

INTRODUCTION

1.1 BACKGROUND

Since the early eighties of the previous century, 'sustainable development' has been in vogue as an alternative development paradigm. Sustainable development is defined as 'development that meets the needs of the present without compromising the ability of the future generations to meet their needs'. The key elements of sustainability are equitable distribution of resources, both for existing people and people not yet born, and not using more than what the ecosystem is able to provide (Brundtland, 1987). By incorporating natural resource constraints into economic activities, sustainable development can be modeled as non-decreasing consumption over time, which is stated to follow the neoclassical growth approach (Solow, 1974; Hartwick, 1977).

In the pursuit of achieving sustainable development, environmental sustainability occupies the centre stage. In that, ensuring forest sustainability becomes a critical dimension, which poses a serious challenge to the world at large. Forests serve multiple ecological, socioeconomic, and cultural roles in many countries. Home to more than half of all species living on land, forests are amongst the most diverse and widespread ecosystems of the world. They provide several significant resources and functions including wood products, recreational opportunities, habitat for wildlife, water and soil conservation, and a filter for pollutants. They also support employment, traditional uses and biodiversity. They help regulate local and regional rainfall. As globally important storehouses of carbon, forests play a critical role in influencing the earth's climate. Forest plants and soils drive the global carbon cycle by sequestering carbon

dioxide through photosynthesis and releasing it through respiration ([http://esl.jrc.it/envind/un_meths UN_ME.htm](http://esl.jrc.it/envind/un_meths_UN_ME.htm)).

There is, however, a serious concern over human impact on forest health, and the natural processes of forest growth and regeneration. The history of the advancement of human civilization is often described as the history of deforestation (Hunter, 1994). According to the World Resources Institute (1997), the world has lost about half of its forest cover and just one-fifth of the original forest remains unexploited. Although net deforestation rates are found to have fallen since the post 1990s, about 13 million hectares of the world's forests are still lost each year including 6 million hectares of primary forests (FAO, 2005). The regions with the highest tropical deforestation rates during 2000-2005 were Central America, which lost about 1.3 percent of its forests each year, followed by tropical Asia including India, Bangladesh, Bhutan, Indonesia, Malaysia, Maldives, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam, losing about 1 percent of forests annually. The process of deforestation results in annual degradation of nearly 12 million hectares of fertile land and loss of thousands of species, estimates ranging from 8,000 to 28,000 per annum. Deforestation and forest degradation directly threaten as many as 400 million people including 50 million indigenous people who depend on forests for subsistence (Hermosilla, 2000). Deforestation is just next to fossil fuels as contributor to global emission (Figure 1.1).

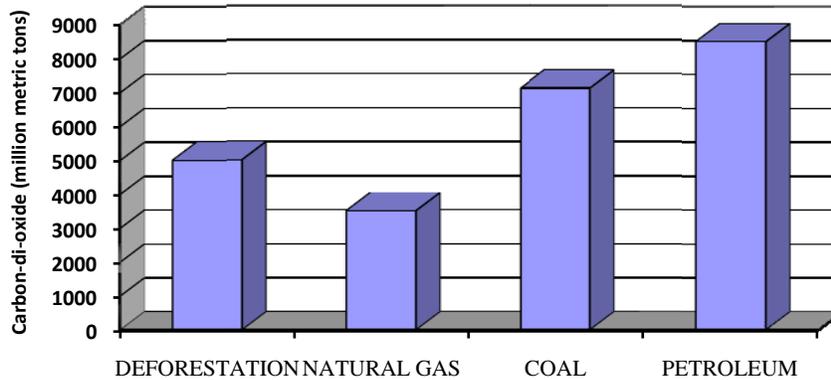


Figure 1.1: Comparison of the Mean Annual Global Emissions from Deforestation and Fossil Fuels, 2000.

Source: IPCC, US Department of Energy (2005)

It is disquieting to note that world resources including the forest resources are fast depleting, thanks to rapidly increasing world consumption. Forest degradation, be at the global, national or local level, is believed to be primarily due to human intervention in natural systems. The current patterns of economic development and social organization are creating a burden on the earth's resources which may be unsustainable in the long run. To be specific, in many parts of the world, forests are being rapidly cleared for agriculture or pasture, destructively logged and mined, and degraded by fires. When forests are degraded or cleared, their stored carbon is released back to the atmosphere during harvest and through respiration (<http://ucsusa.org>).

1.2 FORESTRY IN INDIA

In India, forestry remains one of the most critical environmental issues and is linked with the country's ecological and economic security. Forests constitute primary and renewable natural resource base of the country, contributing considerably to its economy, socio-economic

developments as well as rural life support system. The state of India's forests is important in many ways, whether it be a source of fuel and fodder for rural people, industrial inputs for a growing economy, habitat for thousands of plant and animal species, sink for carbon dioxide emissions, or a protective cover for its soils. However, the pressure on India's forests is very high, with more than 200 million people being dependent on forests for livelihood (FSI, 2009). There is an increasing pressure of conversion of pastoral and agricultural land along with demand of forest goods and services including timber (Kant, 2004; Gardner et al., 2009). The rapid growth of the Indian economy puts additional demands on forests for infrastructure and industrial development. There is increasing demand for diverting forest lands for projects like dams, roads, power stations, townships etc.

About one-fifth of India's geographical area falls under the forest cover (FSI, 2009). The country has experienced a significant problem of deforestation and the conversion of land to environmentally degrading and unsustainable uses. In India, several thousand animal species are considered threatened, including over 500 mammals, 700 fishes, and 1000 bird species. While India remains one of the world's 17 mega-diverse countries in terms of the number of species it houses, 10 percent of its wild flora and fauna are on the threatened list (WII, 2003) About 45 percent of India's land is degraded, due to unabated deforestation, among other things (MOEF, 2009).

The rapid population and industrial growth, as experienced in the country since the mid 20th century, has led to spiraling rise in the demand for forest resources including fuel-wood, charcoal, etc leading to unsustainable clearing of the forest land. With the given population growth, demand for fuel-wood and charcoal is expected to exceed 33 million cubic meters by 2010 (FAO, 2003). The biomass needs for India are expected to increase by two to three times

by 2020 as compared to that in late 1990s (Kadekodi and Ravindranath, 1997). There is an increasing probability of a shortage of round-wood production in India (Planning Commission, 2002).

The time series data of the last decade shows an increase in forest cover in India by about 3.13 million hectares. This, however, does not rule out the clearing of the forests in these years. Further, what is important is the quality of forests, which has been compromised with leading to forest degradation over the years. The forest cover assessed currently is classified into three canopy density classes: very dense forest with canopy density of more than 70 percent; moderately dense forest with canopy density between 40 percent-70 percent and open forest with canopy density between 10 percent-40 percent. In some cases, the size of the dense forest has registered a decline, which may have resulted in the increase in the open forest, implying thereby that there is perhaps degradation of forests in the country rather than any net addition to the forest cover. Moreover, in recent years, there have been significant changes in the resolution and quality of satellite data, methodology of interpretation, scale of mapping and classification scheme, which may have indicated an improved scenario (FSI, 2009).

What is striking is the prevalence of significant inter-state variations in the forest cover itself as well as in its change. There are states where more than 3/4th of the land is under forest cover, while in some others, its presence is very insignificant. In percentage terms, the north-eastern states are densely forested and there are also evidences of forest cover increase in these states. However, in absolute term, Madhya Pradesh has the highest forest cover followed by Arunachal Pradesh, Chhattisgarh, Maharashtra and Orissa (FSI, 2009). Forests in these states are faced with or prone to increased vulnerabilities. Keeping aside Arunachal Pradesh, which is a

small north-eastern state, all other states experience high population density, large scale industrialization and high poverty, among others.

1.3 FORESTRY IN ORISSA

Orissa remains one such critical state of the country where more than a third of the land area falls under forest cover. However, not all is well with the state's forests. Orissa experienced decline in forest cover throughout the 1990s. In the later period till 2007, the state experienced some increase in forest area with fluctuations, whatsoever. The increase in forest cover in recent years, however, does not rule out deforestation. The increase may be attributed *inter alia* to fresh afforestation and inclusion of established large block plantations (FSI, 1999). Moreover, the quality of the forest measured in terms of its canopy cover has seen degradation. Needless to say, the increase, whatsoever, is not sufficient to enable the state to reach a desired level.

1.4 STATEMENT OF THE PROBLEM

It is well recognized that attainment of forest sustainability remains one of the critical challenges. There is thus, a growing demand for devising mechanisms for sustainable forest management. However, it may be important to understand that the dynamics of forest cover changes both spatially and temporally. The indicators of sustainability may vary from one country or region to the other as well as over time. The factors determining sustainability including the forest cover change are also expected to be different in different regions or countries and even over time. Moreover, cross-country or country-specific studies are stated to have their own limitations in addressing the issues at the level of the regional economies. In order to understand the forest dynamics better, it is necessary that region-specific studies are carried out.

Given the above backdrop, the present study attempts to examine the dynamics of forest cover in Orissa. This region-specific study for a state like Orissa carries significance from several counts. Orissa remains one of the poorest states of the country where about 46% of the people live below poverty line (GOI, 2004). Besides, it has predominantly a rural economy, which is highly backward with very high tribal population. The health of the forest, thus, carries enormous significance to the state and especially to the tribal people, whose major sources of livelihood are drawn from the forest and agriculture. Loss of forests bears an immediate and serious threat to their survival. Besides, the state is poised for industrialization and rapid economic growth, which are expected to affect the state of the forest in a big way. Another disturbing feature is that the loss or gain of forest is not uniform across the state.

The following research questions are thus raised:

- (1) How is forest sustainability measured and how do the constituent districts of the state fare in this front?
- (2) What is the trend of forest cover change in the state and in its constituent districts?
- (3) What are the underlying factors responsible of forest cover change in the state? The present study, while attempting to address the above questions, would find out the regional differences, if any, in the level of forest sustainability and suggest appropriate intervention options.

1.5 ORGANIZATION OF THE THESIS

Accordingly, the thesis is organized as follows. The literature pertaining to forest sustainability and the factors responsible for forest cover change is reviewed in chapter II. Chapter III outlines methodology and database. Chapter IV presents the scenario of forest cover change in Orissa

across its districts as well as their relative forest sustainability indices. Chapter V identifies the underlying factors responsible for forest cover change in Orissa and draws implications thereon. Chapter VI summarizes the findings and concludes the study.

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