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Land Transformation and Its Consequences in South Asia

V.K. Dadhwal and A. Velmurugan

1. LAND TRANSFORMATION

1.1 Introduction

Concerns about global and regional land use/cover change arose from the realization that land transformation influences climate change and reduces biotic diversity; hence the interest in deforestation, desertification, and other changes in natural vegetation. The more recent focus on issues related to ecosystem goods and services, sustainability, and vulnerability has led to a greater emphasis on the dynamic coupling between human societies and their ecosystems at a local scale.

The pace, magnitude and spatial reach of human alterations of the earth's land surface is ever changing and it is driven by the interplay of various causes and, hence, the land surface modification or conversion varies globally. These changes are complex and disjunctive process. Changes in land cover and in the way people use the land have become increasingly recognized over the last 15 years as important global environmental changes in their own right (Turner, 2002). The concept of land and land use/land cover change need to be described in clear terms so as to synthesize and compare various data sets on land use/land cover at various scales.

Land is the most important natural resource, which embodies soil, water and associated flora and fauna involving the total ecosystem. According to FAO (1999), land refers to a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface climate, the soil and terrain forms, the surface of hydrology (including shallow lakes, rivers, marshes and swamps), the near-surface sedimentary layers and associated groundwater and geo-hydrological reserve, the plant and animal populations, the human

settlements pattern and physical results of past and present human activities (terracing, water storage or drainage structure, roads, buildings, etc.).

The term “land use” (LU) is often used improperly to describe some regional to global datasets which contain a mixture of both “land use” and “land cover” information. “Land use” is in reality quite distinct from “land cover”. de Bie (2000) defines LU as “A series of operations on land, carried out by humans, with the intention to obtain products and/or benefits through using land resources”. In contrast, land cover is defined as “the observed bio-physical cover on the Earth’s surface” (FAO, 2000). According to various sources quoted in Briassoulis (2000), land cover may be described as the physical, chemical, ecological or biological categorization of the terrestrial surface, while land use refers to the human purposes that are associated with that cover.

Comprehensive information on the spatial distribution of land use/land cover categories and the pattern of their change/transformation is a prerequisite for planning, utilization and management of the land resources. Land transformation takes two forms: *conversion* from one category of land use/land cover (LU/LC) to another and *modification* of condition within a category. Conversion is the better documented and more readily monitored of the two, but too great an emphasis on it obscures important forms of land modification.

There is a functional complexity within types of land-cover change, and a structural complexity between types of land-cover change, both in terms of spatial arrangements and temporal patterns of change. The relationship between land cover and various LU occurring within a given land cover unit is complex. Therefore, land-cover change needs to be measured in its complexity in order to fully understand it. In the present discussion we describe land transformation as land use/land cover conversion and/or modification.

1.2 Scope and Importance

One of the clearest manifestations of human activity within the biosphere has been the conversion of natural landscapes to highly managed ecosystem, such as croplands, pastures, forest plantations, and urban area (Ramankutty et al., 2002). Land use and land cover change (land transformation) are significant to a range of themes and issues central to the study of global environmental change. Alterations in the earth’s surface hold major implications for the global radiation balance and energy fluxes, contribute to changes in biogeochemical cycles, alter hydrological cycles, and influence ecological balances and complexity. Through these environmental impacts at local, regional and global levels, land-use and land-cover changes driven by human activity have the potential to significantly affect food security and the sustainability of the world agricultural and forest product supply systems.

The South Asian region as a whole is experiencing expansion and intensification of crop land, shrinking forest and grass lands, rapid urban