

Risk Matrix Approach for Analysing Sustainability of Land Resources and Desertification in Arid/Semi-arid Zones

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Abstract

Sustainability is the ability or capacity of resources to continue to serve their present role in similar capacity in future. Theoretically, a sustainable activity should be able to persist forever. Sustainable land management as per discussions in the United Nations Earth Summit is, managing land resources for the production of goods to meet dynamic human needs, without compromising potential productivity and environmental balance. It mainly revolves around reducing land degradation and planning land rehabilitation.

Desertification, as per United Nations Convention to Combat Desertification, is a process of reduction in biological potential of land due to natural or anthropogenic changes. Desertification is a dynamic phenomenon; which has threatened environmental health and human development globally. Desertification is a reversible process, with possibility of reversibility being dependent on cost and time for rehabilitation. This indicates that desertification irreversibility is a function of resilience of the existing socio-ecology. Desertification hence can hinder the reusability of land resources towards agriculture and overall environmental sustainability. Irreversible desertification can be considered as unsustainable stage of land for most of the biological processes.

Current work tries to analyse land use land cover dynamics as an indicator for biological potential of land. This dynamics can be used to identify the reversibility of desertification process. Scenario based risk matrix approach is used for identifying (ir)reversibility. A case study of Aurangabad District, situated in Central India, is carried out to illustrate the proposed methodology. Reversibility analysis gives location of the (ir)reversible areas for three different scenarios, which can be used for prioritising the desertification reclamation efforts. Results of case study are in-line with the climatic pattern and distribution of agricultural land. The results indicate that a major portion of degraded land, i.e. around 45 % of district area, is reversible and can be regained for agricultural use. This area needs appropriate planning in terms of water management, soil loss management and sustainable agriculture management to avoid the land from further degradation and recover maximum land to higher biological potential. The output also reveal that, in severe most scenario the agriculture-based districts like Gangapur and Kannad are also affected with irreversible desertification and the overall percentage of irreversibly desertified land is less than 5 % of the areal extent.

Keywords: *Desertification reversibility, Sustainable land management, Land use land cover dynamics, Risk matrix*

Introduction

Sustainability is the ability or capacity of resources to continue to serve their present role in similar capacity in future. Theoretically a sustainable activity should be able to persist forever. This concept of sustainability was first published in "Our Common Future", a report by the World Commission on Environment and Development (WCED) in 1987. Sustainable development is considered as a process of maintaining equilibrium between availability of resources and needs for survival and continuous improvement in standard of living for future generations (Drexhage and Murphy, 2010)

In developing countries land resources are the most valuable resources after water (Hodgson, 2004). Land resource defines the food production potential. This makes sustainable land resources management basic need for food security. The sustainable land management as per discussions in the United Nations Earth