

Climate change impacts and mitigation processes

S. K. Sharma

**Department of Geography and Environmental Science
Carman Residential and Day School, Dehradun, India**

sk105@rediffmail.com

“Climate change poses world’s biggest single threat. Climate change can no longer be denied or ignored”

**Barack Obama, US President
on Earth’s Day on the 22nd April, 2015**

Introduction

India is one of the worst affected countries by climate change. Melting glaciers, extreme weather patterns, declining water resources, submerged coastal areas, adverse impact on agriculture and health, loss of biodiversity and a seasonal Ganges river are some of the impacts of climate change that are already visible in India.

Introduction.....

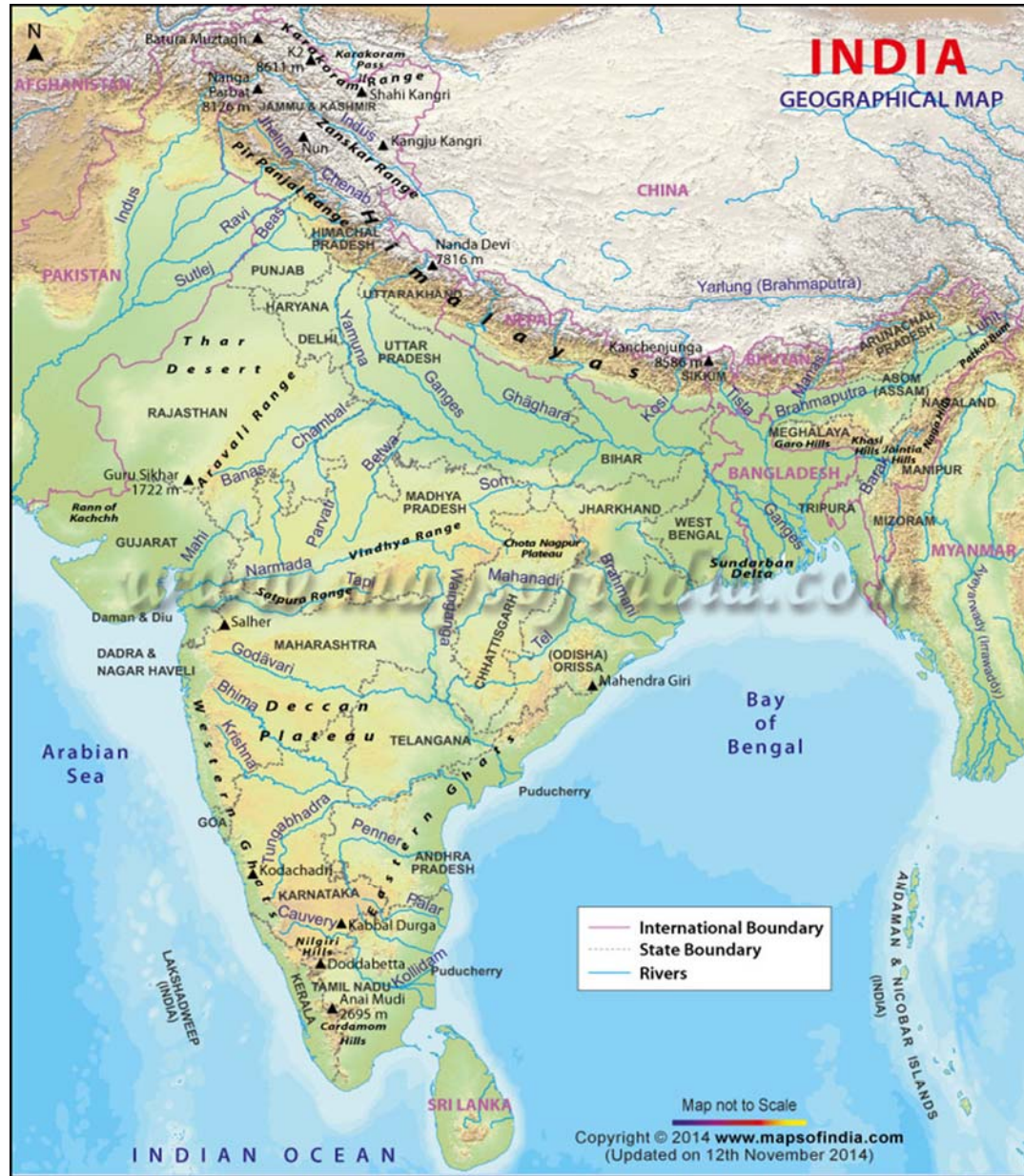
Scientists agree that *rising concentrations of anthropogenic-ally produced greenhouse gases in the Earth's atmosphere are leading to global warming and changes in the climate.*

India as a newly industrialized country with a developing economy has an average growth rate of approximately 7.5% over the last two decades which is poised to grow further in coming years. *Energy is bloodline of economic growth and poses challenges in the area of Green House Gases emissions.* With about 28% of Indian population still below poverty level and about 35% living an average life, huge requirement of energy is inevitable ingredient of intended growth.

Introduction.....

Endowed with large coal reserves India has an energy system that is highly carbon intensive. India's dependence on coal, which meets 52% of its commercial energy needs, is likely to continue in the near future.

Indian industries are also contributing to the global green house gases and facing difficulties in finding ways to utilize natural resources in a sustainable manner without increasing carbon emissions considerably thus, promoting global warming and climate change.



India's worries on climate change pattern are focused on : *Water Resources*

The global warming and climate change is expected to result in the melting of most of the Himalayan glaciers by 2030, as predicted by the UN panel on climate change, which would be truly catastrophic for India and its neighbors.

The *Himalayan region, called the "Water Tower of Asia"*, has a glacier coverage of 33,000 km². It provides nearly 8.6million m³ of water annually. The Himalayan glaciers, namely, *Gangotri*, Siachen, Zemu, Milam and Kedarnath, are the largest store of water outside the polar ice caps, and feed seven Asian perennial rivers – Ganges, Indus, Brhamaputra, Mekong, Salween, Yangtze and Hung Ho (Yellow River).

India's worries.....

However, the Gangotri glacier situated in India is the largest one in the Himalaya. It is about 30.2km long and 0.5-2.5km wide. It supports one of India's largest river basin, the Indo-Gangetic Basin, has been receding since 1780 but started retreating rapidly after 1971 due to climate change.

Receding Gangotri Glacier in Himalayas (after UNEP)



Some visible impacts

The expected danger of the melting down the glaciers and shifting rainfall patterns is resulting in the widespread flooding, erosion and landslides, etc.



Some visible impacts....

....followed by irreversible droughts, forest fires, loss of wetlands and other habitats, saline encroachment, etc. threatening the livelihood of millions of agro-based people in India.



Affect on *water resources*

Nearly 70% of the discharge into the Ganges is from the Himalayan glaciers which means that if the Himalayan glaciers dry up so will the Ganges downstream in India causing water shortages for nearly 37% of India's irrigated land.

This would not only mean unprecedented food shortage but also a massive water crisis. The Indo-Gangetic basin alone is a home to more than 550 million agrarian people.

India's worries on climate change pattern are focused on : *Agriculture*

Agriculture which is globally the largest water user is the main driver behind water use.

The Himalayan Rivers and the basins fed by them are particularly vulnerable to the impacts of climate change. The rivers in the southern Himalayas like Ganges and Indus support *wheat cultivation* on a huge scale during the rabi season (November to March/April).

A diminution of dry season flows from snowmelt due to the receding snow line from climate change *have a seriously adverse impact on the lives of over a half a billion agrarian people in Asia, aggravating the tensions over sharing dry season flows.*

India's worries on climate change pattern are focused on : *Health*

Climate change is affecting human health in India through water related impacts of various kinds – vector-borne diseases, reduced access to safe drinking water, malnutrition due to water shortages, problems following flooding, and other effects which are identified through health impact assessments.

This situation underlines....

This situation underlines the urgency of cutting carbon emissions quickly—before climate change spins out of control.

Mitigating measures

India as a developing economy nation can not abdicate its responsibility in fighting global warming and thus making a transition from *fossil fuel based energy systems* to *one based on renewable resources* to decrease reliance on depleting reserves of fossil fuels and to mitigate climate change.

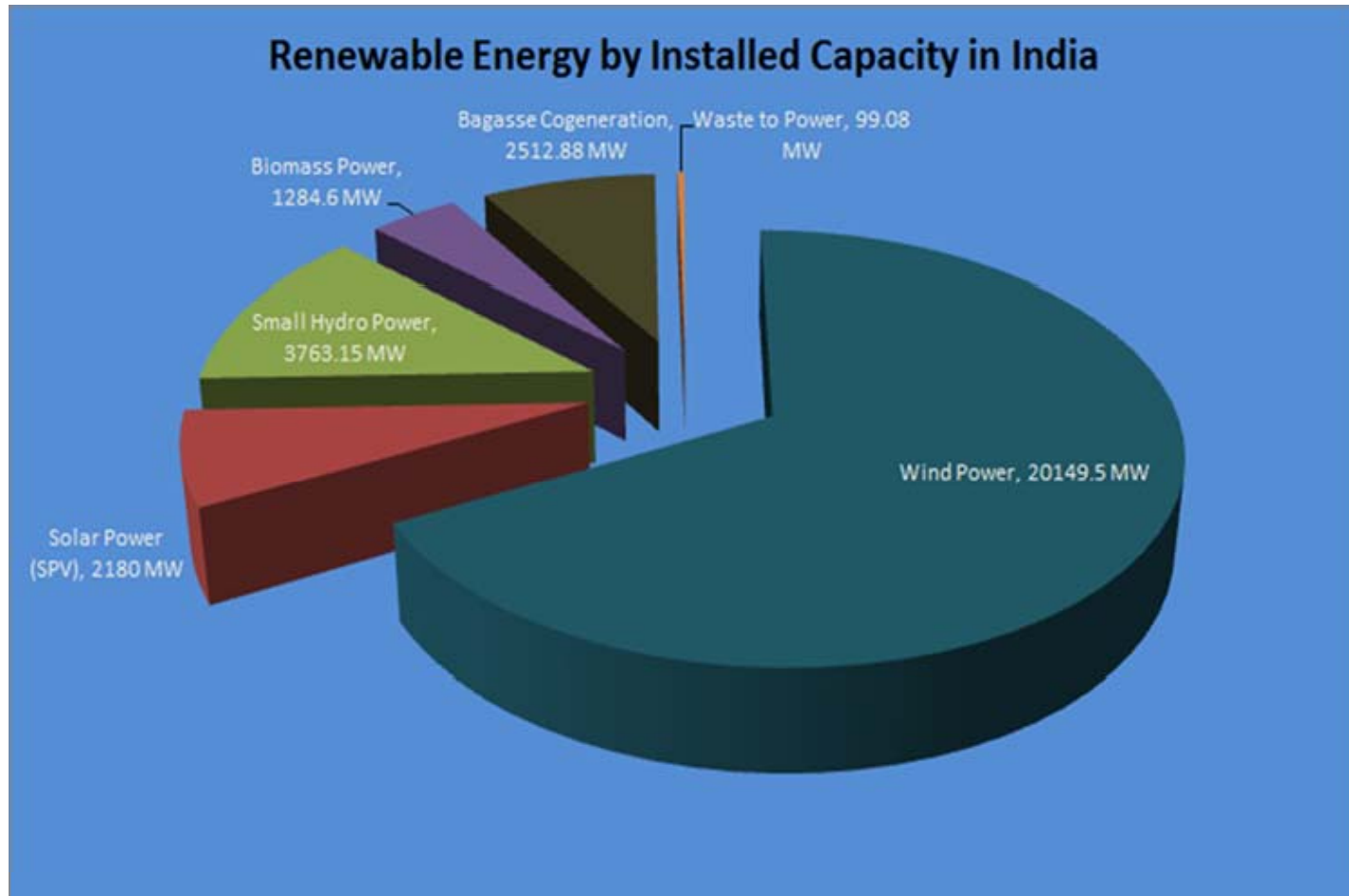
In this context, the Renewable energy will help the country reduce its dependence on fossil fuels, mitigate the greenhouse gas emissions, and environmental and health concerns associated with energy generated from fossil fuels as well as to meet the country's current and future energy needs in a sustainable manner.

Mitigating measures....

Located in tropical region, India is blessed with abundant clean renewable energy resources, including solar energy, wind power, geothermal energy, tidal, ocean thermal energy conversion, biofuels (including biomass), hydro and waste to energy.

Interest in renewable energies has increased in recent years due to environmental concerns about global warming and climate change, reduced costs of renewable energy technologies, and improved efficiency and reliability.

Sources of renewable energy in India as of December 2013, MNRE India



Mitigating measures....

Power generation from renewable sources is on the rise in India. The total renewable energy potential from various sources is estimated at about 250 Gigawatts. Total Renewable Energy Installed Capacity, 2005 – 2015 stands at 34.35 Gigawatts. As of 28.02.2015, the share of power generation from renewable energy sources at 13.1%.

In order to tap this abundant potential, the Government of India has set an aggressive target to expand India's current *solar energy program* to reach 100 gigawatts (the US will provide financial support and technological assistance to help India achieve this goal) together with other sources to reach 175 Gigawatts from renewable energy by 2022.

Mitigating measures...

In addition, the government has created a liberal environment for foreign investment in renewable energy projects.

Also the Government is offering a package of fiscal and financial incentives which includes concessions such as 80% accelerated depreciation, concessional custom duty on specified items, excise duty exemption, sales tax exemption, income tax exemption for 10 years provides loan for setting up wind and other renewable energy power projects to meet the energy demands of the country without hampering the environment.

Adaptation measures

Further initiatives to reduce energy use and green house gas emissions in urban areas, the country is going ahead with the construction of green buildings following the building codes and green design & materials for reducing the energy consumption – Country's first Indian Institute of Technology (IIT-K) “Green Building” was set up in Kanpur on the 8th January, 2008. It is the first building of the country with approximately 41% reduction in energy consumption.

Expected gains

Mitigation measures, including the reduction of greenhouse gas emissions, transferring clean technologies and protecting forests, are crucial to dealing with climate change. *Though these measures will slow climate change, they will not halt or reverse it within the foreseeable future.*

Adaptation measures taken primarily in response to climate change can actually help respond to several other major challenges – food, energy, and environment, as well as economic development.

Conclusions

Renewable energy has emerged as a sustainable solution to the country's energy needs and is now gradually increasing. Moreover, the cost of electricity generation from major renewable sources like wind and solar now compares favorably with the cost of electricity generation from diesel, natural gas, coal or nuclear energy. Therefore, *a shift towards renewable energy is envisaged as a key component of the country's commitment to mitigating greenhouse emissions as well as reduce dependency on fossil fuels.*

A point to make

It is rightly said - *Renewable Energy*, which appeared to be no more than a bright idea some 100 years ago, may remain the only solution 100 years later.

Thank you for your kind attention