AV 8272
M.Sc. –Rural Technology (Third Semester)
Examination, 2015
RT-902R: Remote Sensing and Spatial Application-I

Q.1 Multiple choice questions

1(a) 2 (b) 3(b) 4(a) 5(b) 6(a) 7(c) 8(a) 9(b) 10(c)

Q.2 Short answer type

(a) LAI –Leaf area index is the ratio between leaf area to ground area. Its estimation indicates both assimilating area and growth. Watson developed the concept of Leaf area index. The temporal and spatial distributions of LAI are often needed in global circulation models to compute energy and water fluxes. Since LAI directly quantifies the plant canopy structure, it is highly related to a variety of canopy processes, such as evapotranspiration, light interception, photosynthesis, respiration and leaf litter fall. Remotely sensed estimation LAI would greatly assist the application of LAI as an input for photosynthesis, crop growth simulation models, evapotranspiration, estimation of net primary productivity and vegetation/biosphere functioning models for large areas, at cost effective way. The following formula is used for calculating Leaf area index.

$$LAI = \frac{\text{Leaf area}}{\text{Ground area}}$$

(b) Soil erosion- Soil erosion refers to the detachment and transportation of soil material from one place to another through the action of wind, water and ice or by beating action of raindrops. It is a result of four factors erosivity, erodibility, detachability and transportability. Remote sensing provides significant source for real-time and accurate data related to land and soil. It enables homogeneous information over large regions, and can therefore greatly contribute to regional erosion assessment Remote Sensing can facilitate studying the factors enhancing the process, such as soil type, slope gradient, drainage, geology and land cover. Multi-temporal satellite images provide valuable information related to seasonal land use dynamics. Satellite data can be used for studying erosion features, such as gullies, rainfall interception by vegetation and vegetation cover factor etc.

(c) Land cover -*Land cover is the observed (bio)physical cover on the earth's surface.* It include grass, trees , bare ground , water etc. When considering land cover in a very pure and strict sense it should be confined to describe vegetation and man-made features. Consequently, areas where the surface consists of bare rock or bare soil are describing *land* itself rather than land *cover*. There are two primary methods for capturing information on land cover: field survey and analysis of remotely sensed imagery. Studying about Land use and Land cover has wide range of applications such as landslide, erosion, land planning, global warming , change detection etc.

(d) Forest density –Forest density expresses the stocking status of Forest. . Density and age are often taken as surrogate to structural and compositional changes that occur with the forest succession . Satellite remote sensing response is reported to provide information on structure and composition of forest stands. . High resolution satellite imagery are more useful for density determination. The separated

vegetation area is subjected to AVI to get information on vegetation density. Forest density can be classified as very dense forest open forest, Scrub land etc.

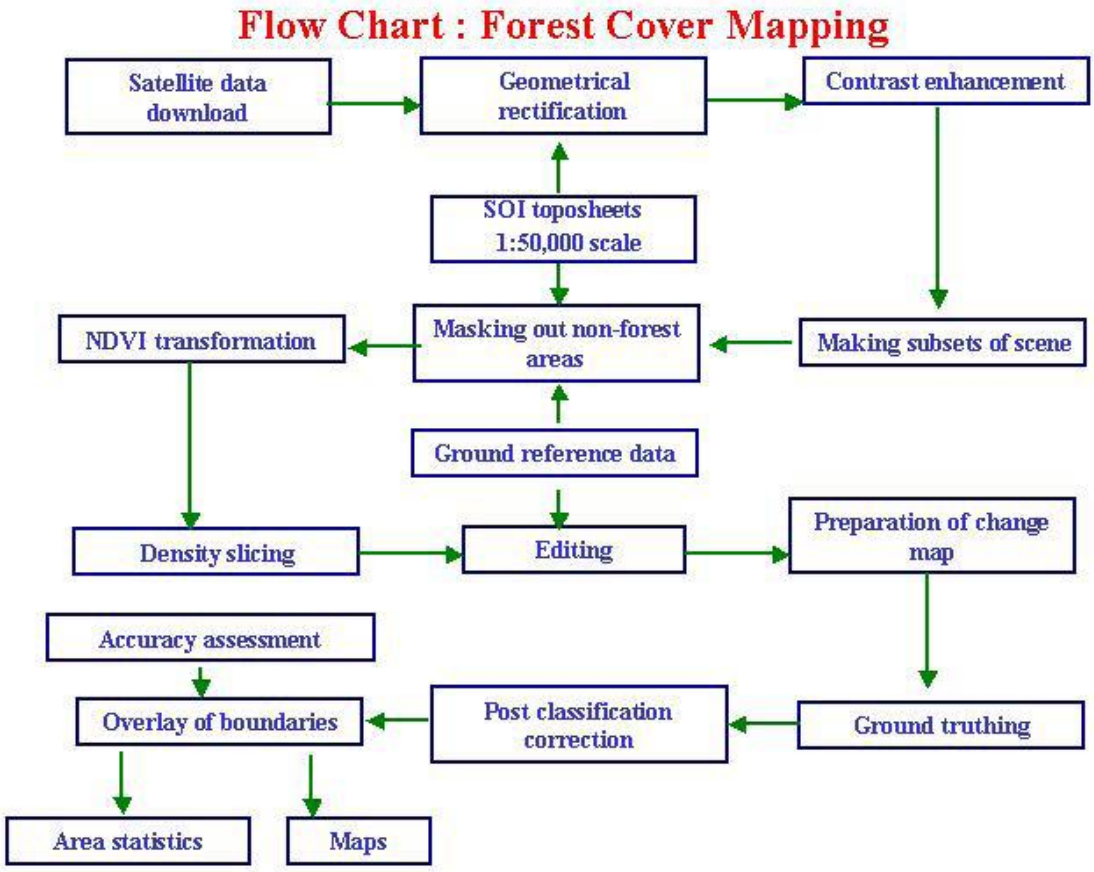
(e) Wild life management- Wild life includes all non domesticated plants, animals and other organisms. Domesticating wild plant and animal species for human benefit has occurred many times all over the planet and has a major impact on the environment. Wild life management is the judicial use of wild resources towards the attainment of scientific ecological economical ethical aesthetic and recreational objectives for the benefit of human being and for the improvement of nature Wild life management includes food management . water management, cover and shelter management Wetland management, Habitat management and Tourism management.

(f) Spectral resolution – Spectral resolution describes the ability of a sensor to define fine wavelength intervals. The finer the spectral resolution , the narrower the wavelength ranges for a particular channel or band. Spectral resolution describe the ability of sensor. The narrower the bandwidth the better is the spectral resolution. .

Q.3 Long answer type questions

(1) Forest cover is defined as an area more than 1 ha in extent and having tree canopy density of 10 percent and above This definition is based on the resolution of digital satellite data (pixel size 23.5m x 23.5m), scale of interpretation (1:50,000) and the technique employed for image processing. The minimum area of 1 ha for forest cover has been kept because this is the smallest area that can be delineated on a map at 1:50,000 scale. Assessment of forest cover using satellite data on a two-year cycle has been one
of the most important activities of FSI since 1986In India Forest survey of India monitors and map country forest cover on biennial basis Now FSI assess forest cover using satellite based remote sensing data and publishes state of forest report (SFR) .

Methodology adopted



The forest cover is broadly classified in 4 classes, namely very dense forest, moderately dense forest, open forest and mangrove. The classification of the cover into dense and open forests is based on internationally adopted norms of classification.

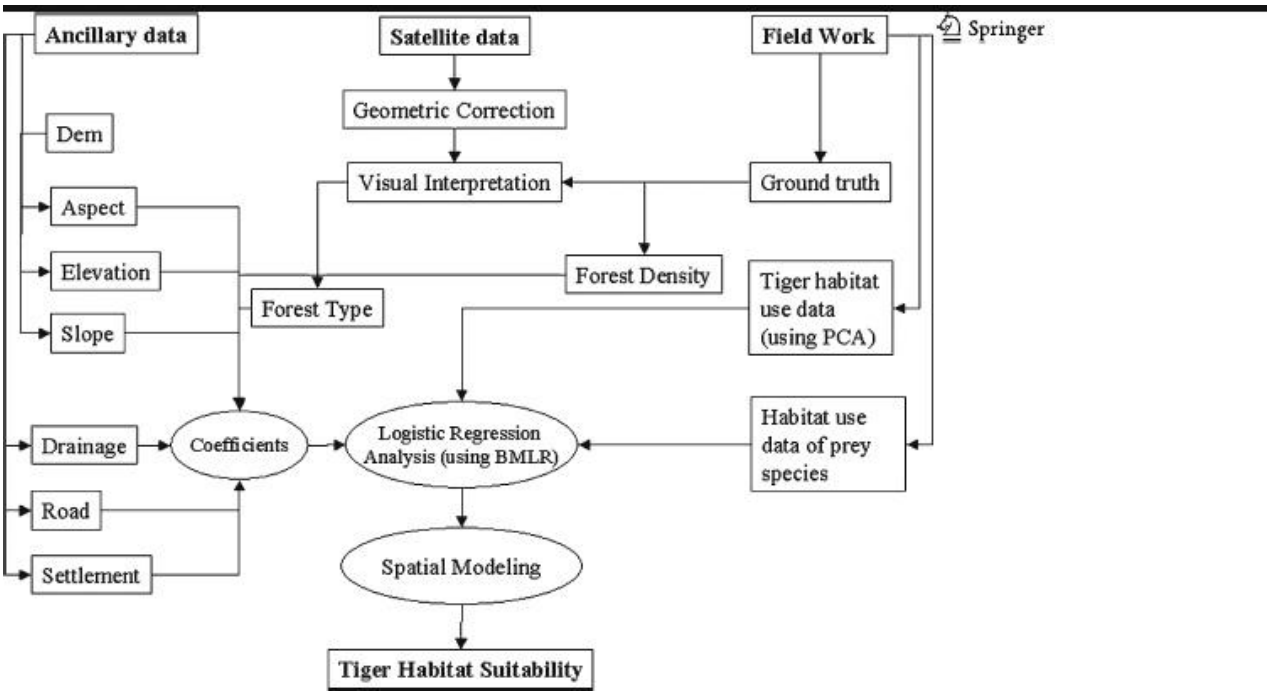
Very dense Forest	All Lands with tree cover (Including mangrove cover) of canopy density of 70% and above
Modrate Dense forest	All lands with tree cover (Including mangrove cover) of canopy density between 40% and 70% above
Open forest	All lands with tree cover (Including mangrove cover) of canopy density between 10% and 40%
Scurb	All forest lands with poor tree growth mainly of small or stunted trees having canopy density less than 10 percent
Non Forest	Any area not included in the above classes

(2)Agriculture and its allied activities provide livelihood to nearly 70% of the country population and they contribute to 35% of the GDP. Agriculture is practised largely under rain fed conditions and less by irrigation. It is geographically distributed in different Agro climatic Zones with diversified cropping system , cropping pattern , high yielding variety of crops & disease agriculture drought farming practises and so on . Thus agricultural resources attach a significant importance for mapping monitoring and management for sustainable development . Satellite remote sensing has matured in meeting timely information requirement on various facets of agriculture land use through sensor development and its application at macro , meso and micro levels. Agriculture is the backbone of Indian economy, providing livelihood to about 67% of population and contributing approximately 35% to GDP of the country. Agricultural productivity substantially increased during post independence era; however it needs to be further enhanced to meeting the food requirements of burgeoning population. The appropriate planning and judicious management of resources are quite important for sustainable agricultural production. Remote sensing and GIS tools are recognized indispensable tools for monitoring and mapping of natural resources including agriculture crops. Different spectral and spatial resolutions of satellite remote sensing made it possible for the modelling the crop responses in varied conditions. The following are the major applications of agriculture in remote sensing:

- Crop inventory
- Crop identification
- Acreage estimation
- Crop forecasting
- Yield modelling
- Crop a biotic stress
- Crop biotic stress
- Soil salinity
- Water logging and flood zone mapping

(3) Habitat is a sum total of environmental condition of a specific place occupied by wildlife species or a population of such species. All species have specific habitat requirements, which can be described by habitat factors. Habitat management is the most crucial concern in protected areas .These factors were connected to the critical characteristics of the habitat, such as vegetation, soil, spatial structure of landscape elements and climatic condition of the area. Tropical dry-deciduous forests comprise more than 45% of the tiger (*Panthera tigris*) habitat in India. Tiger (*Panther tigris*) requires large areas of contiguous habitat for

long-term survival. Habitat analysis is important for introduction, rehabitation and ex situ conservation of species and their habitat. After assessing habitat condition each habitat factor were grouped into four classes highly suitable, moderately suitable, less suitable and unsuitable. Finally all parameter were integrated to derive the Tiger habitat suitability.



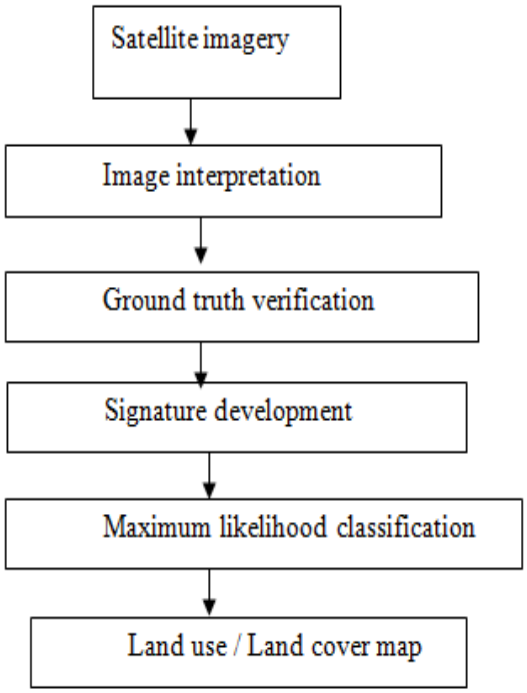
10. The classification of land use differs in different countries. In India land use classification given by National Remote Sensing Agency is widely followed for remote sensing based land use classification. It is a two level classification system and hence depending upon the intensity and the level of classification varies. First level refers the major land use and second level subdivides the major land use.

Classification scheme adopted for land use mapping

S.No.	Level 1	Level II
1.	Building lands	1.1 Settlement

2.	Agricultural lands	2.1 crop land 2.2 Plantation cropland 2.3 Fallow
3.	Wasteland	3.1. Salt affected land 3.2. Waterlogged land 3.3. Marshy land 3.4. Gullied Ravenous 3.5. Land with or without scrub 3.6. Sandy area 3.7. Barren rocky
4	Forest	4.1 Evergreen semi evergreen forest 4.2 Deciduous forest 4.3 Degraded forest 4.4 Forest blank 4.5 Forest Plantation 4.6 Mangrove 4.7 Shifting cultivation
.5	Water bodies	5.1 River stream 5.2 Reservoir
6	Wetland	6.1 Coastal wetlands 6.2 Inland wetlands
7.	Others	7.1 Snow covered land

Methodology



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