IMPACT OF CLIMATE CHANGE AND GLOBAL WARMING IN INDIA

(With a Special Reference to its stand on Climate Change in International Forums)

Dr. Manish Kumar Yadav Associate Professor. Department of Political Science And International Relations. College of Arts & Social sciences, Adi-Keih, Asmara University, Eritrea. E Mail Id-drmanishyadava@gmail.com	Dr. Rajesh Kumar Assistant Professor. Department of Public Administration. College of Business & Economics, Hal Hale, Asmara University –Eritrea E Mail Id -gadsrajesh@gmail.com

Abstract

In the last couple of decades, there have been extensive debates over the existence of global warming, today, the debate is largely over and a consensus has emerged in the global scientific community that Global Climate Change is occurring and that it will have a dramatic and adverse impact on the planet earth's ecosystem. According to a report for the World Bank, by the Potsdam Institute for Climate Impact Research *(*PIK*)* a German government-funded institute: the increase in earth's temperature could result in a sea-level rise of 0.5 to 1 meter with higher levels also possible, by the year 2100 AD, affecting some of the most densely populated and vulnerable coastal cities and mega polis's located in Bangladesh, Indo nesia, Madagascar, Mexico, Mozambique, Philippines, the USA, and Vietnam as well as small Island Nations all over the world especially in South Pacific like Fiji, Kiribati, Marshall Islands, Micronesia, Federated States of Nauru, Palau, Samoa and Solomon Islands. India also has been identified as one amongst the 27 countries that are most vulnerable to sea level rise caused by global warming.

With global warming, the Glaciers are melting on all the six continents as well as in the Arctic Circle and these once majestic glacial mass which used to stretch to the edge of cities like La Paz and El Alto now end up high in the mountains. If present warming trends continue, all glaciers in the Glacier National Park could be gone by 2030 AD. Over the next 100 years, climate change is expected to accelerate and contribute to major ecological, physical, social, and economic changes, many of which have already begun.

No one knows how long our planet can sustain and take on this onslaught, what we do know for sure is that climate change especially due to increasing levels of Green House Gases is already harming the fragile ecosystems and humankind all over the world. Its reality can be seen in the melting glaciers, disintegrating polar ice caps, thawing permafrost, changing monsoon patterns, rising sea levels, and fatal heat waves. Scientists are not the only ones talking about El Nino and La Nina which cause global changes in both temperatures and rainfall, it's also been discussed at length now by Academia, Civil Societies, and Political Leadership, all over the world.

From the apple growers in the orchards of Himachal Pradesh to the farmers in the drought-prone region of Vidharbha and those living on the disappearing islands of Sunder bans Delta a sprawling archipelago, with a core area of 10,000 square kilometres straddling between the Indian state of West Bengal and Bangladesh are already struggling with the impacts of climat e change.

India has been involved in constructive engagements on Climate Change and Sustainable Development since the inception of United Nations Environment Programme in 1972, throug h *Rio* Declaration-Earth Summit 1992, *Kyoto* Protocol-1997, *Johannesburg* Declaration on S ustainable Development-2002, Copenhagen and the Paris Accord of 2009 and 2016 respectiv ely within the United Nations Framework Convention on Climate Change (UNFCCC). India i s also a party to five major international conventions like the International Union for Conserv ation of Nature and Natural Resources (IUCN), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC) etc.

Keywords

Climate Conference (COP23) in Bonn; Climate Risk Index (CRI);Copenhagen Accord o f 2009; Disaster Risk Reduction protocol (2015-2030); Deutsche Gesellschaft für Internation ale Zusammenarbeit **(**GIZ**)**; *El Nino; Emission Gap Report; Green House Gas Bulletin; Gre en House Gases (GHG); Hindu Kush Karakoram-Himalayas (HKKH) region; Hyogo Frame work of Action (HFA); Ice Age; Intended Nationally Determined Contributions (INDC); In tergovernmental Panel on Climate Change, 2001; International Institute for Applied Syste ms Analysis (IISA); International Union for Conservation of Nature and Natural Resources (IUCN);* Johannesburg Declaration *on Sustainable Development-2002; Kyoto Protocol-1997; La Nina; Like Minded Developing Countries (LMDC)*; *National Action Plan on Climate Change (NAPCC); National Disaster Management Authority of India (NDMA); New Climat e Institute; Paris Accord of 2016;Radiosonde; Rajasthan State Action Plan on Climate Cha nge (RAPCC); Rio Declaration-Earth Summit 1992; The Climate Change Agenda for*

Rajasthan (CCAR); *The Energy and Resources Institute TERI; Tarun Bharat Sangh ;UN Office for Coordination of Humanitarian Affairs (UNOCHA); UN Office for Disaster Risk Reduction (UNISDR); United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC); United Nations Environment Programme (UNEP); United Nations Framework Convention on Climate Change (UNFCCC); World Meteorological Organization (WMO) and Worldwatch Institute.*

Introduction

This research paper is extensively based on secondary sources and is divided into three parts the first part deals with a short introduction on Global Warming and Climate Change, factors responsible and Impact of Climate Change and Global Warming; the penultimate part touches upon the effect of Climate Change on Water Resources in Indian Scenario with a special reference to the state of Rajasthan and the concluding part refers to India's stand on Global Warming/Climate Change in International Forums, and its Disaster Risk Reduction credentials.

We start with a startling report published in the reputed medical journal *"The Lancet"* in 2016 which revealed how global warming and other extreme weather conditions driven by climate change hurts the planet, crops and human health. The extreme events due to these have caused 129 Billion USD in economic losses.[1]

The Green House Gas Bulletin, the United Nations weather agency's publication has reported high levels of Carbon Di-Oxide (CO_2) in the atmosphere which has reached 403.3 parts per million in 2016. This is a 50% increase and in fact higher than the average for the past decade. The CO_2 in the atmosphere is up by 145% while Methane (CH_4) is up by 257% and Nitrous Oxide (N_2O) is up by 122% over the pre-industrial level (before 1750 AD). The steady increase in the levels of these gases from 1970 until the present is consistent with the increase in global average temperatures. This scenario in fact existed three to five million years ago at the end of last Ice Age when the sea level was 20 meters higher than now and the planet was 2-3 degrees Celsius warmer.

World Meteorological Organization Chief Petteri Taalas has said *"there is hope"* to reverse the worrying concentration rates but that the time to act was now *"without rapid cuts in*

[1] **The COST OF EXTREME WEATHER, The Times of India-Student Edition, New Delhi, November 6, 2017, p-6.**

Carbon Di Oxide and other Green House Gases, we will be heading for dangerous temperature increases by the end of this century"; he stated.

The concentration of Carbon Di-Oxide in the atmosphere has hit a new high; the United Nations in its communiqué has warned that drastic action is needed to achieve targets set by Paris Climate Agreement. While the spokesperson from the World Meteorological Organizati on has said: *"Concentrations of CO_2 in the atmosphere surged at a record-breaking speed in the year 2016 to the highest level in last 800,000 years".*[2]

Factors Responsible for Global Warming:

The cumulative onus for such stupendous and sharp increase in the emission of the greenhouse gases is singly borne by humans alone, for it is us, humans, who have contributed towards the menace only to uphold our selfish wants and desires. Discussing on the major ways in which humans have aggravated the issue it can be said that the major sources to be blamed for such high increase in the greenhouse gas emissions include the power sector, industry, and the transport sector respectively. The contribution of agricultural sector towards global warming is around 14% [3] a percentage share similar to that made by the transport sector and we cannot turn a blind eye towards it. In most cases, the contribution of agriculture as a predominant source of global warming stands less highlighted on account of its utility in feeding the masses and tackling food insecurity and also generating livelihood options. Another important source responsible for the emission of the large concentration of greenhouse gases in the atmosphere is the change in the pattern of land use. It would be pertinent to mention in this context that the change in the land usage has a contribution of 18% towards the increase of greenhouse gases [4] with deforestation, peat decay/fires and the decay/burning of biomass occurring worldwide.

In Brazil, for instance, between the years 1999 and 2005, carbon dioxide emissions were recorded to the extent of 1.11 billion tonnes every year only due to deforestation.[5]

---

[2] CO2 level in atmosphere rises to what it was 3m to 5m years ago-The Times of India, New Delhi, October 31st, 2017, p-21.
[3] http://entertainment.howstuffworks.com/hsw-shows/sysk-crowd-sourced-quiz.htm -accessed and retrieved on 1.11.2017.
[4] http://www.rupe-india.org/mail.html--accessed and retrieved on 1.11.2017.
[5] ibid

The other instance that would be of relevance to cite in this context is the case of Indonesia where the total emissions per year for the same period was as high as 2.27 billion tonnes on account of deforestation engineered deliberately to create land space for the growth of biofuels.[6]

Natural factors have continued to warm the planet even before the Industrial Revolution and also much before humans started treading on the mother Earth. The geological records reveal that such natural warming and cooling is a one thousand and five hundred years old cycle which began at least one million years ago. Warming of the planet has been observed by the scientists in the last hundred years and they are of the opinion that it is a regaining trend from the Little Ice Age. There are several natural factors responsible for causing global warming, the most prominent ones being animal exhalation, changes in the Earth's orbit, continental drifts, increase in the temperature of the oceans, natural decomposition processes solar variab ility, and volcanic eruptions. Solar activity, for instance, when the Sun's activity is stronger, there is a decrease in the formation of low-altitude clouds this non-cloud formation allows more Sun rays to reach the Earth's surface and thereby lead to increase in the temperature.

It is the human-induced global warming that has caused the stupendous increase in the concentrations of the greenhouse gases in the atmosphere. There are multifarious factors accountable for the same, the most noteworthy being the burgeoning overpopulation. Latest reports on world population mention that the current population of the world is more than 7 billion [7] with India housing more than 1.3 billion people[8]. Thomas L. Friedman in his book *'Hot Flat and Crowded'* has explained the present scenario in a very lucid manner when he says: "*.....It is getting hot, flat, and crowded. That is, global warming, the stunning rise of middle classes all over the world, and rapid population growth have converged in a way that could make our planet dangerously unstable. In particular,……. tightening energy supplies, intensifying the extinction of plants and animals, deepening energy poverty, strengthening petro-dictatorship, and accelerating climate change".*[9]

---

[6] ibid

[7] http://www.huffingtonpost.com/2011/07/11/world-population-day-high_n_894592.html-accessed and retrieved on 1.11.2017.

[8] National Census, 2011-accessed and retrieved on 1.11.2017.

[9] http://www.huffingtonpost.com/2011/07/11/world-population-day-high_n_894592.html-accessed and retrieved on 1.11.2017.

Resources have become limited to meet the requirement for such high mass of population which has, in turn, converted land use patterns to meet their social security needs. Migration of people either in the name of urban prosperity or being forced upon to be displaced as a consequence of developmental projects have both contributed to the change in land patterns. Along with the change of agricultural lands for urban settlements and industrial projects, forests have been cleared in major parts of the globe either to serve the requirement of timber or non-timber forest produce or to engage the areas with more productive farming, namely bio-fuel production. Sometimes however felling of trees has been continued indiscriminately either with the connivance of government/forest officials or without them in the loop to meet other selfish motives.

As a consequence of over-felling of trees, the carbon sinks that are present in the forests have shrunk thereby exposing us to higher concentrations of carbon-dioxide. The burning of coal and oil complemented with natural gas has assisted mankind in the generation of wealth and prosperity but has also aided in their destruction by enhancing climate change. In short the unviable ecological resource management is one of the important reasons that has led to global warming.

It holds attenssion that the rate of global warming around the tropics in theory and by logic is supposed to be higher, with the highest limit at six miles above the Earth's surface. This, is, however, not true in reality. According to the experts of human-induced global warming, balloon-borne radiosondes reveal that there is rather a slight reduction in temperature over the equator [10]

Impact of Climate Change and Global Warming

Global climate change is one of the most important challenges facing the international community today. Scientists have presented overwhelming evidence that climate change is indeed happening, that human activity has contributed to the problem, and that it will have far-reaching implications for ecosystems, including human settlements.[11]

The human habitat systems that are highly susceptible to climate change are agriculture, energy production, fisheries, forestry, human health (particularly with a net increase in the

[10] Singer Fred S., "Global Warming: Man-Made or Natural?", Imprimis, August 2007, Volume 36, No.8, available at http://www.hillsdale.edu/hctools/ImprimisTool/archives/2007_08_Imprimis.pdf-accessed and retrieved on 1.11.2017.
[11] Idean Salehyan, "Climate Change to Conflict? No Consensus Yet", Journal of Peace Research, Vol.45, No. 3 (May, 2008), pp. 315-326.

geographic range of Malaria and Dengue) industry, insurance/financial services, and water resources and because of the limits to human tolerance of heat, much of Earth's surface may not be habitable by 2300 AD. The high-profile threats such as economic slowdown and sea level rise have caused widespread anxieties; their impacts on human communities would pale into insignificance in a futuristic world that might become partly or wholly uninhabitable by/for humans due to rise in temperature.[12]

A nation's ability to cope with and adapt to climate change depends on such factors as access to resources/information, available technology education, infrastructure, management capabilities and skills. The most important thing to note is that the impacts of future climate change will most likely be disproportionately borne by the world's poor.[13] The reports of IPCC indicate that developing countries would be affected by climate change disproportionately and poor countries in particular and poor people in all countries would be severely affected due to the observed changes in many biological and physical systems.

The rapid retreat of glaciers is one of the most visible signs of Earth's changing climate, The Uttarakhand disaster that was witnessed at the beginning of the 2013 monsoon season is a consequence of ignorance of the ecological system that holds up the ecologically fragile Himalayas, and greed to profit from the exploitation of the rich natural and cultural heritage of the region.

The UN panel report warns that glaciers across the Himalayas are melting at an alarming rate and may disappear altogether by 2035. Such an event will not only have a severe impact on the Himalayan ecology and the people living in the region but also cause a wide swath of misery downstream. This is because of most of India's great northern rivers, like the Ganga and the Yamuna, are dependent on the glaciers (i.e. Gangotri and Yamunotri Glaciers) for their perennial water supply.[14]

The glaciers in Jammu and Kashmir are melting fast, by more than half a meter every year, but its long-term impact remains unknown. Norwegian scientist Andreas Kaab at the

---

[12] Anthony J. McMichael and Keith B. G. Dear, "Climate change: Heat, health, and longer horizons", Proceedings of the National Academy of Sciences of the United States of America, Vol. 107, No. 21 (May 25, 2010), pp. 9483-9484

[13] Denis G. Arnold and Keith Bustos, "Business, Ethics, and Global Climate Change", Business & Professional Ethics Journal, Vol. 24, No. 1/2, The Roots of the Obligation of Business to Preserve the Environment (Spring/Summer 2005), pp. 103-130.

[14] Raj Chengappa, 'Apocalypse Now', India Today, April 23, 2007, p.42

University of Oslo and his French colleagues used the satellite data to study glaciers in the Hindu Kush-Karakoram-Himalayas (HKKH) region, reported: *"in most of the satellite images that we used to support our study, the glaciers in J&K look really bad with not much snow accumulation area left*."[15]

Apart from the greenhouse gases and emissions which are discussed above the rise in temperature of the earth itself has led to further global warming. As the ice-sheets melt (including glacial ice, ice shelves, and tabular icebergs**)**, the meltwater gets formed; this meltwater is darker than ice and hence absorbs more heat thus resulting in further warming. One of the foremost reasons for the speedy meltdown of the ice-sheets of Greenland and Antarctica is due to such effect and also on the other hand with the rise in temperature; metabolic processes get enhanced and allow the carbon dioxide in the soils to escape. This, in turn, increases the concentration of carbon dioxide in the atmosphere which accelerates the process of global warming.

It is beyond human understanding and influence when we experience global warming due to our aspirations and development patterns. Hence in any discussion on global warming scenarios, two important points that should be kept in mind are – firstly, it is immaterial where the emissions have occurred for since global warming effects are not ascertained and bounded to geographical boundaries and secondly, oceans and forests serve as carbon sinks presumably for almost half of the emissions. With the acceleration in the rate of global warming and the rate at which deforestation continues, the number of such carbon sinks is sharply reducing as also the capacity of the oceans to absorb carbon dioxide is also getting reduced. Therefore an effective and thorough assessment of the present global situation is necessary to be undertaken for the sake of humankind and for upholding the true spirit of humanity.[16]

Effect of Climate Change on Water Resources

Climate change debate is often centered on temperature; water is what will determine

15. 'Glaciers in J&K melting fast, warn European scientists', Deccan Herald, August 23, 2012, p. 8.
16. Chapter 1 INTRODUCTION TO GLOBAL WARMING-Shodhganga shodhganga.inflibnet.ac.in/jspui/bitstream/10603/122757/9/09_chapter%201.pdf-accessed and retrieved on 1.11.2017.

whether a community (a village, city, or region) or ecosystem can survive. Water is the medium through which climate change impacts are being felt and will be experienced. Climate change will eventually draw on changes in monsoon, seasonality etc. i.e. timing, quantity, and quality. This indicates that in the future sustainable climate change solutions water as a resource will play an important role.

Water managers, farmers, and other stakeholders are used to dealing with seasonal and yearly variation, but climate change will shift water and weather patterns with greater frequency and to greater extremes. Future situations will be substantially less manageable and less predictable, exacerbating underlying stresses and presenting new risks. Increased drought /flood recurrence and duration, higher variability of precipitation patterns, increased cyclonic intensity, changing trends in snowpack and generally accelerating rates of melting glacier will be experienced.

This alteration (shifts in timing and averages) and intensification (increasing number and severity of extreme events) of the hydrological cycle will change seasonality and water temperatures and alterations in precipitation patterns will affect water quality. Dissolved oxygen levels, the concentration of pollutants and levels of toxic algae and sedimentation will all change, which means impact on aquatic species will not only have health and sustenance implications but also economic consequences.

Indian Scenario

India will also be severely impacted by climate change as the health of Indian economy is tied to natural resources and climate-sensitive sectors such as agriculture, water, and forestry. India may face a major threat and would require the serious adaptive capacity to combat climate change. Many studies have underscored the nation‘s vulnerability to climate change. With changes in key climate variables, namely temperature, precipitation, and humidity, crucial sectors like agriculture and rural development are likely to be affected in a major way. Impacts are already being seen in unprecedented heat waves, cyclones, floods, salinization of the coastline and effects on agriculture, fisheries, and health.

The future impacts of climate change, identified by the Government of India's National Communications in 2004 include:

- Decreased snow cover, affecting snow-fed and glacial systems such as the Ganges and Brahmaputra. (i.e.70% of the summer flow of the Ganges comes from meltwater).

- Erratic monsoon with serious effects on rain-fed agriculture, peninsular rivers, water and power supply.

- Drop in wheat production by 4-5 million tonnes, with even a 1ºC rise in temperature.

- Rising sea levels causing displacement along one of the most densely populated coastlines in the world threatening freshwater sources and mangrove ecosystems.

- Vulnerability of population living in coastal, arid and semi-arid areas of the country due to increased frequency and intensity of floods.

- Studies indicate that over 50% of India's forests are likely to experience a shift in forest types, adversely impacting associated biodiversity, regional climate dynamics as well as livelihoods based on forest products and

- Vulnerability to extreme events would affect arid and semi-arid zones, of which nearly two-thirds are drought-prone. Large areas in Rajasthan, Andhra Pradesh, Gujarat and Maharashtra and comparatively small areas in Karnataka, Orissa, Madhya Pradesh, Tamil Nadu, Bihar, West Bengal, and Uttar Pradesh are frequented by drought. About 40 million hectares of land is flood-prone, including most of the river basins in the north and the north-eastern belt affecting about 30 million people on an average each year.

  The climate change predicted in the Third Assessment Report of Intergovernmental Panel on Climate Change, 2001, says that the warming will be higher during the winters as compared to the summer season.

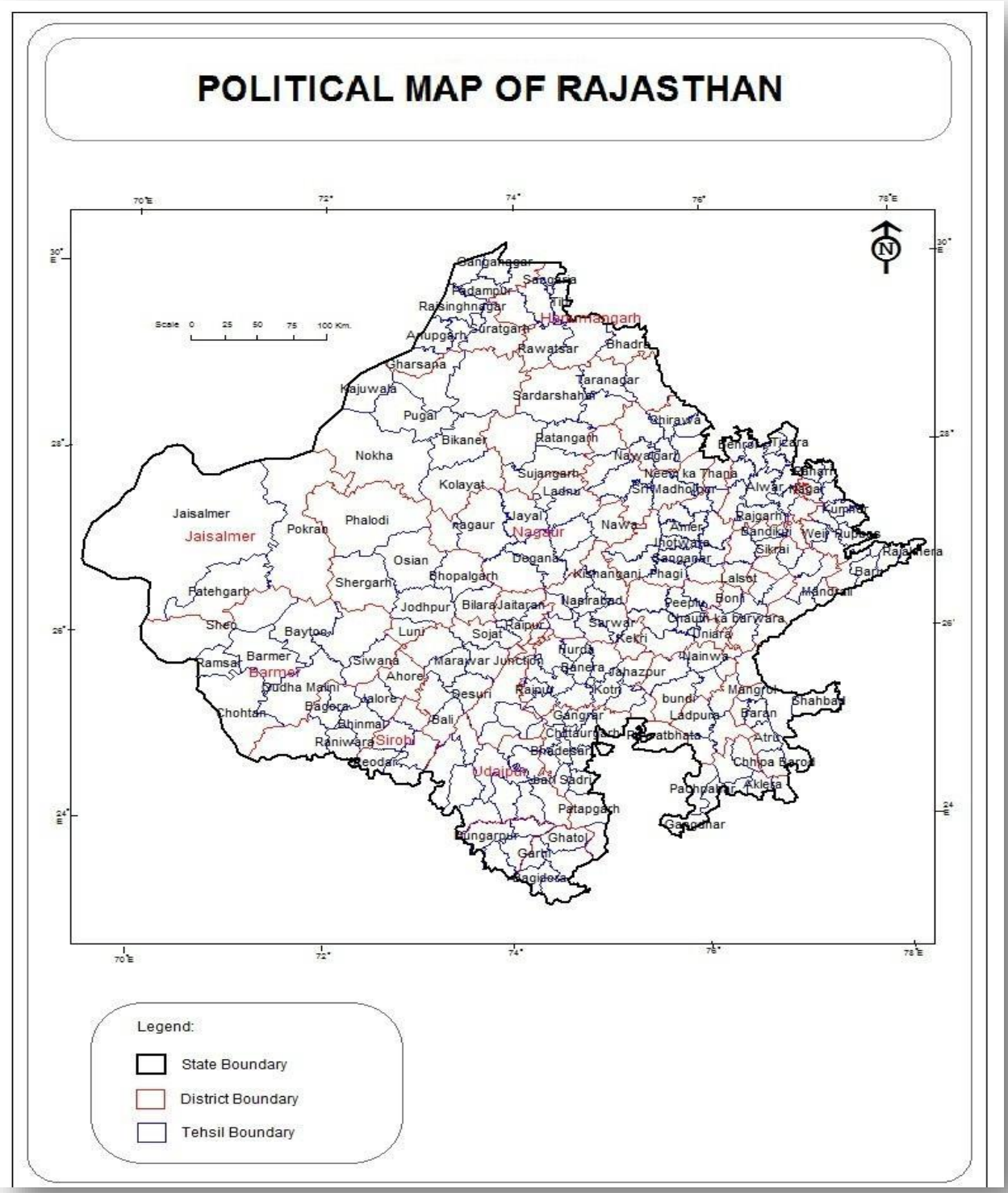
Impacts of Climate Change in the Context of Rajasthan

Rajasthan is the largest state in the country, which covers an area of about 3, 42,239 square kilometers, and is further divided into 33 districts within 7 divisions, see Map-1. It stretches

in two of India's major physiographic divisions, namely the Great Plains (The Great Indian Thar Desert) and the Central Highlands. The Aravalli range (the oldest range of Fold Mountains in India extends from one end to the other, for almost more than 850 kilometers) intersects the state diagonally from southwest to northeast, extending right up to Delhi where the area east of the Aravalli falls in the northern part of the Central Highlands. The Aravalli forms the Watershed line between catchment streams flowing into Arabian Sea and Bay of Bengal respectively. It has a steep but discontinuous front to the Thar plains in the west and a relatively gentle slope towards the alluvial basins in the north and the east. Except for the Chambal, the other 13 rivers of the state are non-perennial. The central part of Aravalli consists of an important basin with interior drainage in Sāmbhar Lake. This area is full of sand hills and typical landscape with several low depressions.

The climate of Rajasthan on the west of the Aravalli like other desert and semi-desert regions in the world gets rapidly heated during the day and cool down quickly after dusk, high variations are noted in the maximum and minimum temperature. In the east and south of Aravallis, there is considerable variation in the temperature and amount of rainfall. Climatically, Rajasthan is the driest State in the country and Rainfall is the only source of water in the State, which is received from South-West monsoon which usually arrives by the middle of June and continues with intervening breaks till almost September end. The annual rainfall varies from less than 100 mm to 1000 mm. As one moves from southwest to northeast, the rainfall goes on decreasing. It is highest on the Aravalli near Mount Abu where it exceeds 1000 millimeters; the average rainfall in north-western parts of Jaisalmer district ranges between 1 to 100 millimeters while in Banswara, Chittorgarh and Jhalawar districts it varies between 901 to 1000 millimeter, and the state itself has about 528-millimeter average rainfall.

Another vulnerability issue is widespread land degradation which is a persistent challenge in Rajasthan. The processes leading to land degradation are generally triggered by increasing demand for food from the growing population, which results in over-exploitation of natural resources. Human activities such as firewood cutting in rural areas and around main cities, deforestation for commercial use, urbanization and industrialization, overtaxed rangeland carrying capacity and overgrazing by ever-expanding herds, cultivation in ecologically marginal areas, low level of agricultural technology, reduced fallow time etc., has led to various types of land degradation process, including increasing soil degradation through



salinization, flooding, drought water logging etc. These processes, in turn, reduce agricultural productivity.[17]

Map-1-Source **climate change-Shodhganga-shodhganga.inflibnet.ac.in/bitstream/10603/24677/7/07_chapter%201.pdf-accessed and retrieved on 1.11.2017.**

---

17. climate change-Shodhganga-shodhganga.inflibnet.ac.in/bitstream/10603/24677/7/07_chapter%201.pdf-accessed and retrieved on 1.11.2017.

Rajasthan State Action Plan on Climate Change (RAPCC)

The State of Rajasthan in Indian has scarce and highly uneven distribution of water resources. Studies have collaborated that the state is highly sensitive and vulnerable to climate change, and has a very low adaptive capacity. The State also has the highest probability of drought occurrence in the country. A threat such as a climate change thus calls for timely and coheren t policy response and action that will help reduce vulnerability and build the resilience of the State to likely climate impacts.

The various departments of the Government of Rajasthan, with the help of a multidisciplinary team of experts from The Energy and Resources Institute TERI and support from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), have drafted the Rajasthan Action Plan on Climate Change. The RAPCC has been envisioned in concurrence with the guiding principles of the Rajasthan Environment Policy, 2010; Rajasthan Environment Mission, 2010 ; and the Climate Change Agenda for Rajasthan (2010-2014). The vision of Rajasthan Action Plan on Climate Change (RAPCC) is "to achieve sustainable development by reducing vulnerability to climate change impacts and enhancing the resilience of ecological, economic and social systems in Rajasthan".

In 2008, a National Action Plan on Climate Change (NAPCC) for India was released in view of the criticality of addressing the challenges posed by climate change along with the imperatives of poverty alleviation and economic growth for India. The focus of NAPCC is to improve the understanding of climate science, adaptation, mitigation, energy efficiency, natural resource management and conservation; and also to identify measures for promoting development and addressing the issue of climate change in an effective manner.

The NAPCC further sets eight priority missions to respond to climate change; these include N ational Mission on Solar Energy, Enhanced Energy Efficiency, Sustainable Habitats, Water, Sustaining the Himalayan Ecosystem, Greening India, Sustainable Agriculture and Strategic Knowledge for Climate Change, covering a range of response strategies.

State-specific missions for Rajasthan were developed highlighting research gaps and needs al ong with relevant policy measures, in light of the state's vulnerabilities and capacities. For each task force, certain research and development need as well as supporting policy

and regulatory measures were identified. Based on the guiding principles, the Climate Change Agenda for Rajasthan (CCAR) identified a list of strategies under the following seven state-level Task Forces constituted under the concerned Principal Secretary/ Secretary of the Department:

1. Water Resources.
2. Agriculture and Animal Husbandry.
3. Forestry and Biodiversity.
4. Human Health.
5. Enhanced Energy Efficiency and Solar Energy.
6. Urban Governance and Sustainable Habitats and
7. Strategic Knowledge of Climate Change.

The RAPCC builds on the key areas as identified under the CCAR by prioritizing urgent areas of action in a phased and time-bound manner and is in coherence with the Rajasthan State Environment Policy and Environment Mission and while the RAPCC primarily focuses on ris k reduction and adaptation measures, it also looks into the co-benefits offered by specific strat egies in the form of mitigation.[18]

Success Story to Emulate

Dr. Rajendra Singh of Alwar District (Rajasthan) also known as *"Waterman of India"* and winner of Ramon Magsaysay Award for community leadership and Stockholm Water Prize, an award known as "*the Nobel Prize for water"* is a success story to be emulated at ground level. Dr. Rajendra Singh through his NGO called *'Tarun Bharat Sangh'*, (which is supported by United Nations and World Bank) has been instrumental in fighting the slow bureaucracy, mining lobby and has done pioneering work with the help of villagers in water management and water harvesting through the use of check dams, johads, rainwater storage tanks and other time-tested as well as path-breaking techniques in their semi-arid area which lies close to the Thar Desert.

---

18. Rajasthan State Action Plan on Climate Change -Ministry of...www.moef.nic.in/sites/default/files/sapcc/Rajasthan. pdf-accessed and retrieved on 1.11.2017.

Over the years since 1985 when it was a single village enterprise, *'Tarun Bharat Sangh'* has helped to collect rainwater for the dry seasons by building over 8,600 johads and other water conservation structures and has aided over 1,000 villages in this way; the NGO has also revived five rivers in the region, namely Arvari, Bhagani, Jahajwali Ruparel, and Sarsa.[19]

India's Stand on Global Warming /Climate Change and its DRR credentials

Climate change is considered to be a non-traditional security threat in contemporary times and its impact on human security is supposed to be highly deleterious. According to former U NFCCC Executive Secretary Yvo de Boer-India joins a growing contingent of developing countries that *"are making very significant efforts to show what they are doing to address climate change and indicate what more they are willing to do*."

Earlier on before the Copenhagen Summit of 2009 the then Environment Minister Jairam Ramesh stated that *"India cannot and will not take emission reduction targets because poverty eradication, ...social and economic development are first and over-riding priorities."* Though in a surprising reversal, later on, India agreed to quantify its efforts to mitigate climate change. Ramesh said India would reduce emissions by *"a broadly indicative number,"* although the reductions would still not be bound by International Law.

At the Major Economies Forum on Energy and Climate in Italy, Sixteen countries including India declared that the global average temperature should not exceed 2 degrees Celsius above the pre-industrial levels. At the subsequent Major Economies Forum in Washington, D.C., India proposed that it could submit more detailed and regular information to the international community on its domestic climate change efforts as a step toward greater transparency.

All countries that are party to the U.N. Framework Convention on Climate Change (UNFCCC) are expected to mandatorily submit periodic *"national communications"* containing a report on carbon emissions and climate mitigation activities taken up by them. But India, like other developing countries, is under no obligation as the other industrialized countries, especially for those actions that are not internationally funded.

---

19. **Rajendra Singh | k-learn.adb.org-k-learn.adb.org/node/3124-accessed and retrieved on 1.11.2017.**

However India's former Special Envoy on Climate Change, speaking to Worldwatch stated *"We are prepared to...incorporate [self-funded actions on climate change] in our national communication [and]...to consider making the national communication more detailed and more regular,"* But, he said, all parties to the UNFCCC would need to agree to such changes.

India's interest and investment in climate change has seen an upward trend on domestic front lately. The Ministry of Environment and Forests released a report listing 20 initiatives that the country is undertaking to address climate change at home which comes as part of India's larger National Action Plan on Climate Change and will help offset 11 percent of India's annual emissions, according to the Ministry report.

The government of India insists that, despite a common goal of global climate stabilization, each country has a different responsibility to address the problem and India has not wavered from this position and has taken this issue proactively in all the international climate negotiations till date.

In the past former Minister for External Affairs S M Krishna also stated and emphasized in the U.N. General Assembly the importance of focusing on climate change adaptation as well as mitigation. *"Developing countries must be supported financially, technologically, and with capacity-building resources so that they can cope with the immense challenges of adaptation".*[20]

India found itself casted as a potential *"spoiler"* that could hinder international efforts to tackle climate change at the Paris climate summit as delegates from 195 countries attempted to hammer out a deal to fight global warming. The answer lays in the construction of a deeply flawed narrative that risk repositioning India and other emerging countries in global climate politics. It is based on two misleading premises. The first, a sleight of hand that obscures the past, asserts that the only thing that mattered in Paris was where individual countries are heading, not how the world ended up with global warming in the first place. The second premise builds on this to suggest that the global future is alarming because of India's plans to significantly step up the use of coal to develop its economy and increase its power supply to the masses, at a time when the world is struggling to find a way to kick its fossil fuel habit. That India accounts for 3%-

20. India Steps Up Climate Change Efforts | Worldwatch Institute-www.worldwatch.org/node/6278--accessed and retrieved on 1.11.2017.

-global greenhouse-gas emissions since the industrial revolution, compared with 27% for the U.S., is irrelevant by this logic.

In his opening remarks, at the Paris Climate Change conference, the then French President François Hollande stated that any deal should be *"universal, differentiated and binding,"* with *"differentiated"* being climate-speak for *"context matters."* While the exact form of this differentiation remains a hot topic for debate, it is certainly and squarely on the table.

By asking individual nations to come up with their own blueprints for tackling carbon emissions — known in the jargon as Intended Nationally Determined Contributions (INDC) — in the run-up to the talks, the approach at the Paris conference acknowledged the importance of such contextual imperatives.

Over the years, Democratic Indian climate politics has been shaped by the need to balance dual and seemingly contradictory objectives: India needs an effective climate agreement to protect its population against the impact of climate change, but it also needs sufficient low-cost energy for development. While India has historically prioritized the latter objective, in recent years a more balanced view has emerged, including in official circles and it is time to make common cause in addressing the climate problem by giving adequate attention to the past as something that matters when we sit down to talk about the future.[21]

Paris pledges are not on track in 16 of the 25 major carbon-emitting countries, including Australia, Canada, the EU nations (en bloc) and the United States, says a report from Germany by the International Institute for Applied Systems Analysis (IISA) and two other institutions including New Climate Institute.

---

21. Why India Has a Point at the Paris Climate Talks - Time Magazine- By Navroz K. Dubash and Radhika Khosla, December 7, 2015-http://time.com/4138055/india-paris-talks-climate-change/-accessed and retrieved on 1.11.2017.

This report communicates an overview of projected greenhouse gas emissions in these 25 major emitting countries/region up to the year 2030AD, taking into appraisal the emission trajectories based on current policies and the implementation of their nationally determined contributions (NDC's) under the Paris Agreement.

This report has in fact substantiated what the United Nations Environment Programme (UNEP) had said in its 'Emission Gap Report' of 31st Oct 2017. The UN environment body meanwhile came out with a report on adaption issues. The report called Adaption Gap Report, also noted that the developing countries would need 140$ billion to $300 billion per year by 2030 to adapt themselves for facing the impact of global warming.

Countries roughly on track to achieve or even over-achieve their self-determined uncondition al targets are: India, Brazil, China, Colombia, Japan, Mexico, Russia, Ukraine, and Turkey while Argentina, Australia, Canada, Chile, Congo, Ethiopia, the EU, Indonesia, Kazakhstan, Morocco, Philippines, South Korea, Saudi Arabia, South Africa, Thailand, and the USA require additional measures to achieve their targets.

Though the NDCs are meant for actions under the Paris Agreement post- 2020, it is important for countries to fine tune their current policy trajectories so that they can achieve their individual targets and a common goal to keep the average global temperature rise below 2 degree Celsius by the end of this century.

The above mentioned report comes soon after India questioned the developed countries on their slothful record during pre-2020 commitment period under the Kyoto Protocol. India sought them to walk the talk by reminding the rich nations of their previous commitment on the inaugural day of the Climate Conference (COP23 Nov 6-17th, 2017) in Bonn. [22]

Developing countries, including India, have also asked rich nations to ratify the second commitment period of the Kyoto Protocol (2013-2020), which will guide their climate action plan for the next three years, by June 2018 to build trust and confidence in the multilateral process. Ratification of the protocol is a valuable part of the momentum for global climate action and so far only 84 of the total 191 signatories have ratified it.

---

22. India on the path to meet climate targets, the rich world falling short-The Times of India, New Delhi, November 9, 2017, p-19.

While supporting a group of *'Like Minded Developing Countries' (*LMDC) on the issue at the COP23 Climate Conference, India, too has raised the demand of including pre-2020 actions of rich nations in the agenda.[23]

India has been ranked as the sixth most vulnerable country in the world in terms of facing extreme weather events, with Haiti, Zimbabwe, Fiji, Sri Lanka and Vietnam taking the top five positions in a list of nations facing climate risk by the Berlin-based NGO Germanwatch through its Global Climate Risk Index (CRI). CRI is based on an analysis of the number of deaths (due to climatic conditions) per 100,000 inhabitants, and the extent of financial losses per unit of GDP of countries. Economic and population data from IMF were taken into account while arriving at the rankings. The report noted that in 2016, India lost the maximum number of lives (2,119) and over $21 billion worth of property to weather-related events while the USA suffered the maximum financial loss (over $47billion). In the above analysis, only weather-related events-storms, floods and extreme temperatures (heat and cold waves) - are incorporated and "Geological incidents like earthquakes, volcanic eruptions or tsunamis, for which data is also available are not relevant in this context as they do not depend on the weather and therefore, are not possibly related to climate change," said the report.

"The CRI does not provide an all-encompassing analysis of the risk of anthropogenic climate change but should be seen as just one analysis explaining countries exposure and vulnerability on climate-related risk based on the most reliable quantified data. It is based on the current and past climate variability and also on climate change", said the report.

Referring to the CRI, the report advised the high-ranking countries to consider the index as a *"warning sign"* that they are at risk of either frequent extreme weather events or, in rare cases, extraordinary catastrophes.[24]

---

23. India, China unite on climate action, The Times of India, New Delhi, November 10, 2017, p-15.

24. India 6th among nations most vulnerable to climate extremes, The Times of India, New Delhi, November 10, 2017, p-1 and 15.

On the question of India's DRR credentials, inaugurating the 'Indian Disaster Response Summit' organized by NDMA and Facebook, MoS for Home Kiren Rijiju said PM Modi's 10 point agenda on disaster management has listed harnessing technology to create a culture of disaster resilience. He said reaching out to the people and communities was the primary responsibility of all stakeholders and efforts should be made to make people informed and guide them during emergencies. Harnessing the power of innovative social media like Facebook (Marked Safe Feature) herein comes in to play to "prepare, respond and recover". [25]

Lastly to conclude National Disaster Management Authority of India (NDMA) has emerged as a world leader in disaster response mainly due to climate change and has come a long way in projecting India as a resilient power capable of protecting lives of its inhabitants and infrastructure while also showcasing its soft power credentials to the world. Their prompt and excellent response in regions affected by cyclone Phailin and Hudhudin has also not gone unnoticed where India's humanitarian diplomacy came in to full play and was appreciated world over in the Organizations and Forums like UN Office for Coordination of Humanitarian Affairs (UNOCHA), UN World Conference on Disaster Risk Reduction at Geneva, and UN Office for Disaster Risk Reduction (UNISDR). The UN member countries which met in Sendai, Japan and signed a new DRR protocol replacing Hyogo Framework of Action (HFA) has also heavily borrowed from the best practices and positive inputs of National Disaster Management Authority of India.[26]

---

25. Centre ties up with Facebook for disaster response, The Times of India, New Delhi, November 10, 2017, p-15.

26. Yadava, M. "OPINION | Has India Emerged as a World Leader in Disaster Management?" IndraStra Global Vo l. 002, Issue No: 08 (2016) 0042 http://www.indrastra.com/2016/08/OPINIO N-Has-India-Emerged-as-a-World-Leader-in-Disaster-Management-002-08-2016-0042.html | ISSN 2381-3652--accessed and retrieved on 1.11.2017.

*This research paper was presented by the authors at the **International Seminar on Technological Development in Contemporary Era, Threat to Environment at National and International Strata: Challenges and Remedies** conducted by The Nehru Memorial Law PG College, Hanumangarh Town (Rajasthan), India from November 11th -12th, 2017.*