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Understanding the Global Impacts of Climate Change

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Climate Change Induced Migration: A Brief Study from South Asia

Prajapati Shapkota

PhD Candidate, Environmental & Natural Resource Policy (ENRP)
Department of Environmental Studies
SUNY College of Environment Science and Forestry, Syracuse NY

Briefly Asia Pacific and South Asia

Asia Pacific Region

- ✓ Population 4.45 Bi – 60% of world population
- ✓ Urban population – 24% (1970); 42 % (2007) – 50% (by 2020)
- ✓ ADB estimates about 903 million struggle on $1.25/day
- ✓ Has several large and small vulnerable countries

(www.unescap.org)

South Asia Region

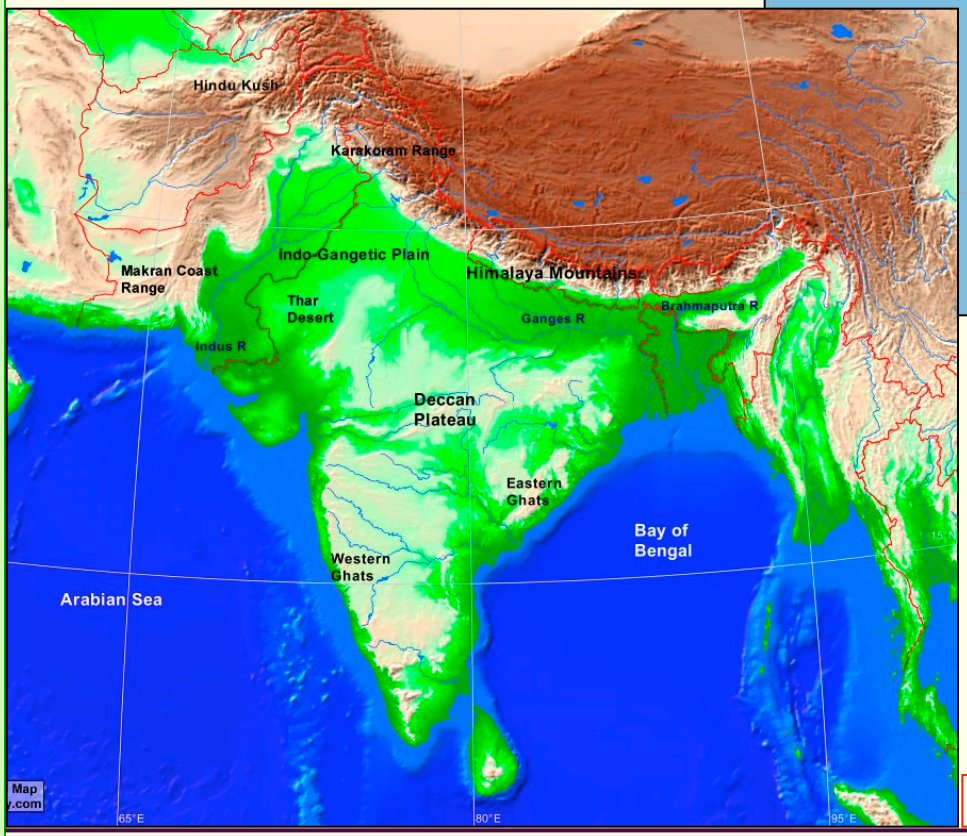
- ✓ Population -1.76 Bi (UNESCAP 2016): 40% of Asia-Pacific
- ✓ Urban population: 17(Nep) to 35 (Pak)%) Average (33%)
- ✓ Population under $1.25/day: - 6.5(S) to 49.6% (BD)
- ✓ Climate change related issues surface predominantly in
  - ◆ Himalayan (alpine mountains) region
  - ◆ Coastal region
  - ◆ Island countries
  - ◆ Central region of the sub-continent

(www.saarcstat.org)

The South Asia Region with Selected Indicators

Knowing South Asia region (the Indian Subcontinent and the island states - the SAARC countries

Source:google.com



Source: google.com

South Asia Countries

Afghanistan

- ✓ Population 25.98million
- ✓ Population density 37.5/km^2
- ✓ Urban population – 23.3
- ✓ Employment in Agriculture – 70%
- ✓ Poverty – 42% (below $1.25/day)
- ✓ GNI per capita - $330
- ✓ Household w electrification – 25%
- ✓ Mobile phones – 39/100
- ✓ Forest area - 2.1%
- ✓ Access to improved water -48%
- ✓ Access to sanitation – 37%
- ✓ Internet user – 3.3/100
- ✓ Landlocked and mostly dry mountainous country

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

Bangladesh

- ✓ Population 148.69 million
- ✓ Population density 1033/sq. km
- ✓ Urban population – 28.1%
- ✓ Employment in Agriculture – 48.1%
- ✓ Poverty – 40% (below $1.25/day)
- ✓ GNI per capita - $640
- ✓ Household w electrification – 46.5%
- ✓ Mobile phones – 35.7/100
- ✓ Forest area – 11.1%
- ✓ Access to improved water -80%
- ✓ Access to sanitation – 53%
- ✓ Internet user – 0.4/100
- ✓ Flood prone land lying mostly in the alluvial plains and delta region 0-1063m amsl

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

Bhutan

- ✓ Population 0.720 million
- ✓ Population density 18.8/sq km
- ✓ Urban population – 34.7%
- ✓ Employment in Agriculture –60.15%
- ✓ Poverty – 26.2% (below $1.25/day)
- ✓ GNI per capita - $8070
- ✓ Household w electrification – 85%
- ✓ Mobile phones – 55.92/100
- ✓ Forest area – 84.6%
- ✓ Access to improved water -92%
- ✓ Access to sanitation – 65%
- ✓ Internet user – 7/100
- ✓ Small landlocked mountainous country that rendered 1/6 of its population as refugees

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

India

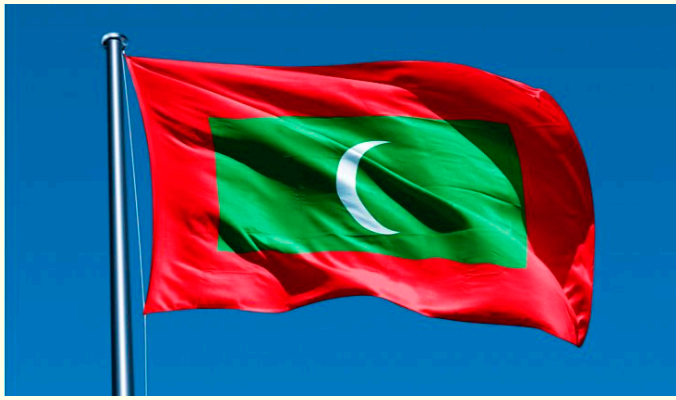
- ✓ Population 1.210 billion
- ✓ Population density 382/sq km
- ✓ Urban population – 31.2%
- ✓ Employment in Agriculture –53.2%
- ✓ Poverty – 32.7 (below $1.25/day)
- ✓ GNI per capita - $6490
- ✓ Household w electrification –78.3.%
- ✓ Mobile phones – 72.7/100
- ✓ Internet user – 32.8/100
- ✓ Access to improved water -91.4%
- ✓ Access to sanitation – 47.6%
- ✓ Forest area – 21.1%
- ✓ Second most populous country with a range of climatic zones from tropical to alpine

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

Maldives

- ✓ Population 0.319 million
- ✓ Population density 1053/sq km
- ✓ Urban population – 35%
- ✓ Employment in Agriculture –4.2%
- ✓ Poverty – 15% (below $1.25/day)
- ✓ GNI per capita - $9332
- ✓ Household w electrification –99.8.%
- ✓ Mobile phones – 72.7/100
- ✓ Internet user – 11.8/100
- ✓ Access to improved water -91%
- ✓ Access to sanitation – 98%
- ✓ Forest area – 3.3%
- ✓ Archipelago in the Indian Ocean with 0-2.4m amsl



Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

Nepal

- ✓ Population 26.62 million
- ✓ Population density 180.9/sq km
- ✓ Urban population – 17%
- ✓ Employment in Agriculture –73.9%
- ✓ Poverty – 25.2 (below $1.25/day)
- ✓ GNI per capita - $490
- ✓ Household w electrification –69.9.%
- ✓ Mobile phones – 50.2/100
- ✓ Internet user – 14.55/100
- ✓ Access to improved water -88%
- ✓ Access to sanitation – 31%
- ✓ Forest area – 25.4%
- ✓ Landlocked mountainous country with melting glaciers, killer lakes and numerous snow fed rivers.

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

Pakistan

- ✓ Population 177.10 million
- ✓ Population density 222.0/sq km
- ✓ Urban population – 36.86%
- ✓ Employment in Agriculture –45.1%
- ✓ Poverty – 21.4 (below $1.25/day)
- ✓ GNI per capita - $1258
- ✓ Household w electrification-91.37.%
- ✓ Mobile phones – n/d
- ✓ Internet user – 12/100
- ✓ Access to improved water -87%
- ✓ Access to sanitation – 66%
- ✓ Forest area – 4.19%
- ✓ Country with varying climatic zones

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia Countries

Sri Lanka

- ✓ Population 20.32.62 million
- ✓ Population density 324/sq km
- ✓ Urban population – 16.3%
- ✓ Employment in Agriculture –31%
- ✓ Poverty – 1.4 (below $1.25/day)
- ✓ GNI per capita - $2866
- ✓ Household w electrification –87.7.%
- ✓ Mobile phones – 100/100
- ✓ Internet user – 6.7/100
- ✓ Access to improved water -84.7%
- ✓ Access to sanitation – 93.9%
- ✓ Forest area – 29.9%
- ✓ Small island tropical country prone to cyclones and incessant rains.

Source: www.saarcstat.org/content/saarc-figures-2013

South Asia's Major Cities

A majority of largest S Asian cities are either in the coastal region or along low lying river valleys and flood plains making them vulnerable to flooding and storm surges, cyclones and sea level rise.

Understanding Climate Change and its Global Impacts

What is Climate Change?

The Intergovernmental Panel on Climate Change – IPCC (2014) Synthesis Report:

- ✓ Climate Change as "a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer".

How and Why of Climate Change?

- ✓ Climate Change (CC) is considered due to modern development and population growth –development and exploitation of natural resources to obtain energy and materials for improving the quality of human life and thus emitting greenhouse gases (GHG) in excess.
- ✓ Natural GHG emission is considered minimal with human and animal population growth at a balance with climate.
- ✓ The global CC concern is intimately tied with economic development – the anthropogenic causes of global warming by the use of fossil fuels to drive the economic growth.

Greenhouse Gases & Climate Change

Scientific investigations have given us a clear understanding of the causes of climate change.

- ✓ **Certain gases (CO_2, CH_4, NO_2) in the atmosphere trap heat and regulate the Earth's temperature - The Greenhouse Effect**
- ✓ **Burning of fossil fuels (oil and coal) releases large amounts of CO_2 into the atmosphere**
- ✓ **Depletion of main carbon sinks –green plants with deforestation and desertification decreases the earth's absorptive capacity**
- ✓ **More greenhouse gases means stronger greenhouse effect and there is more CO_2 in the air than ever before.**
- ✓ **This causes climate change with:**
  - **Extreme weather events (hurricanes, floods, draughts)**
  - **Melting of polar ice caps and receding of polar region and alpine glaciers with sea-level rise**

Is Climate Change a Reality?

"There's no more debating if climate change is a reality.

- ✓ **Scientists agree: the world is getting warmer and human activity is largely responsible.**

- ✓ **Today, our planet is hotter than it has been in 2,000 years, and on track to grower hotter than it's been in two million years."**

https://www.greenpeace.org/usa/global-warming/climate-science/

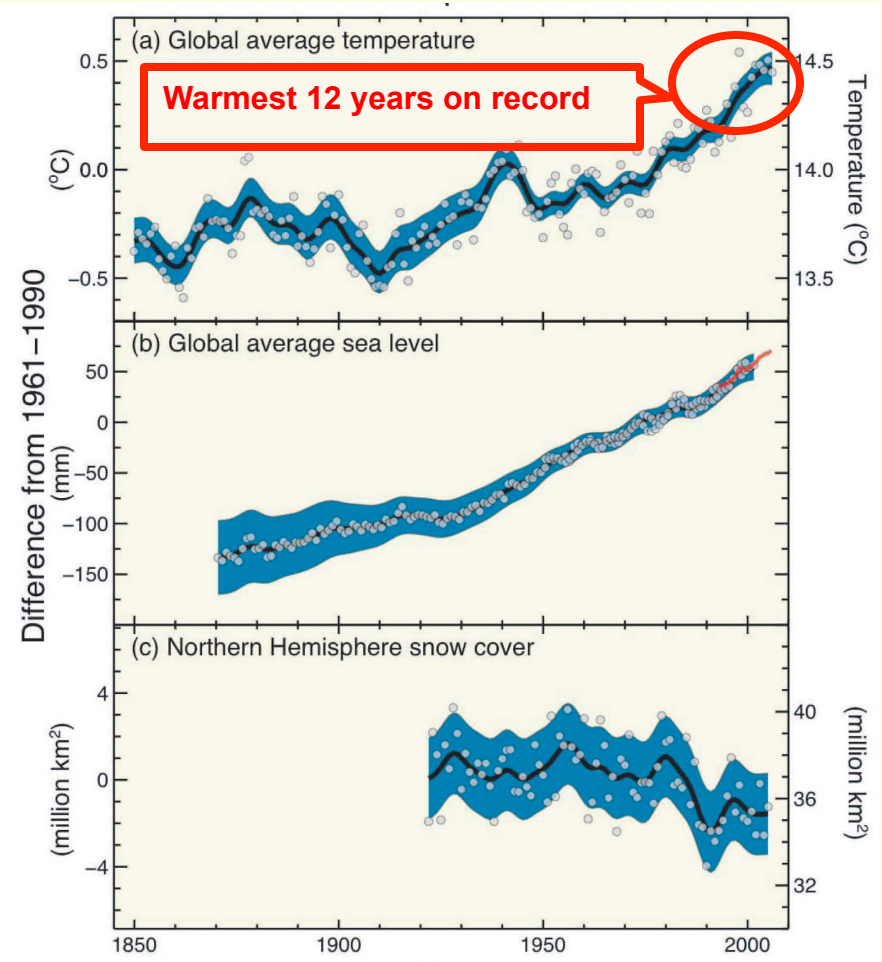
Our Understanding of Climate Change

Phases in the History of Climate Change

- ✓ **Phase I (by 1980's)**
  - ➢ Does Climate Change (CC) occur?
  - ➢ How much can it occur?
- ✓ **Phase II (1990's)**
  - ➢ What are the impacts and vulnerabilities?
  - ➢ How can we reduce GHG emissions and mitigate CC?
- ✓ **Phase III (ongoing)**
  - ➢ What are the means of CC adaptation?

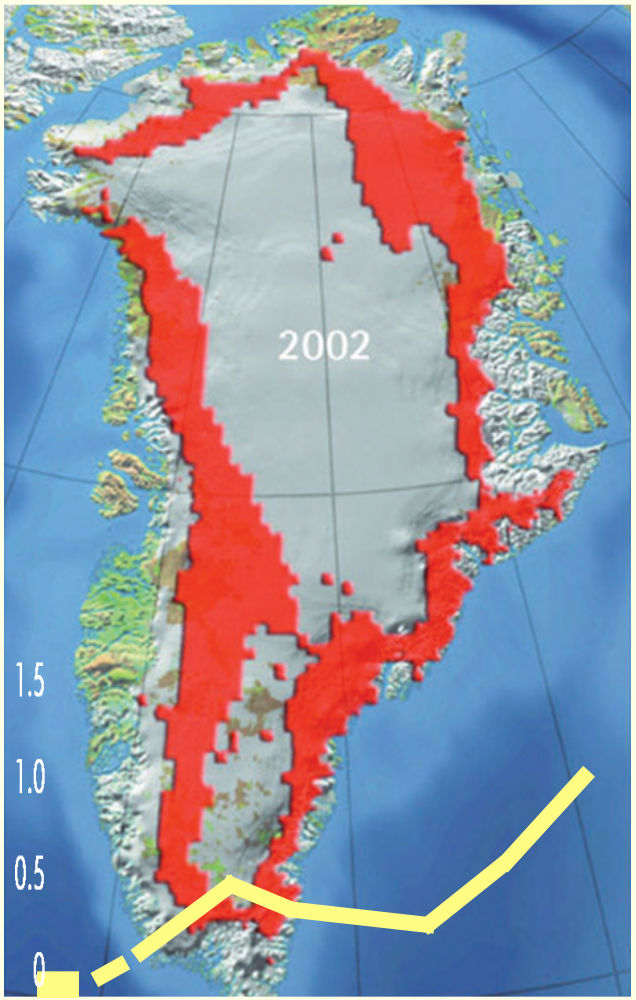
Warming of the Climate System

- ✓ Increasing in global average air and ocean temperatures
- ✓ Rising global average sea level
- ✓ Reductions of snow and ice



The above figure is based upon IPCC researching to understand the impact of GHG to cause Climate Change (IPCC 2014)

Example: Recorded impacts of unprecedented Climate Change



—-- The red areas on these images show expansion of seasonal melting of the Greenland ice sheet from 1992 to 2002.

—-- The yellow line indicates the increase in temperature globally by 1ºC from 1900 to 2000

The two maps distinctly indicates the impact of global warming of 1ºC from 1900 to 2000 causing the ice sheets to melt that leads to rise in sea levels

What we know about Climate Change is mostly through Environmental Organizations, Actors and Advocates

Climate Change Regime has mostly Non-State Actors

Non-state Actors: any organization with no formal or legal status as a state or agent of a state: two kinds with local, national, regional or international responses

- ✓ NGOs —private, voluntary interest groups
- ✓ Epistemic communities (experts/scientists, academics indigenous groups, traditional communities)

Some common NGOs/ INGOs

- ✓ United Nation Agencies (UNEP, UNFCC, UNESCAP)
- ✓ Intergovernmental Panel on Climate Change
- ✓ COP (under UN mandate)
- ✓ Environmental NGOs (Greenpeace, WWF, Worldwatch Inst, EDF, Sierra Club, Earth Island Inst. etc)
- ✓ International Development Agencies (CIDA, Sida, USAID etc)
- ✓ ADB, The World Bank

Role of Non-state Actors

The main roles of environmental agencies (non-state actors) are:

- ✓ Research and knowledge management
- ✓ Raise public awareness and advocacy
- ✓ Influence policy makers and their agenda
- ✓ Take mitigation and adaptive actions
- ✓ Propose solutions
- ✓ Provide policy and research expertise
- ✓ Represent public opinion
- ✓ Represent marginalized voices

Almost everyone is concerned and hence we have Climate Talks

Year	Climate Talks	Status
1992	Rio Summit	The parties agreed on 'preventing dangerous climate change'. President Bush signed the UNFCCC indicating agreement to the treaty.
1997	Kyoto	Kyoto Protocol (KP) the first binding treaty for cuts in emissions in Europe and Japan. KP effective only in 2005 though key polluters, US has not yet ratified it and China need not cap its emissions as a developing country.
2009	Copenhagen	The Copenhagen talks had vast numbers of brackets indicating disagreements on central issues.
2010	Cancun	The Cancun 2010 negotiations showed much dissension and near collapse before a positive conclusion, at least on procedural grounds.
2011	Durban	Many contentious issues were merely brought to negotiations in Durban.
2012	Doha	Doha Amendment to Kyoto Protocol with a revised list
2013	Durban	Establishment Green Climate Fund and Long-term Finance
2014	Lima	COP 20: Government agree to ground rules for 2015 Paris summit
2015	Paris	Agreement enforced from Nov 4, 2016 with 143 of 197 parties ratifying the UNFCC agreement. US accepted for 55% reduction of GHG emissions.

Source (UNFCCC, 2012)

Climate Change Impacts in South Asia

Impacts of Climate Change in South Asia

- ✓ Melting of glacier in the Himalayas is projected to increase flooding, and rock avalanches from destabilized slopes, and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede.

- ✓ Availability of freshwater in central, east, southeast and South Asia, mostly in large river basins, is projected to decrease that could adversely affect more than a billion people by the 2050s – a majority in South Asia

(UNEP 2009)

Impacts of Climate Change in Asia

- ✓ Endemic morbidity and mortality due to diarrheal disease primarily associated with floods and droughts are expected to rise in South and South-East Asia
- ✓ Increases in coastal water temperature would exacerbate the abundance and/or toxicity of cholera in South Asia.
- ✓ Coastal areas, especially heavily-populated megadelta regions in South and South-East Asia, will be at greatest risk due to increased flooding from the sea and, in some megadeltas, flooding from the rivers

(ADB 2012)

Likely Impact of Climate Change

The most likely impacts are:

- ✓Floods and inundations
- ✓Storms (Cyclones, Typhoons, Surges, Tornadoes, Hurricanes)
- ✓Saline Intrusion
- ✓Droughts
- ✓Pests/Locusts
- ✓Disease: Outbreaks and Vectors
- ✓Forest Fires
- ✓Landslides
- ✓Heat Waves/Cold Waves, Temperature Extremes
- ✓Sea Level Rise
- ✓Riverbank Erosion

These impacts lead to people becoming climate/ environmental refugees or migrants.

Some facts and figures: Migration/displacement

The Internal Displacement Monitoring Centre (IDMC, 2015) estimates:

- ✓ Global internal displacement between 2008 and 2015 was over 203 Mi
- ✓ Displaced internally in 2015 due to sudden-onset disasters - over 19 Mi
- ✓ Displaced in South Asia – 7.9 Mi (41%)
- ✓ Displaced by conflicts – 65.6 Mi (UNDP 2015)

http://www.undp.org/content/undp/en/home/sustainable-development/economic-recovery/migration-and-displacement.html

Climate Change Migration from South Asia and Vulnerable Countries

Vulnerability of South Asia

IPCC Report "Climate Change 2014:Impacts, Adaptation and Vulnerability" states that advanced Climate Change will cause food shortage and stagnated economic growth.

- Glacier melting, flooding and erratic monsoon impacting food sources - agriculture
- Rising temperatures require more irrigation and cooling
- Extreme heat and drought in parts of India, Pakistan and Bangladesh cause reduced agricultural production
- Rising sea level threaten mainly the coastal regions and island countries like Maldives, Sri Lanka and other islands
- Flooding and land degradation impact India, Nepal, Bhutan, Afghanistan, Pakistan and Bangladesh

Climate change migrations

Local Migrations

- Rural to urban migration
- Drier unproductive or flood prone to productive areas
- Coastal zone to hinterland

Regional & International Migration

- One country to another neighbor or developed countries
- From island states or countries to mainland regions
- From one state/region to another

Such migrations are in search for employment, education, better life or escape from impacts of climate change.

www.ipcc.ch/pdf/assessment-report/ar5/wg3/WGIIIAR5_SPM_TS_Volume.pdf

Climate change displacement and international migration examples

Displacement in South Asia by:

- Floods, cyclones and land stability in Bangladesh, India, Nepal
- Floods, droughts and changing monsoon patterns– India, Pakistan, Bangladesh, Afghanistan, Nepal

International Migration from South Asia

- Island people (SL & Maldives) seek to migrate to neighboring countries or developed countries (America, Australasia, EU)
- Bangladeshis move to India, SE Asia or developed countries

To Note:

Recent migration from Bhutan and Nepal was mostly political (ethnic cleansing or civil strife) and not climate factors

Most vulnerable countries….

Afghanistan

- ✓ Droughts and floods
- ✓ Poverty and Safety
- ✓ Conflicts
- ✓ Second largest origin of refugees in the world
- ✓ Migration to Pakistan and Iran

Migration Policy Institute 2018

Most vulnerable countries

Bangladesh

- ✓ Food insecurity – damage to agriculture and fisheries
- ✓ Local ecosystem threatened
- ✓ Social instability: Conflict between “climate refugees” and host communities
- ✓ Displacement internally to safer and secure places or migration to India, SE Asia and Nepal
- ✓ Political issues: refugees and host country

The main reasons – floods, droughts and cyclones

Most vulnerable countries….

Maldives

- ✓ Threats from sea level rise, cyclone and storms
- ✓ Can do very little to prevent them
- ✓ Sovereignty in question
- ✓ Can cause international migration (to India or abroad)

Most vulnerable countries….

Sri Lanka

- ✓ Temperature from 1961 to 1990 is about 2^{o}C in the country
- ✓ Change in precipitation – increase in Feb, decrease in June
- ✓ Impacts water resources
- ✓ Crop pests, diseases and orchard productivity
- ✓ Impacts fisheries
- ✓ Rural to urban ,migration from highlands and agricultural lands
- ✓ Migration from coastal fishing community to cities or migration abroad (India or other Gulf countries)

Australia bound Sri Lankan fishermen migrants

Most vulnerable countries….

Nepal (Greenpeace, 2017)

- ✓ Glacial lake outbursts
- ✓ Elevated rate of snow melt causing floods
- ✓ Droughts
- ✓ Dams on river over flow or burst
- ✓ Ecosystem threatened
- ✓ Social Instability by local migrations and to India and abroad

Most vulnerable countries….

Pakistan

- ✓ Floods, droughts and land degradation
- ✓ Deforestation and water scarcity
- ✓ Agriculture threatened
- ✓ Migration to urban areas (Islamabad and Karachi)
- ✓ Ethnic discord, resource struggle, urban violence

saarcstat.org

Most vulnerable countries….

India

- ✓ Droughts and land degradation
- ✓ Deforestation and water scarcity
- ✓ Agriculture threatened
- ✓ Migration to urban areas from Gujrat and Rajasthan
- ✓ Floods cause migration in Assam & Bengal from farmlands to cities

saarcstat.org

Local Migrations: An example from India

75-year-old Afsa's husband is dead and her son left for the city to work in after the severe monsoon floods in 2016. He has sent money only once (Pic: Manipadma Jena)

Migrations during after floods

greenpeace.org

Interventions for adaptation

Change	Sector	Impact	Intervention example
Increase in temperature	Agriculture	• Altered cropping seasons; • Increase in evapo-transpiration; • Increase in irrigation water requirements; • Heat stress on crops and livestock.	• Introduction of short cropping varieties; • Diversification of crops; • Introduction of heat/moisture tolerant seed varieties; • Increase soil organic content/ low tillage agriculture; • Water conservation crop management practices; • Tree planting to provide shade and fodder for livestock.
	Water resources	• Increase in glacial melt, snow melt impacting river flows; • Increase in water requirements and/or reduced water availability; • Formation of glacial lakes leading to outbursts in longer term; • Worsening availability of fish stocks.	• Introduction of water storage methods; • Water conservation; • Monitoring and early warning systems for glacial lake outburst floods (GLOFs); • Conservations of coastal mangroves and other vegetation.
	Human health	• Increase in heat stroke; • Increase in malaria, dysentery, and other diseases; • Decline in productivity.	• Introduction of mosquito nets in new areas; • Education and awareness about heat-related illnesses.

Sterrett, C. (2011). Review of climate change adaptation practices in South Asia. Oxfam Policy and Practice: Climate Change and Resilience, 7(4), 65-164.

Interventions for adaptation

Change	Sector	Impact	Intervention example
Changes in rainfall patterns and/or seasonality	Agriculture	• Increased run off/soil erosion; • Farmers uncertain when to cultivate, sow, and harvest; • Crops damaged by unseasonable heavy downpours; • Reduction in agricultural seasons.	• Appropriate, accessible, and reliable seasonal and weather forecasts; • Crop diversifications and crop mixing; • Livelihood diversification; • Crop insurance; • Floating gardens during times of inundation.
	Water	• Shift in monsoon season; • Erratic/intensive rains; • Reduced water recharge; • Increased frequency/severity of floods; • Increased frequency/ severity of droughts.	• Rainwater harvesting at household level; • Checks on dams, plantations; • Improved drainage; • Protected/raised food, water, and sanitation; • Community water management committees.
Sea level rise	Coastal livelihoods / resources	• Increase in salt water intrusion; • Increase in cyclones/flooding; • Loss of land to sea/ erosion; • Increased frequency/severity of storm surges.	• Introduction of salt tolerant crops/species; • Livelihood diversification; • Monitoring and early warning systems for cyclones and storm surges; • Sea defences; • Protected/raised food, water, and sanitation; • Mangrove rehabilitation.

Sterrett, C. (2011). Review of climate change adaptation practices in South Asia. Oxfam Policy and Practice: Climate Change and Resilience, 7(4), 65-164.

Thank you very much
for your attention!

Q&A

Discussions

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