UNIT 9 URBAN PLANNING

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9.0 INTRODUCTION

Urban planning is a combination of both science and art. The science of urban planning pertains to collecting, correlating and analysing the facts about an urban area. The art is used in arranging the land uses or its spatial activities in such a way so that residents of the urban area find it convenient, efficient, economic and beautiful. Thus, science and art needs to function

hand in hand when a new town or city is being designed or when an existing town or city is being remodelled.

The greatest challenge facing urban planningis the co-operation of various agencies involved in the use and development of land since most of the planning is based on precise prediction of future possibilities. As a result, urban planning demands near accurate projections and farsightedness about understanding the various needs of the society occupying or likely to occupy the area in future. Many scholars believe that the success of atown planner lies in converting the town from an inert and lifeless object to acomplex organic body that pulses with life.

The urban planning chapter identifies the concepts and issues of existing and future land use planning in urban areas as a framework for the sustainable management and development of urban spaces. In this context several issues like land use planning in urban areas; management of land in urban and peri-urban areas; spatial organization of cities: their growth and typologies; ecological parameters for planning at different levels like site planning, settlement planning and regional planning; and role of GIS in urban land use planning are covered for basic understanding.

9.1 OBJECTIVES

After reading this unit, you will be able to:

- Determine the key concepts and definitions of urban planning and urban land use planning
- Know the various land uses and dynamics of land use changes in urban and peri-urban areas
- Know the determinants spatial growth of cities and the type of growths.
- Analyse the ecological parameters for planning.
- Explain the role and implications of GIS in urban planning

9.2 URBAN PLANNING

The term urban planning is used to indicate the arrangement of various components or units of a town or urban area in the best possible way for optimum utilization. It also includes ways and means to be adopted for the improvement of the existing towns/cities or for the extension of towns/cities. Thus, the knowledge of urban planning helps in achieving the best possible advantages of the situation of town/city withrespect to its land and the surrounding environments. Urban planning thus involves design and regulation of the uses of space that focus on the physical form, economic functions, and social impacts of the urban environment and on the location of different activities within it.

9.3 LAND USE PLANNING

Land use planning is the way in which the land use planner manages land and its uses and provides useful services to the various land use game players. Land use planning refers to the process by which a society, through its institutions, decides where, within its territory, different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place. This also includes protecting well-defined areas from development due to environmental, cultural, historical, or other factors by establishing legal and institutional provisions that control the nature of development activities. The land use planning also determine control over plot areas such as land consumption or surface ratio, their intensity or floor-area ratio, their density or units of that activity (or people) per hectare, the technical standards of the infrastructure and buildings that will serve them and related parking spaces and allowances. In relation to pollution prevention, land use provisions should ideally include levels of gas emissions, light radiation, noise, water, solid waste discharges, and on-site or predisposal treatment of pollutants. All these factors are considered to form a legal guide for landowners, developers, citizens, and authorities.

9.3.1 Ideals of Urban land use planning

The four essential ideals of any urban planning scheme are beauty, convenience, environment and health.

1) The object of beauty is achieved by taking advantages of the natural conditions surrounding the town like preservation of trees and natural greenery. In addition to this are the architectural components of the town like ancient architectural buildings, temples, churches, mosques, buildings of cultural and historical significance, etc.

2) The object of convenience is applied in the form of various economic, social and recreational amenities to be given to the public like electricity, proper sites for industrial units, transport facilities, adequate water supply, easy disposal of sewage and industrial wastes, facilities to commercial units, etc. The recreational amenities include open spaces, parks, town halls, playgrounds, cinema house, community centres, stadium, etc.

3) The object of environment should be moulded in such a way that residents and commuters can go about their normal activities with the least amount of strain.

4) The object of health is accommodated in a town planning by considering several factors like providing parks and playgrounds for the public, maintaining green belt, controlling pollution etc.

9.3.2 Components of Urban land use planning

The components of land use planning and how they are interlinked in their functions are shown in figure 1.

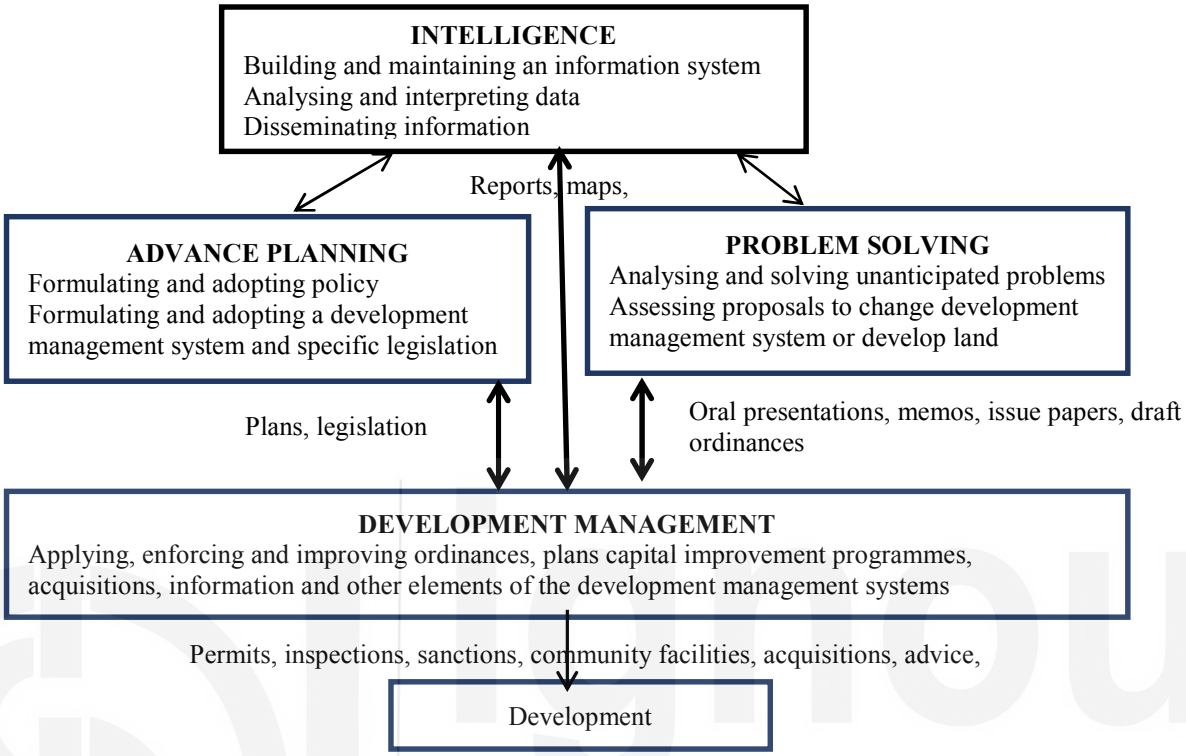

Figure: 1 Components of land use planning

These components also form the main functions of land use planning which ultimately leads to the development of urban areas. These four functions are intelligence gathering, advance planning, problem solving and development management. Intelligence gathering involves gathering, organizing, analysing, projecting and interpreting data and information for multiple stake holders in land use development. Such intelligence alerts decision makers to provide future projections for city growth and alternatives in case there are negative impacts on social, economic and environmental health of the city. It is based on the premise that better information will lead to improved public discourse, more equitable and effective policy and better land use decisions. Advance planning encompasses both long tern plans and intermediate plans. It involves defining goals, designing future land use patterns that balances social, market and environmental values, devising policies and programmes to achieve them and assisting in adoption of such policies and programmes. While advance planning is anticipatory, problem solving is responsive. Problem solving can be compared to fire fighting of local government authorities to solve an immediate problem to safe guard the city only at regional level and not make changes in the entire plan. Development management deals with the day to day administering, enforcing and revising of policies, regulations, public investments and other measures that constitutes the actual development management systems. In other words it includes all aspects of implementation after adoption of the plan like

monitoring and enforcing permits and public investment policies, invoking sanctions wherever necessary, monitoring funding, site selection, site planning etc. All these four components should be correctly and accurately provided to the land use decision makers to improve community discourse and land use decisions and to achieve a more desirable future in which social use, market values, environmental values are in balance.

9.3.3 Process of land use planning

In most countries, the land use plan and zoning codes are prepared by planning institutions. Then they are opened to the processes of public consultation and participationwhich are then subjected to the constitutional tests and rulings of the judiciary. The plan is implemented through the process of land subdivision (or development) and subsequently construction. The main source of funding for construction and maintenance of public works and public and services comes from the development fees andland and real estate taxes.

9.3.4 Economics of land use planning

The most desired outcome of town planning is betterutilization of the resources of the community. Thetown planning mainly deals with the utilization of available lands. Land being fixed and scarce, for any givensize, the best planned town is one where the aggregate land values are at a maximum.Thus, ideally, the best urban plan will lead to the highest aggregate land values. The following factors are considered foroptimum utilization of the resources in a given area for the purpose of planning:

1) There should be no change in the quantity ofresources.
2) The demand for goods and services should notchange.
3) The techniques of production should remain more or less same.

If town planning merely results in theredistribution of land values and if there is no net increase in land values, the townplanning in economic sense, is not justified. Thus, the town planning should not lead toincrease in the land values at certain places and corresponding decrease in the land values atsome other places.

9.4 LAND USE ZONES OF URBAN PLANNING

The probable growth anddevelopment of the town should be suitably conceived by the town planner and it shouldbe seen that the town does not develop in any haphazard fashion. The urban areas should be divided into suitable zones such as commercial zone, industrial zone, residential zone, etc. and suitable rules and regulations should be formed for the development of each zone. Some of the main land use activities of the urban system are as follows:

1) *Green belt:*Green belt on the periphery of town determines thelimitation of size and expansion of a town or a city. Hence, the final size of the town/city can well be sometimes anticipated.

2) *Residential area:*Adequate housing accommodation needs to be provided tovarious categories of people. In most cities and towns residential land use segregation is based on income levels of residents like low income residents, middle income residents and high income residents. However, under ideal circumstances, no development ofslums should take place within city limits and if slums are there, they should be cleared by the provision of somealternative arrangement.

3) *Public buildings*: There should be a well-balanced grouping and distribution ofvarious public buildings throughout the town. The unnecessary concentration of publicbuildings at certain spots of the town should be avoided.

4) *Recreation centres:*Depending upon the size of town, enough space should bereserved for the development as recreation centres for the general public.

5) *Road systems:*The efficiency of any town is measured by the layout of its roads.The provision of a faulty road system in the initial stages oftown development may prove to be too difficult and costly to repair or to re-arrange in future. The urban areas should be provided with suitable transport facilitiesso that there is minimum loss of time from place of work to the place of residence.

9.5 ECOLOGICAL PARAMETERS FOR PLANNING

In order to reduce ecological footprint of urbanized areas, land use plans should be Complete, and Compact so that it can Conserve and restore the natural resources to the optimumlevel, and add to developments that are Comfortable and are produced in Coordinated, as well as in Collaborative ways. Some good practices in land use planning that can help attain positive urban environmental effects are described below.

1) It should be compulsory to define, make and effectively protect areas which have high environmental biodiversity or historical or cultural values. It can be done by allowing transfer of development rights from these areas into ones where development is acceptable and should be supported by fiscal measures that preserve lands in their natural condition or preserve the profitability of rural economic activities.

2) Plan for industrial zones should be done by appropriately defining their location, design, infrastructure, regulation, and the buffers separating them from residential and other activity zones. This should be combined with fiscal and other incentives for remediation and resettlement.

3) Urban plans should take into consideration urbanized areas, land uses, densities, and intensity of development so that there is maximum usage of public transport and decreased usage of private vehicles. Moreover, commuting patterns should be incorporated to maximize the use of installed infrastructure and transit corridors, and reduce the costly extension of infrastructure.

4) Urbanization should not be carried out at the expense of rural settings. So the urban and rural realms should be integrated into the same framework for land-use planning as opposed to a competitive approach of various sectors.

5) All types of urban agriculture should be developed within greenbelts which should include green roofs, neighbourhood and community farms, or large farm operations, and creative incentives should be implemented to make them economically feasible.

6) Authorized levels of gas emissions, noise, air pollution, sun radiation, energy consumption, solid and water waste discharges, and similar measures for the different land uses and constructions should be established with provisions for fining or penalizing operations that exceed these requirements.

Check Your Progress Exercise 1

Note: a) Write your answer in about 50 words.

b) Check your answer with possible answers given at the end of the unit.

1) What is Urban Planning?

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2) What is Land Use Planning?

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3) What are the four essential ideals of any urban planning?

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9.6 SUSTAINABLE URBAN DEVELOPMENT THROUGH URBAN PLANNING

The basic concepts that needs to be incorporated intourban planning for sustainableurban development are transport network, drainage network,density distribution and disaster proofing. Twelfth Five Year Plan has identified two major issues of inadequate water supply and solid waste management to address environmental sustainability of urban areas.

India is a diverse nation with many types of cites with varying topography, cultural and historical backgrounds and socio-cultural variations. In such diversities, multiple options would need to be explored.Implementation of some of the successful approaches in one city has failed in others.Therefore micro projects would need to be prepared in existing developments, while larger urban plans have to be tailored in city specific and contextual requirements. Certain steps have been taken or need to be taken for sustainable urban environment with the help of urban planning and are discussed here.

9.6.1 Land Use Zoning in State Land Policy

State Land Utilisation Policy would need to be defined at the perspective plan level, which should be as per the guiding framework of National Land Utilisation Policy (draftversion is currently in place), Department of Land Resources, Ministry of RuralDevelopment, for different states keeping in context the state-specific needs, potential, priorities and legal provisions keeping in mind the needs of people, environmentas well as different sectors of economy and development. It is suggested thatthe land in the country will be divided into six Land Utilisation Zones (LUZs) based on thepredominant use of those lands, viz. 1.Predominantly Rural and Agricultural Areas;

2) Areas under Transformation;
3) Predominantly Urban Areas;
4) Predominantly Industrial Areas;
5) Predominantly Ecological Areas, Landscape Conservation & Tourism Areas, Heritage Areas and
6) Major Hazard Vulnerable Areas.

The state resource mapping and analysisshall play the foundation of the long-term policies regarding development ofinfrastructure and resource mobilisation on the land. Thus each state should formulate the strategy of land development in a spatial concept plan.

9.6.2 Integration of Land Use Planning and Transport Network

Integrating land use andtransport network planning is identified as one of the objectives of National Urban Transport Policy (NUTP) in 2006. Urban sprawl in many cities has resulted in loss of high quality agricultural land, open spaces and fragmentation of ecosystems. High dependency on private vehicle use coupled with unfavourable public transport system leads to environmental pollution. Therefore, land use pattern with respect to transport network of a city should be done in such a way that trip lengths and travel times are minimized and additionally accessibility, comfort andefficiency are maximized. All transportnetworksfrom pedestrian pathways to mass transitsystems should be integrated for harmoniousestablishment of land use to make cities sustainable.

Transport networks being the most permanent element of cities should be planned in carefully. 'Transit Oriented Development' is encouraged where planning is focused around a transit node which facilitates complete ease of access to the transit facilitythereby inducing people to prefer to walk and use public transportation over personal modesof transport. This kind of development is highly dependent on establishing mixed landuse zones by strategicdensification. This can be done by the following:

i) Dispersing high traffic volumes by making multiple parallelstreets rather than concentrating traffic on few major arterial streets

ii) creating a finenetwork of streets that provides choice of routes for all modes, reducing distancesbetween places as well as journey times

iii) Providing fast, convenient interchange options and spatialprovision for various modes of Intermediate Public Transport (IPT) at Multimodal Transit Station for seamless travel.

iv) Providing the shortest direct route to pedestrians and non-motorisedmodes to station as well as between building blocks. Cities should be Pedestrian friendly.

9.6.3 Focus on Regional Planning

'Sustainable settlement planning' requires strategic approach in planning urban areas from thenational/state level to the regional level in an integrated and holistic manner. It integrates top-down and bottom-up approaches. Therefore in the 12th Five-year plan; regional and urban planning was recognized as an instrument for guiding inclusive growth. In this approach, spatial planning is done in a coordinated manner with respect to sharing

ofnatural and other resources, provision of infrastructure and conservation of theenvironment.

9.6.4 Land to Generate Fund for Infrastructure Development

Formulation of spatial plan should be such that the plan is able tocreate economic growth and which could fund the implementation of the plan. Town planning schemes followed in Maharashtra and Gujarat are successful case to demonstrate financial sustainability with respect to costrecovery of the plan. When schemes and projects are conceptualised without proper financial viability assessments, there are problems of cost recovery andmaintenance funds. As a result many Urban Local Bodies suffer from a very weak resource base whichmakes it heavily depend on external funding compromising on sustainability of plans earlier conceived. Therefore, implementing agencies need to treat land as an asset for infrastructure developmentthrough capital gain, stamp duty, auction and other mechanisms in consensus with the StateFinance Commission.

9.6.5 Sustainable Waste Management

Evidences have shown that zero waste can be achieved by adopting systematic approach of segregation at sourceby planning, collection facilitation and most importantly public awareness. In India, many suchpractices of conversion from waste to wealth have been successfully implemented, wherewaste is treated as a commodity for sale and purchase. Since the standard of living is improving in urban areas quantum of all kinds of waste have also increased. Innovative approachesto solid waste management are needed to be conceptualized in the State level policies and implemented by the cities at the Development Plan level and the local areaplanning.Management of waste water is equally important. Planning should also encompass concepts of zerolandfill site to save the precious land which is fixed and also under tremendous pressure.

9.6.6 Inclusive planning

Development plans should explicitly allocatespaces for theurban poor who generally work in the informal sector and resides in informal settlements. Informal sector is significantly gaining recognition with the growth of towns associated with rural urban migration. So proper panning is required to accommodate huge flux of migrants to the cities who tend to encroach on urban lands forming slums. Since these people form an important part of the city, inclusive planning is necessary for sustainable development of cities. It is of utmost importance to protect the interest ofurban poor by reserving space, extending legal title (ownership) by incorporating them in the MasterPlan.

9.6.7 Disaster Risk Reduction

Over the past couple of years, the Government of India has brought about a paradigm shift in the approach to disaster management which is now disaster risk management. The new policy emanates from the belief thatinvestments in mitigation are much more cost effective than expenditure on relief andrehabilitation. It is based on the concept that development should take place in such a way that it reduces the risks to disasters. For example permanent structures like roads and buildings should not be built on flood plains. In case of a flood there will be loss of both life and property. Such disaster planning needs to take into consideration institutional mechanisms, preparedness, response and capacitybuilding both at State and District level. For this disaster proofing, data and information need to be collected on a regular basis and there is a need to undertakemapping for all infrastructure, services and amenities to understand requirements andidentify gaps.

9.7 SITE AND SITUATION FOR THE DEVELOPMENT OF TOWNS

If a survey is carried out regarding the origin of some of the important existing towns and cities of the world, it can be easily established that any town or city has originatedbecause of certain specific causes. The contributing forces for the origin of towns andcities can be broadly divided into two categories, namely, topographical and functional.

The topographical features contributing to the origin of towns are as follows:

1) Conditions favourable for industrial units
2) Hilly areas to achieve the object of defence
3) Plain areas useful for agriculture and business activities
4) River banks, andSea or ocean fronts for trade

The functional aspects responsible for the origin of towns are as follows:

1) Education
2) Health resorts
3) Political, and
4) Religious

In case of planned cities selection of site is done in a systematic way. Spatial development is a continuous, time-oriented, cyclic process. Site identification and selection is an important component of town planning and development. For comprehensive planning, two components of integration of the sectoral development and spatialplanning, site specific needs are to be first identified in the beginning of the planning process. The growth potential and special functions performed bythe urban centres such as marketing, industry, tourism, pilgrim centres etc. need to be clearly recognized. The site needs are identified based on thetypology of urban development- such as port city, old

city, industrial townships, peri-urbanareas; corridor development, regional development and accordingly the vision needsto be preparedthat are specific to thesettlement and are likely to have impact on the future development.

9.7.1 Site Characteristics for Sustainable Urban Development

Each development plan takes into consideration the following characteristics of a site for successful implementation of the urban plan.

*Physical characteristics and natural resources*which includes:

1) location, regional setting, brief history of development of the town;
2) City influence and its characteristics including settlement pattern, rural-urbanrelationship and fringe area developments and issues related to decentralisation of activities
3) Climate
4) Topography
5) Soil: soil profile and condition
6) Sub-surface geology and aquifer system
7) Environmentally and ecologically sensitive areas like water bodies, air, water, noise, soilpollution
8) Heritage; sites, buildings and areas
9) Existing generalised land use
10) Developable and non-developable area
11) Land use, zoning and built floor space, existing zoning and developmentwithin zoned area, existing land use, existing land use pattern, built floor space,floor space permitted

Demography: Existing population, age-sex composition, sex ratio, literacy, workingpopulation, growth rate, natural growth rate, migration, floating population,population density, and household characteristics-household density and size.

Economic base and employment:

It includes:

1) Formal sector –

   Primary:Urban agriculture, forestry & fishing, Mining & quarrying;

   Secondary:Manufacturing; Construction; Gas, water and electricity supply

   Tertiary:Trade, Hotels and Restaurants; Transport, Storage and Communication, Financial services such as Banking, Insurance etc.;Real estate and Business services; Public Administration andOthers services.

2) Informal sector and urban poverty alleviation-

Informal trade, commerce, transport, household industries, Work force, Occupational pattern, Employment generation; Whole sale / retail trade

*Housing and shelter (both formal and informal):*housing scenario, housing stock, housing supply mechanism, housing needassessment, slums, squatter and illegal housing identification

*Transportation:*Mode of transportation - by road, rail, air, water; Network of roads, railways, waterways and their interrelationship with major activity, nodes; Transport terminals; Trans-intra city transportation facility; Pedestrian and bicycle;Goods movement system; Transportation land use integration; Parking; Signage and way findings

*Other Facilities:*Education: schools, technical institutes, universities; Health care: Dispensary, health centres, hospitals; Recreational; Religious; Socio-cultural; Parks and open spaces.

*Infrastructure:*Water supply: network, existing demand and supply scenario, water transmission,reservoirs and distribution; Energy: existing demand and supply scenario, transmission and distribution network; Drainage, sanitation and refuse and solid waste disposal: existing demand andsupply scenario, generation and collection system, transportation, treatment anddisposal of waste; Communication; Police protection, fire protection; Cremation and graveyards; Disaster management centre.

9.8 SPATIAL ORGANIZATION OF CITIES AND THEIR GROWTH AND TYPOLOGIES

The cities and towns grow with time both in terms of their area and in population. Several factors contribute to the overall development of an urban area like transport facilities, installation ofindustries, expansion of factories, provisions for defence or security proximity ofagricultural lands, availability of electric power, political importance, etc. Although towns and cities are not solely products ofindustrialization as they existed many centuries before the Industrial Revolution, however, it is an established fact that historically the degree of urbanization increased sharply as a result of industrialization. Besides industrialization certain towns developed in response to defensive purpose as staying in groupsfacilitated defence against attack from hostile outsiders. As time passed, this factor got lesser importance with respect to town formation.The urban areas provide better infrastructure creating a pull factor especially in developing countries like a reliable water supply, education and health care provisions. Urban areas are also meeting place for exchangeof goods or a place of assembly for religious, recreation, political or administrative purposes, etc.It also provides better employment opportunities and a platform to perform specializedactivities on different scales.The growth of towns, to a large extent, depends on the economic forces because urban

areasare centres for specialized activities. The sizeof a town will depend on the amount of goods and services produced and exported. The economic base theory suggests that if there is an increase in the demand ofgoods and services exported by the town, the growth of town takes place and the rate ofgrowth will naturally depend on the rate at which demand for its exportable productsincreases. Moreover, the money earned by the export activities would provide a fund forsupporting the production of goods and services required by the population of town. The new economics theory establishes the fact that with decrease in per unit cost of production with economies of scale, there will be agglomeration effect. So production will attract further production leading to growth of towns.

Expansion of transport and communication with increase in the population also leads to expansion of towns. While in some cases, the airports may play an important role in others roads and railways leads to growth of towns. If town is connected with roadways and railways, there will be increase of passengersand goods traffic even from long distances. This will lead tooverall expansion of trade and industry.If facilities of waterways are available, towns can grow as a harbourwith possibility of foreign trade and business.

Besides horizontal growth of towns, availability of mechanical lifts, escalators and elevators have made it possible to havevertical growth of towns in the form of skyscrapers.

9.8.1 Types of Growth

The growth of towns and cities can be of two types: Growth according to origin and Growth according to direction.

The growth of towns and cities according to the origin can be further divided in two categories:(1) Natural growth and (2) Planned growth.

1) *Natural growth:*Historically,most of the towns have developed and grown in a natural way. In other words, natural growth of towns takes place without any future planning. In the absence of any urban planning mechanism, the land uses like transport system, industrial and commercial units, residential and recreational areas develop in an irregular way without anyconsideration for future sustainability of the towns. The natural growth of a town may be inthe form of the following four types:(i) Concentric spread(ii) Ribbon development(iii) Satellite growth(iv) Scattered growth.

   i) *Concentric spread:*In concentric spread, towns develop in the form ofconcentric rings with nucleus as town. The first zonecharacterizes the central business district and is the focal point of commercial, social andcivic life of the town area. It represents the area of original settlement and land use inthis zone takes the form of shops, offices, hotels, theatres, etc. Such towns generally register complicated

problems like traffic congestion, narrow streets, concentration of population, improper houses, etc. As the town grows people who can affordmore transport time andcharges go away from thecentral zone and thus low-income housing, middle-income residences and high-classresidences aresubsequentlyformed away from thecentral business district respectively.The idea of concentric spread is based on the fact that similar or functionally relatedactivities will be located at the same distance from the centre of an urban area. Thus, thetown grows radially from the centre whereby each inner zone extends its area byinvading the adjoining zone towards the periphery of the town area.

*ii) Ribbon development:*In this typeof urban growth, city expands in a natural way along the sides of main road and long fingers or ribbons. Houses, factories, shops, etc. develop because of improvement of roadsurface and growth of motor traffic as a natural tendency. Depending upon the number of main transport routes, especially the fastest ones, thegrowth of town may even be in the form of a star-shaped pattern. If such city development is allowed, houses face heavy traffic associated with noise, dust and undesirable smells, there is increase in cost of various basicutility services such as water supply, electricity, postal deliveries, telephone, etc., interior portion and patches of land remain undeveloped which results in the wastage of valuable land.

iii) Satellite growth: The development of a satellite town is mainly due to the presence of one or more metropolis near it. A satellite town is generally situated beyond the green belt of the parent city. Though it has its own local government and corporate life, it depends upon a nearby large town or city for employment and other necessary goods and services.

iv)Scattered growth**:** In this case, the growth of a town takes place in a very irregular way resulting in traffic congestion, encroachment of industries on residential areas,slums, lack of parks and various other problems which prove to be too difficult to besolved in future.

*v) Planned growth:*In case of a planned growth, a town develops in a predeterminedline as conceived by the town planner. The overall growth of the town is controlled bythe enforcement of suitable rules and regulations with rational land use planning.

2) Growth according to direction:

With respect to direction, the growth of towns and cities can take place in the following two ways: (1) Horizontal growth – areal expansion of cities and (2) Vertical growth – vertical expansion adding to more number of skyscrapers.

9.9 LAND USE PLANNING AND MANAGEMENT IN URBAN ANDPERI-URBAN AREAS

Land use planningand management in urban and peri-urban areas pose one of the greatest challenges for sustainablefuture of growing cities. The limited spatial resources in the peri-urban areas provides many services to the city like production (agriculture and forestry), recreation, residence, waste disposal, and wildlifehabitats etc. This is accomplished by multifunctional land useswhere several activities are performed in a single piece of land. It is estimated that major part of the global population in the future will be living in the cities, and inevitably will be largely dependent on the peri-urban areas for several goods and services. In order to fulfil these demands, careful planning of peri-urban areas is of utmost importance.Moreover with rapid rural urban migration, planning of peri-urban area has become more challenging.While urban planning designates specific areas for housing, industry, trade facilities, green space, wastedeposal etc. in cities, no such plan exists for peri-urban areas. In today's world the delineation of cities are fairly clear, the modern cities of the 18th, 19thand 20th centuries sprawled into the countryside, structurally altering the land areas bythe emergence of houses and infrastructure, and functionally occupying vast areas dueto the demands of the urban dwellers. Densely built-up areas were denoted urban areas(including what many people refer to as suburban areas), whereas the transition zonebetween the urban areas and rural areas were denoted peri-urban areas, characterized bythe presence of numerous urban functions, but structurally in many ways resemblingrural areas with villages, fields, forests etc.The management of peri-urban regions is based on the acceptance of the intimateinterrelationship between the city and its surroundings. The failure to see and accept thisinterdependency implies a failure to plan and manage the human environment in asound and sustainable manner. The failure to accept the extent of the cities both asstructural and functional units may equally lead to incomplete and even disastrousdecisions.

So new urban patterns are emerging which is a combined result of constrains, preferential sitting, planning guidelines, demographics and existing urban pattern and availability of land. Urban planners need to take care of all the components of sustainable urban planning for inclusive urban development with not only their technical expertise but with continuous consultation with the various stakeholders at different levels of planning.

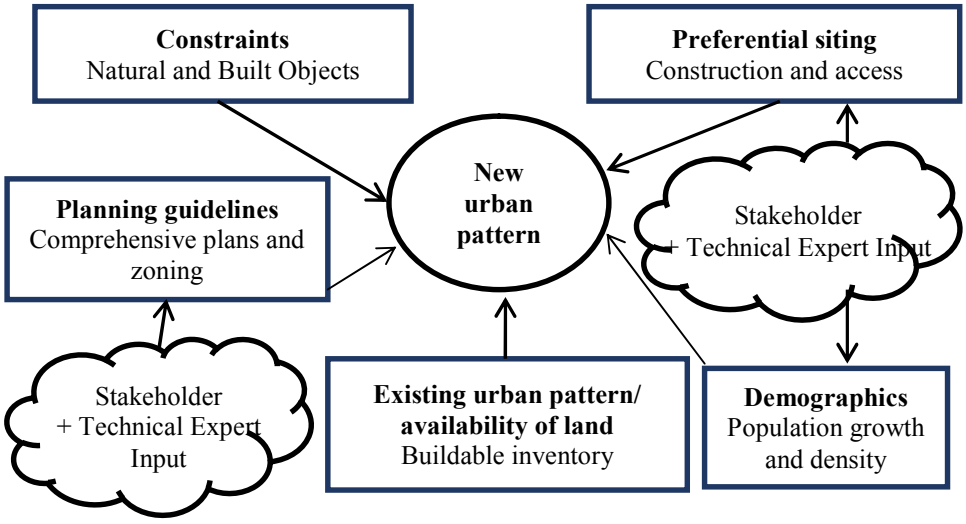
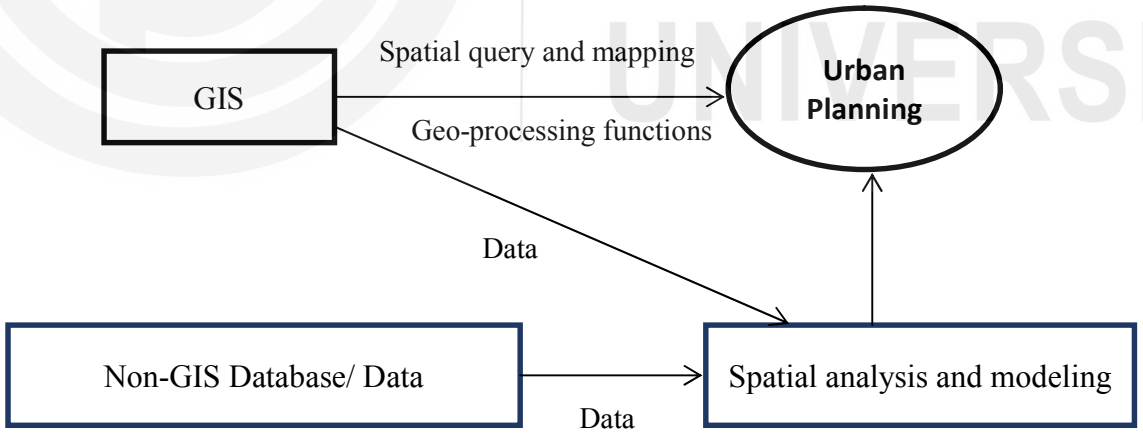


Figure 2: Process used to allocate urban land use

9.10 ROLE OF GIS IN URBAN LAND USE PLANNING

GIS is a formalised computer-based information system capable of integrating data from various sources to provide the information necessary for effective decision-making in urban planning. GIS is used both as aspatial database and as an analysis and modelling tool(Figure 3). Database management, visualisation, spatialanalysis, and spatial modelling are the main uses ofGIS in urban planning. The applications of GIS varyaccording to the different stages, levels, sectors and functions of urban planning.

GIS can be used for efficient dataretrieval, query and mapping. Data can be



GIS and urban planning

extracted from their databases and input them toother modelling and spatial analysis programs.When combined with data from other databases or specially conducted surveys,geographical information can be used to makeeffective planning decisions. Spatial analysis can be done usinggeo-processing functions such as map overlay,connectivity measurement, and buffering. Itcan be used to store land use maps and plans,socioeconomic data,

environmental data and planningapplications. Useful informationcan be extractedfrom the database through spatial query.

Mappingprovides the most powerful visualisation tools in GIS.It can be used to explore the distribution ofsocioeconomic and environmental data, and displaythe results of spatial analysis and modelling exercises.Spatial analysis and modelling are used for spatialstatistical analysis, site selection, identification ofplanning action areas, land suitability analysis, landuse transport modelling, and impact assessment.The many benefits in using GIS in urban planning according to Royal Town Planning Institute 1992 are listed below:

- improved mapping – better access to maps,improved map currency, more effective thematicmapping, and reduced storage cost;
- greater efficiency in retrieval of information -faster and more extensive access to the types ofgeographical information important to planningand the ability to explore a wider range of 'whatif" scenarios;
- improved quality of services, for example speedieraccess to information for planning applicationprocessing, better communication to the public and staff

The most frequentlyinvolved sectors of urban planning are land use,transport, housing, land development, andenvironment. There are many applications of GIS in the land use, transport, housing, land development andenvironmental sectors. For example it is used in siteselection and land suitability analysis, network analysis and route selection. GIS is moreuseful in modelling and development of planningoptions than in the determination of planningobjectives. The different stages in the urban planningprocess can be generalised as the determination ofobjectives, resource inventory, analysis of existingsituations, modelling and projection, development ofplanning options, selection of planning options, planimplementation, plan evaluation, monitoring and feedback.

Other main functions are Resource inventorywhere geographical information, when integrated wither mote sensing, can save time in collecting land useand environmental information. Remote sensingimages are important source of spatialinformation for urban areas and they can accurately help to detect land useand land use changes for whole urban area.GIS can help to store, manipulate, and analyse physical, social, and economic data of a city.GIS can help to identify areas of conflict of land development with the environment by overlaying existing land development on land suitability maps. Areas of environmental sensitivity can be identified using remote sensing and other environmental information.GIS can be used in the implementation of urbanplans by carrying out environmental impactassessment of proposed projects to evaluate andminimise the impact of development on theenvironment. Spatial modelling of spatial distributions makes it possible to estimate the widest range of impacts of existing trendsof population, and

of economic and environmental change.The use of GIS with multi-criteria decision analysis can provide the technical inputs in the selectionof planning options.

Check Your Progress Exercise 2

Note: a) Write your answer in about 50 words.

b) Check your answer with possible answers given at the end of the unit.

1) What are the components of land use planning?

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2) What is 'Transit Oriented Development'?

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3) Why do we need urban planners?

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9.11 LET US SUM UP

The different demands on land to different purposes in combination with a general shortage of land make overall planning and detailed management of regional landscapes increasingly necessary. Population pressure and increasing rural urban migration has put tremendous pressure on urban land resources. Therefore land of urban and peri-urban areas in particular has become an extremely important object for planning and management. Conflicting interests on land issues are inevitable as different sectors compete to occupy limited space available in the cities. In order to balance the

different and opposing land use interests, urban land use planning is mandatory in present urban development scenario.

9.12 KEY WORDS

Land use planning: Regulating the use of land for agriculture, industries, residential areas by a central authorityPeri-urban areas: Areas which are situated at the outskirts of cities.

GIS: A framework for gathering, analysing and managing data.

9.13 REFERENCES OR SUGGESTED READINGS

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9.14 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress Exercise 1

1) The term urban planning is used to indicate the arrangement of various components or units of a town or urban area in the best possible way for optimum utilization.

2) Land use planning refers to the process by which a society, through its institutions, decides where, within its territory, different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place.

3) The four essential ideals of any urban planning scheme are beauty, convenience, environment and health.

Check Your Progress Exercise 2

1) The components of land use planning are intelligence gathering, advance planning, problem solving and development management.

2) 'Transit Oriented Development' is encouraged where planning is focused around a transit node which facilitates complete ease of access to the transit facility thereby inducing people to prefer to walk and use public transportation over personal modes of transport

3) Your answer should include sustainable cities, ecological foot prints and efficient land uses.