

Application of RS and GIS in Landuse and Landcover Mapping of Solapur City

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Abstract:

Landuse and Landcover is result of natural and manmade features covered on the Earth surface. There were some fundamental differences between Land use and land cover. Land use refers to the purpose the land serves (recreation, wildlife habitat or agriculture) which does not describe the surface cover on the ground i.e. a recreational land use could occur in a forest, scrubland, grasslands or on manicured lawns. And other hand, Land cover commonly defined as the vegetation (natural/planted) or manmade constructions which occur on the Earth surface. Landcover refers to the surface cover on the ground, whether vegetation, urban infrastructure, water, bare soil or other; it does not describe the use of land, and the use of land may be different for lands with the same cover type.

As per getting information through sentile-2 image, in Solapur city highest area covered by agricultural land which is 64.11sq.km. and lowest area covered by water bodies (1.12 sq.km.). Eastern and middle part of Solapur city covered by built up area and south, west and north area by agricultural and waste land.

Keywords: Remote Sensing, GIS, Landuse and Land Cover.

Introduction:

Land cover is the observed physical properties cover on the earth's surface. The terms LU and LC is often used interchangeably, but each term has its own unique meaning. Land cover refers to the characteristics and surface cover of Earth's Surface, as represented by natural elements like natural or planted vegetation, water, bare earth, impervious surface and other physical features of the land. Identification of land cover establishes the baseline information for activities (Thematic mapping and change detection analysis). Land use refers to the activity, economic purpose, intended use, and/or management strategy placed on the land cover types by land managers. When used together the phrase Land Use / Land Cover generally refers to the categorization or classification of human activities and natural elements on the landscape within a specific time frame based on established scientific and statistical methods of analysis of appropriate source materials. Land cover is the physical material at the surface of the earth and Land use is the description of how people utilize the land for the socio-economic activity urban and agricultural land uses are two of the most commonly recognized high level classes of use. Remote Sensing data and techniques and Geographical Information System (GIS) provide efficient methods for analysis of land use and land cover aspects and tools for Land Use and Land Cover planning and modeling.

Objectives:

The objective of present study is mapping of land use and land cover using Remote Sensing and Geographical Information System.

Study area:

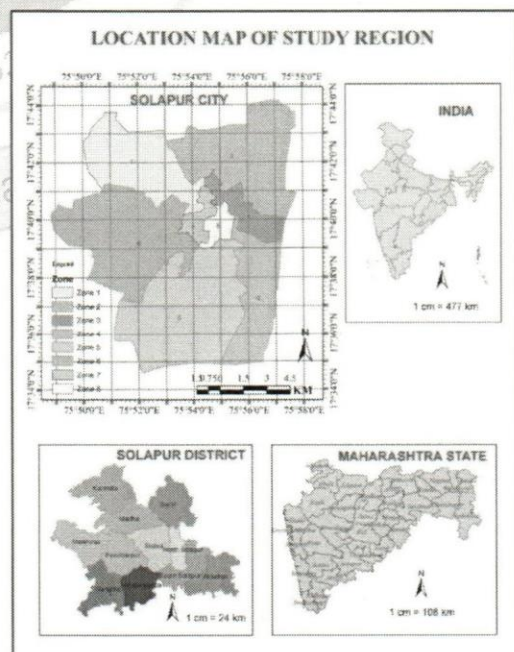
Solapur city is located in the south-western region of the Indian state of Maharashtra. It is located on major highway, rail routes between Mumbai, Pune.

Bangalore and Hyderabad. It covers 180.7sq.km. geographical area and 1.25 million population in 2018. The Solapur city of Maharashtra state is located between 17°34'35"N to 17°44'10" N latitudes and 75°48'50" E to 75°57'35" E longitudes. In the SOI toposheet, it covers parts of 47 $\frac{0}{13}$ and 47 $\frac{0}{14}$ (Fig No.1).

Materials Used:

The Sentinel-2 data is used for the acquiring Landuse and Landcover classification of Solapur city dated by 01 February 2019. Sentinel-2 is multispectral data which covers 13 bands (443 nm to 2190 nm) in the visible, near infrared and short wave infrared of the spectrum. Following is detail information of the Data.

- Date Taken:- 01/02/2019
- ID:-1C_T43QEV_A009955
- Tile No:- 43 QEV
- Platform Sentinel:- 2B



- Orbit No:- 62
- Resolution:- 10, 20 and 60 meter.
- Band 2(Blue), Band 3(Green), Band 4(Red): Resolution 10m.

The survey of India (SOI) toposheets 47⁰/₁₃ and 47⁰/₁₄ of 1:50000 scale to study landuse and landcover and also for field check and ground truth verification.

Methodology:

Landuse/Landcover mapping is carried out with the help of Sentinel-2 satellite image. The supervised classification and ground truth verification method used for the preparation of landuse and landcover map. Various features are identified and distinguished using interpretations key such tone, texture, size, shape and association are used to interpret landuse pattern. The Saga Software is used for image processing such as image rectification and Q GIS software is used to prepare land use and land cover map and to calculate the area under various features.

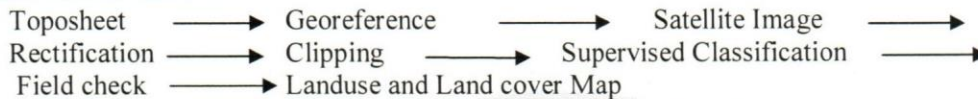


Fig No.2 Flow diagram of Workflow

Explanation:

Land use and Land cover is important component in understanding the human activity with the environment and thus it is necessary to simulate changes. Landuse refers to man’s activities and the varied uses which are carried on over land and land cover refers to natural vegetation, water bodies, rock/soil, artificial cover and others noticed on the land (NRSA, 1989).

In Solapur city most of the land is under agricultural land which includes, Jawar, wheat, vegetable, cotton and other cash crops. Built up area includes settlement and transport including (Road and Rail). Forest and water bodies area covers only 1.79 and 1.12 respectively. In water body it includes Nala, lake and other streams. In Study region, built up area covered in the middle part of the map. Fig No.4 shows the detail information of Landuse and Landcover in Solapur city.

Fig No.3 Image Classification
Fig No.4 Landuse and Landcover Classification using Sentinel-2 image

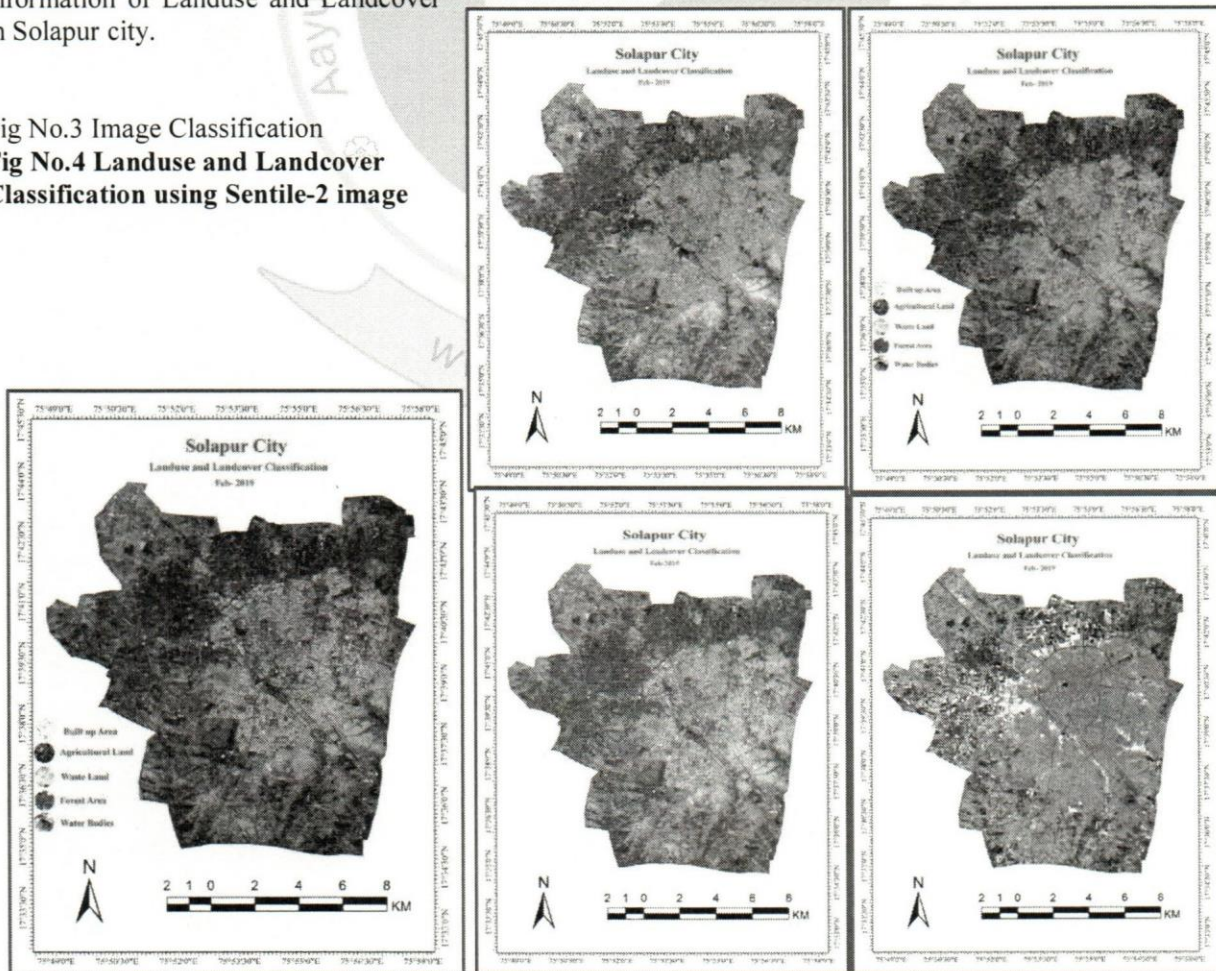


Table No.1 Land Use and Land Cover Classification (Sentile-2)

Sr. No.	Land use Land Cover	Area (sq.km.)
1	Built Up Area	63.04
2	Waste land	50.68
3	Agricultural Crop Land	64.07
4	Forest Land	1.79
5	Water Bodies	1.12
	Total	180.7

Source: Sentile-2 Satellite Image.

Conclusion:

Optimal utilization of land resources is essential for sustainable development in any region. Landuse describes how a parcel of land is used such as for agricultural, settlements/industry, where as landcover refers to the material such as vegetation, rocks or water bodies that are present on the Earth surface. In Solapur city, western part of the region covered by the cash crops i.e. sugarcane and southern part by jawor, sugarcane and other crops. Agricultural land is useful for the production of various crops. Around the 64 percent area of agriculture land witnessed the maximum people of this region also work in agricultural sector. So, GIS and RS techniques are effective tool in landuse and landcover mapping.

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