

A Perspective of Climate Change in Context of Nepal

Deep Prakash Ayadi

M.Sc. Environmental Science

College of Applied Sciences-Nepal, Thapathali, Kathmandu

E-mail: deepayadi@gmail.com

1. Introduction

Climate Change is neither newer nor unusual. The earth's average surface temperature and climate have been changing throughout the world's 4.7 billion years history. Sometimes it has changed gradually and other times fairly quickly (Miller, 2004). The earth maintains a natural carbon balance under normal conditions; the system gradually corrects the imbalances and returns into the balance conditions. However the rate at which humans are now burning carbon based fuels which produces the Green House Gases (GHGs)-Carbon dioxide (Co₂), Methane (CH₄) etc, introducing the carbon into the atmosphere, has decreased the earth's ability to maintain balances. This phenomenon is known as the green house effect. This causes the global warming, temperature increasing process which results into the climate change. But the major concern is over the climate change induced by the human induced activities.

Climate Change according to United Nations Framework Convention on Climate Change (UNFCCC), "*climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods*" (IPCC, 2007).

2. GHG Emissions and Evidence of the Climate Change in Nepal

The major cause of the climate change is the emissions of the GHGs. The main agents of the GHGs emissions are natural and man-made induced forest fires, use of carbon based fossil fuel, deforestation, and land use change, clearing and burning of grasslands. The major portion of the GHG emissions comes from industrial processes, production of electricity, and transport in developed countries which use large amounts of fossil fuels. But in many developing countries, however, there are large emissions of Co₂ from deforestation and burning of the firewood.

The combustion of fossil fuels, deforestation and land use changes are two major sources of greenhouse gases (GHGs) in Nepal. During the period of 1960/61 to 1990/91, the general input of Carbon Dioxide due to deforestation and land use change in Nepal, was estimated at 6.9 x 10¹² grams/year, 3.96 x 10⁶ tons/year. These differences are basically due to the variation in the consideration of the forest areas. On the other hand, annual emission of GHGs through utilization of petroleum products is estimated at 72 Gigagram (Gg) of Carbon, and 1.79 Gg of Nitrogen in between 1970/71 to 1990/91. Boden, Marland and Andres (1995) derived the trend of Co₂ emission in Nepal by utilization of fossil fuels since 1950 to 1992. They estimated an emission of 354,000 tons of Co₂ emission in 1992 due to combustion of fossil fuels. (MOPE, 2000). Change in the temperature in the

Himalayas is about 0.09°C per year 0.04°C in Terai region, more in winter. No distinct long-term trends in precipitation records for 1948 to 1994 (IPCC 2007).

Table 1: Temperature increases in Nepal from 1977-1994

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Observed	11.9	13.7	18.0	22.0	23.8	25.0	24.6	24.7	23.5	20.9	16.9	13.2
Projected	15.8	17.3	20.9	25.1	26.9	28.6	26.2	26.4	26.6	24.6	20.3	15.8
% Change	32.4	25.9	16.1	13.9	12.8	14.2	6.3	6.9	13.0	17.7	20.1	19.3

(Raksakulthai, 2003)

Table 1: Precipitation increases in Nepal from 1977-1994

	Total	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Observed	1907	18	24	32	58	135	299	528	407	297	83	10	16
Projected	3785	20	27	34	60	174	1091	1071	635	515	131	10	17
% Change	98.4	11.1	12.5	4.7	3.4	28.5	264.9	102.8	56.0	73.4	57.8	0.0	3.1

(Raksakulthai, 2003)

3. Impacts of the Climate Change

The impact of the climate change is likely to affect the severely like Nepal and developing countries. As they heavily depend upon the climate-sensitive sectors such as subsistence agriculture, forests resource for the firewood, natural water bodies and bio-diversity for the income and livelihood. So the effect of the climate change is also severe in rural sector of the Nepal.

a. Weather and climate

According to a report of UNEP and ICIMOD based on data from 49 monitoring stations, a number of melting glaciers are retreating by 30-100m in Nepal and Bhutan, leading to the formation of unstable lakes threatening to burst their banks. The Himalayan Rivers would become seasonal once their glaciers are gone. The Arctic Greenland ice sheet is said to have shrunk by 6% between 1978 and 1996. The loss of ice cover is likely to increase warming because of reduced reflectance of solar energy.

b. Ecosystem

With increasing global warming, species and ecosystems are likely to shift from lower to higher latitudes and altitudes i.e. Equator to pole and low land areas to high mountains and Himalayans. Temperatures decrease by altitude at the rate of 60⁰ C in general but in the Himalayan region it is about 5-10⁰ C.

c. Food

Crop productivity is projected to increase slightly at mid- to high latitudes for local mean temperature increases of up to 1 to 3°C depending on the crop, and then decrease beyond that in some regions. At lower latitudes, especially in seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1 to 2°C), which would increase the risk of hunger.

d. Melting of ice sheet and rise in sea levels

Glaciers in the Himalayan region are retreating; this is compelling evidence of global climate change, if the trend continues, and long term loss of natural fresh water storage is predicted to be dramatic. As glacier retreat the rapid accumulation of the water in these lakes can lead to sudden breach of dam. The resultant rapid discharge of huge amounts of water and debris is known as Glacier Lake Outburst Flood (GLOF) and can be catastrophic to downstream riparian area. ICIMOD/UNEP (2007) study recorded that 15 GLOF events recorded in Nepal.

e. Health and Malarial infection

The occurrence of many vector-borne diseases until now has not been seen in cold latitudes and altitudes. The warming is likely to lead to new distributions of vector-borne diseases. Malarial transmission is predicted to increase in warmer and wetter climates. The health status of millions of people is projected to be affected through increases in malnutrition; increased deaths, diseases and injury due to extreme weather events; increased burden of diarrhoeal diseases; increased frequency of cardio-respiratory diseases due to higher concentrations of ground-level ozone in urban areas related to climate change; and the altered spatial distribution of some infectious diseases.

f. Tourism

The contribution of the tourism on the climate change is very much. Also climate change also affects the tourism. Like Nepal, where tourism is the major sources of the income for the many people and back bone for the country's economy. Tourist activity in general may expand because of longer summers in the mountains and more heat stress in the plains. Tourist centers are likely to move upward into remote areas, threatening some of the last remaining forest-rich areas and virgin lands of the Himalayas.

g. Water

The climate system has a number of preferred patterns of variability having a direct influence on elements of the hydrological cycle. Regional climates may vary out of phase, owing to the action of droughts and floods, and with other changes which have significant impacts on humans.

h. Cultural and Natural Heritage

Climate has great influence on the cultural and natural heritage. Archeological evidence is preserved in the earth because of the balance in the Biological-Chemical and Geological process of the soil. Short or long cycles of changes may result in a poorer level of the survival of some sensitive material.

4. Adaptation and Mitigation

Adaptation to the climate change refers to the adjustment in natural or human system in response to actual or expected climatic stimuli or their effects, which moderate harm or exploits beneficial opportunities. Climate mitigation refers to the technological, economic and social changes and substitutes that lead to emission reductions. Societies can respond to climate change by adapting to its impacts and by reducing GHG emissions (Mitigation), thereby reducing the rate and magnitude of change.

Adaptation, at the national level, includes initiating an effective implementation strategy for adaptation, including enhancement of the scientific basis for decision making; methods and tools for the assessment of adaptation; education, training and public awareness on adaptation, including for young people; individual and institutional capacity-building; technology development and transfer; and promotion of local coping strategies. Beyond that, possible initial activities on adaptation could include appropriate legislation and regulatory frameworks, which promote adaptive-friendly action. Using climate change as a driver to undertake activities with multiple benefits can actually catalyze progress in achieving a country's sustainable development goals, while contributing to adaptation objectives.

The wide deployment of climate-friendly technologies is critical. Existing clean technologies need to be rapidly adopted by the private sector and deployed widely, including through technological cooperation between developed and developing countries. With the continued dominant role of fossil fuels in the global energy mix, energy efficiency, cleaner fossil fuel and carbon capture and storage technologies are needed to allow their continued use without jeopardizing climate change objectives. Alternative resources of the energy are the key mitigation measures for the Nepal. Biogas, solar energy, Wind energy and Small hydropower are the climate friendly technologies that are adopted by the government in the rural areas of the country.

5. Governments Approach

In Nepal no any climate change policies are on enforce. But various environmental policies are adopted in the National level and rectified and enforced international conventions for the protection of the natural resources and preservation and control of the pollution.

Major National Laws for the protection of the Environment are Interim Constitution of the Nepal, 2063; Environmental Protection Act, 1996; Water Resource Act, 1992; Soil and Watershed Conservation Act, 1982; Solid Waste management and Resource mobilization Act, 1980. The Major Enforced / Rectified international Conventions were Convention for the protection of the world culture and Natural heritage, 1978; Vienna convention for the protection of the ozone layer (Vienna Convention), 1994; Montreal protocol on substance that deplete the ozone layer (Montreal Protocol), 1994; London Amendment to the Montreal Protocol on substances that deplete the Ozone layer (London Amendment), 1994; UN Framework Convention on Climate Change-UNFCCC, 1994.

6. Conclusions

Climate Change is an emerging environmental issue at International, National and Local Level. It needs a global consensus and political commitments. The evidences of the climate change are also occurring in Nepal. The glacier melt and Glacial Lake Outburst Flood (GLOF) are the major issues that should be addressed soon. Nepal is also an agricultural based economy and many people in the country depend upon the agriculture and agriculture based small entrepreneurship. The effects projected by the climate change in the country is a big issue. Hence together we can make a difference for the sustainable earth.

References

GON (2007): “*Three Year Interim Plan (2007/08-2009/10)*”, National Planning Commission, Singhadarbur, Kathmandu, Nepal

ICIMOD, (2007): “*Reducing Carbon Emissions: through community managed forests in the Himalayas*” Kathmandu, Nepal

ICIMOD/UNEP ,(2007): “*Impacts of the climate change on Himalayan glaciers and glaciers lakes-case studies on GLOF and associated Hazards in Nepal and Bhutan*” Kathmandu, Nepal.

IPCC, (2007): “*Summary for Policymakers. In: Climate Change 2007: Mitigation, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Karki, K. (2007): “*Green House Gases, Global Warming and glacier ice melt in Nepal*”, The Journal of Agricultural and Environment, Vol 8, Government of Nepal, Kathmandu, Nepal

Miller, G. T. (2004): “*Environmental Science*”, 10th Ed. Thomson, Books/Sole, Singapore. pp 281-304.

MOPE, (2000): “*Nepal's State of the Environment*” Government of Nepal, Ministry of Population and Environment, Kathmandu.

Raksakulthai V. {2003): “*Nepal: Climate Change Vulnerabilities and Adaptation*” NAPA Workshop, Thimphu, Bhutan, 9-11 September 2003, Asian Disaster Preparedness Center.

Simpson, M.C., Gössling, S., Scott, D., Hall, C.M. and Gladin, E. (2008): “*Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*” UNEP, University of Oxford, UNWTO, WMO: Paris, France.

UNESCO (2006): “*Predicting and managing the effects of Climate Change on World Heritage*”. United Nations Educational, Scientific and Cultural Organization

The End