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Universidad Austral de Chile Conocimiento y Naturaleza

Climate Change Adaptation Practices of Forest Dependent Poor People: A Case of Nepal and Ghana

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A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (UNFCCC, 1992)

Man-made factors (deforestation, agriculture, industries, automobiles, and the burning of fossil fuels) are contributing to Greenhouse Gas (GHG) emission, a major cause of global warming (IPCC 2001).

Global human sourced GHG emissions by sector



Termperature and Precipitation (in global context)

- Temperature near the earth surface rose by 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during 20th century (IPCC 2007)
- it could increase as much as 6.4 °C (11.5 °F) on average during the 21st century (Wigley 1999, IPCC 2007)



 Sea level rise will reach 280-340 mm on average between 1990-2100, and nearly 30% of this change will be attributable to ice melting (IPCC 2001)

Impacts caused by global warming



Adapted from Chaudhary and Aryal (2009)

Phenology and Breeding Behaviors

Species, country and duration of study Phenology and breeding behavior shift Phenology date in base year Breeding season Jays, Mexico (1971-1998) Timing of laying Tree Swallows, Canada (1959-1991) Bird singing Northern Cardinals, USA (1930-1940) Blooming Butterfly milkweed, USA (1930-1940) Male's courtship calling Various birds, USA (1990-1999) Laying date Various birds, UK (1971-1995) Red admiral, Gt. Britain (20 years period) Appearance Breeding season Amphibians, England (1 decade period) Vegetation growing season Plants, Europe (1961 onward) 10 days in 30 days in 20 days in advance. advance advance

Figure: Some examples of Early Phenology and Breeding Behaviours of Various Plant and Animal Species. (Adapted from Groom et al. 2007)

Range Shift in Different Places around the World

Country	Species	Observed range shift	Reference
		Begun breeding on	Pounds et al. (1999)
Costa Rica	Lowland bird	mountain slopes	
Switzerland	Alpine flora	Expanded toward the	Grabherr et al. (1994)
		summits	
Sierra Nevada,	Edith's checkerspot		Parmesan (1996)
CA	butterfly	Shifted upward by 105	
		meters	
Canadian			
Rockies	Treeline	Upward movement	Parmesan (1996)
			Hersteinsson and MacDonald
Canada	Arctic fox	Contracted toward Arctic	(1992)
		ocean	
USA	Sactrem skipper	Expanded from CA to WA	Crozier (2003)
	butterfly		

Adapted from: Groom et al. (2006)



- IPCC's 4th Assessment Report also confirms that 20-30% of species became already extinct between 1980-1999
- 15-37% of known plants and animals will be extinct or "committed to extinction" by 2050 (Thomas et al. 2004)

Ghana and Nepal



Temperature

Nepal

Average annual mean maximum temperature between 1977 and 2000 was 0.06 °C (pronounced warming in the higher altitude)



Source: Department of Hydrology and Meteorology, Government of Nepal (2010)

Ghana

Ghana mean annual temperature rose by 1.0°C, an average rate of 0.21°C/decade



McSweeney et al. not dated. Available from: <u>http://country-profiles.geog.ox.ac.uk</u>; accessed November 20, 2016.

Pattern of precipitation (mm) in the last 30 years

- More unclear, and large uncertainties
- UNDP country profile reported a trend of decreasing annual precipitation (McSweeney et al. 2003)

Year	Total annual (January–December)	Mean winter (December–February)	Mean pre-monsoon (March–May)	Mean monsoon (June-September)	Post-monsoon (October–November)
1979–1988	852	31	62	131	25
1989-1998	809	31	47	133	22
1999-2008	787	21	48	139	13

Source: Department of Hydrology and Meteorology, Government of Nepal (2010)

Vulnerability matrix of Lamra VDC, Nepal

- Erratic rainfall, drought, landslides and diseases are major hazards identified by mountain community
- Declining and irregular rainfall patterns and drought directly affecting the rain-fed agricultural practices

Major hazards Major	Erratic	Drought	Landslides	Water/vector	Rank
livelihood resources	rainfall			borne diseases	
Rice cultivation	3	3	1	0	Ι
Winter crops	3	2	1	0	II
Wage labor	2	1	0	1	IV
Livestock (forage and grazing)	1	2	1	1	III
Seasonal migration to India	1	0	0	0	V
NTFP collection	2	3	0	0	III
Total score and rank	12 (I)	11(II)	3(III)	2(IV)	

Scores: significant impact-3; medium impact-2; low impact-1; and no impact-0

Source: Gentle and Maraseni, 2010

Climate Change , effects and responses

Observed changes	Well bein g statu s	Effects on livelihoods		Adaptation Practices		
		Nepal	Ghana	Nepal	Ghana	
Decreasing and erratic precipitation, low pre-monsoon and winter rainfall	Well- off	Decreased production of rice and winter crops, decrease in livestock numbers	Decrease fodder. Increased soil erosion	Cropping pattern, storage of grains, cash saving, selling non-irrigated land and purchasing irrigated land, lending out money	Plant legumes as cover crops. Brewery of local beer, called "Pito"	
Increasing mean maximum and minimum temperature	Medi um	Limited production of rice and winter crops, decrease in livestock numbers, scarcity of resources	crop failure	Cropping pattern, storage of grains, cash saving, selling properties (livestock/land), increased seasonal migration, shifting towards skilled jobs	Plant varieties of crops and cultivars e.g. sorghum, millet, maize, rice, yams, groundnuts and beans Women diversify their income by engaging in petty trading and selling of cash crop like Cola.	
Prolonged drought drying pasture land and water sources	Poor	No production of rice, limited production of winter crops, food deficit and hunger, debts	Crop wilting	Cropping pattern, sale of property (seed, utensils, garments, livestock, land), changing food behaviour, consumption loan, selling labour in the local and Indian market, children dropping out of school and sent to do labouring work	Plant More drought-tolerant varieties of red sorghum. Shift towards cultivation in low lying, marshy areas and river valleys where soils retain more moisture. Mulch yam mounds to regulate soil moisture content. Engage in bee-keeping for honey Gathering of wild food, illegal mining	

Source: Gentle and Maraseni 2010; Sagoe 2008; Hesselberg and Yaro 2006; Gyasi et al. 2008)

Conclusion

- With limited livelihood options, people are affected by unseasonal weather events, remoteness, poor asset and poor services
- Agricultural production is an important aspect for subsistence livelihoods increasingly uncertain and risky due to erratic rain/snowfall and frequent drought
- The effects differed amongst people wellbeing with higher impacts for the poor who lived in vulnerable sites, depend on rain fed subsistence agriculture, own little land or other physical assets and have low education and skills they could use to benefit their livelihood strategies
- Mainstreaming climate change in national development policies, plans and programmes



You can take action

You can take steps at home, on the road, and in your office to reduce greenhouse gas emissions and the risks associated with climate change. Many of these steps can save your money; some, such as walking or biking to work can even improve your health! You can also get involved on a local or state level to support energy efficiency, clean energy programs, or other climate programs.



United States Environmental Protection Agency