



HUMAN SETTLEMENT AND PLANNING

Lectures Notes

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INTRODUCTION TO URBAN AND RURAL PLANNING

Urban and rural planning is a branch of spatial planning concerned with the development and organization of land use, infrastructure, and services in both urban and rural areas. It involves a systematic and strategic process aimed at improving the quality of life, ensuring sustainable development, and managing the growth of communities.

1. Definition

Urban and rural planning refers to the process of designing and regulating the use of space, focusing on the physical layout of settlements and the provision of services and infrastructure to meet the needs of current and future populations.

2. Purpose of Planning

- **Sustainable Development:** Balancing economic growth, environmental protection, and social equity.
- **Efficient Land Use:** Preventing urban sprawl and conserving rural land.
- **Improved Quality of Life:** Ensuring access to housing, transportation, education, healthcare, and green spaces.
- **Disaster Risk Reduction:** Planning for natural hazards and climate change resilience.

3. Key Differences Between Urban and Rural Planning

Aspect	Urban Planning	Rural Planning
Population Density	High	Low
Infrastructure	Complex systems (roads, transit, utilities)	Basic infrastructure (roads, water, etc.)

Aspect	Urban Planning	Rural Planning
Land Use	Diverse (residential, commercial, industrial)	Mainly agricultural or natural
Goals	Manage growth, reduce congestion	Support agriculture, preserve environment

4. Components of Urban and Rural Planning

- **Land Use Planning:** Allocation of land for different uses such as housing, industry, and agriculture.
 - **Transportation Planning:** Designing systems for movement of people and goods.
 - **Environmental Planning:** Ensuring development is eco-friendly and sustainable.
 - **Housing and Community Services:** Planning for adequate housing, education, and healthcare facilities.
 - **Economic Planning:** Encouraging economic development and job creation.
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5. Stakeholders in Planning

- Government (local, regional, national)
 - Urban and regional planners
 - Architects and engineers
 - Environmental experts
 - Community members and organizations
 - Private developers
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6. Planning Tools and Techniques

- Geographic Information Systems (GIS)
- Zoning regulations
- Master plans or development plans
- Environmental Impact Assessments (EIA)

- Public participation and consultation
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7. Challenges in Planning

- Rapid urbanization
 - Climate change
 - Inadequate infrastructure in rural areas
 - Informal settlements and housing shortages
 - Balancing development with environmental conservation
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8. Importance of Urban and Rural Planning

- Guides orderly growth and development
- Reduces poverty and improves access to services
- Promotes equity and inclusiveness
- Preserves cultural and natural heritage
- Ensures resilience and adaptability to future challenges

CITY MASTER PLAN

1. Definition

A **City Master Plan** (also called a Comprehensive Plan or Development Plan) is a long-term planning document that outlines the vision, policies, and strategies for the physical, economic, and social development of a city, typically over 20–30 years.

◆ Objectives of a City Master Plan

- Ensure **orderly urban growth** and sustainable development.
- Provide **adequate infrastructure** (roads, water, sanitation, power).
- Improve **housing, public services**, and living standards.
- Protect **natural resources** and the environment.

- Enhance **economic development** and employment.
 - Manage **land use** efficiently.
 - Encourage **social equity** and inclusion.
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◆ Key Components

1. Land Use Planning

- Residential, commercial, industrial, recreational zones
- Mixed-use development
- Transit-oriented development (TOD)

2. Transport and Mobility

- Road network, public transport, non-motorized transport (NMT)
- Traffic management and parking
- Integration with regional transport

3. Housing

- Affordable housing strategies
- Slum redevelopment
- Urban renewal programs

4. Infrastructure and Utilities

- Water supply, drainage, sewerage
- Solid waste management
- Power supply and telecommunications

5. Environment and Sustainability

- Green spaces, parks, urban forestry
- Climate resilience and disaster risk reduction
- Pollution control (air, water, noise)

6. Economic Development

- Industrial zones and economic corridors
- Support for small businesses and startups
- Tourism and cultural heritage

7. Social Infrastructure

- Education, healthcare, community centers
- Safety and security
- Inclusive planning for women, children, elderly, and disabled

8. Governance and Implementation

- Institutional framework

- Funding and investment strategies
 - Monitoring, review, and citizen participation
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◆ Planning Process

1. **Data Collection & Surveys**
 - Demographic, economic, environmental, and spatial data
 2. **Stakeholder Consultation**
 - Community engagement, public hearings, expert input
 3. **Visioning & Goal Setting**
 - Based on needs, trends, and projections
 4. **Drafting the Plan**
 - Maps, zoning, development controls
 5. **Approval and Implementation**
 - Legal backing, budgeting, and phasing
 6. **Monitoring & Review**
 - Periodic updates (usually every 5–10 years)
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◆ Challenges

- Land acquisition issues
 - Urban sprawl and informal settlements
 - Financing and investment
 - Coordination among agencies
 - Political interference
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◆ Examples of Tools Used

- Geographic Information Systems (GIS)
- Remote sensing and satellite data
- 3D modeling and simulations
- Public participation platforms

SURVEY

1. Definition of Survey

A **survey** is the scientific method of determining the relative positions of points on, above, or below the earth's surface by measuring distances, angles, and elevations. It helps in mapping and planning infrastructure, land development, and resource management.

◆ 2. Objectives of Surveying

- Determine land boundaries and ownership.
 - Collect data for **mapping and planning** (e.g., roads, buildings, cities).
 - Measure **topography** (elevations, slopes, natural features).
 - Support **construction projects** with precise layout.
 - Facilitate **city planning, zoning, and land use management**.
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◆ 3. Principles of Surveying

1. **Working from Whole to Part**
 - A control framework is established first, and details are added later to minimize error.
 2. **Location by Measurement**
 - Points are located by measuring distances and angles from known points.
 3. **Consistency in Measurement**
 - Use of standardized methods and instruments to maintain accuracy.
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◆ 4. Types of Surveys

Type	Description
Land Survey	Measures land features for ownership and planning.
Topographic Survey	Shows natural and man-made features (e.g., rivers, buildings).
Cadastral Survey	Determines property boundaries and land parcels.
Engineering Survey	Used for design and construction of infrastructure.
Geodetic Survey	Large-scale surveys considering earth's curvature.
Hydrographic Survey	Measures underwater features (rivers, lakes, seas).
Aerial/Remote Sensing	Uses drones/satellites to collect geographic data.

◆ 5. Methods of Surveying

1. **Chain Surveying**
 - Uses chains or tapes to measure distances.
 - Suitable for small, flat areas.
 2. **Compass Surveying**
 - Uses compass and tape.
 - Records bearings and distances.
 3. **Plane Table Surveying**
 - Field-based, uses a drawing board mounted on a tripod.
 4. **Levelling**
 - Measures elevation differences.
 - Used in road design, drainage, construction.
 5. **Theodolite Surveying**
 - Measures horizontal and vertical angles accurately.
 6. **Total Station Surveying**
 - Electronic instrument combining theodolite and EDM.
 - Measures angles, distances, and coordinates.
 7. **GPS Surveying**
 - Satellite-based method to determine precise locations.
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◆ 6. Survey Instruments

- **Chain/Tape** – For linear measurements.
 - **Compass** – For bearing angles.
 - **Level** – For height/elevation.
 - **Theodolite** – For precise angle measurement.
 - **Total Station** – Digital, advanced surveying.
 - **GPS Receiver** – For global positioning.
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◆ 7. Uses of Surveying

- Urban and regional planning
 - Construction and civil engineering
 - Land subdivision and legal documentation
 - Infrastructure development (roads, bridges, pipelines)
 - Environmental monitoring and natural resource management
 - Disaster management and flood mapping
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◆ 8. Errors in Surveying

- **Systematic Errors** – Due to faulty instrument or method.
- **Random Errors** – Due to unknown/unpredictable variations.
- **Blunders** – Human mistakes like incorrect reading.

Minimization Techniques:

- Regular calibration of instruments
- Cross-checking measurements
- Using standardized procedures

◆ 9. Importance in Urban Planning

- Base data for **City Master Plans**
- Identification of **land use patterns**
- Supporting **transport network design**
- Aiding **utility services layout** (water, sewer, electricity)
- Planning **green zones, public amenities, housing**

ZONING

1. Definition of Zoning

Zoning is the process of dividing a city or region into sections (zones) to regulate the use, form, and function of land and buildings. It is a key tool used in **urban planning** to control development and ensure orderly growth.

◆ 2. Purpose of Zoning

- Ensure **compatible land uses**
 - Prevent **urban chaos and overcrowding**
 - Promote **public health, safety, and welfare**
 - Guide **infrastructure development**
 - Encourage **sustainable urban growth**
 - Protect **natural resources and heritage**
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◆ 3. Types of Zoning

Type	Description
Residential Zoning	For housing (e.g., single-family, multi-family dwellings)
Commercial Zoning	For businesses, offices, shops, and malls
Industrial Zoning	For factories, warehouses, and manufacturing units
Mixed-Use Zoning	Combines residential, commercial, or other uses
Agricultural Zoning	For farming and rural land preservation
Recreational/Open Space Zoning	Parks, green belts, and play areas
Institutional Zoning	Schools, hospitals, government buildings
Special/Heritage Zoning	For historical or environmentally sensitive areas

◆ 4. Zoning Components

- **Land Use Regulation:** Specifies permitted and prohibited activities.
 - **Floor Area Ratio (FAR):** Ratio of building floor area to plot size.
 - **Building Height Limits:** To control skyline and congestion.
 - **Setback Requirements:** Minimum open space around buildings.
 - **Density Control:** Number of units or people per area.
 - **Parking Requirements:** Based on building use/type.
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◆ 5. Zoning Maps

- Graphical representation of zones within a city.
 - Color-coded based on zoning types.
 - Used by planners, developers, and the public to understand land use regulations.
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◆ 6. Zoning Laws and Regulations

- Enforced by **urban local bodies** (e.g., municipalities).
 - Often part of a **Development Control Regulation (DCR)** or **Building By-laws**.
 - Zoning changes may require public consultation and approval.
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◆ 7. Advantages of Zoning

- Organizes urban space efficiently.
 - Reduces conflicts between incompatible land uses (e.g., factories next to homes).
 - Supports environmental protection.
 - Improves quality of life through better layout.
 - Enhances property values through certainty and regulation.
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◆ 8. Disadvantages of Zoning

- May restrict development flexibility.
 - Can lead to **segregation** (e.g., economic or social).
 - Zoning changes can be influenced by politics or corruption.
 - Risk of **urban sprawl** if not managed properly.
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◆ 9. Modern Zoning Trends

- **Form-Based Codes:** Focus on building form rather than use.
 - **Performance Zoning:** Based on environmental or impact criteria.
 - **Inclusionary Zoning:** Requires a share of affordable housing.
 - **Smart Zoning:** Integrates technology and data in zoning decisions.
 - **Transit-Oriented Zoning:** Higher density near public transport hubs.
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◆ 10. Zoning in City Master Plan

- Acts as the implementation tool for land use proposals.
- Ensures land is used according to the **vision of the master plan**.
- Helps in regulating future growth patterns.

HOUSING

Definition of Housing

Housing refers to buildings or structures that individuals or families occupy as living space. It includes not only the physical shelter but also access to **basic services, security, and a healthy environment**.

◆ 2. Importance of Housing

- Basic **human need** and a fundamental right.
 - Provides **shelter, safety**, and **privacy**.
 - Supports **health, well-being**, and **social stability**.
 - Drives **economic development** (construction, real estate).
 - Plays a role in **urban form and planning**.
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◆ 3. Types of Housing

Type	Description
Detached Houses	Independent homes with open space around them.
Semi-detached Houses	Two units sharing a common wall.
Apartments/Flats	Multi-story residential buildings with multiple units.
Slums/Informal Housing	Unregulated housing lacking basic services.
Public Housing	Government-provided housing for low-income groups.
Cooperative Housing	Owned collectively by a group of residents.
Rental Housing	Occupied by tenants who pay rent to owners.

◆ 4. Key Components of Housing

- **Structure** (walls, roof, rooms, ventilation)
 - **Water supply**
 - **Sanitation and toilets**
 - **Electricity**
 - **Access roads**
 - **Open space/play area**
 - **Waste disposal systems**
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◆ 5. Factors Influencing Housing

- **Population growth**
- **Income and affordability**
- **Land availability and cost**

- Government policy and regulation
 - Urbanization and migration
 - Natural disasters and climate
 - Cultural and lifestyle preferences
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◆ 6. Housing Problems in Urban Areas

- Shortage of affordable housing
 - Slum formation
 - Overcrowding
 - Poor quality construction
 - Lack of basic infrastructure
 - Rising land prices
 - Displacement due to development projects
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◆ 7. Affordable Housing

- Housing that is **economically accessible** to low- and middle-income groups.
 - Usually defined as housing that costs **no more than 30% of household income**.
 - Requires **government intervention**, subsidies, or public-private partnerships.
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◆ 8. Government Housing Policies (India example)

Scheme	Purpose
PMAY (Pradhan Mantri Awas Yojana)	Affordable housing for all by 2022
Rajiv Awas Yojana	Slum-free cities
JNNURM	Infrastructure and housing for urban poor
State Housing Boards	Construct and allocate housing at state level

(Other countries have similar initiatives, like HUD in the USA or Social Housing in the UK.)

◆ 9. Sustainable Housing

- Use of **eco-friendly materials**
 - **Energy efficiency** (solar panels, insulation)
 - **Water conservation** (rainwater harvesting, low-flow fixtures)
 - Promotes **healthy indoor environment**
 - Reduces **carbon footprint**
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◆ 10. Role of Housing in Urban Planning

- Determines **density** and **urban sprawl**
 - Affects **transport demand**
 - Shapes **land use** patterns
 - Requires integration with **infrastructure** (schools, hospitals, roads)
 - Essential in creating **inclusive and livable cities**
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◆ 11. Smart Housing Concepts

- Use of **IoT and smart technologies** for energy, security, and automation.
 - **Smart homes** integrated with digital infrastructure.
 - Often linked to **smart city** development.
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◆ 12. Challenges in Housing Development

- Land acquisition and legal issues
- Financing and mortgage access
- Urban-rural housing gap
- Regulatory bottlenecks

- Resistance to vertical development in traditional communities

TRAFFIC AND TRANSPORT SYSTEM IN TOWNS AND CITIES

A well-designed urban traffic and transport system balances different modes of transport, prioritizes moving people over vehicles, and incorporates smart technology to enhance sustainability, efficiency, and equity. Key challenges in cities include congestion, pollution, and inadequate public transport, which can be addressed through integrated planning and innovative solutions.

Urban transportation modes

Mass public transit

- **Metro rail:** High-capacity systems that run on exclusive rights-of-way, offering fast and reliable service for large populations. Cities like Delhi, Kolkata, and Mumbai have extensive networks.
- **Suburban rail:** These systems provide regional rail connections for daily commuters, with dense networks in metropolitan regions like Mumbai and Chennai.
- **Bus systems:** Buses are a primary mode of public transport in Indian cities, offering flexible routes. Bus Rapid Transit (BRT) systems, with dedicated lanes, are a successful implementation in cities like Ahmedabad and Pune.
- **Tram:** Kolkata has a long-established tram service, and other cities use light rail transit (LRT).

Intermediate public transport (IPT)

- **Auto-rickshaws and taxis:** Provide flexible, last-mile connectivity, and are especially prevalent in smaller cities where formal public transport is less developed.
- **E-rickshaws:** Electric variants of rickshaws that are gaining popularity due to their low running costs and environmental benefits.
- **Shared taxis and minibuses:** Informal and privately-owned systems that fill gaps in public transport coverage.

Private and non-motorized transport (NMT)

- **Automobiles and two-wheelers:** While offering convenience, the high number of personal vehicles contributes significantly to traffic congestion and air pollution. Two-wheelers are especially popular due to fuel efficiency and maneuverability.
- **Walking and cycling:** Promoting walking and cycling through dedicated lanes and pathways is crucial for short-distance travel and reducing traffic.

Urban transport challenges

- **Traffic congestion:** Rapid motorization and population growth have outpaced infrastructure development, leading to traffic jams and gridlock, especially during peak hours.
- **Air and noise pollution:** High vehicular emissions significantly impact air quality and public health. Noise pollution also deteriorates the quality of life.
- **Inadequate public transport:** Many cities lack sufficient and well-maintained public transport options, driving people towards personal vehicles. Overcrowding and unreliable service are common issues.
- **Equity and accessibility:** Public transport costs can disproportionately burden low-income households. Additionally, poorly planned systems can limit mobility for vulnerable groups, including women and the disabled.
- **Ineffective traffic management:** Traditional, fixed-time traffic signals often fail to adapt to real-time traffic conditions, causing unnecessary delays.
- **Urban freight issues:** The movement of goods, especially "last-mile" delivery, contributes to traffic congestion and emissions, with demand projected to increase.

Solutions and strategies

Integrated planning and policy

- **Transit-Oriented Development (TOD):** Creating dense, walkable urban spaces around mass transit hubs to reduce travel distances and dependence on cars.
- **Integrated land-use and transport planning:** Ensuring coordinated development of land and transport networks to create more livable cities.
- **Unified Metropolitan Transport Authority (UMTA):** A high-level body to ensure better coordination among various transport and planning agencies.

Smart technology and innovation

- **Intelligent Traffic Management Systems (ITS):** Using sensors, data analytics, and AI to monitor traffic in real-time, enabling dynamic and adaptive signal control to reduce congestion.
- **Mobility as a Service (MaaS):** Integrating various public and private transport options into a single digital platform to provide seamless, multi-modal travel planning.
- **Smart parking:** Technologies that guide drivers to available parking spots, reducing the time spent searching and contributing to congestion.
- **Electric Vehicles (EVs):** Promoting electric two-wheelers, buses, and other vehicles to reduce emissions and urban pollution.

Promoting sustainable mobility

- **Improved public transit:** Enhancing bus and rail systems to make them more reliable, comfortable, frequent, and accessible to attract more users.
- **Dedicated lanes:** Implementing dedicated lanes for buses and other high-capacity transit to improve speed and reliability.
- **Non-motorized transport (NMT) infrastructure:** Creating dedicated pedestrian walkways and cycle lanes to promote walking and cycling for short distances.
- **Demand management:** Using measures like congestion pricing, high parking fees, and restrictions on personal vehicle usage to discourage private car use in crowded areas.

Freight and logistics management

- **Off-peak deliveries:** Encouraging or mandating urban freight transport during off-peak hours to reduce congestion during the day.
- **Digitalization:** Using intelligent transport services and digital platforms to manage freight traffic efficiently.



Traffic Saturated Cities

Vehicle flood creates congestion and harms alternatives creating vicious cycles that escalate quickly in large, dense cities without ROW A mass transit

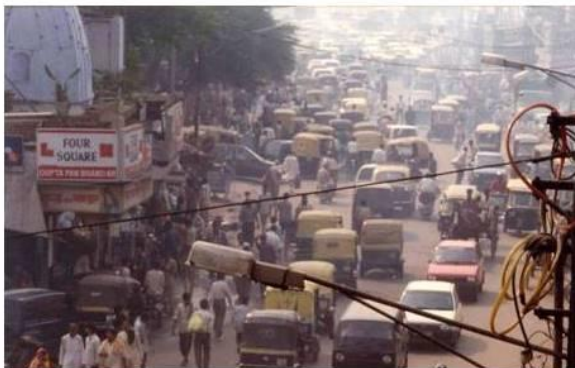
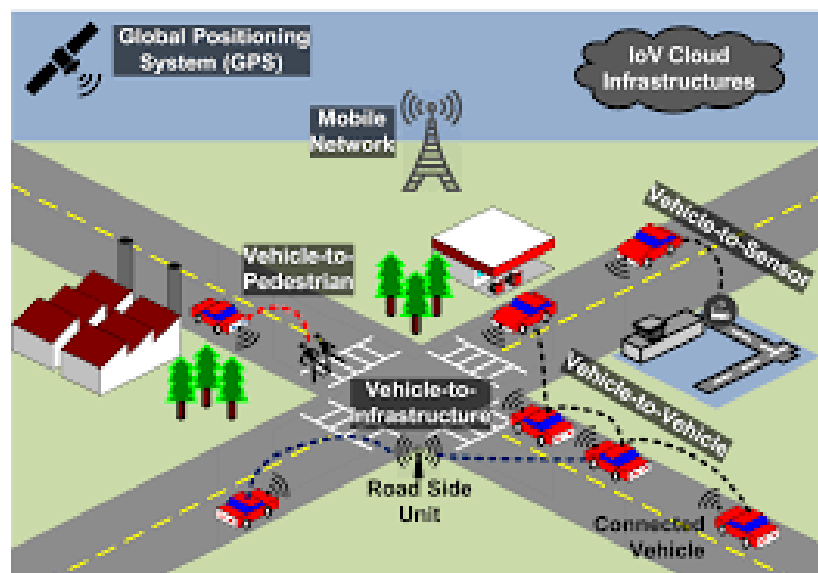
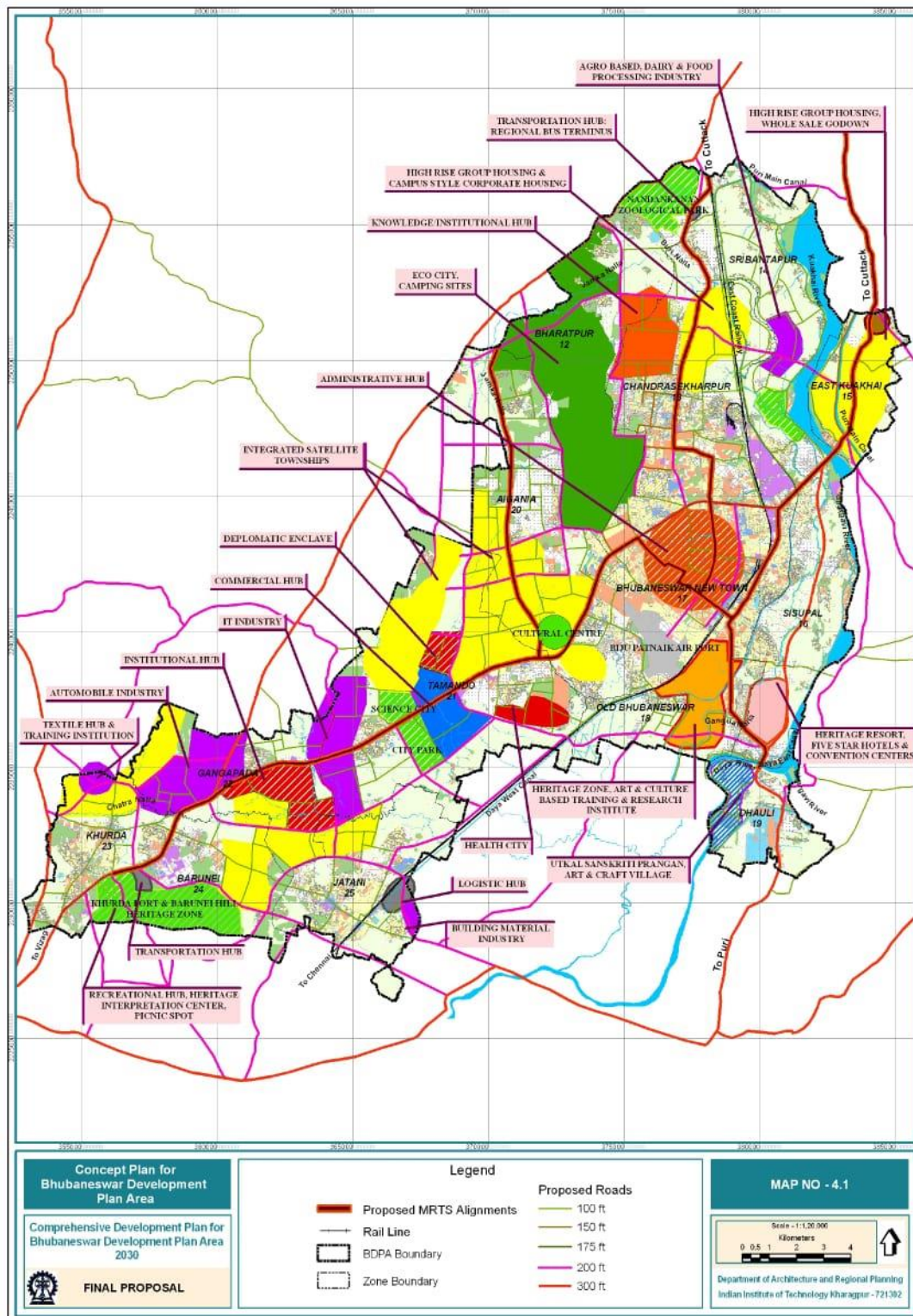


Image Source: GIZ-SUTP



BHUBANESWAR MASTER PLAN



Bhubaneswar's master plan and comprehensive development plans (CDPs) have been widely appraised for their ambitious goals, but also criticized for their implementation challenges. The Bhubaneswar Development Authority (BDA) has received recognition for a participatory planning approach and has proposed significant infrastructure upgrades. However, rapid, and often unplanned, growth has created various issues, leading to new initiatives like the "Bhubaneswar New City Project" to address ongoing problems.

Appraisals and successes

- **Smart City recognition:** Bhubaneswar was named a top-performing Smart City by Juniper Research and received international awards, including the Pierre L'Enfant International Planning Excellence Award.
- **Structured development:** The original master plan, designed by German-Jewish architect Otto Koenigsberger, created a well-structured city with excellent road networks.
- **Citizen participation:** The Smart City proposal shifted focus towards a more citizen-led planning process, leading to various projects centered on public feedback.
- **Heritage development:** An area of 1,112 acres in Old Town is identified as a Heritage District, with projects initiated for streetscape design and conservation of monuments.
- **Infrastructure development:** The BDA has undertaken large-scale projects, including a multi-modal hub at the railway station, a ring road, and the "Complete Street Project," which prioritizes pedestrians and cyclists.
- **Planned new townships:** Plans are in place for new developments in areas like Chandrasekharapur, Aigania, Tamando, and Gangapada to address the growing housing shortage.
- **Technology integration:** The "Bhubaneswar One" web-based map portal, built with GIS data, was developed to aid planning.

Criticisms and challenges

- **Unsustainable and unbalanced growth:** Rapid urban sprawl has replaced farmlands and marshy lands, leading to environmental degradation. There is a

marked north-south divide, with unbalanced growth between planned and unplanned areas.

- **Lack of participation in implementation:** While plans emphasize participation, critics argue that implementation is often a top-down process dominated by politicians and bureaucrats, leaving little room for public input.
- **Environmental impact:** Forest areas like Nandankanan and Khandagiri have been reduced, and natural drainage channels have been encroached upon, leading to flooding during heavy rains. There is a lack of long-term climate change measures.
- **Infrastructure deficits:** Despite modern projects, problems like waterlogging, an inefficient sewerage system, and inadequate social infrastructure persist. Many traffic signals are not operational and are managed manually.
- **Weak enforcement:** The original gridiron street pattern is losing control due to mixed land uses and unauthorized construction, particularly on agricultural and restricted lands.
- **Erosion of original vision:** The original architectural philosophy of Koenigsberger, which favored egalitarian and community spaces, has been eroded over time in favor of grander, more intimidating government buildings.
- **Inadequate housing and services:** Despite new housing projects, the city faces a significant backlog and qualitative shortage of dwelling units to meet the projected population growth.
- **Incomplete planning:** Some developments, like the ring road, are being built in phases using town planning schemes, which rely on land pooling and redistribution. While efficient, this approach can be slow and may face local objections.

Recent and future plans

- **Bhubaneswar New City Project:** In September 2025, the Odisha Cabinet approved a new urban development project over 800 acres within the BDPA, with an estimated investment of ₹8,179 crore. It aims to create a modern, inclusive hub with sustainable urban living principles and is being designed with Singapore-based consultancy Surbana Jurong.

- **Long-term drainage plan:** A high-level meeting was held in August 2025 to review and finalize a long-term drainage master plan up to 2050 to address urban flooding and climate resilience.
- **Revised Comprehensive Development Plan:** The BDA is updating the Comprehensive Development Plan 2030 to reflect the city's current growth, particularly focusing on zoning issues on the outskirts.
- **"Vision 2036":** The government aims to transform Bhubaneswar into a "smart city" like Singapore or Dubai by 2036, with an emphasis on technology-based development and affordable housing.