

# Chapter 10

## Soil Carbon Sequestration: An Alternative Option for Climate Change Mitigation

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### ABSTRACT

*The gaseous composition of our earth's atmosphere has changed drastically in recent years. This has resulted in unprecedented global warming, hydrological variation, and various climate change impacts in different places of the world. Mitigation and adaptive strategies of climate change through soil carbon sequestration technique is emerged as an alternative option. Among the different types of soil, forest soil has the highest potential to sequester atmospheric carbon because of its rich ecology. However, human-induced deforestation activities and traditional methods of cultivation perturb the soil of organic carbon. Therefore, it is essential to understand the various influencing factors and subsequently the improvement of existing ecosystem for the mitigation of global climate change to some extent. Studies and innovative research on agroforestry, including soil carbon sequestration at regional level, will be a better choice for improvement of environment, food security, and climate change.*

### INTRODUCTION

The Intergovernmental Panel on Climate Change (IPCC) stated that warming of the climate system is now 'unequivocal', based on scientific evidences of warming in global average temperatures, frequent and severity of extreme events, and melting of snow and rising sea levels (IPCC, 2007)

Increase in the concentration of Greenhouse gases is one of the main factor for inducing the climate change. Re-radiation of earth's energy by the greenhouse gases (GHGs) towards the earth's surface known as greenhouse effect causes the heating up of the earth's surface which led to the change in the hydrological cycle and subsequently the climate change. It is considered that the rapid urbanization along

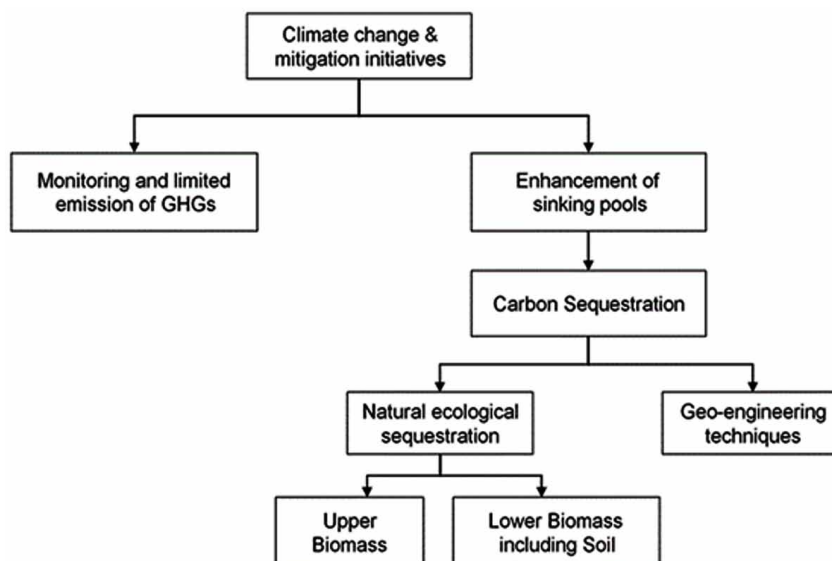
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with population growth during the past several decades have greatly enhanced the GHGs concentration in atmosphere. Among the GHGs, it is known that carbon dioxide is the major contributor to global warming. Other green-house gases such as  $\text{CH}_4$ ,  $\text{CO}$ ,  $\text{N}_2\text{O}$  etc. also have important role in global warming either directly or indirectly even though the percentage contribution has been minimal as compare to former. In order to cope and frame policies on the growing crisis of climate change, a committee known as the Intergovernmental Panel on Climate Change (IPCC) was established in 1988 with the sole aim to provide the world a clear scientific view on the current state of knowledge on climate change and its potential environmental and socio-economic impacts.

### Climate Change Mitigation and Adaptation Options

IPCC and other research agencies working on climate changes suggested a lay layout for the mitigation of climate change related issues. *First one is the detection and reduction of greenhouse gas sources both at global and local level. Second is the identification and improvement of sinking pools.* In order to meet the National GHGs emission baseline, monitoring, identification and establishment of ambient GHGs in urban areas are highly essential (Figure 1). The growing GHGs concentration in the urban areas or cities popularly known as the ‘greenhouse cap’ has been a source of concern. But considering the pace at which the countries are advancing in all the sectors and the rate at which the population rate is growing, the feasibility of the GHGs emission reduction from urban sources is low both from the political and technical perspective. It was also noted that many countries have dramatically increased the emission rate at the end of the first Kyoto protocol period rather than reduce emission of the GHGs. Scientists, engineers, policy makers, and others are finding the ways to reduce the growing threat of climate change. Though, there is no single solution, yet the development of geoengineering technologies, may play an important role in addressing this issue. Wide range of geoengineering techniques have been developed and proposed as a remedy for climate change but only a few of them are scientifically proven and have

Figure 1. Climate change and mitigation initiatives



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