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## LAND DEGRADATION AND SUSTAINABLE AGRICULTURE IN RAJASTHAN, INDIA

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### ABSTRACT

Land degradation refers to the reduction in the producing capacity of land due to wind and water erosion of soil, loss of soil humus, depletion of soil nutrients, secondary salinization, diminution and deterioration of vegetation cover as well as loss of biodiversity. Land and water are the two most important natural resources used in all food production systems. Even now 90 per cent of the food production comes from the soil and less than 10 per cent from inland water and oceans. The increased anthropogenic influence on natural resources is leading to their over exploitation affecting the productivity of land, upkeep of environment that survive with it and overall activity of life system. Land degradation seriously undermines the livelihood opportunities, thus leads to poverty, migration and food insecurity. Rajasthan is the largest state in the country in terms of area which is located in north-western part of the country. It has geographical area of 34.22 million hectare which constitutes 10.41 per cent area of the country. The population of state is 68.62 million which constitutes 5.67 per cent of total India's population. Rajasthan has the second position in livestock population of the country, which is 56.66 million. The land resources of Rajasthan are more peculiar on two counts. Firstly, it has a large desert area as compared to other states in the country. Secondly, the Aravali range of hills make a large part of land barren and it divides the state into two distinct regions, i.e. west of Aravali and east of Aravali. The net sown area is most important class of land use and contributes about half (17038 thousand hectare) of the total geographical area of the state. It plays a vital role in determining the agricultural prosperity in a sustainable manner. The net sown area also increased marginally over the years. Too large share or too small share of net sown area to geographical area is detrimental to sustainable agricultural development of a state/region. Unless we keep out natural resources intact, the sustainable development of the state in general and that of agricultural sector in particular would pose serious challenges in the years to come. In Rajasthan, 67% of area is affected by desertification and/or land degradation where the wind erosion (44.2%) is the maximum contributor followed by water (11.2%), vegetal degradation (6.25%) and salinization (1.07%). The problem of soil degradation is therefore, posing serious threat to the sustained agricultural production and jeopardizing food security not only for the present generation but also for the future generations. Degradation of the ecosystem particularly the land component and the consequential loss of productivity of this scarce resource would severely affect the livelihood of majority of human and livestock population. The resultant effects of the degradation are massive unemployment, migration of labour, regional and intergenerational disparities, loss of natural resource base and ecological imbalance.

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## INTRODUCTION

Land degradation refers to the reduction in the producing capacity of land due to wind and water erosion of soil, loss of soil humus, depletion of soil nutrients, secondary salinization, diminution and deterioration of vegetation cover as well as loss of biodiversity. Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic vicissitudes and human activities is also referred to as desertification. Land degradation has greatly hasten in recent times due to burgeoning population and the enhanced means of exploitation of natural resources.

Land and water are the two most important natural resources in almost all food production systems. Long ago the Greek philosopher Aristotle described "the soil as the stomach of plant". Even now 90 per cent of the food production comes from the soil and less than 10 per cent from inland water and oceans. The increased anthropogenic influence on natural resources is leading to their over exploitation affecting the productivity of land, upkeep of environment that survive with it and overall activity of life system. Land degradation seriously undermines the livelihood opportunities, thus leads to poverty, migration and food insecurity.

Rajasthan is the largest state in the country in terms of area which is located in north-western part of the country. It has geographical area of 34.22 million

hectares which constitutes 10.41 per cent area of the country. Physiographically, the state can be divided into four major regions, namely the western desert with barren hills, level rocky/sandy plains, the Aravalli hills and south-eastern plateau. The state has varied climate from semi-arid to arid. The temperature in the state ranges from zero to 50°C. The average rainfall ranges from 480 mm to 750 mm being as low as 150 mm in arid region and 1000 mm in south-eastern plateau.

The population of the state is 68.62 million (Census, 2011) which constitutes 5.67 per cent of total India's population. Rajasthan has the second position in livestock population of the country, which is 56.66 million (Livestock Census, 2007).

Thus, looking to population pressure of human beings and livestock and their activities in addition to climatic wind and water effects, an attempt was made to measure the extent of land degradation and its effect on sustainable agriculture in Rajasthan.

## LAND USE PATTERN

At present, to meet the over-growing demand for food, farmers are left only with intensive agriculture as the land available for cultivation is decreasing. The trend not only accelerates the land degradation but also narrows down the chances for increasing the food production.

The land resources of Rajasthan are peculiar on two counts. Firstly, it has a large desert cover com-

**Table 1.** Land Utilization in Rajasthan

		('000 hectares)					
S. No.	Classification	2005-06	2006-07	2007-08	2008-09	2009-10	Quinquennial Average
1.	Geographical area (for the land utilization purpose)	34266	34265	34270	34270	34224	34259 (100)
	(i) Forest	2675	2698	2727	2728	2735	2712.6 (7.92)
	(ii) Land put to non Agricultural uses	1823	1835	1847	1970	1976	1890.2 (5.52)
	(iii) Barren & un-culturable land	2439	2427	2418	2295	2292	2374.2 (6.93)
	(iv) Permanent Pastures & other grazing land	1708	1706	1703	1699	1697	1702.6 (4.97)
	(v) Land under misc. Trees crops & groves	21	20	16	18	17	18.4 (0.05)
	(vi) Culturable waste	4590	4611	4573	4336	4475	4517.0 (13.18)
	(vii) Current Fallow	1910	1939	1724	1565	2055	1838.6 (5.37)
	(viii) Other fallow land	2264	2265	2167	2108	2048	2170.4 (6.34)
	(ix) Net area sown	16836	16764	17065	17551	16974	17038.0 (49.73)
2.	Area sown more than once	4863	4770	5113	5220	4770	4947.2 (14.44)
3.	Total cropped area	21699	21534	22208	22771	21745	21991.4 (64.19)

Note: Figures in parentheses are percentage of Total Geographical Area (TGA)



pared to other states in the country. Secondly, the Aravali range of hills make a large part of land barren and it divides the state into two distinct regions. The west of Aravali is arid and semi-arid and the east of Aravali is humid and sub-humid in nature.

The present geographical area of the state is 34.25 million hectares. The broad land use patterns vary remarkably across regions and districts. The detail of land use classification from 2005-06 to 2009-10 and overall average for this period is shown in Table 1.

In order to have proper eco-system balance, one third of the geographical region is required to be under forest cover. The forest cover in the state is 7.92 per cent. Only 5.52 per cent of the geographical area is put under non-geographical purposes such as buildings, roads, rail, canal and other permanent structures. The topographical features often put large share of area under hills, mountains, rocks and so on (classified on barren & uncultivable land) which is 6.93 per cent in the state. With the proper planning, this land can be put under proper use. About 5 per cent area of the state is under permanent pastures and grazing lands which is mainly used for grazing purpose to the livestock. The negligible area is under tree crops and groves. Due to various regions like soil and water quality problems including acute desert cover or permanent water logging condition, 13.18 per cent area of Rajasthan state is under culturable waste land. The scientific reclamation of land use planning strategy is a matter of grave importance in those regions where culturable waste land is high. The fragile nature of land and other socio-economic reasons make it necessary to put part of culturable and fallow lands for a whole year. The share of current fallow lands at state level is 5.37 per cent and decreasing over the years. Similarly the other fallow lands which is cultivable lands put fallow for 2 to 5 years to improve the quality of soil is about 6.34 per cent. The net sown area which is most important class of land use out of nine classes is about 17038 thousand hectare (49.73%). In fact this part of the land plays a vital role in determining the agricultural prosperity in a sustainable manner.

The net sown area also increased marginally over the years. Too large share or too small share of net sown area to geographical area is detrimental to sustainable agricultural development of a state/region. Unless we keep our natural resources intact, the sustainable development of the state in general and that of agricultural sector in particular would pose serious challenges in the years to come. The area sown more than once is only 15 per cent which shows the

poor irrigation facility in the state. As a whole, 21991.4 thousand hectare (64.19%) is the total cropped area of the state.

#### Causes of Land Degradation for Agricultural land:

The major cause is the conversion of medium to low productive agricultural land to other uses like industries, brick kilns, road etc. The practice of intensive agriculture is also causing land degradation. The other factors responsible for land degradation are:

1. **Climate:** Higher evaporation than precipitation, drought, short duration rainfall with high intensity, high velocity winds, cyclones, storms etc.
2. **Soil factors:** Slope, coarse texture, impermeable and compact layers, seismic/volcanic eruptions etc.
3. **Management factors:** Unwise land use, improper cropping system with no conservation measures, excessive use of chemicals exploitation of ground water, indiscriminate deforestation, shifting cultivation etc.
4. **Socio-economic and policy factors:** Population pressure, poverty, slow adoption of improved technologies, declining land: man ratio, land tenure system, ineffective land policies and cultural practices etc.,

Land degradation and desertification mainly occurs due to (i) Wind erosion – Sand dunes and other sandy landforms in Thar desert are most vulnerable to wind erosion especially in the western part of the state. High human and livestock pressures along with the historical dry climates also contribute to the localized wind erosion or soil reactivation. The practice of mechanized deep ploughing and increase in the net sown area are accelerating the Aeolian processes, (ii) Water erosion – parts of Aravali hill ranges, eastern margin of Thar desert are experiencing accelerated rill and gully erosion and (iii) Water logging and salinity – excess irrigation and wrong drainage planning have caused water logging and salinity build up in canal command areas of Ganganagar and Hanumangarh districts.

The study conducted by NBSS & LUP, Udaipur shows that 11.61 m ha, representing 33.2 per cent of total geographical area in Rajasthan is affected by various soil degradation problems induced mainly by human-intervention. The most serious problem is of wind erosion, causing loss of top soil and/or terrain deformation, and has affected 6.6 m ha representing 19.4 per cent area. Water erosion has been observed in 3 m ha representing 7.1 per cent of total

**Table 2.** Degraded and Wastelands Statistics of Rajasthan

(Area in ' 000 ha)

District	Degraded and Wastelands classes						Total
	Exclusively Water Erosion (>10 tonnes /ha/yr)	Water erosion under open forest	Exclusively wind erosion	Saline and Sodic Soils	Total of Classes	Other*	
Ajmer	275	0	1	10	286	559	845
Alwar	358	102	0	18	478	356	834
Banswara	387	78	0	0	465	37	502
Baran	480	84	0	0	564	133	697
Barmer	0	0	1908	14	1922	930	2852
Bharatpur	297	3	0	1	301	205	506
Bhilwara	552	19	0	6	577	466	1043
Bikaner	1	0	2119	0	2120	626	2746
Bundi	448	91	0	0	539	15	554
Chittorgarh	466	167	0	12	645	435	1080
Churu	0	0	1346	35	1381	314	1695
Dausa	134	3	0	6	143	199	342
Dholpur	253	10	0	0	263	41	304
Dungarpur	357	0	0	2	359	19	378
Hanumangarh	0	0	320	80	400	860	1260
Jaipur	215	41	0	14	270	836	1106
Jaisalmer	0	0	2753	19	2772	1091	3863
Jalore	4	0	244	10	258	801	1059
Jhalawar	501	70	0	0	571	50	621
Jhunjhnu	0	0	149	0	149	442	591
Jodhpur	0	0	1235	6	1241	1042	2283
Karauli	353	78	0	0	431	120	551
Kota	417	9	0	0	426	119	545
Nagaur	7	0	735	31	773	995	1768
Pali	21	3	1	2	27	1202	1229
Rajsamand	275	13	0	0	288	98	386
Sawai Madhopur	263	12	0	1	276	173	449
Sikar	0	0	414	0	414	361	775
Siroi	303	105	0	1	409	102	511
Sri Ganganagar	0	1	194	77	272	529	801
Tonk	390	0	0	0	390	327	717
Udaipur	679	307	0	28	1014	317	1331
Total	7436	1196	11419	373	20424	13800	34224

\*Normal Agricultural land, water bodies, lakes &amp; habitants etc.

Source : NBSS &amp; LUP, Udaipur, (Rajasthan)

geographical area. Salinity alone and in combination with water/wind erosion and flooding has been found to affect 1.4 m ha representing 4.0 per cent area. The area not fit for agriculture including rock outcrops and Rann/ salt flat and active sand dunes accounts for 5.2 m ha representing 15.2 per cent of the total geographical area.

In Rajasthan, 67% of area is affected by desertification and/or land degradation where the wind erosion (44.2%) is the maximum contributor followed

by water (11.2%), vegetal degradation (6.25%) and salinization (1.07%) as depicted in Table 2. Total degraded lands in the state account for 20,424 thousand ha (54% of TGA). Among various districts, Jaisalmer is highly degraded with 2,772 thousand ha, followed by Bikaner (2,120 thousand ha), Barmer (1,922 thousand ha), Churu (1,381 thousand ha), Jodhpur (1,241 thousand ha) and Udaipur (1,014 thousand ha).

In the state, 11,419 thousand ha is affected by wind

erosion which is a major contributor to land degradation. Jaisalmer (2,753 thousand ha), Bikaner (2,119 thousand ha), Barmer (1,908 thousand ha), Churu (1,346 thousand ha) and Jodhpur (1,235 thousand ha) are the highly wind erosion affected districts. Water erosion is very prominent in Udaipur (986 thousand ha), Chittorgarh (633 thousand ha), Bhilwara (571 thousand ha), Baran (564 thousand ha) and Bundi (539 thousand ha) districts. Saline soils and sodic soils (263 thousand ha) are mostly found in Bhilwara, Bharatpur, Alwar, Ajmer, Tonk, Jaipur, Chittorgarh, Dungarpur, Udaipur and Sri Ganganagar.

### CONCLUSIONS

The problem of soil degradation is therefore, posing and serious threat to the sustained agricultural production and jeopardizing food security not only for the present generation but also for the future generations. Degradation of the ecosystem particularly the land component and the consequential loss of productivity of this scarce resource would severely affect the livelihood of majority of human and livestock population. The resultant effects of the degradation are massive unemployment, migration of labour, regional and intergenerational disparities,

loss of natural resource base and ecological imbalance.

### REFERENCES

- Anonymous. 2010. Status report. NBSS & LUP, Udaipur, Rajasthan.
- Govt. of Rajasthan, 2010. Rajasthan State Environment Policy. Department of Environment Govt. of Rajasthan.
- Govt. of Rajasthan, 2011. Basic Statistics Rajasthan 2011. Directorate of Economics and Statistics Rajasthan, Jaipur.
- Gajja, B.L. and Purohit, M.L. 1998. Sustainable management of land resources in arid zone of Rajasthan. *Proceeding of National Seminar on Management of Natural Resources in Rajasthan*. 298 -305.
- ICAR, 2010. Report on Degraded and Wastelands of India Status and Spatial Distribution. ICAR, New Delhi.
- Joshi, B.R., Patel, N.K. and Kumar, Sandeep, 2009. Depletion of common property resources in arid areas of Rajasthan : An economic analysis. *Rajasthan Economic Journal*. 33 (1 & 2) : 15 -27.
- Sharma, P.M., Chaturvedi, P. and Varghese, K.A. 1998. Temporal changes and spatial diversities in the use of land resource endowments in Rajasthan. *Proceeding of National Seminar on Management of Natural Resources in Rajasthan*. 15-22.

