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Land use land cover analysis of minor no. 2 at Mula right bank canal (MRBC) command area

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Abstract
The study was conducted on soil and water quality management strategies under special reference to GIS and Remote sensing in minor of Mula right bank canal command area, with an objective to assess the level of degradation in minor of Mula right bank canal command area during the year 2018-2020 under Department of Soil Science and Agricultural chemistry. The Land Use Land Cover map (LULC) of the study area were classified into three class *i.e.,* The agricultural land (90.76%), the built-up land (5.43%) and water bodies (3.81%). The data obtained from Remote sensing technique, especially satellite data can be effectively used in mapping as well as monitoring of temporal changes in land use land cover. Proper planning, management and monitoring of the natural resources depend on the availability of accurate land use information.

Keywords: Land use land cover (LULC), remote sensing (RS), geographic information system (GIS), global positioning system (GPS)

Introduction
Land use and land cover changes refer to quantitative changes in the aerial extent (increases or decreases) of a given type of land use and land cover, respectively (Jorge and Missing 2005) [5]. Land use and land cover is an important component in understanding the interactions of the human activities with the environment (Kotoky *et al*. 2012) [6]. Proper planning, management and monitoring of the natural resources depend on the availability of accurate land use information. Remotely sensed data especially satellite data can be effectively used in mapping as well as monitoring of temporal changes in land use and land cover (Tagore and Shah, 2013) [4]. Land cover changes may result either from land conversion (a change from one cover type to another), or land modification (alterations of structure or function without a wholesale change from one type to another) or even maintenance of land in its current condition against agents of change (Surwase 2021) [7].
Land use changes on the other hand may involve either conversion from one type of use to another (*i.e.,* changes in the mix and pattern of land use in an area), or modification of certain type of land use (*i.e.,* changes in the intensity of use or alterations of its characteristic qualities/attributes) (Pradeep *et al*. 2014) [8].
The problem of human induced secondary soil sodification has considerably increased in the last few decades largely due to irrigation mismanagement, neglect of drainage and continued irrigation with soluble salt loaded groundwater (Kharche *et al*. 2010) [9]. Fresh water scarcity, climate change impact and reduced availability and quality of widely used amendment like gypsum may further need attention to the problem in foreseeable future (Mandal *et al*. 2010) [10]. The study was conducted on soil and water quality management strategies under special reference to GIS and Remote sensing in minor of Mula right bank canal command area, with an objective to assess the level of degradation in minor of Mula right bank canal command area during the year 2018-2020 under Department of Soil Science and Agricultural chemistry.

Methodology
Study Area: The study area fig 1.1 (minor No.2 MRBC) was delineated on all sides naturally and had intensive agricultural land. The northern side of the area has Mula River, southern side encompasses the Mula right bank canal, western side Dev River, and eastern side is occupied by railway track. Availability of canal irrigation water in the study area is regular, and frequency is more with monocultural sugarcane cropping pattern.

Delineation was carried out with the help of Remote sensing (RS) and Geographic Information System (GIS). The sentinel-2 satellite data (10 m resolution) was used to prepare thematic and crop cover maps. Map are prepared at 1:20,000 m. scale as per NBSS and LUP, Nagpur, and MPKV, Rahuri recommendations.

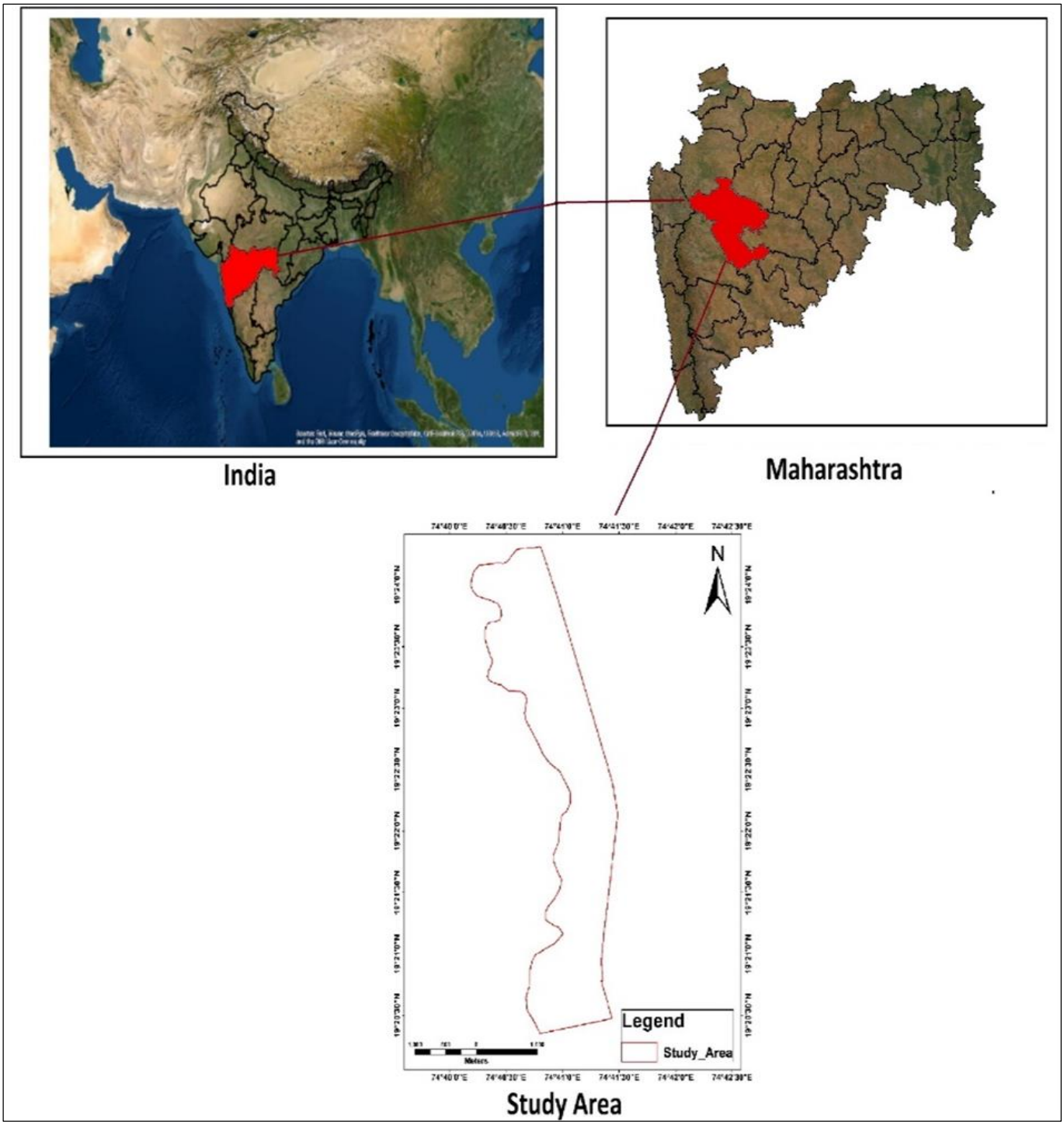

Fig 1: Location map of the study area

Development of Land Use Land Cover Map

The development of Land Use Land Cover Map was developed by using using Arc-GIS 10, Version 10.5 software. The methodology adopted for the development of Land use Land cover map is presented in following flowchart Fig. 1.2.

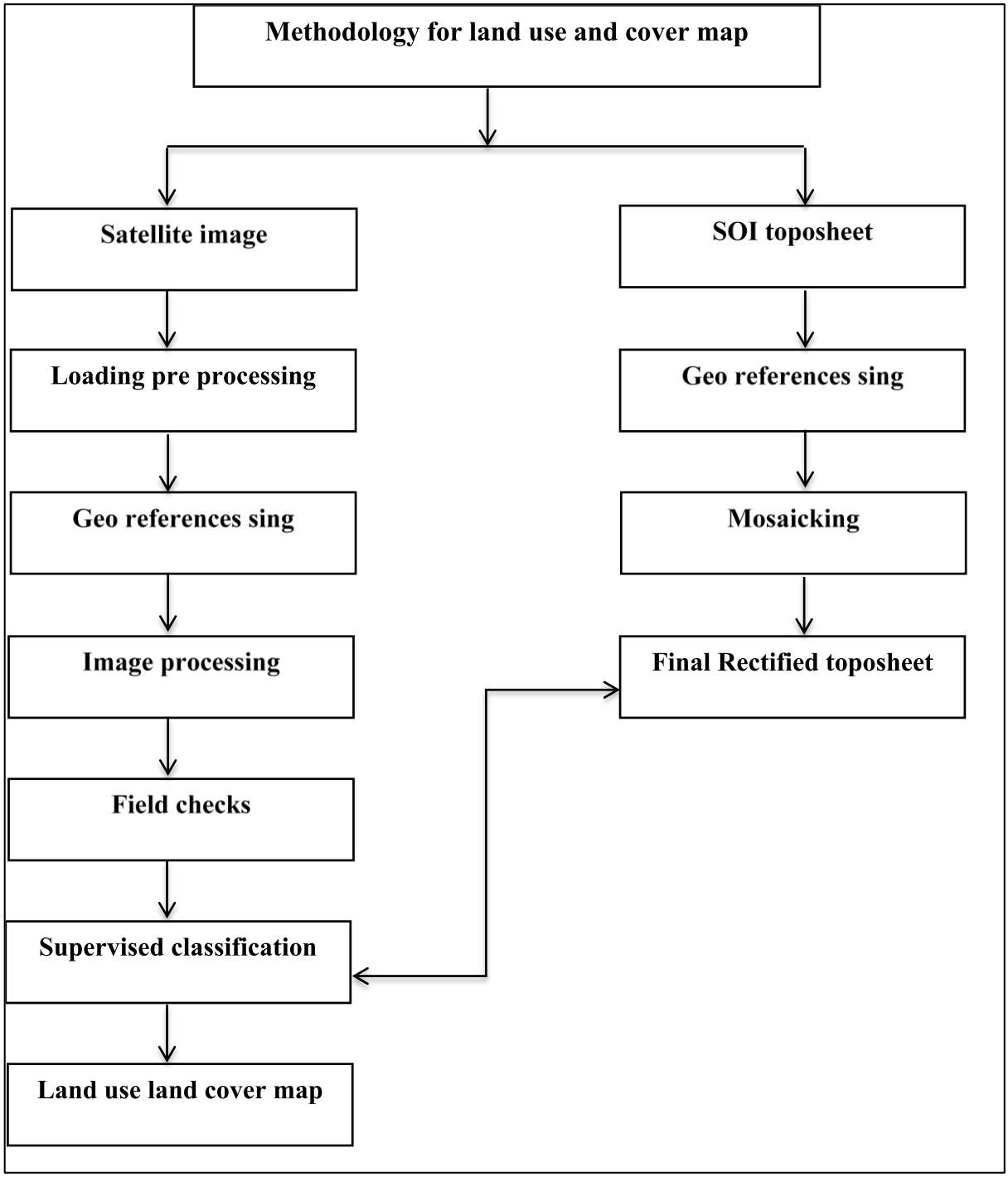

Fig 2: Flow chart of the method adopted for land use land cover map preparation

Result and Discussion

The data with respect to Land Use Land Cover map (LULC) are presented in Table 1.1 and depicted on map Fig. 1.3. The Land Use Land Cover map (LULC) of the study area was classified into three classes. In the Agricultural land class include field crops and fallow land. The build-up land class includes residential, commercial, industrial, transportation, roads and mixed urban. While, water bodies class include river, open water, lakes, ponds, and reservoirs. Among the class of Land Use Land Cover (LULC) map of only three class were reported in the study area. Agricultural land class reported 490.12 (90.76%) and build up land class 29.36 (5.43%) and water bodies class 20.52 (3.81%) were reported.

Table 1: Status of Land Use Land Cover (LULC) of Mula Right Bank Canal command area Minor No.-2

Sr. No.	Land use land cover class	Description	Area (ha)	Area (%)
1	Agricultural land	Crop field and fallow land	490.12	90.76
2	Built up land	Residential, commercial, industrial, transportation, roads and mixed urban	29.36	5.43
3	Water bodies	River, open water, lakes, ponds, and reservoirs	20.52	3.81
		Total	540	100

The class of agricultural land was highest in study area since it is situated under Mula canal command area, where availability of irrigation water is not constraint and is supplied whole the year round. The study area belongs to Agro-ecological region (AER 6) defined as Deccan plateau hot semi-arid Eco region with shallow and medium (with inclusion of deep black soil) with LGP of 90 to 150 days suitable for intensive agricultural (Mandal *et. al.*, 2010) [10] and soils of study area are medium black to deep black cotton soils having high water holding capacity, good fertility and productivity suitable for cultivation of sugarcane. The major crop growth in area is sugarcane.

Similar results on Land Use Land Cover class were reported by Kumar *et al.* (2013) [1] for Tirupati region of Chennai district Tamil Nadu, Pande *et al.* (2018) [3] for northern part of Akola district of Maharashtra and Mahadule *et al*, (2020) [2] for Rahuri tehsil of Maharashtra.

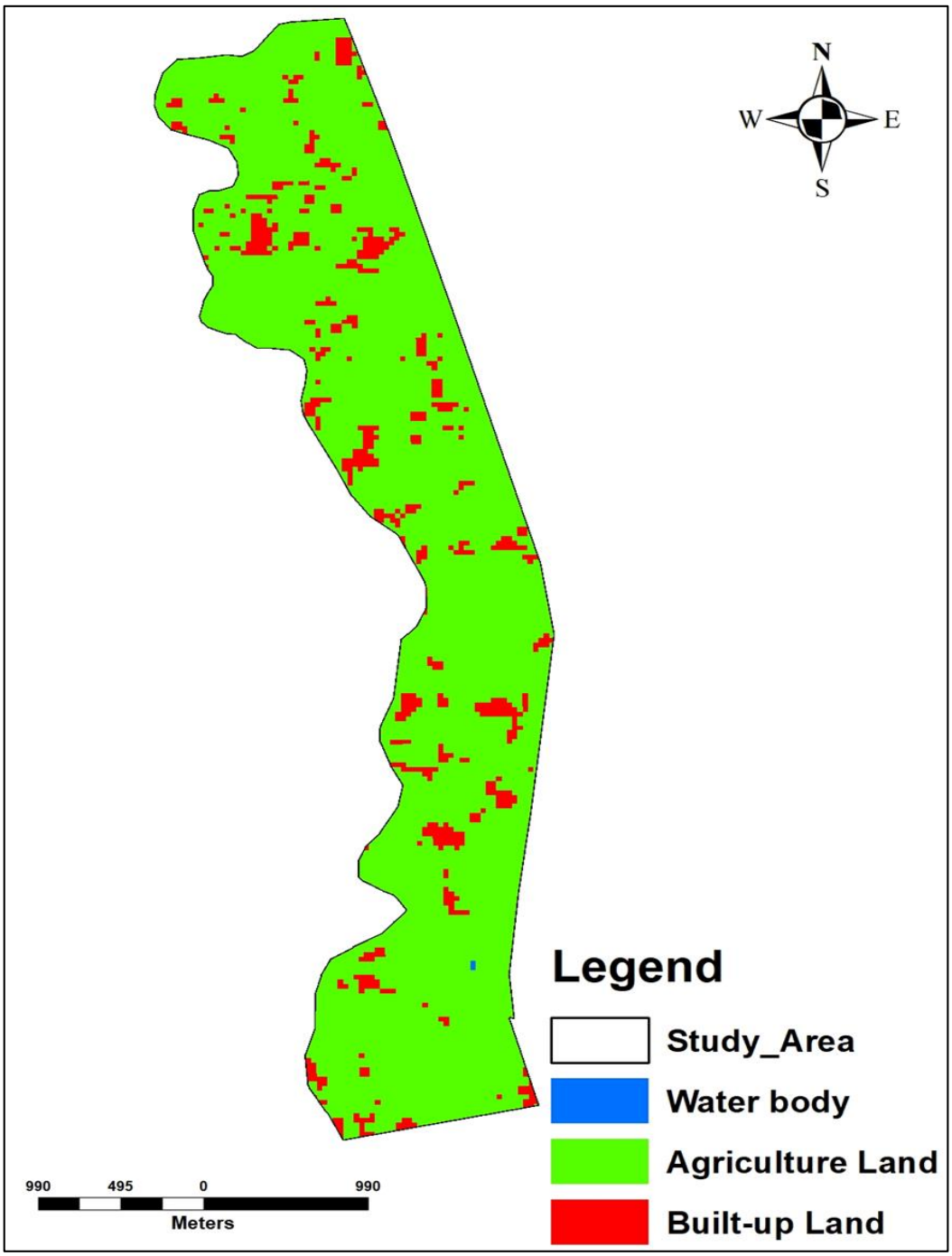

Fig 3: Land Use Land Cover Map

Conclusion

The data obtained from Remote sensing technique, especially satellite data can be effectively used in mapping as well as monitoring of temporal changes in land use land cover. Proper planning, management and monitoring of the natural resources depend on the availability of accurate land use information. Land use Land cover map prepared by using GIS-GPS and Remote sensing technologies and map shows that most (90.76%) of the land is under cultivation and mapping was carried out by scale 1:20,000 meter using the inverse distance weightage (IDW) interpolation method in Arc GIS software.

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