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Assessment of Land Degradation of Malhar1 Micro watershed Using RS and GIS Techniques

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ABSTRACT
A study was carried out to at Malhar1 micro watershed which is located in Yadgir taluk of Yadgir district, Karnataka and having a total area of 737 hectares and lies between 16° 37' 44.04 N latitude and 77° 11' 50.29 E longitudes. The results indicated that whole micro watershed was affected due to the impact water as source of degradation. Water erosion and seasonal water logging were the major types of land degradation found in the study area. Sheet, rill and gully erosions were the dominant types of water erosion. At Malhar1 MWS out of 737 ha area, sheet erosion was 647 ha (87.82 %) which is a major part, rill erosion covered 60 ha (8.08% area coverage) and gully erosion was about 9 ha (1.23%). Degradation mapping unit MWgu030204 covers 9 ha (1.23%) which is to be taken on first priority. MWri030304, MWsh020304, MWsh010304 can be taken as a second priority for management of degraded lands. The other mapping units are less problematic which covers more area and can be managed successfully.
Keywords: *Remote sensing, degradation mapping units, GIS, micro watershed.*

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INTRODUCTION

Assessment of land degradation is a complex process driven by both natural and anthropogenic forces. Secondly, land degradation occurs at varied temporal and spatial scales making its quantification a great challenge. High costs of soil analysis equally hamper assessment and management of land degradation. The direct measurement is considered the most accurate approach to land degradation assessment. This approach has limitations in terms of the representativeness of the data obtained, the spatial resolution and patterns and potential to provide information on long-term rates of land degradation.

MATERIALS AND METHODS

Malhar1 micro watershed which is located in Yadgir taluk of Yadgir district, Karnataka and having a total area of 737 hectares and lies 16° 37' 44.04 N latitude and 77° 11' 50.29 E longitudes. Semi arid climate prevails on Malhar1 micro watershed and belongs to North Eastern Dry Zone of Karnataka state. Mean maximum and minimum temperatures are 33.24°C and 21.50°C, respectively. The average annual rainfall is 872.02 mm. The entire rainfall is received in about 50 rainy days. The growing period, which indicates the availability of water for plant growth, is about 150 to 180 days in a year. The cadastral map overlaid IRS data of Cartosat1 imagery (2.5m spatial resolution) merged with LISS IV imagery (5.8 m spatial resolution) obtained from KSRSAC, Bangalore has helped in the identification and delineation of boundaries between, uplands and lowlands, water bodies, forest and vegetated areas, roads, habitations and other cultural features of the area. Apart from the imageries, the Survey of India (SOI) toposheet of the area (1:50,000 scales) was used for initial traversing. Satellite image data was used for mapping the land degradation classes. The topographic map of the study area was digitized and geo referenced to a map coordinate system so as to generate spatial information and subsequent use in a GIS environment. Based on the parcel wise (Survey number wise) information collected from through visual field

observations was tabulated and incorporated into the GIS environment. Based on the interpretations as given in the table 1 degradation mapping units were drawn accordingly.

RESULT AND DISCUSSIONS

Water erosion and seasonal water logging were the major types of land degradation found in the study area. Sheet, rill and gully erosions were the dominant types of water erosion. The problem of water logging was observed in a small area. The results indicated that whole micro watershed was affected due to the impact water as source of degradation. Water erosion was the most widespread form of degradation of all land degradation types in the micro watershed through the displacement of soil material by water resulting in either loss of top soil or terrain deformation or both. The severity of the problem depended on soil type, slope, land use and land form *etc*. Most of the area in the micro watershed was covered by agricultural land use only. A part of it was covered with open scrub with slightly undulating land form. Severity of land degradation extended from slight to severe in case of sheet erosion, moderate to severe in case of rill and moderate in case of gully. Seasonal water logging was observed in the study area. The degradation types found were rill, sheet and gully erosion which are influenced by water (Fig.1). At Malhar1 MWS out of 737 ha, area under sheet erosion was 647ha (87.82%), rill erosion 60 ha (8.08%) and gully erosion covered 9 ha (1.23%). The severity of land degradation was classified as slight, moderate and severe which determines the extent of degradation. At Malhar1 MWS out of 737 ha area moderate erosion was recorded in 508 ha (68.92%), slight erosion in 106 (21.95%) and severe erosion in 46 ha (6.26%) which are depicted in Table 2 and 3. The severity of erosion depends on soil type, slope, land use *etc*. The severity of both rill and sheet erosion ranged from slight (01) to severe (03) while, gully erosion was moderate [1]. Similar classification was made in Andhra Pradesh [2] and Maharashtra [4]. The parcel wise data which was collected gives us the clear picture that severity of erosion can be identified easily and priority can be given to the particular parcel number only. The Similar results were reported in Karnataka [3].The MWS was classified into 3 different land forms such as upland, midland and lowland depending upon various morphological features (Fig. 1). The Malhar1 MWS covers upland about 377 ha (51.15%), midland about 263 ha (35.66%), and lowland covers 76 ha (10.32%) out of 737 ha (Table 4). The major land use/land cover of Malhar1 micro watershed was agriculture and open scrub (Table 5). At Malhar1 MWS out of 737 ha area agriculture covered 552 ha (74.82%) and open scrub covered 164 ha (22.30%). Similarly water-logging as one of the soil degradation processes in Hanumangarh district of western Rajasthan [5].The land degradation mapping units were identified parcel wise and the classified based on the interpretations. Malhar1 micro watershed was classified about seventeen mapping units based on type and severity of degradation, land form and land use.

Priority for land treatment

The land treatment priority was fixed based on the type and severity of land degradation. Most of the area in the micro watershed was covered by agricultural land use and partly was the open scrub with slightly undulating landform. The Severity of land degradation ranged from slight to severe in case of sheet erosion, moderate to severe in case of rills and moderate in case of gullies. Seasonal water-logging was also observed in small extent in the study area.

Based on the results obtained, priority for land treatment in the study area was suggested. The mapping units affected by gully erosion were given first priority for treatment followed by rills and sheet erosion. In Malhar1 MWS seventeen mapping units were identified based on type and severity of degradation, landform and land use. Out of which MWgu030204 covers about 9 ha (1.23%) which is to be taken on first priority (Table 6 and Fig. 2) and MWri030304, MWsh020304, MWsh010304 can be taken on second priority for management of degraded lands. However, the remaining degradation mapping units are less problematic and can be managed for soil and water conservation.

CONCLUSIONS

The knowledge of extent of degradation and severity of degradation is essential and the mapping units which were identified as problematic are taken as 1st priority for treatment and to impart soil and water conservation measures.

REFERENCES

1. Anonymous (2007). Manual on nationwide mapping of land degradation using multi temporal satellite data, soils division, earth resources group, RS and GIS applications area, department of space, NRSC, Hyderabad.
2. Nagaraju, M. S. S.; Nayak, D. C.; Verma, T. P.; Ravi Shankar, T.; Rao, B .R. M. and Venkataratnam, L. (2001). Soils and their suitability evaluation for different crops using remote sensing and GIS techniques – A case study in part of Podili Mandal, Prakasham district, Andra Pradesh. Proc. of ICORG-2000, Vol. II, 2-5 Feb.2001, Hyderabad: pp. 382-387.

3. Prabhavathi, M.; Patil, S. L. and Raizada, A. (2013). Assessment of soil fertility status for sustainable crop production in a watershed of semi arid tropics in Southern India. *Indian J. Soil Cons.,* 41(2): 151-157.
4. Prashant, R.; Indal Ramteke, T.; Ravishankar and Vinod Othale. (2012). Geo spatial technologies for identification, mapping and assessment of land degradation in Dhule district of Maharashtra. *Agropedology.,* 22(1): 1-7.
5. Raina, P., Mahesh Kumar and Singh, M. (2009). Mapping of soil degradation hazards by remote sensing in Hanumangarh district (Western Rajasthan). *J. Indian Soc. Remote Sensing.,* 37: 647-657.

TABLE 1**:** INTERPRETATION OF LAND DEGRADATION MAPPING UNITS OF MALHAR1 MICRO WATERSHED

Sl. no.	Degradation mapping unit	MWS	Influencing agent	Degradation type	Severity	Land form	Land use/land cover
1	MWgu030204	Malhar1 (M)	Water (W)	Gully (Gu)	Severe (03)	Midland (02)	Open scrub (04)
2	MWri020101	Malhar1 (M)	Water (W)	Rill (ri)	Moderate (02)	Upland (01)	Agriculture (01)
3	MWri020104	Malhar1 (M)	Water (W)	Rill (ri)	Moderate (02)	Upland (01)	Open scrub (04)
4	MWri020204	Malhar1 (M)	Water (W)	Rill (ri)	Moderate (02)	Midland (02)	Open scrub (04)
5	MWri030101	Malhar1 (M)	Water (W)	Rill (ri)	Severe (03)	Upland (01)	Agriculture (01)
6	MWri030304	Malhar1 (M)	Water (W)	Rill (ri)	Severe (03)	Lowland (03)	Open scrub (04)
7	MWsh010101	Malhar1 (M)	Water (W)	Sheet (sh)	Slight (01)	Upland (01)	Agriculture (01)
8	MWsh010201	Malhar1 (M)	Water (W)	Sheet (sh)	Slight (01)	Midland (02)	Agriculture (01)
9	MWsh010204	Malhar1 (M)	Water (W)	Sheet (sh)	Slight (01)	Midland (02)	Open scrub (04)
10	MWsh010301	Malhar1 (M)	Water (W)	Sheet (sh)	Slight (01)	Lowland (03)	Agriculture (01)
11	MWsh010304	Malhar1 (M)	Water (W)	Sheet (sh)	Slight (01)	Lowland (03)	Open scrub (04)
12	MWsh020101	Malhar1 (M)	Water (W)	Sheet (sh)	Moderate (02)	Upland (01)	Agriculture (01)
13	MWsh020104	Malhar1 (M)	Water (W)	Sheet (sh)	Moderate (02)	Upland (01)	Open scrub (04)
14	MWsh020201	Malhar1 (M)	Water (W)	Sheet (sh)	Moderate (02)	Midland (02)	Agriculture (01)
15	MWsh020301	Malhar1 (M)	Water (W)	Sheet (sh)	Moderate (02)	Lowland (03)	Agriculture (01)
16	MWsh020304	Malhar1 (M)	Water (W)	Sheet (sh)	Moderate (02)	Lowland (03)	Open scrub (04)
17	MWsh030101	Malhar1 (M)	Water (W)	Sheet (sh)	Severe (03)	Upland (01)	Agriculture (01)

TABLE 2: AREA AND PER CENT COVERAGE OF LAND DEGRADATION TYPE OF MALHAR1 MICRO WATERSHED

Sl. no.	Degradation type	Area (ha)	Area covered (%)
1	Gully	9	1.23
2	Rill	60	8.08
3	Sheet	647	87.82
4	Habitation	4	0.55
5	Railway	17	2.32
Total		**737**	**100.00**

TABLE 3: AREA AND PER CENT COVERAGE OF SEVERITY OF LAND DEGRADATION OF MALHAR1 MICRO WATERSHED

Sl. No.	Severity	Area (ha)	Area covered (%)
1	Slight	106	21.95
2	Moderate	508	68.92
3	Severe	46	6.26
4	Habitation	4	0.55
5	Railway	17	2.32
Total		**737**	**100.00**

TABLE 4: AREA AND PER CENT COVERAGE VARIOUS LAND FORMS OF MALHAR1 MICRO WATERSHED

Sl. No.	Land form	Area (ha)	Area covered (%)
1	Lowland	76	10.32
2	Midland	263	35.66
3	Upland	377	51.15
4	Habitation	4	0.55
5	Railway	17	2.32
Total		**737**	**100.00**

TABLE 5: AREA AND PER CENT COVERAGE VARIOUS LAND USE/LAND COVER OF MALHAR1 MICRO WATERSHED

Sl. No.	Land use/land cover	Area (ha)	Area covered (%)
1	Agriculture	552	74.82
2	Open scrub	164	22.30
3	Habitation	4	0.55
4	Railway	17	2.32
Total		**737**	**100.00**

TABLE 6: AREA AND PERCENT COVERAGE OF VARIOUS LAND DEGRADATION MAPPING UNITS OF MALHAR1 MICRO WATERSHED

Sl. no.	Degradation mapping unit	Area (ha)	Area covered (%)
1	MWgu030204	9	1.23
2	MWri020101	13	1.74
3	MWri020104	9	1.24
4	MWri020204	5	0.66
5	MWri030101	16	2.13
6	MWri030304	16	2.13
7	MWsh010101	18	2.39
8	MWsh010201	54	7.36
9	MWsh010204	78	10.53
10	MWsh010301	10	1.32
11	MWsh010304	03	0.34
12	MWsh020101	283	38.33
13	MWsh020104	19	2.55
14	MWsh020201	117	15.88
15	MWsh020301	37	5.05
16	MWsh020304	4	0.59
17	MWsh030101	4	0.59
18	Habitation	4	0.55
19	Railway	17	2.32
Total		**737**	**100.00**

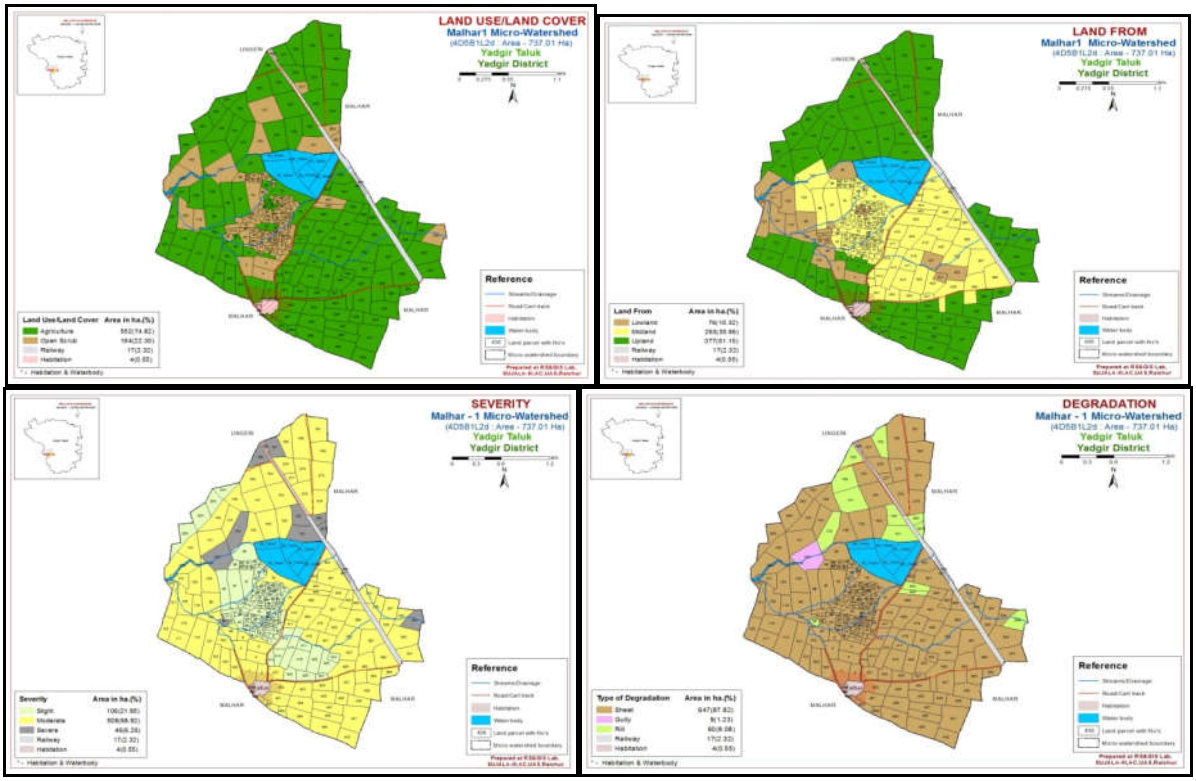

FIG. 1: FIGURE SHOWING DEGRADATION TYPE, SEVERITY, LAND FORM AND LAND USE/LAND COVER OF MALHAR1 MICRO WATERSHED

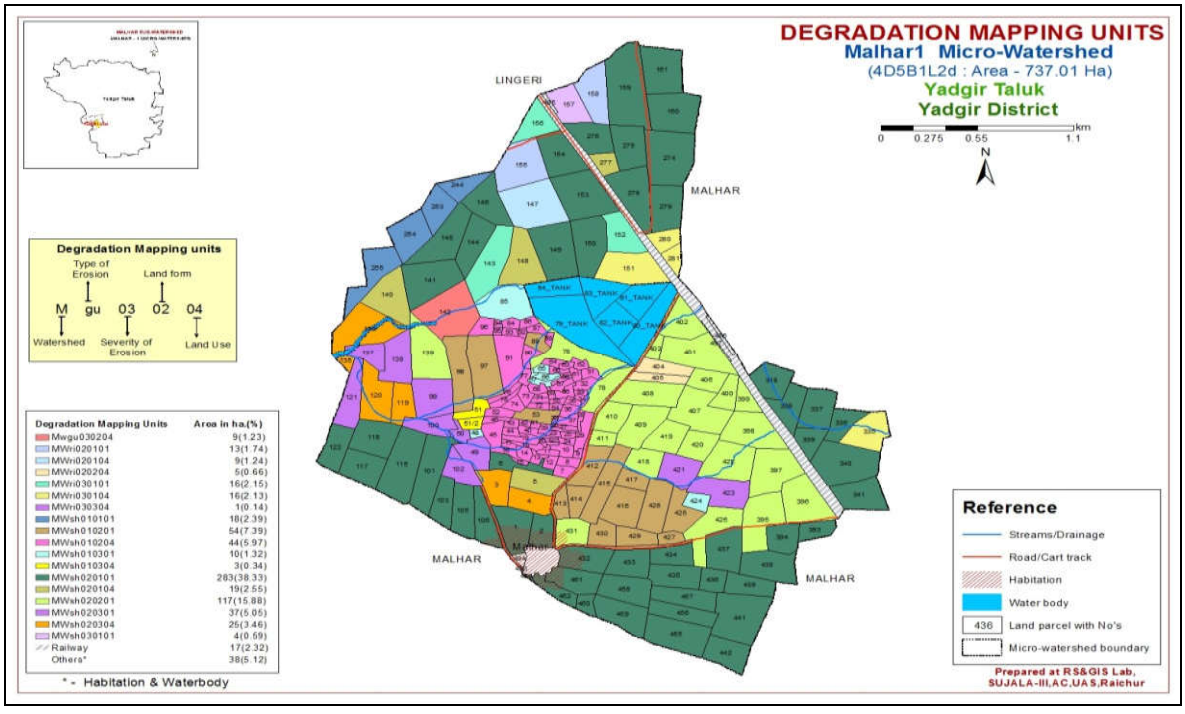

FIG. 2: FIGURE SHOWING VARIOUS DEGRADATION MAPPING UNITS OF MALHAR1 Micro-Watershed

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