

Soil Degradation Assessment in Major Land Use Systems in Sikar District of Western Rajasthan

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Received: December 2013

Abstract: Study on assessment of soil degradation in major land use system namely rainfed and irrigated crop lands, grazing lands and forest lands in Sikar District of western Rajasthan was conducted to identify the kind of soil degradation, its intensity and effect on soil fertility. Extensive and intensive field survey was carried out with the help of Survey of India toposheets, IRS-1A satellite imagery (Path 31 and Row 49) False Color Composite (band 2, 3, 4) on 1:50,000 scale. Wind erosion/sand deposition is the main soil degradation process identified in all the three land use systems. On satellite images, slightly degraded soil appears as pale brown with dark magenta tone indicating crop/vegetation cover (W1); moderately degraded soils in pale brown with patches of medium magenta tone (W2) light tone indicating sand piling and severe degraded soils in light yellow with whitish tones indicating extensive occurrence of typical dune features. The wind erosion degraded nearly 82.02% rainfed crop lands, 27.83% grazing lands, 40.69% irrigated crop lands and 8.44% forest lands. Water erosion is the main soil degradation process in forest and grazing lands that degraded about 76.98% and 38.17% area, respectively. Slight soil degradation appeared in uniform dark magenta tone in rainfed crop lands with uniform light pale brown to medium grey tone, medium degradation indicated by whitish grey patches of shallow soils with few stream channels and severe degradation is represented uniformly by light brown tone, intercepted by a number of streams that appear light gray in color. Combined degradation due to wind and water erosion accounted for 16.38% of grazing and 13.86% of forest lands. Salinity and alkalinity hazards degraded 17.58% area of grazing land. Surface soil samples from degraded and non-degraded sites of rainfed crop lands, irrigated crop lands and grazing lands were analyzed for soil fertility. The results revealed that organic carbon, available phosphorus and potassium were high in non-degraded sites than the degraded sites.

Key words: Soil degradation, wind erosion, water erosion, satellite imagery.

Human needs often change the natural system from one that is stable to one that is degrading, dependent on the severity of the human interference. In Sikar District during last three decades there have been drastic changes in the land use system due to exploration of ground water for irrigation and use of tractor mounted equipments, farmers have started to cultivate marginal lands (dune slopes and shallow soil) with the use of poor quality ground water (saline/high RSC water) for irrigation. Besides this, overgrazing of pasture lands, indiscriminate cutting of trees for fodder, fuel and other requirements, brought significant deterioration in the soil resources. In India about 120.7 Mha area is reported to be suffering from various types of degradation processes. Singh *et al.* (1992) reported that 89.7% area of western Rajasthan is affected

by different type of degradation processes, viz. wind erosion, water erosion and salinization. Thus soil degradation assessment is essential for suggesting measures for conservation of resources and restoration of the productivity of deteriorated soils in different land use systems.

The Central Arid Zone Research Institute (CAZRI) has been carrying out soil degradation mapping since the year 1991. Studies on soil degradation mapping on small scale using remote sensing techniques have been reported in several literatures (Saxena *et al.*, 1991; Raina *et al.*, 1993; Raina, 1999). However, soil degradation in major land use systems is still in dearth. Therefore, present study is an effort to estimate the area degraded and its intensity in different land use system in Sikar District of western Rajasthan, with a view to help in planning for restoration of soil productivity.

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