Parry et al., eds. Cambridge: Cambridge University Press, Cambridge.

Ocean acidification

- Average pH of ocean surface water is[1]:
  - **0.1 unit lower today** than before the industrial period
  - **projected to decrease another 0.3 to 0.4 units** by the end of the century
- A**lters marine ecosystems**, particularly coral reefs, impacting coastal livelihoods and food security and **increasing the vulnerability of coastal areas** to storms
- **In Asia, coral reefs are a source of approximately one quarter of the annual fish catch**, providing food to one billion people[2]

1. Meehl, G.A. et al. (2007). "Global Climate Projections." In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. S. Solomon et al., eds. Cambridge: Cambridge University Press.
2. Hoegh-Guldberg et al. (2007). "Coral Reefs Under Rapid Climate Change and Ocean Acidification." *Science* 318:1732-1742.

Glacial Retreat

- Rising temperatures causing retreat of glaciers and **altering water supplies worldwide**
- In Asia, could affect **half a billion people in Himalaya-Hindu-Kush region** and a **quarter of a billion people in China** [1]
- **Glaciers in Nepal undergoing rapid retreat** (20m per year) leading to glacial lake outburst floods, resulting in loss and life and property and damage to forests, land and infrastructure[2]
- **Negative consequences for downstream agriculture in South Asia** as Himalayan rivers contribute 40 percent of the average annual flow of the Ganges River Basin, 70 percent in dry season

1. Christensen, J.H. et al. (2007). "Regional Climate Projections." In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon*, S. et al., eds. Cambridge: Cambridge University Press.
2. Jianchu, X. et al. (2007). "The Melting Himalayas: Regional Challenges and Local Impacts of Climate Change on Mountain Ecosystems and Livelihoods." *ICIMOD Working Paper.* Kathmandu: ICIMOD

Slow onset events in a national context

What sea level rise means for Bangladesh

- Most land mass less than 10 m above sea level making Bangladesh highly vulnerable

- Rise in sea level of 1 m would **inundate 18 percent of land, impacting 11 percent of the population**

- Significant repercussions for food security, livelihoods and health

- As a least developed country, Bangladesh lacks the resources needed adapt

Agrawala, S., Ota, T., Ahmed, A.U., Smith, J. and M. van Aalst. (2003). *Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans. Paris: OECD.*

Slow onset events in a national context

What salinization means for Bangladesh

- Scarcity of drinking water
- **Significant impacts on health** including diarrhea, skin disease, hypertension, malnutrition and diminished maternal health[1]
- Rice cultivation impossible in many affected areas with **significant implications for food and livelihood security**[2]
- Loss of livelihood prompting many to migrate[3]

1. CCC. (2009). *Climate Change and Health Impacts in Bangladesh*. Climate Change Cell. Dhaka: MOEF.
2. Faisal, I.M and S. Parveen. (2004). "Food Security in the Face of Climate Change, Population Growth, and Resource Constraints: Implications for Bangladesh." *Environmental Management* 34(4): 487-498.
3. MoEF. (2009). *Bangladesh Climate Change Strategy and Action Plan*. Dhaka: Ministry of Environment and Forests , Government of the Peoples' Republic of Bangladesh

Addressing the risk of slow onset events

- **Prepare effectively**
  - Land use zoning (e.g. Delineate areas for shrimp and crop production in the coastal zone)
  - Land suitability and adaptive agriculture (e.g. Saline tolerant rice cultivation)
  - Evacuation /Resettlement plan (e.g. Raised platform cluster villages)
  - Land reclamation and land elevation raising (e.g. Building cross dams)
  - Integrated management of land and water (e.g. Integrated shrimp/crop cultivation)
- **Increase capacity to cope**
  - Improved knowledge and skills (e.g. Risk modelling)
  - Flexibility in decision making (e.g. Immediate repairing of damaged infrastructure)
  - Adaptive learning and management (e.g. Learning from piloting projects)
  - Systems transformation over time (e.g. Mainstreaming climate change into government planning and policies)

The way forward

- Regional and transboundary cooperation and collaboration
- International mechanisms including institutional frameworks
- Financial and technical assistance for vulnerable countries
- Better understanding of current realities and probable future impacts of climate change
- Political leadership and capacity building of national and local institutions to prepare and respond effectively
- Implementing sound policies that will reduce loss and damage from slow onset events