International Journal on Emerging Technologies **8**(1): 139-142(2017)

ISSN No. (Print) : 0975-8364
ISSN No. (Online) : 2249-3255

Climate Change: Impacts and Adaptability

Ar. Prajakta Rahate
Department of Architecture and Planning,
School of Planning and Architecture, Bhopal, (Madhya Pradesh), INDIA

(Corresponding author: Ar. Prajakta Rahate)
(Received 27 December, 2016 accepted 16 January, 2017)
(Published by Research Trend, Website: www.researchtrend.net*)*

ABSTRACT: The implicit and majestic views in our near surroundings are a result of the tremendous human activities which took place after the industrial revolution. The dynamic changes in infrastructure, over exploitation of resources, alteration in natural habitats and settlements and dominantly pollution have adversely affected the environment, causing unhealthy climatic behavior consisting of climatic changes, such as unusual seasonal changes, implicit weather defaults; ill health effects such as outbreak of certain diseases, irritations of skin, increase in mortality rates due to extreme heat waves. The impacts doesn't stop sparing the biodiversity in forms such as melting of glaciers, rise in water sea levels, conversion of agricultural land into built up, decrease in the number of water bodies, endangering and extinction of flora-fauna. Thus, an immediate plan for adaptation for resilience is required for mitigation and in the long run; removal of all improper.

Keywords: climate, sustainable, impacts, adaptation, mitigation, nature.

I. INTRODUCTION

With the upcoming versatility and modernization, our surrounding society is evolving dynamically. The urban fabric and structure which consisted of traditional building materials of stone, bricks and cement has over the time advanced into skeleton frames and framework of glass and steel. These though provide a magnificent view, prove equally harmful to the environment. With studies suggesting an increase in temperature of rural areas worldwide, the phenomenon's of urban heat islands, global warming are 'no new' terms to be felt surprised for.

Half of the world's total population lives in urban areas, contributing around three fourths of the global economy. In early days, people commuted from home to work places which were situated on the outskirts of the cities-maintaining a healthy green surroundings in the neighborhood, but today the entire group of crowds have shifted to cities due to better provisions of resource efficiency through integration of water, energy, transport and waste management systems; and thus losing all the benefits of green blue infrastructure. Earlier where people preferred pedestrian pathways to travel longer distances enjoying the weather; the scenario today is entirely opposite where every individual affords his own vehicle to travel even shorter distances. These types of changes in the neighborhood are responsible for disturbing the micro climate of the surroundings by increasing the pollution levels and further degrading the available healthy environment, at a larger scale. The rapid increase in population and their demands and the haphazard growth of building densities have impacted by exerting load on the existing supply and further manipulating the micro climate of the area. The tremendous build-up of greenhouse gases constantly present in the atmosphere has led to an enhancement of the effect. The impacts and effects of such climate change vary from place to place and thus the adaptation and mitigation measures vary accordingly. A sudden unaccounted trail of storms or a tsunami would require immediate action plan for adaptation and rehabilitation, instead of those followed during a flood situation.

Unlike weather which is a short term phenomenon, which is difficult to predict as it can change rapidly; climate phenomenon is the seasonal average of decadal years and remains for a longer period of time. Climate is affected by Biotic factors (transpiration, respiration, photosynthesis, decomposition, digestion) and Abiotic factors (Latitude, altitude, ocean currents, topography, solar radiation, evaporation, orbital variations, volcanic activity). Adaptability may be defined as the adaptive behavior of a system to adjust itself in the changes occurring, positively or negatively.

For example, to defend itself against the heavy heat waves, a building is brought under air conditioning which is a positive adaptive change, but negatively impacts the environment by producing anthropogenic heat, further resulting to global warming. Implementing natural adaptive measures such as green roofs, geothermal techniques, increase of vegetative cover are some methods that help increasing healthy efficiency of the ecosystem.

II. IMPACTS

Impacts are described as the immediate reflexes after any situation and thus can be positive or negative. The impact of a natural or manmade disaster often leads to deep negative impacts in the surrounding. The prolonged effects of these impacts are visible on ecosystems, economies and communities; in the physical, social and to a certain extent the economic factors of the country. The key sectors on which the impacts of climate change are seen are: Disaster risk reductions, Education, Energy, Fisheries, Food and Agriculture, Forestry, Health, Infrastructure, Nature & Ecosystem Conservation, Spatial Planning, Tourism, Transport, Waste and Water (*UNFCCC 2001*). The major impacts can be described as below:

Table 1: Major Sectors and impacts of climate change.

Sectors affected by Climate Change	Impacts
Temperature extremes & Changing Rainfall Patterns	• Ill Health effects- Heat strokes and heat related mortality • Sudden and unpredictable floods and cyclones; acid rains & droughts • Urban Heat Island Effect
Rising Sea Level	• Land inundation; flooding and water logging • Deterioration of quality of water & increase of diseases • Disruption to mobility
Heavy precipitation events	• Land inundation and degradation of agricultural/ good quality soil • Deterioration of quality of surface and groundwater • Damage to settlement and infrastructure • Water borne and food borne diseases
Melting of Glaciers	• Disturbance to transport; traffic jams due to ice • Impact on tourism
Agriculture & Food Security	• Seasonal water scarcity • Deterioration of yield and stored grains
Energy security	• Fluctuation in hydropower and thermal power generation -both of which depend on adequate water supplies to function effectively
Migration and Conflict	• People tend to travel to resource-full area from a resource-deficit area at times of disasters, employment, etc

Vulnerability is a function of character, magnitude and rate of climate variation to which a system is exposed, its sensitivity and its adaptive capacity. The degree to which a system is susceptible to and unable to cope with adverse effects of climate change, including climate variability and extremes may be defined as Vulnerability to climate change.

Measures to mitigate the impact of climate change

-Crop diversification, more efficient use of water and improved soil management practices together with the development of drought-resistant crops can reduce some of the negative impacts.

-Building codes will need to be strictly enforced and urban planning will need to prepare for climate-related disasters Coastal embankments will need to be built where necessary and Coastal Regulation Zone codes enforced strictly.

-With built-up urban areas rapidly becoming "heat-islands", urban planners will need to adopt measures to counteract this effect.

-Improvements in hydro-meteorological systems for weather forecasting and the installation of flood warning systems can help people move out of harm's way before a weather-related disaster strikes. Building codes will need to be enforced to ensure that homes and infrastructure are not at risk

-Investments in R&D for the development of drought-resistant crops can help reduce some of the negative impacts. Projects will need to be planed taking into account climatic risks.

-The efficient use of ground water resources will need to be incentivized. Major investments in water storage capacity would be needed to benefit from increased river flows in spring and compensate for lower flows later on.

-Improvements in irrigation systems, water harvesting techniques, and more efficient agricultural water management can offset some of these risks. Regional cooperation on water issues will be needed.

-Health systems will need to be strengthened in identified hotspots. Improvements in hydro-meteorological systems for weather forecasting and the installation of flood warning systems can help people move out of harm's way before a weather-related disaster strikes.
-Reducing impacts of Urban Heat Islands- Increasing tree and vegetative cover; Creating green roofs (also called "rooftop gardens" or "eco-roofs"); Using cool or green pavements; Installing cool or reflective roofs; using geo-thermal techniques.

III. ADAPTATION

'Adaptation to climate change refers to adjustments in human and natural systems in response to actual or expected climatic variation, with a view to moderating harm or exploiting beneficial opportunities' (IPCC 2001). The capacity of a human or society to hold or sustain the impact or disaster with the available resources efficiently is termed as adaptive capacity. Adaptability is necessary as it seeks to reduce the vulnerability of social and biological ecosystems to relatively sudden change and thus offset the effects of global warming. Adaptation action plans are important for developing countries rather than developed since those countries are predicted to bear the brunt of the effects of global warming. Adaptation can help mitigate the adverse impacts of climate change, in various conditions and extreme temperature conditions.
There are two types of adaptation action processes as:
(i) Anticipatory adaptation- taking action in preparation of climate change
(ii) Reactive adaptation- taking action when climate change effects are experienced.

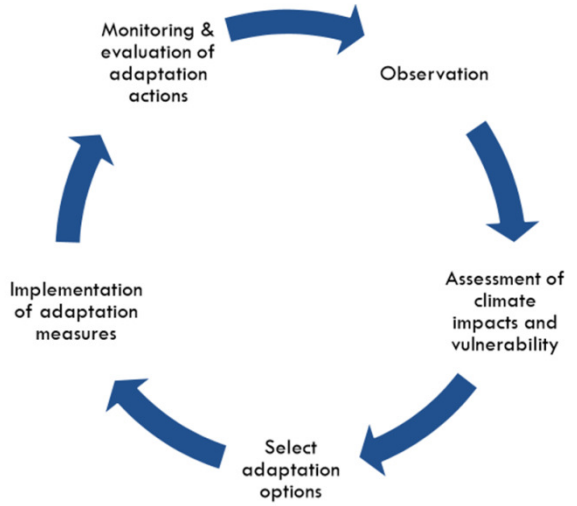

Fig. 1. Key Elements of an Adaptation Process (UNFCCC 2011) Source: UNFCCC 2011.

An effective adaptation plan requires the following data: Climate Data (decadal data and projected forecasts, etc.), Socio-economic data (population dynamics, urbanization trends, etc.), Planning Information (National development plans, Municipal development plans, etc.) and Other Environmental data (forest cover, biodiversity, etc.). As per Scheraga and Grambsch, the 9 fundamental principles identified, to be considered when designing adaptation policies are:

1) The effects of climate change vary by region.
2) The effects of climate change may vary across demographic groups.
3) Climate change poses both risks and opportunities.
4) The effects of climate change must be considered in the context of multiple stressors and factors, which may be as important to the design of adaptive responses as the sensitivity of the change.
5) Adaptation comes at a cost.
6) Adaptive responses vary in effectiveness, as demonstrated by current efforts to cope with climate variability.
7) The systemic nature of climate impacts complicates the development of adaptation policy.
8) Maladaptation can result in negative effects that are as serious as the climate-induced effects that are being avoided.
9) Many opportunities for adaptation make sense whether or not the effects of climate change are realized.

Adaptation to the adverse effects of climate change is vital in order to respond to the impacts of climate change that are already happening, while at the same time, preparing for the future impacts. The following are certain International Initiatives to Support Climate Change Adaptation undertaken along with the UNFCCC support:
(i) Activities of the Adaptation Committee and Least Developed Countries (LDCs) Expert Group
(ii) Approaches to address the loss and damage associated with climate change in developing the countries, that are specially prone and vulnerable to the effects of climate change
(iii) Implementing adaptation action through National Adaptation Programmes of Action (NAPAs) and National Adaptation Plans (NAPs)- country driven processes
(iv) The Cancun Adaptation Framework (CAF), including the five clusters- implementation, support, institutions, principles and stakeholders engagement
(vi) The 'Nairobi Work Programme' – on impacts, vulnerability and adaptation to climate change-through a variety of knowledge products and publications
(vii) The technical examination process on adaptation for the period 2016-2020
(viii) The development and transfer of technologies, research and systematic observations

(ix) Supporting adaptation through finance, technology and capacity building programmes.

A successful adaptation plan is not only location specific or condition specific or neither does it only depend on the governmental authorities, but also on the active and sustained engagement of relevant stakeholders including national, regional, multilateral and international organizations, along with the participation of public and private sectors and the civic society. The prevailing climatic conditions, the availability of natural resources and the capacity of the site surrounding to withstand the changes and show initiation to develop and recover, within worthy time limits are the other major factors playing an important role in the adaptation plan processes.

IV. CONCLUSIONS

Climate change is that meteorological phenomenon which results in increasing the temperatures, uncertainties in rainfall and sea level rise. Industrialization and urbanization develop the country positively but in that process, harm the environment by increasing the levels of global warming, increasing the urban heat island formation; and further amplifying the climate variability impacts by stressing the inadequate infrastructural services, further weakening the capacity of the environment to hold and sustain the society and its demands.

To avoid all these, a thorough analysis of the effects and impacts should be done essentially in all sectors and further a timely appropriate adaptation and mitigation plan should be implemented to reduce the heavy effects of climate change.

REFERENCES

[1]. C.H.D. Magadza. (2000). Climate Change Impacts and Human Settlements in Africa: Prospects for Adaptation, *Environmental Monitoring and Assessment*, Volume **61**, Issue 1, pp 193–205.

[2]. Road to Resilience- a guide to leading a resilient life (2015). TARU. The Rockefeller Foundation.

[3]. Satapathy, S. *et. al*. (2011). Adaptation to Climate Change with a Focus on Rural Areas and India. Deutsche Gesellschaft für Internationale.

[4]. Zusammenarbeit (GIZ) GmbH, India Publication.

[5]. T. P. Hughes, *et al.* (2003). Climate Change, Human Impacts and the Resilience of Coral Reefs. *Science 301.*

[6]. Vatsa, K.S. (2004). Risk, vulnerability, and asset-based approach to disaster risk management. *International Journal of Sociology and Social Policy.* Vol. **4**, No. 10-11, pp. 1-48.