Global Climate Change and Its Impact at Regional Level, Policies and Practices for Disaster Resilient Society

Niranjan Sahoo[1]*, Biren Kumar Behera[2], Uday Chatterjee[3], Biswajit Pahanta Singh[4]

Abstract

With the rise in global population and numbers of anthropogenic activities, an abruptly spike in average global temperature has been witnessed on global scale but its vulnerability and cumulative impacts at regional level has put its habitants and livelihood at stake. It's obvious that climate change has a direct impact on emerged disasters. Extra weathering rise in temperature is paving the way for the melting of ice caps, drought, rise in temperature intensifying more powerful storms along with torrential downpour and flood, coastal inundation owing to rise in sea level subsequently. The prime objectives of the chapter are to draw a general illustration by comparing climate change and resulted disasters. It focuses on regional analysis to out the real consequences of climate change. Another objective of the chapter is to find out potential threats in future and practice policies for disaster resilient society. Secondary data from different government sources, UN climate change department, World Meteorological Department, NIDM, climate and disasters related issues from the newspaper article etc. were collected and analyzed by using simple statistical tools to find out resulted disaster and its impacts at regional level. The northern hemisphere is experiencing more heat owing to the dominance of landmass and it has witnessed many warm years after 1990, since climate statistics have been monitored and documentation began in 1861 and also expected increase in the global mean temperatures in coming years. At least 7,348 recorded disasters occurred around the world and the number has doubled in the last 20 years with 1.19 million deaths and an USD of 1.63 trillion economic losses. Ice is melting, in coastal bastion inundation of flood

[1] **Niranjan Sahoo,** Assistant Professor, Jayoti Vidyapeeth Women's University, Rajasthan, India
* Corresponding Author Email: niranjansahoo@jvwu.ac.in, niranjansahoo743@gmail.com
[2] **Biren Kumar Behera,** Department of Geography, Utkal University, Odisha, India
[3] **Uday Chatterjee,** Assistant Professor, Bhatter College, Dantan, Bengal, India
[4] **Biswajit Pahanta Singh,** Department of Geography, Ravenshaw University, Odisha, India

owing to sea level rise and drought in the interior parts which suffer from water scarcity etc. agriculture and food security deeply get threaten and keep habitants at stake in the era of climate change and hence some policy and practices at different level need to be addressed for disaster mitigation.

Keywords: *Climate Change, Adoptability, Disasters Management, Mitigation, Resilient.*

1. Introduction

The industrial revolution emerged as a new paradigm with the rise in global population and to necessarily meet the needs of human beings, in the era of urbanism and economic development. An abrupt spike in the average global temperature has been witnessed due to the rising numbers of anthropogenic activities, as well as industrialism. Thus, vulnerability and cumulative impacts at regional level have put the habitants and their livelihoods at stake. The rise in sea level has subsequently been a result of the extra weather activities that have helped in the rising temperature and thus, paving the way for melting of the ice caps, as well as intensifying more powerful storms along with torrential precipitation which further has resulted in flooding and coastal inundation. The tropical belts, torrid, temperate and frigid zones across the countries have been experiencing disasters related to the change in climate. The climate change has put up a great threat upon the various landscapes such as mountains, coastal belts, plains and desert, and the inhabitants, ecology and economy shall be pushed into vulnerability. The northern mountainous region, desert, coastal belts etc. comprise India's physiographic divisions. Inundating coastal regions, amid profound seasonal irregularity, the plains lives and livelihood of the inhabitants will be affected. Since industrialism exploded, the climate change has become profound, especially in the tropical belt.

This paper is a research-based on some case studies, personal observations on climate change phenomena and how propounds impacts falling on the rest of the seasons present very supportive evidence regarding the matters of climate change and disasters related to it. In India, empirical model was in use, in a practical way, which was necessary for estimating the value of climate change and resulting disasters by analyzing and monitoring spatial-temporal characteristics of elements of weather.

2. Climate Change and Issues Concomitant to Disasters

The average global temperature has witnessed a growth at a rate of 1.9 degree Celsius since 1990, thus making the 21st Century as the era of climate change. This era of climate change has been the witness to the rise in the mean temperature on the global scale, the melting of ice caps and rise in the sea level, thus exposing the coastal belt inhabitants to greater vulnerability (Sahoo and Satpathy, 2020). Amid the rise in temperature on global scale, it has also been paving ways for the melting of ice caps, droughts, intensifying frequent devastating storms along with torrential downpour as well as flash floods, as well as the coastal inundation owing to the rise in sea level subsequently. Especially in tropical belts, climate change disasters have been on the rise across all the countries. Changes are temperature and certain properties in elements of weather have been showcasing how the change in climate is in full swing, and its cumulative impacts are being reflected in the form of natural disasters. Some natural disasters in the recent times, such as the cyclones Idai and Kenneth, the Australian Wildfires, the East African drought, the South Asian flash floods, and the dry corridor in Central America are some of the major attributes in this regard, and have been the appropriate indicators of the climate change.

2.1. Climate Change and Health Disaster-The Coronavirus Issue

As coronavirus is recent origin, we still lack in adequate evidence that whether climate change has helped in the outbreak of COVID-19 or not, but numerous foregone researches have alters how we relate to other species on Earth and that matters to our health and put our health at risk.

Substantial rise in global temperature pushes as the planet heats up, animals big and small, on land and in the sea, are headed to the poles to get rid of the heat. That creates an opportunity for pathogens to get into new hosts. Deforestation, which takes place for the sake of agricultural purposes, is the single most dominant factor of habitat loss globally. Loss of habitat forces animals to migrate and other animal likely to be contacted with other animals or people and share germs large livestock farms can also serve as a source for spillover of infections from animals to people. With the population explosion and more food demand, the human attre bound to explore the more food but it creates an ecological imbalance researchers claim that the owing to meat based food being high on demand corona has emerged in China. We have many reasons to

take climate action to improve our health and reducing risks for infectious disease emergence is one of them.

2.2 Climate Change, Air Pollution and Coronavirus

Looking at the ongoing corona crisis and its symptoms which is getting worse owing to air pollution has been a focal aspect in corona research among researchers. Recent researches from Rachel Nethery, Xiauo Wu, Francesca Dominica and other colleagues at Harvard Chan have found that people who dwelling in places with poor air quality are more suspect to die in corona. People who are exposed to more air pollution and who smoke face worse respiratory infections than those who are breathing cleaner air, and who don't smoke (Wu, Xiao et al., 2020).

Climate change has acts as an effective favorable factor in spreading some infectious diseases, including Lyme disease, waterborne diseases such as Vibrio para-haemolyticus which causes vomiting and diarrhea, and mosquito-borne diseases such as malaria and dengue fever. To help limit the risk of infectious diseases, we should do all we can to vastly reduce greenhouse gas emissions and limit global warming to 1.5 degrees.

We have seen a trend of greater emergence of infectious diseases in recent decades. Most of these diseases have entered into people from animals, especially wild animals. This trend has many causes. We have massive concentrations of domesticated animals around the world, some of which can be home to pathogens, like the flu, that can make people sick. We also have massive concentrations of people in cities where diseases transmitted by sneezing may find fertile ground. And we have the ability to travel around the globe in less than a day and share germs widely.

In the past century we have our demands upon nature, such that today, we are losing species at a rapid pace unknown since the dinosaurs, along with half of life on earth, went extinct 65 million years ago. This rapid dismantling of life on earth owes primarily to habitat loss, which occurs mostly from growing crops and raising livestock for people. Owing to lack of land resources and fewer food sources to feed on, animals find food and shelter where people are dwelling, which subsequently leads to disease spread.

Another major cause of species loss is climate change, which can also change where animals and plants live and affect where diseases may occur. Historically, we have grown as a species in partnership with the plants and animals we live with. So, when we change the rules of the game by drastically changing the climate and life on earth,

we have to expect that it will affect our health. To combat climate change; we need to drastically decrease greenhouse gas emissions. Generating electricity from low-carbon energy sources like wind and solar decreases harmful air pollutants such as nitrogen oxides, sulfur dioxide, and carbon dioxide that lead to more heart attacks and stroke as well as obesity, diabetes, and premature deaths that put further strains on our health care systems.

Climate change has been the single most dominant factor which has been reflected as a multi-faceted cause of disasters. These environmental disasters are the extreme events induced by nature that have exceeded the tolerable magnitude and have made human lives very difficult, resulting in colossal losses in property, human and animal lives, not to mention, the destruction of environment and settlements. Severity and frequency of disasters have been on the rise at a rapid rate under the influence of the global climate change (Sahoo and Satpathy, 2020). Climate change owing to changes in temperature spike has affected different landscapes such as mountains, coastal areas, plains and deserts. The impact of the climate change at the aforesaid landscapes has been affecting the ecology, people and their economy.

3. Climate Change and Impact at Regional Level

The vulnerability to natural disasters caused by climatic changes is determined by the many factors, mainly by the region's geographical location, topography, nature of landscape, etc. and these factors later may have a big impact on economic and social infrastructure and affect the lives of the people who have been dwelling in the region. The authors have broadly discussed the impact of climate change and its impact at four major areas such as mountains, coastal, desert and plains as the climate primarily focuses on the climate change and its effects. Figure 1 shows the impact of climate change at different regional level.

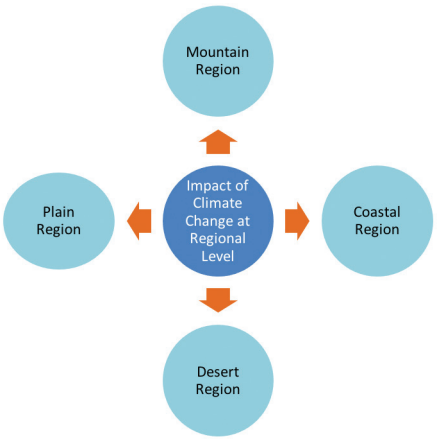

Figure 1: Impact of Climate Change at Regional Level

This section further reiterates the spike in the average global temperature and how it leads to melting of ice caps, which further leads to rise in sea level, and surge in storms because of the increased sea level. The melting of glacial bodies in mountainous landscapes heavily affects the surrounding environment, putting its habitants at a greater risk. In coastal regions, the natural disasters are a combined effect of two phenomena, rise in sea level and an obvious storm surge which has been intensified due to the rise in sea level as well as the increase in average temperature. Both the phenomena leave the footprints of the disasters across the coastal bastion, not to mention the coastal inundation which has been affecting the lives and livelihood of the coastal dwellers because of the spike in temperature. The authors have focused on the four major aforesaid landscapes, in a bid to find out the impact of the climate change on them.

3.1 Mountain Ranges

Many issues have been raised because of the average spike in global temperature. A research revealed that up to a quarter of the global mountain glacier mass could disappear by 2050 and up to half could be lost by the year 2100 (Kuhn, 1993a; Oerlemans, 1994; and IPCC, 1966b).

Many studies have been carried out during the period 1999-2001, in an attempt to find the link between the climate change and melting of glaciers. In the valley of

Himalayas, the glaciers have retreated approximately by one kilometre since the Little Ice Age (Mool P.K. et al., 2001a). The Chinese Glacier Inventory, was a study carried out by the Chinese Academy of Sciences had reported that during the last 24 years, there had been a 5.5% shrinkage in volume of China's 46,928 glaciers, equivalent to the loss of more than 3000sq. km of ice. The study has predicted that if the climate continues to change at this extent, then two-thirds of China's glaciers would have disappeared by 2050, and almost all of them would be gone by 2100.

Older studies on selected glaciers of the Indian Himalayas had indicated that most of the glaciers were retreating discontinuously since the post-glacial time. Of these, the Siachen and Pindari Glaciers were retreating at a rate of 31.5m and 23.5m respectively (Vohra, 1981.) Gangotri glacier has been retreating at an average of 18m per year (Thakur et al., 1991). The Milam Glacier in the Kumaon Himalaya had been monitored to have been retreating at an estimated rate of 9.1m per year between 1901 and 1997 (Shukla and Siddiqui, 1999). The snout of DokrianiBamak Glacier in the Garhwal Himalaya had been monitored to have been retreated 586m between the period 1962 to 1997 (Dobhal et al., 1999). The average retreat had been estimated at a rate of 16.5m per year.

There has been much supportive evidence for assuming that the glaciers melting at an unprecedented rate as an indication of climate change. Valley glacial retreats and shearing of glaciers cause avalanches which pose a serious threat to the inhabited regions in the mountainous landscapes. In mountain valley regions, glacial retreats have been causing vivid impacts on both ecology and tourism-based economy of the region since the natural beauty of the glacial region has been degraded. For example, the Northern Mountain ranges of India are glacial. If the glaciers melt owing to the cumulative impact of climate change, then it will lose its relevance on being a hub of tourism and thus affect the local economy badly. Thus, from ecological perspective, the flora and fauna indigenous in these regions would be wiped out amid prevailing inhospitable climate and hence, apart from environmental disasters, impact of climate change will result in the downfall of the local economy.

3.2 Coastal Regions

The coastal regions have been usually densely populated and also served as hubs of tourism, economic activities, etc. and hence rise in the sea level will not only depopulate the area by making the climate refugee but also affect the local economy badly. Rise in

the global sea level has been in the limelight for the researchers for quite some time now. Global mean sea level has risen about 8-9 inches since 1880, with about a third of that coming in just the last two and half decades. The rise in sea level has been mostly owing to a combination of melt water from glaciers and the ice sheets, as well as the thermal expansion of the sea water as it gets warmer. In 2019, the global sea mean level had been recorded as 3-4 inches above the 1993 average, which was the highest annual average in the satellite record (1993-present). The sea level has been recorded to rise 0.24 inches in 2019 as compared to it was in 2018. Amidst the rise in temperature and warm up in the sea surface, the intensification of more powerful storms has been putting the habitants of the coastal regions at risk, as the coastal regions has been influenced by maritime climate and vulnerable to three types of disasters namely cyclone, tsunami and storm surge. Global temperature and global mean sea level have been highly parallel to each other and have continued to rise till date. This has been instrumental in the range of impacts including increased risk of floods and submergence, salinization over the standing crops, the surface and the groundwater as the potential human and ecosystem impacts because of these disasters have been significant in the 21st century, although they have remained mostly uncertain. The actual impacts depend on a range of factors which are human-controlled, such as coastal land use and management approaches. The rise in sea level will only directly impact the coastal zone, and such changes raise significant concern due to the high concentration of natural and socio-economic values located there. Coastal belts have been a hub of tourism, trade and other lucrative economic activities. Thus, there is competition in between humans being in a bid to explore coastal region in an era of climate change as the lives and livelihoods get badly affected after being hit by such unpredictable, devastating and frequent disasters in the coastal bastion. Such sea based natural hazards have turned into catastrophic disasters as a consequence of these disasters goes on to hamper both the economy and ecology of the region to a great extent. This has been expected to increase by 50% by 2030, and the people may come face to face with the threat of extinction. To add this, each year, 10 million people experience coastal floods due to storm surges and landfall of cyclones, and 50 million will be at risk by 2080 (Nicholls, 2004). "Urbanization is an important trend and large coastal cities having more than 10 million people are projected to be affected with many smaller cities and towns clustered close to the coastline shall be under threat (Nicholls, 1995a; Small and Nicholls, 2003). The coastal zone is a major focus of human

habitation and economic activity, as well as being important ecologically (Holligan and deBoois, 1993; Turner et al., 1996; Sachs et al., 2001)."

India has a long coastline of 7,517 km. Nine states and four Union Territories come under the coastal region of India. The east coast lies between the Eastern Ghats ecosystem and the Bay of Bengal. The west coast strip extends from the Gulf of Cambay in the north Kanyakumari Five hundred and sixty million people live in this coastal region. One hundred and seventy-one million people in these coastal regions have been directly affected by the floods and cyclones followed by torrential rain. In addition, approximately 4million comprising of 8,64,550 fishermen households have been affected by these disasters. Further, climate change related to sea level rises has been instrumental in increasing the vulnerability of the coastal ecosystem by posing a threat to many coastal cities, urban centres and coastal populations in developing countries."Satabhaya village located on the coastal district of Kendrapara in Odisha is a victim of climate change and has been prone to natural calamities like the deposition of sand dunes causing great havoc to inhabitants since climate change. Coastal inundation due to storm surge and tidal inundation into the coastal plains makes agriculture, especially the rice belt of eastern Odisha, infertile. In Odisha, coastal plains, especially eastern coastal district of Odisha, areas are inundated with saltwater for months, thereby making the landmass infertile for generations" (Sahoo and Satpathy, 2020).

3.3 Plain Regions

The plain landscapes being fertile in nature and best suited for the practice of agriculture and have provided a hospitable climate for human habitations. In India, over 70% of rural households depend upon agriculture as their principal means of livelihood. Agriculture along with fisheries and forestry, have accounted for one third of the nation's GDP and is the single largest contributor. As per the Census of 2011, 263 million people are engaged in agriculture sector and over half of them are agricultural labourers. In the era of climate change, irregularities in seasonal cycle in general and erratic nature of monsoon in particular, have been the major problems for agriculture, which is the primary sector in India. The production has been on a setback as the crops are unable to cope with the changing nature of climate and hence low production has become a regular occurrence. If a disaster occurs and impacts agriculture, the livelihoods of all these people are affected, pushing them into the trap of poverty. In case of Indian

context, plain landscape is a physiographic division out of rest, on which agriculture based human settlement is predominantly found and colossal loss of people and animal and economy has been recorded because of the frequency in natural disasters owing to climate change.

4. Climate Change and Agriculture

The practice of agriculture takes place by taking into account of relief feature, climate of certain geographic area and hence, Climate change and agriculture are interrelated processes, both of which take place on a global scale. Adverse effects of climate change affect agriculture practice climate both directly and indirectly. Which can take place through changes in precipitation pattern; temperature range (Heat wave) changes in atmospheric Carbondioxide and ground-level ozone accumulation and anthropogenic activities help in propound effect of climate change. In 2010, agriculture, forestry and land-use change were estimated to contribute 20-25% of global annual emissions. According to an estimation done by the European Union's Scientific Advice Mechanism In 2020, that the food system as a whole contributed 37% of total greenhouse gas emissions, and that this figure was on course to increase by 30-40% by 2050 due to population explosion and dietary change among populace.

The agricultural sector is a driving force in the gas emissions and land use effects thought to cause climate change. In addition to being a significant user of land and consumer of fossil fuel, agriculture contributes directly to greenhouse gas emissions. through practices such as rice production and the raising of livestock. According to the Intergovernmental Panel on Climate Change, the three main causes of the increase in greenhouse gases observed over the past 250 years have been fossil fuels, land use, and agriculture. The agricultural food system is responsible for a significant amount of greenhouse gas emissions.

4.1 Desert Region

Deserts have been sparsely inhabited than those of the other landscapes, owing to inhospitable environment, scanty rainfall and sand topography which restrict agricultural practices. Ongoing climate crisis in the deserts have made the inhospitable climate further harsh on the desert dwellers. Global warming has had much effect on

the world's already hot deserts, but even small changes in temperature or precipitation drastically impact plants and animals living in deserts. The incidence of droughts has been increasing because of the global warming and results in the drying up of the water holes. Desserts are mainly found in the western part of the continents and have direct impact of trade wind on the climate of deserts. So, in the era of climate change and changes in the wind pattern have a direct impact on the deserts.

Population growth and greater demand for land have been posing serious threats to combat this problem. It has been assumed that temperature rise has been a contributor in the increasing number of wildfires, which alter desert landscapes by eliminating slow-growing trees and shrubs and replacing them with fast growing grasses. Irrigation used in the agriculture, may, in the long term, lead to increase in the salt levels in the soil thus, becoming infertile. Grazing animals can destroy many desert plants and animals. Potassium cyanide used in gold mining may poison wildlife. Off-road vehicles, when used irresponsibly, can cause irreparable damages to the desert habitats. Oil and gas production may disrupt sensitive habitats. Similarly, deserts have been used for nuclear testing grounds and have been affected because of the nuclear waste dumped afterwards.

5. Policies and Practices for Disaster Resilient Society

A set of policy actions, researches, strategies, plans, legal norms and operating programmers should be reinforced in view of reducing the level of risk and vulnerability of disasters. Amid the rise in population and to meet the bundle of human wants, international policy making bodies such as UN, ILO (International Labor Organization), and International Food Organization, climate preventive policy and region-specific approaches in collaboration with grassroots level activists for disaster resilient society are in urgent need. The United Nations Framework Convention on Climate Change (UNFCCC) approaches climate risk reduction from two perspectives; first is about mitigation or reduction of greenhouse gas emissions to stabilize concentration levels at a safe level by which global temperature rise may stabilize and the second perspective aims at adaptation, or adjustment, to climate driven change. According to the Intergovernmental Panel on Climate Change (IPCC), Global policies are to keep global warming below 2°C while emissions of carbondioxide (CO_2) and other greenhouse gases

(GHGs) must be halved by 2050 (compared with 1990 levels).The first and foremost objective as remedies to climate change is to stabilize atmospheric greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system in the long term. Initiative to combat climate change is very much essential and subsequently spike in temperature and result issues such as ice or valley glacial melt, coastal inundation, desertification in plain and desert may have a minimal impact after undertaking proper measures. Figure 2 shows the Policies for Disaster Resilient Society.

The first policy should be on GHGs to give a breakthrough to temperature rise. Some ages old policies and practices should be revisited, reformed and implemented pertaining to finance, environment, education and society. The Concern of Human Rights is also not properly addressed. It is necessary to develop coastal environment, legal institutes and socio-economic practices to formulate draft management plans, consult local people, implement pilot projects and feasibility studies as well as train personnel for the projects. Most of the training development and awareness programmers are lacking in practical aspects of financial capacity and trained human resources.

6. Financial Aspect

Financial aspect is a focal point in the matter of disaster management. The financial aspect includes post disaster mitigation, resource mobilization, effective relief distribution, restoration of loss in agriculture through crops insurance etc. Financial aspect in policy making that has command over other aspects like socio-economic vulnerabilities proliferation caused in a post-disaster situation are not similar across all social classes. For example, the poor hold a lower berth financially in society and at the time of disaster rehabilitation and mitigation, and the authorities should prioritize them. The proper policy should be put in place and specific vulnerabilities of different areas and people should be addressed in financial aspect so that resource mobilization begins at the grassroots level. “The specific agro-ecology of excessive water during the rainy season and ingress of salinity from the sea has generated a great deal of genetic diversity in rice for traits such as submergence tolerance, salinity tolerance and deep-water floating types (Siddiq et al., 2006).”An integrated approach for management of agriculture in coastal areas may be developed and adopted using the Integrated Coastal

Agriculture Management Guidelines (FAO 1998). The PMFBY scheme is a multi-peril crop insurance scheme introduced in January, 2016. It follows an 'area basis approach' with seasonal activities under the consideration of a broad set of risks spanning various stages of crop development and post-harvest losses due to natural calamities. States and union territories have been entrusted by the State-Level Coordination Committee on Insurance to notify the insurance unit such as village/village panchayat or any other equivalent unit for major crops. Research suggests climate change helping early blooming fields to early ripping the crops and subsequently loss in total grains at the production time and hence short span seasonal harvestable crops having short span life period should be adopted in the climate affected regions across the country. The maximum premium payable by the farmers is 2% for all kharif food and oilseed crops, 1.5% for rabi crops, and 5% for annual commercial and horticultural crops (Tripathy, 2020). Development of flood-resilient agriculture is one of the possible solutions. Research on short-duration crops for disaster-prone zones of India has become essential. Farmers in most parts of India adopt mono-cropping as they are at the mercy of monsoon. Developing the capabilities of farmers by providing inputs to opt for multiple-cropping and cultivating short-duration crops is a practical solution for risk reduction. To feed up of the bulk of population, it is very much essential to practice new climate resilient practice in agriculture.

7. Social Aspect

Some prolonged impacts of disasters may lead to deep concern on social issues such as poverty and poverty may force the affected community to go in search of work for their survival and in the end, they will be forced to leave their proveniences for interstate migration. Such consequences are found in disaster pronged states such as Odisha, Bihar and Uttar Pradesh.

Developing nations like India still lack behind in education, social awareness and it may enhance disaster-related discrimination. If a person or a certain community on account of their cast, religion, creed, gender and socio-political ideology face any discrimination at the time of mitigation, preparedness, rehabilitation and recovery in disaster management, then it is called as Disaster Discrimination and hence social paradigm acts as hindrance in disaster management. There have been some notable examples found at the time of cyclone in Puri district of Odisha, and in order to avoid

such social paradigms, respective authorities should take the matter into consideration. In the recent flood disaster that happened in Kerala, the Keralites came in support of each other by practicing religious orthodoxy. Most communities in the society are also not readily involved in mitigating animal suffering during disasters for lack of proper training to deal with emergencies (Heath and Linnabary, 2015). Lack of proper training among different communities in society such as agricultural community, and fishermen community, may lead the people to proliferate their social and financial issues after disasters. An effective preparedness is partnership between government strategies and individual and societal behaviors and it should be done in collaboration with each other (Berman and Redlener, 2006).

8. Environmental Aspect

In the environmental aspects of disaster management, issues pertaining to environmental degradation, settlement in the disaster-prone should be looked after and policy and practices in relation to environmental management and assessment in bid to restore its lost glory should be reinforced. The coastal forests of eastern India are being destroyed year after year by the catastrophic cyclones formed in the Bay of Bengal. Coastal forestry not only hinders the speed of the wind but acts as an ecological heritage in the coastal biodiversity.

The National Centre for Coastal Research (NCCR), in its report submitted to the Ministry of Earth Sciences (July, 2018) has revealed that between 1990 and 2016, approximately 34 per cent of the Indian coastline (2246.49 km) has been eroded and this has been primarily due to anthropogenic factors which have augmented the natural process of coastal change. As per the report submitted by NCCR, it has estimated that the decline of 59.18sq.km of mangroves took place between 1972 and 1975 and 1980 and 1982.India has lost about 40% of its mangroves in the last century. The post-Sendai Framework has established the inter connection between pre-disaster risk reduction through building community resilience and post-disaster rehabilitation in a larger framework of disaster governance (Tripathy, 2020). Thus, widespread forestation across cyclone prone coastal bastions should be undertaken with community participation. In the era of climate change and amid degradation of the natural environment, bunches of stern environmental policy are yet to be carried out at the grassroots level. Amid global climate change and change in landscape must have a vivid impact on emerging disasters

in certain locations, looking at the degree of susceptibility at present and to vulnerability in future, sorts of research, action plans for the disaster management and mitigation should be in priority on behalf of the government. Laws pertaining to settlement in the coast should be addressed and slum areas found in the coastal areas should be looked after as they have close proximity to the seas and they are more susceptible to the tsunami, cyclone, and storm surge. Since, lower income and lower educated levels live in coastal cities, they are not willing to give up their livelihood activities like fisheries and they have no idea regarding sustainability of their occupation which is a major issue (Silva et al., 2011).

Depopulation in climate change time should be properly put under observation. Under the supervision of UN's climate change monitoring body special attention should be paid at climate refugees as the people suffer from the loss of their settlements to the marine transgression and they are forced to inhabit at other locations.

9. Educational Aspect

Education is another important aspect in disaster management, as it makes people aware. It will be very much useful in case of eradication of social paradigms and practice of religious orthodoxy in the disaster management context. Many countries are taking significant steps in the field of education for Disaster Risk Reduction (Petal, 2008). Region-based and disaster specific new research institutions should be established in a bid to promote studies about identification of risk zone.

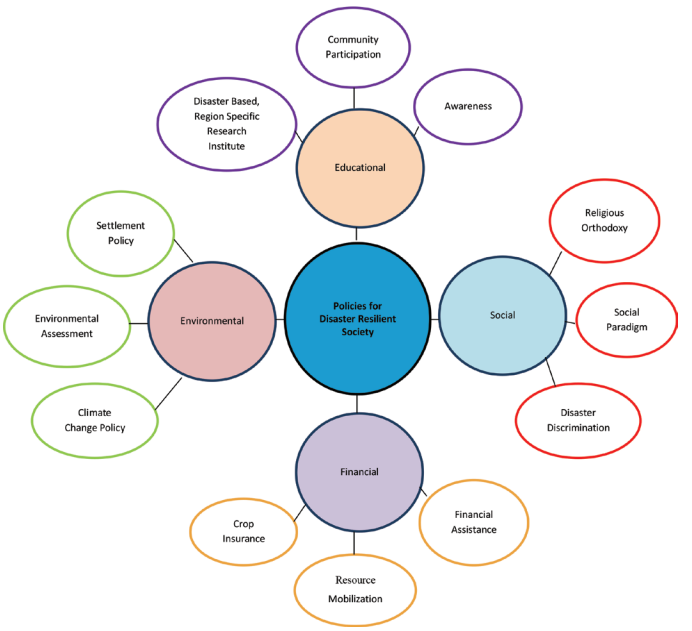

Figure 2: Policies for Disaster Resilient Society

Most of the policies are outdated and practices are age old in nature. In order to ensure more effective implementation of ultimate policy goals, the policies need to be reviewed and updated. An efficient system for monitoring and impact assessment of policy implementation needs to be developed. Ensuring stakeholder participation in policy formulation is of vital importance. Good management practices need to be followed at all times in order to ensure adequate policy implementation. The policies must include specifically detailed contingency plans for coping with disasters along with guidelines on how such a plan is to be effectively made.

10. Conclusion

The authors of the chapter, by using some qualitative and quantitative analysis, have found that climate change indicators are more profound. Authors' observations on seasonal cycles, especially in the coastal bastion of eastern India are quite astonishing. If there is a cyclone in the Bay of Bengal, just before the onset of monsoon, then there

will be irregularities in the normal seasonal cycle and will affect the rest of the climatic phenomena. For example, the Asian monsoon usually begins its onset on the Malabar Coast by on June 5 but, if a cyclone takes place, then, an erratic nature of monsoon will be reinforced. Subsequently, other seasons would be faced with irregularities, like, a late monsoon, early retreat of monsoon, and late winter etc. is. It's quite obvious that climate change has direct impact on emergence of natural disasters.

Undoubtedly, the northern hemisphere is experiencing more heat owing to the dominance of landmass and it has witnessed many warm years after 1990, since climate statistics have been monitored and documentation began in 1861 and also expected increase in the global mean temperatures in coming years. Climate change threatens different landscapes such as mountainous, coastal, and plain and phenomena like melting of ice, in coastal bastion, the inundation of flood owing to sea level rise and drought in the interior parts which suffer from water scarcity etc. Adaptation to climate change is a challenge for all countries. From a global perspective, the adaptation challenge is greater for developing countries. They are more vulnerable to climate change because their economies are more dependent on climate-sensitive sectors, such as agriculture, fishing, and food security may be deeply threatened, keeping habitants at stake in the era of climate change and hence some policies and practices at different levels need to be addressed for disaster mitigation. Coastal zone regulations are outdated and need to be revised and each responsible party, such as local-level and provincial-level officers and coastal communities should be involved indecision making and formulating strategies and implicating at grassroots level (Samaranayake, 1995). Therefore, this research has analyzed all the individual factors of elements of weather, and it can be helpful in planning a better strategy for resilience during extreme events of climate change for disaster resilient society. Climate change also plays a pivotal role in the outbreak of diseases like corona. From the aforesaid analysis corona being air transformable virus so, In places like New Delhi where air pollution is a common issue and the quality of air is in degraded state we have to pay particular attention to individuals who may be more vulnerable than others to polluted air, such as the homeless and people those residing in slum area may need more attention. Reducing air pollution caused by burning fossil fuels like coal, oil and natural gas also helps keep our lungs healthy, which can protect us from respiratory infections like corona virus.

We also need to take climate action to prevent the next pandemic. For example,

preventing deforestation a root cause of climate change can help stem biodiversity loss as well as slow animal migrations that can increase risk of infectious disease spread. The recent Ebola epidemic in West Africa probably occurred in part because bats, which carried the disease, had been forced to move into new habitats because the forests they used to live in had been cut down to grow palm oil trees. Communicate clearly to the public that the Covid-19 pandemic does not change the imperative to evacuate, given the substantial risks of remaining in place during extreme climate-driven hazards. Use existing community pandemic-communication channels to disseminate critical information. We can make many smart investments to avert another outbreak.

Increase the number of available shelter sites, with lower occupancy per site, more separated spaces within sites, and more space per shelter resident with standard shelter-registration information for all persons entering, to facilitate contact tracing in case Covid-19 is diagnosed in persons who used the shelter. We need to do everything we can right now to slow the spread of this disease, and that means we need to follow the advice that public health experts are telling us regarding on social distancing and good hand hygiene. Provide electricity subsidies and extend moratoriums to prevent electricity and water shutoffs for people with pandemic-related unemployment and economic hardships to allow them to remain in their homes. We can make our workforce healthier and more climate-resilient through scaling-up our investments in low-carbon technologies in a bid to boost our economy. Ensure effective alternatives to minimize heat exposure if designated cooling centers or popular indoor, air conditioned venues are closed.

A sustainable Endeavour towards disaster resilient society, experienced and well-trained administration are necessary to stay prepared against any impending disaster which may strike at any time and destroy the lives of people, environment and economy. Looking at the above aforesaid illustration, undoubtedly new policy and practices are very much needed for disaster resilient society. Animal meat and more sustainable animal husbandry could decrease emerging infectious disease risk and lower greenhouse gas emissions. The developing nations, like India need to be more concerned on the disaster mitigation to save both its people and economy, but India being second populous nation in globe it lacks behind as per reckonings.

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