

# Chapter 18

## Adaptation to Climate Change for Sustainable Development: A Survey

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### ABSTRACT

*Climate change is an important global issue. For sustainable development human society must adopt the climate change and reduce vulnerability. This chapter provides an overview on the climate change and its effects, in response how human societies adopt it across the globe. Chapter reviews major papers on adaptation to climate change. Based on major important articles this chapter provides clarity of the concept of adaptation, types of adaptation, measurement of adaptation and determinants of adaptive capacity. It also highlights on sustainable development and shows possible future directions of adaptation and limitations.*

### 1. INTRODUCTION

Climate change is the most severe problem that we are facing today. Climate change is one of the greatest threats to the human civilization and the toughest challenge for the economic development in the 21<sup>st</sup> century. Accumulation of fossil fuel consumption in developed countries during industrialization is the main cause of climate change in the world. They have contributed a lot to change the climate. Less Developed Countries (LDCs) have contributed negligible or little to cause climate change, yet face its harshest impacts and have the weakest capacity to adapt to these impacts. This chapter reviews adaptation and sus-

tainability issues under climate change conditions. In this context, even there is lot of limitations or obstacles for development; adaptation to climate change minimizes risks and also provides certain opportunity to grow with sustainable development. There are more than thousand research articles on climate change, adaptation, and sustainable development but I shall cover few important papers and try to provide a clear concept on it.

This paper is organized as follows. Section 1 highlights climate change and its impacts. Section 2 clearly defines the concept of adaptation, nature of adaptation, measurements, cost, etc. Section 3 briefly describes adaptive capacity. Section 4 reviews sustainable development. Section 5 presents future adaptation and finally, Section 6 concludes.

DOI: 10.4018/978-1-4666-8814-8.ch018

## **2. CLIMATE CHANGE**

Climate change is real, and the causal link to increased greenhouse gas emissions that is now well established (Coondoo and Dinda 2002). Globally, the ten hottest years on record have occurred since 1991, and in the past century, temperatures have risen by about 0.6° C (See, IPCC reports for details). In the same period, global sea level has risen by about 20 cm – it is partly due to melting of mountain ice and partly due to thermal expansion of the oceans. Scientific research finds evidences that in last two centuries anthropogenic activities have increased atmospheric greenhouse gases concentration that is more than pre-industrial levels. Only increasing pressure of greenhouse gas emissions and aerosol concentrations in atmosphere could explain the rising trend in temperature in last 100 years (IPCC reports).

Recent climate change is the result of human actions and specially from the burning of fossil fuels and land use changes. Development activities increase the atmospheric concentrations of greenhouse gases (GHG) – mainly carbon dioxide, methane and nitrous oxide. The GHGs are accumulated in the upper level of atmosphere and acts like the roof of GHG that is trapping solar long-wave radiation which raises temperature. It also provokes other forms of climate disruption and accelerates the process. This depends on a complex interplay of many factors, including rates of population expansion, economic growth and patterns of consumption. The effects are not uniform. The changes differ from one location to another. There are different weather consequences, while some regions have intense rainfall, others have more prolonged dry period and few areas have both.

### **2.1. Treats of Climate Change**

As a consequence of continued global warming, millions and millions of people around the

World are facing risk of flooding, droughts and debilitating diseases like Malaria, Dengue, Swine Flu, Chickengunia, Encephalitis, etc. Poor people in under developed nations are likely to be most vulnerable in health and their livelihoods. The social consequences also vary and it depends on level of development. There are different social impacts within the same society – heat stress affects older people more than young. Across the world and in every country those most at risk are typically the poor, and in developing countries those who depends most for their survival on a healthy natural environment, such as ethnic tribes, fishing communities, and livestock herders. There is still good chance of mitigating the bad effects of climate change through stabilizing atmospheric carbon dioxide concentration relatively at lower level which can be achievable target.

Taking action to tackle the climate change may provide better standard of living and may also create economic opportunity in terms of job creation or employment opportunity. We need to investigate all means of reducing atmospheric carbon dioxide concentration like sequestration, fusion, fuel cells, renewable energy, etc. Climate change is causing the earth's surface temperature to rise and increasing the prospect of extreme weather events. To some extent this affects everybody, but it is difficult to predict climatic event at a specific location and at particular point of time. It is certain that people living in fragile and difficult ecosystems become more vulnerable with risks to their health, their livelihoods. It is possible to adjust to most of these changes and to protect those most at risk.

### **2.2. Action for Adaptation**

Already the World has considerable experience of many types of adaptation and knowledge that can fruitfully be shaped both within and between countries. The important lesson is that many measures are essentially social and political – people

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