M.Sc. Remote Sensing and GIS RT-401

Remote Sensing in Human Settlement Analysis

Unit-I

4.1 Master Plan

MS: Monika Sharma

DEFINATION OF URBAN AREA

URBAN AREA:

- Urban areas/town are created when a large group of people gather to live in a certain area.

- There is a density of human structure.

- Urban areas created through urbanization.

THE CENSUS OF INDIA 2011:

The three criteria are satisfying a town in India:

- A minimum population of 5000

- At least 75 per cent of the male main working population engaged in non-agricultural pursuits

- A density of population of at least 400 persons per sq. km.

Types of urban area

Type of Towns/UA	2011	2001
Statutory Towns	4,041	3,799
Census Towns	3,894	1,362
Urban Agglomerations	475	384
Out Growths	981	962

Source-census of India

BACKGROUND INFORMATION

- 377 million person live in urban areas(31.16% of total population)

- For the first time seen independence, absolute increase in urban populations higher than the rural areas(2011 census)

- Level of urbanization increased from 27.81% (2001 census) to 31.16% (2011 census)

- 7 sates have higher urban population (NCR Delhi, Chandigarh, Lakshadweep, Daman & DEU, Goa and Mizoram)

- NCR Delhi has high proportion of urban population (97.50%)

- Maharashtra has highest (50.8 m) & Sikkim has lowest (0.15m) urban population

- More than 30% growth in urban population in Sikkim, Kerala, Tripura states.

Urban Population in India

Indicator	2011	2001
Population(in million)	377.1(31.16%)	286.1(27.81%)
Sex ratio	926	900
Population(0-6 yrs.)in million	41.2	37.3
•Persons	84.98	79.92
•males	89.67	86.27
•females	79.92	72.86

Source-census of India

NEED OF URBAN PLANNING

- The urban centres in India are experiencing rapid growth of population, particularly in the post-independence era.

- The primary reason for population growth is industrial progress. Due to industrialization, new factories, offices or service centres come up, which in turn leads to housing complexes, market areas, recreational centres, and so on, resulting in congestion and overcrowding.

- The prime factors of this increase in demand are also the population growth and the related requirements of urban life, such as the development of transport and communication and other infrastructure facilities.

- Therefore, many cities are expanding beyond their statutory limit that is for every urban area growth has spilled beyond the city boundary.

- The pattern of city growth and its spatial structure is determined by various historical, economic, social and ecological forces that influence urban land use.

- Therefore, proper planning of urban land use is available. Planning has to be done in such a way that the utmost land is utilized.
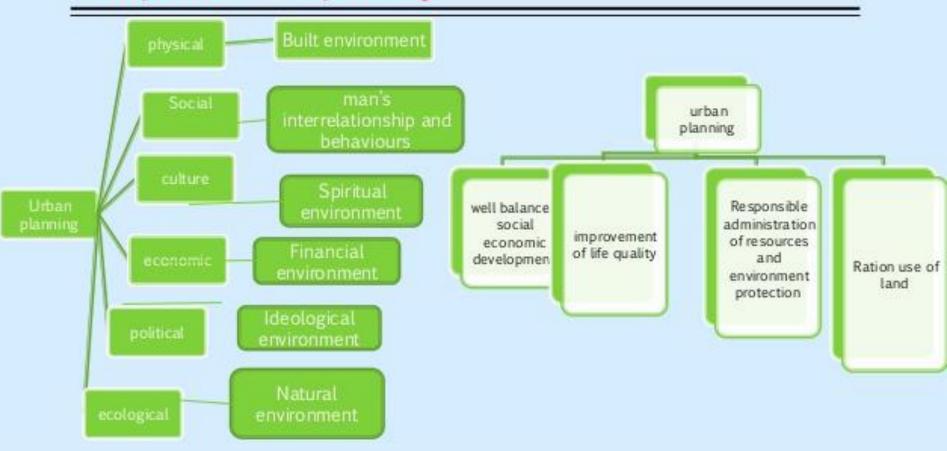
THE AIM OF URBAN PLANNING

i. Removal of slums.

ii. Providing people with proper housing facilities or accommodation along with the basic infrastructure like electricity and water supply.

iii. Organization and improvement in the means of transport and communication.

iv. Setting apart space for industries, parks and public places including burial sites.

v. Making arrangements for recreation both for children and for older people.

vi. Arranging for sanitation and cleanliness of the town and its adjoining areas.

vii. Allocating space for marketing centres, shops, and so on.

viii. Arranging for education, health and medical services

Proposed plan for Andhra Pradesh New capital
Amaravathi

Source: http://indianexpress.com/article/india/india-others/singapore-submits-plan-for-amaravathi-to-cm-naidu-foundation-stone-to-be-laid-on-

Purpose of urban planning

physical → Built environment

Social → man's interrelationship and behaviours

culture → Spiritual environment

Urban planning

economic → Financial environment

political → Ideological environment

ecological → Natural environment

urban planning
- well balance social economic development
- improvement of life quality
- Responsible administration of resources and environment protection
- Ration use of land

Main Requirements for Urban Planners

Apart from topographical mapping, planners must look forward to remote sensing (data products) technology in order to provide information on existing landuse and their periodic updating and monitoring. In addition, with appropriate technique and methodology the same data products can be used to:

- Study urban growth/sprawl and trend of growth

- Updating and monitoring using repetitive coverage

- Study of urban morphology, population estimation and other physical

- aspects of urban environment

- Space use surveys in city centres

- Slum detection, monitoring and updating

- Study of transportation system and important aspects both in static and Dynamic mode

- Site suitability and catchments area analysis

- Study of open/vacant space

- High spatial resolution satellite data are highly beneficial in the context of complex urban areas where relatively small size and complex spatial patterns of the component scene elements (e.g. buildings, roads and intra-urban open space)

Platform and Sensor System	Spatial resolute (m. pixel)	Year of operation	Mapping scale	Extractable Information
Landsat (MSS) IRS-1A & 1B (LISS-I)	80 72	1972 1988 & 1991	1: 1,000,000 1: 250,000	Broad land-use/land-cover and urban sprawl
Landsat TM IRS-1A & 1B (LISS-ID) IRS-1C & 1D (LISS-IID) SPOT HRV-I (MLA) IRS-1D(LISS-IV)	30 36 23 20 5.8	1982 1988 & 1991 1995 & 1997 1998 2003	1: 50,0000 1: 5,000	Thematic data for broad structural plans and spatial strategies
ASTER VNIR (0.52-0.86 μm) SWIR(1.60-2.43 μm) TIR(8.125-11.65 μm)	15 30 90	1999	1: 250,000 1: 50,000	Land-use/land-cover, urban sprawl, ecological monitoring data
SPOT HRV-II (MLA) IRS-1C &1-D (PAN)	10 5.8	1998 1995 & 1997	1:25,000 1:10,000	Data for land-use/land-cover for urban area
MOMS-II	4	1983	1:8,000	Land-use/land-cover details
IKONOS Quickbird	1.0 0.61	1999 2001	1:4,000 1:2,000	Cadastral map, detailed information extraction for urban planning and infrastructure mapping
CARTOSAT-1 CARTOSAT-2	2.5 1.0	2005 2007	1:4,000 1:1,000 1:2,000	Large scale cartographic work and DM generation cartographic applications at cadastral level, urban and rural infrastructure development and management
ALMAZ	1.0		1: 4,000 1: 2,500	Ground plans and urban design
RESOURCESAT-I (LISS-IV)	5.8	2003	1:10,000 /1:4,000	Monitoring the urban growth. Inventory of land-use/ land-cover.

Remote Sensing Satellites/Sensors and its Application in Urban Studies

Source : Modified after Atiqure Rahman (2006).

Urban Land Use Classification Criteria

Level I	Level II	Level III	Level IV
Built up	Built up (Urban)	High Density residential	High rise apartments/ flats
	Built up (Rural)	Medium Density residential	Medium rise apartments/flats
		Low Density residential	Low rise apartments/flats
			Row houses
			Slum and squatters
		Industrial	Service industry
			Light industry
			Extensive industry
			Heavy industry
			Hazardous
		Mixed built up	
		Recreational	Parks/gardens
			Playgrounds
			Historical monuments
			Cinema halls
			Swimming pools
			Major function halls
		Public and Semi Public	Educational
			Hospital
			Cantonment
			Religious
			Government institutions
			Petrol Pump
			Fire stations
			Police stations
			Others
		Communications	Post Office
			Telegraph office
			Radio TV station
			Others
		Public utilities and facilities	Water treatment plant
			Landfill/dumping
			Electric power plant
			Sewerage treatment plant
			Others
		Commercial	
		Transportation	Bus terminus
			Railway stations
			Air port
			Others
		Reclaimed/vacant land	Layouts/plotted land

PLANNING LEVEL

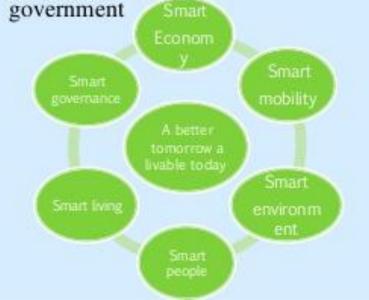| Level of planning	Micro-level (regional & perspective)	Meso-level (district/ development)	Micro-level (project, Micro-watershed, village)
	Low resolution(80-360m)	Medium resolution (4-30m)	High resolution(0.6-4M)
Mapping scale	1:50000 to 1:1M	1:10000 to1:50000	10000 to 1:5000
Urban planning	•Urban land use at level –I •Urban sprawl analysis •Transportation network(highways, railways est.)	•Urban land use mapping(up to level -2) •Urban suitability analysis •Mapping of major transport network •Updating of city guide maps	•Urban land use mapping 9up to level-4) •Slum typology •Mapping of street urban road network •Mapping of property parcel •Input for infrastructure development •Population estimation

Level of planning	Micro-level (regional & perspective)	Meso-level (district/ development)	Micro-level (project, Micro-watershed, village)
	Low resolution(80-360m_	Medium resolution (4-30m)	High resolution(0.6-4M)
Mapping scale	1:50000 to 1:1M	1:10000 to1:50000	10000 to 1:5000
Infrastructure Planning	•Regional level corridor planning	•Broad site suitability • analysis Mapping of major road network	•Specific project site analysis •Dams, highways ,canal, industries, power plants
Disaster	•Flood, cyclone, drought, earthquake, prone areas ,landslide mapping, slope stability mapping	•Post disaster damage assessment •Property insurance for natural disasters	•Post disaster relief management support •Tracing of approaches routes •Waste disposal and solid waste management
Rural development planning	•Regional maps •Settlements network	•Land and water resources development maps	•Cadastral level land use map •Land parcel maps •Micro level watershed/village

Land-cover/land-use and their image characteristics

Land-cover/land-use	Image characteristics
Settlements	Settlements Light grey clustering with particular patterns for the urban area. There may be brownish maroon patches for in between vegetation. For the rural settlement there occur no particular patterns of such image characteristics
Agriculture	Identify rabi if the month of data acquisition is January or February or March and colour is brown red. (a) For the kharif crops same characteristics in image occur if the image data are acquired in the month of September, October or November. (b) Fallow land is identified by light grey colour within cropped area (red colour). (c) Plantation occurs as brownish maroon patches
Forest (a) Dense forests (b) Degraded forest (c) Forest blank (d) Forest plantation	Dense forests are identified by dark red colour patterns. In the case of degraded forest the dark red colour patterns contain small brown or white patches. The blanks in the forest show creamy patches in the dark red/background. Forest plantations are identified by dark red colour sign of particular pattern.

Land-cover/land-use	Image characteristics
Waste Land (a) Muddy water logging (b) Clear water logging (c) Temporary water logging (d) Permanent water logging (e) Marshy area water logging (f) Gullied land (g) Land with scrub (h) Land without scrub (i) Sandy area	Muddy water logging occurs as blackish or deep blue spots while clear water logging area is identified by dark/bright blue patches. Comparing the images of rainy season and out of rainy season identifies temporary and permanent water logging. Marshy area is recognized as a sign of vegetation (red/pink spots) in the water logged (blackish blue/bright blue) area. Gullied land occurs as white/grey spot. The image of land with scrub contains white patches in the land area. Sandy area is classified as bright white coloration along the course of river.
Water bodies (a) River/stream (b) Canal (c) Lake/ reservoirs (d) Embankments	River/stream is identified as long non-linear path coloured with dark blue/bright blue line in white background. Canals are identified as line segments sign of water bodies. Lake/reservoirs are identified as patterns along the river. Embankment occurs as light grey structure along the river.
Others	Grasslands are identified as uneven appearance characterized by red (light to medium grey tones) Snow is identified as white patches on the hills.

Source: Prasad and Sinha (2002)

SMART CITY

A developed urban area that creates sustainable economic development and high quality of life by excelling in multiple key area ; economy , mobility, environment , people living and government

Sustainable solutions

Management of resources efficiently

Active citizen participation

Research and development

Transport efficiency

Communication network

Infrastructure development

Technological advancement

Yielding better quality of life

Smart Economy

Smart governance

Smart mobility

A better tomorrow a livable today

Smart living

Smart environment

Smart people

Geospatial technology

URBAN GROWTH IN RANCHI

1991

1999

Major Urbans

Mega Cities

Class-I

2009

2014

Ranchi
1991
1999
2009
2014