



**SATHYABAMA**

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**SCHOOL OF BUILDING AND ENVIRONMENT**

**DEPARTMENT OF ARCHITECTURE**

## **UNIT – I – Sustainable Urban Planning – SARA5331**

## I. UNIT 1

### Prehistoric Settlements

Pre Historic Urban planning in

- GREECE Prius
- ITALY Siena
- PERSIA Timbuktu
- INDIA Harappa & Mohenjo daro

ECO-VILLAGE CONCEPTS PRINCIPLES AND CASE STUDY

- Findhorn, Scotland
- Kobunaki, Japan

PASSIVE CLIMATE DESIGN is to enable both indoor and outdoor comfort without the use of mechanical means or by burning out non renewable energy.

Historic settlements deployed passive measures in both architecture and urban planning.

Active measures are exclusive to Modern design principle, which finds itself detached from the surrounding and thus increasing the cost of energy to maintain comfort.

Passive measures is to accept the dynamics of nature and to establish a dialogue with nature and to react to the seasons of the year and time of the day.

Ancient Greece

The Town of Piraeus

Planner: Hippodamus of Miletus

Invention of formal Town planning is attributed to Hippodamus (498 BC)

Official planner in the government of 'Alexander'

Planned urban centers include Olynthus, Priene, Miletus and Piraeus

In 5th century BC, Piraeus was selected to be the port of Classical Greece.

Hippodamus planned the City for a population of 50,000 people.

Agora is named after the planner

Ancient Greece

Hippodamus helped to design the new harbor town of Piraeus, which served as a commercial port for Athens further inland.

His direct involvement in these cases remains unproven, but his name remains permanently associated with this type of plan that we call Hippodamian.

Rational town planning, with straight streets intersecting to form quadrilateral city blocks, had just been popularized in Greece by the architect Hippodamus. Aristotle objected that at least part of every city should preserve the haphazard arrangement of earlier times to make it more difficult for invaders to fight their way in.

Hippodamus arranged the buildings and the streets of Miletus around 450 BC such that the winds from the mountains and the sea close to Miletus could flow optimal through the city and provide a cooling during the hot summer.

Hippodamus first applied to his home city the grid plan which he had developed on inspiration from geometrically designed settlements, and that later many cities were laid out according to this plan. Miletus, which is a fine example of the grid plan, comprises houses on blocks created by streets and side streets crossing at right angles, with public buildings in the city centre, This plan retained in the Hellenistic period, however in the Roman period it began to

deteriorate gradually and inevitably.

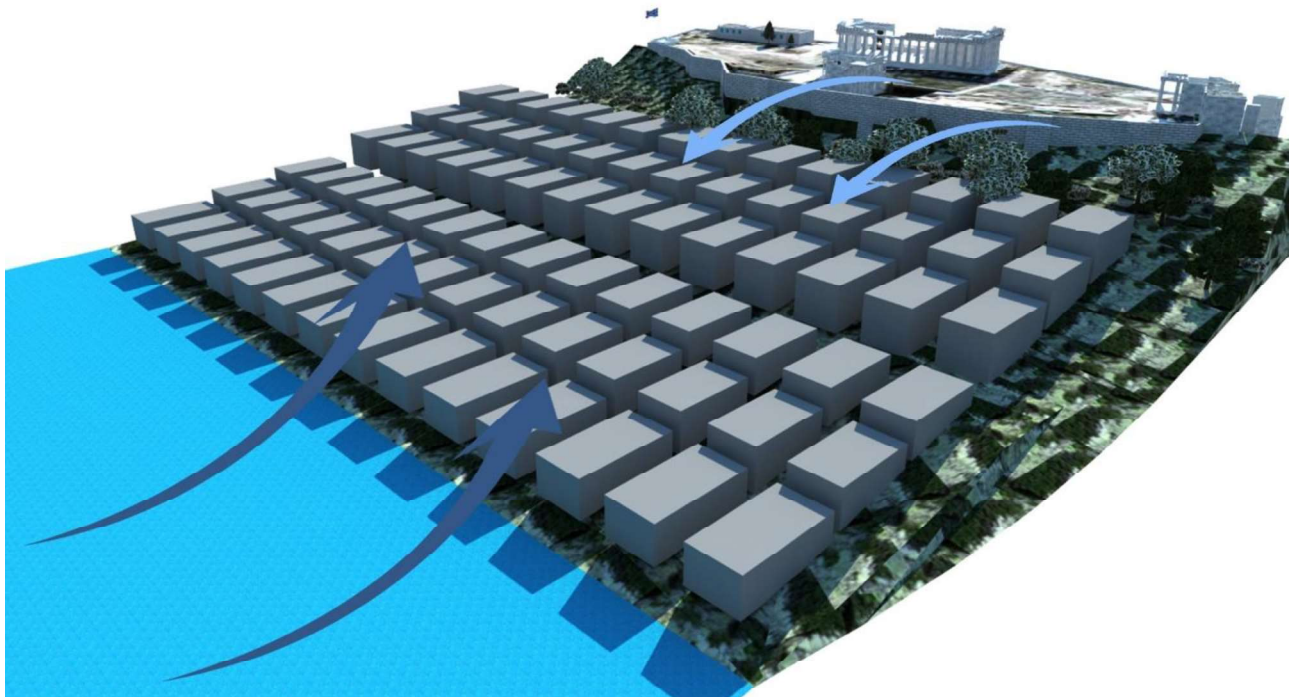
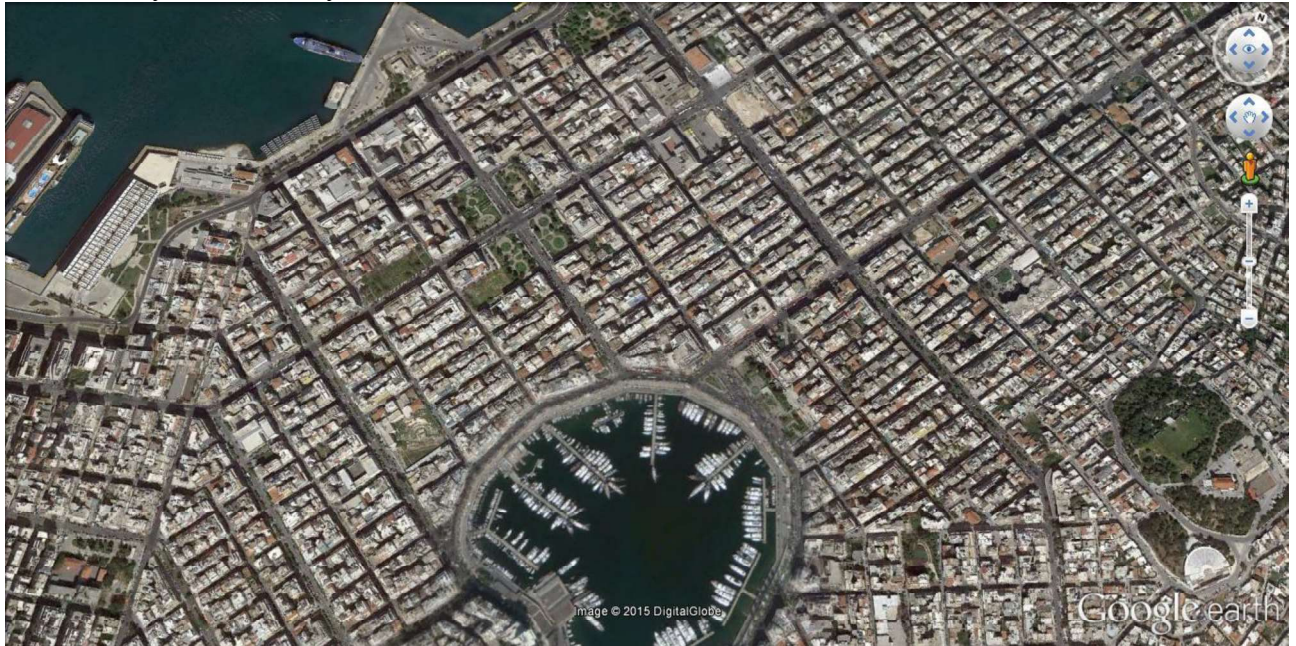
The Greeks were the first to use solar architecture. They oriented their houses to make use of the sun during winter, while obscuring its rays during summer and entire cities were built this way as early as 400 BC.

The Town of Piraeus

Largest port in Greece

Largest passenger port in Europe

12 Km away from the city centre of Athens



*Figure 1- Athens*



## Ancient Italy

### The Town of Siena

This Tuscan city developed on three hills connected by three major streets forming a Y-shape and intersecting in a valley that became the Piazza del Campo. The seven-kilometre long fortified wall still surrounds the 170-hectare site. Protected gates were doubled at strategic points, such as the Porta Camollia on the road to Florence. To the west, the walls embrace the Fort of Santa Barbara. Inside the walls towerhouses, palaces, churches and other religious structures survive. Also of note are the city's fountains that continue to be fed by an extensive system of original tunnels.

The city is a masterwork of dedication and inventiveness in which the buildings have been designed to fit into the overall planned urban fabric and also to form a whole with the surrounding cultural landscape.



*Figure 2 – Italy*

Eco-village are described by the Global Eco village Movement (2005) as Urban or rural communities of people, who strive to integrate a supportive social environment with a low impact way of life.

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## PERMACULTURE DESIGN

- Eco-village design is a new field of knowledge still under development.
- The concept of sustainability should play an increasing role in future urban development world-wide. In order to ensure ecological sustainability, cities around the world have to decrease their environmental footprint.
- Permaculture Design
- Co-housings and socially motivated eco-villages
- Cultural | Spiritual eco-villages
- Integrated eco-village design
- Case studies
- Permaculture design is ecologically oriented and developed for low impact lifestyle Initiated by Bill Mollison
- Permaculture design aims to reduce the ecological footprint by 80%.

- It is based in the values of "care of the earth and of people"
- Started as a single family private house concept
- Contours are followed and retained.
- All four directions are considered in planning to utilize or avoid exposure to wind and sun, frequency of rainfall , creating microclimates and capacity to retain water

#### Crystal Water Permaculture Village in Australia

- Food production, renewable energy production, recycling of waste and compost toilets.
- Whole idea is to create harmony with nature
- The placement and architecture of houses are based on these observations and follow ecological building principles.
- The same considerations are used for the placement and methods of food production activities, renewable energy production, wastewater treatment facilities, recycling of waste, compost toilets and green businesses.
- Restoration of natural habitats and diversity of nature are guiding principles of permaculture zones.
- In 1984, when Crystal Waters Permaculture Village was founded in northeastern Australia, it was the world's first permaculture village. Some 200 residents now live on 85 private one-acre lots, with another 500-some acres held in common as a wildlife sanctuary. As a consequence, kangaroos and wallabies are a common sight along the road.
- In a region plagued by extreme drought, Crystal Waters stands out as a sparkling oasis whose intricate network of dams channels rainwater into thriving streams and lakes.
- By rural Australian standards, the community is high-density; most homes deploy solar energy and rainwater catchment. Yet the nearest town is a 30-minute drive and the community itself is spread across five steep ridges, making Crystal Waters very much part of the dominant car culture.
- Residents enjoy their own bakery, a community center, and a monthly country market.
  - The balance of the hydrology was maintained, ensuring that the quality and quantity of the water downstream has not been negatively affected by Crystal Waters' development.
  - 17 dams were created and are multi-purpose –
    - increasing the 'edge',
    - providing access for traffic from ridge to ridge,
    - opportunities for aquaculture, climate moderation, recreation, beauty and habitat.
    - They provide a flood mitigation strategy; as they absorb runoff and the overflow is directed into the Mary River and Kilcoy Creek via specially placed swales.
    - They are also a source of emergency water.
  - Re-use and recycle are two catchcries of Permaculture. Evidence of this philosophy can be seen all around Crystal Waters, in the overall design and in individual lots. There has been a consciousness change towards human waste. It is not seen as someone else's problem but as a resource.
  - A long term sustainable approach is taken, particularly with regard to forestry. Trees have been planted with the intention that they provide habitat and moderate

environmental extremes, as well as various timber end uses.

- Buildings make extensive use of renewable materials such as earth and wood, with particular emphasis on solar passive design.

#### Social Eco-villages

Adding social values to the European life style is the major focus

- Very popular in Denmark where the concept of social living is lost and is being restored by Social Eco-villages
- Houses are built closely in clusters around a plaza or a playground putting Children's need first.
- Cars are typically kept on the periphery.
- Each cluster has 10-30 homes and the cluster being repeated to form the village.
- Concepts of bringing senior citizens and the youth to live together in the clusters to reduce ecological foot print
- Cases of physically or mentally handicapped are also integrated in to a cluster to increase "socialness".
- Hertha Eco Village, Denmark
- They reverse integrated "normal" people into a development planned for people with different mental abilities
- Everyone in their village is there because they believe that it is mutually beneficial for people of varying abilities to live in the same community together and share life and culture
- Resident workers are employed in the workshops at dairy farming, vegetable farming, cafeteria catering, laundry and weaving. They cook lunch for a local kindergarten and also make cheese from the milk they produce.
- Galten Denmark
- 137 people total
- Reverse integrated
- 26 of them differently abled
- Other residents are "normal"
- 21 years operating
- Rulolph Steiner inspired
- 1/3 of buildings Hertha Shared Housing & Workshops
- 2/3 of buildings are privately owned homes
- 24 hectares, farming 21.5 (59/53 acres)
- Built on only 7% of their land, Hertha farms the rest
- Vastu or Feng shui plays a major role in shaping these villages.

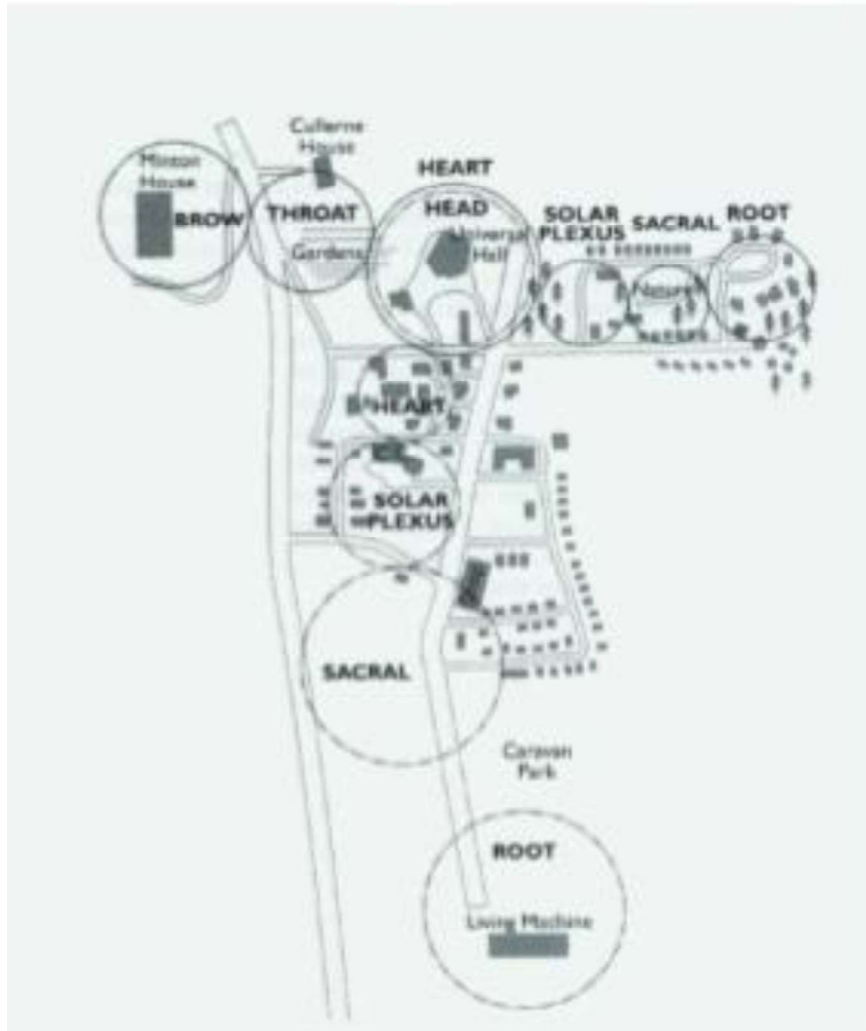
#### Cultural | Spiritual Eco-villages

Having a common cultural or social impulse is the driving factor in creating a village

- Here, the focus is on a central element that could be a temple (a place of worship in general) or meditation or seminar centers or celebration and cultural performance centers.
- Planning parameters are derived from the elements of nature like directions, seasons etc.
- This is further development of having a tree as the focus of a village for the villagers to gather around or having the temple at the focus for spiritual activity.

Cultural | Spiritual Eco-villages

Having a common cultural or social impulse is the driving factor in creating a village



*Findhorn's double chakra system. Peter Dawkins*

*Figure 3 – Findhorn*

Landscape temples (chakra systems as found in the landscape) represent a spiritual way of adjusting to place as defined and described by Peter Dawkins. He has analysed all of Europe as one chakra system, but also cities and parts of cities have their chakra energy structure, which you may adapt to consciously or unconsciously.

#### INTEGRATED ECO VILLAGE

1. Personal vehicle mobility should not hold the status of a basic right.
2. Large houses on large lots is not an acceptable aspiration.
3. Diversity of residents in a community is enriching.
4. Lower land costs per unit can be achieved at relatively



high densities while also ensuring an abundance of public spaces.

5. New urbanism's market is broader than is typical in conventional suburbia because of the diversity of accessible urban attractions.

6. Incorporation of a diversity of uses broadens the tax base for local authorities.

7. Higher-density development reduces set-up and maintenance costs of public infrastructure.

8. Neighborhood shops do not require the extensive shared-cost refurbishment which is common in malls.

#### Integrated Eco-village design

1. Alternative transportation
2. Renewable energy
3. Local organic food production
4. Renewable food distribution system
5. Turning waste into resource
6. Retaining or increasing water level
7. Recreation through Nature
8. Ecological jobs creation
9. Guidelines about population growth limit



*Figure 3 – Findhorn*

Case Study:

Findhorn, Scotland

New models of holistic sustainability since 1962, famous for the gardens grown in adverse sandy conditions.

1. 61 ecological buildings using natural non toxic materials respecting the environment, 4 wind



turbines and a biological Living Machine sewage treatment system

2. Breathing wall concept allowing the building fabric to interact with the human habitants.
3. Straw-bale construction and 'earthship' system of construction
4. Passive solar radiation to reduce heating needs such as larger openings in the South and minimal openings on the North. Solar panels for water heating.
5. Four wind turbines create 750 KW of power to make the village self sustainable. Electric, hybrid and fuel-cell vehicles.
6. To improve the cycle of water use for the settlement, a non chemical biological sewage treatment system called as the 'living machine' has been installed, creating a mini- ecosystem, mimicking the nature's own water cleaning system.
7. Extensive recycling program and organic food production.

- Findhorn Uses of passive solar features where possible through orientation and window layout.
- This Eco-village Uses of solar panels for domestic hot water heating. A district heating system using a gas condensing boiler for highest fuel efficiency. There is Super-efficient insulation in Findhorn (U-values of 0.2 watts/m<sup>2</sup>C in roof, walls and floors) (Dawson,2006). Using Low-energy light bulbs throughout, Triple glazing (U=1.65 watts/m<sup>2</sup> C),Cellulose insulation (made from recycled paper),Non-toxic organic paints and wood preservatives throughout are common in Findhorn (Ibid) .
- Another things about Findhorn: Isolating electrical circuits to reduce electromagnetic field stress.
- Water conservation (showers, low-flush toilets and self-closing taps). Collection and recycling of rainwater for garden use.
- Shared facilities (laundry, kitchens, lounges) avoiding unnecessary duplication. Simple timber frame construction and detailing, suitable for self building .

#### SARVODAYA ECO VILLAGE , SRILANKA

- Sarvodaya in Sri Lanka is another eco-village that was built before that the word eco-village came into the existence.
- Sarvodaya designed and introduced for 55 poor tsunami affected families. It was started in2006.
- A feature of this resettlement is its focus on ecological and sustainability.
- The total population will settle down in the eco-village is 245.
- Each home has a battery that stores power from a small roof-mounted solar panel.
- The only appliances for most houses are normally only lights, a radio or television .
- Use of renewable energy sources and Composting of organic waste are available in this eco-village.
- And in this ecovillage Roof top capture of rain water will contribute to production of fruit and vegetables

## Sarvodaya in Sri Lanka



Fig.4: Sarvodaya in Sri Lanka (Source: [www.gen.ecovillage.org](http://www.gen.ecovillage.org))



Fig.6: The edge of town recycling station emptied monthly in Sarvodaya (Source: [www.gen.ecovillage.org](http://www.gen.ecovillage.org))



### READINGS

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### VIDEO LINKS

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## **UNIT – II– Sustainable Urban Planning – SARA5331**

## **II. UNIT 2**

### **Post Industrial Settlements**

#### **ENHANCEMENT**

- IMPROVING ENVIRONMENTAL QUALITY
- ENERGY EFFICIENCY
- EFFICIENT RESOURCE MANAGEMENT

#### **URBAN DESIGN STRATEGY**

- TRANSPORTATION PLANNING
- EFFECTIVE NEIGHBOURHOODS
- LAND-USE ZONING
- LANDSCAPE
- ZERO DISCHARGE SITES AND COMMUNITIES

#### **OVERVIEW**

Urban Population

Urban Centres are where 75% of the male

- population is involved in non agricultural
- or fishing activities (UN Classification)

Historic Growth of

- Urban population:  
In 1950: 74.6 Crore out of 259 Crore (28 %)  
In 2014: 390 Crore out of 725 Crore (53 %)  
In 2050: 640 Crore (Estimate)

Cities with a Population of

- 1million (10 lakhs)  
In 1950: 5 Cities  
In 2014: 498 Cities
- 100 in China | 60 in India | 40 in USA

#### **Why is there a shift to Urban centers?**

Socio economic factor seeking better employment opportunities and in turn better standard of living

#### **Guidelines**

- Unplanned spontaneous development unable to cope with the increase in urban elements
- Governance is influenced by Political, social, economic, physical, infra structural and housing factors
- Urban inhabitants could live in a more sustainable way by reducing consumption and waste disposal.
- Over the longer term, progressive outcome might be socially engineered, as a policy and rough environmental justice.
- Along this path 'sustainability', a former 'specialism', is now becoming a core philosophical 'generalism' for urban and regional planning.



Figure -7 Urban Planning

*Urban Planning: programs pursued in most industrialized countries in an attempt to achieve certain social and economic objectives, in particular to shape and improve the urban environment in which increasing proportions of the world's population spend their lives. Encyclopedia Britannica*

### Challenges of sustainable urban planning And development

- Population explosion
- Vehicular increase (private & commercial)
- Underdeveloped Public Transportation
- Emission and Pollution
- Poor Waste discharge management
- Safety and security issues
- Water supply and sanitation
- Reduction in green cover
- Infra structure deficiency
- Toilet and sewage collection
- Climate responsive planning
- Overall imageability of the urban centre



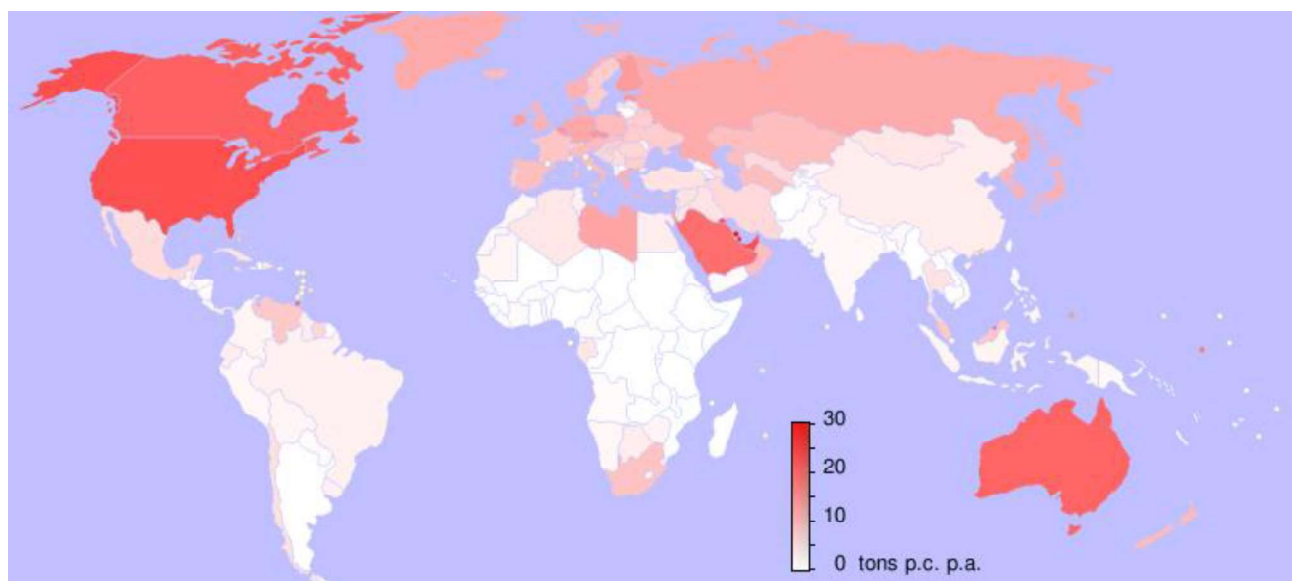
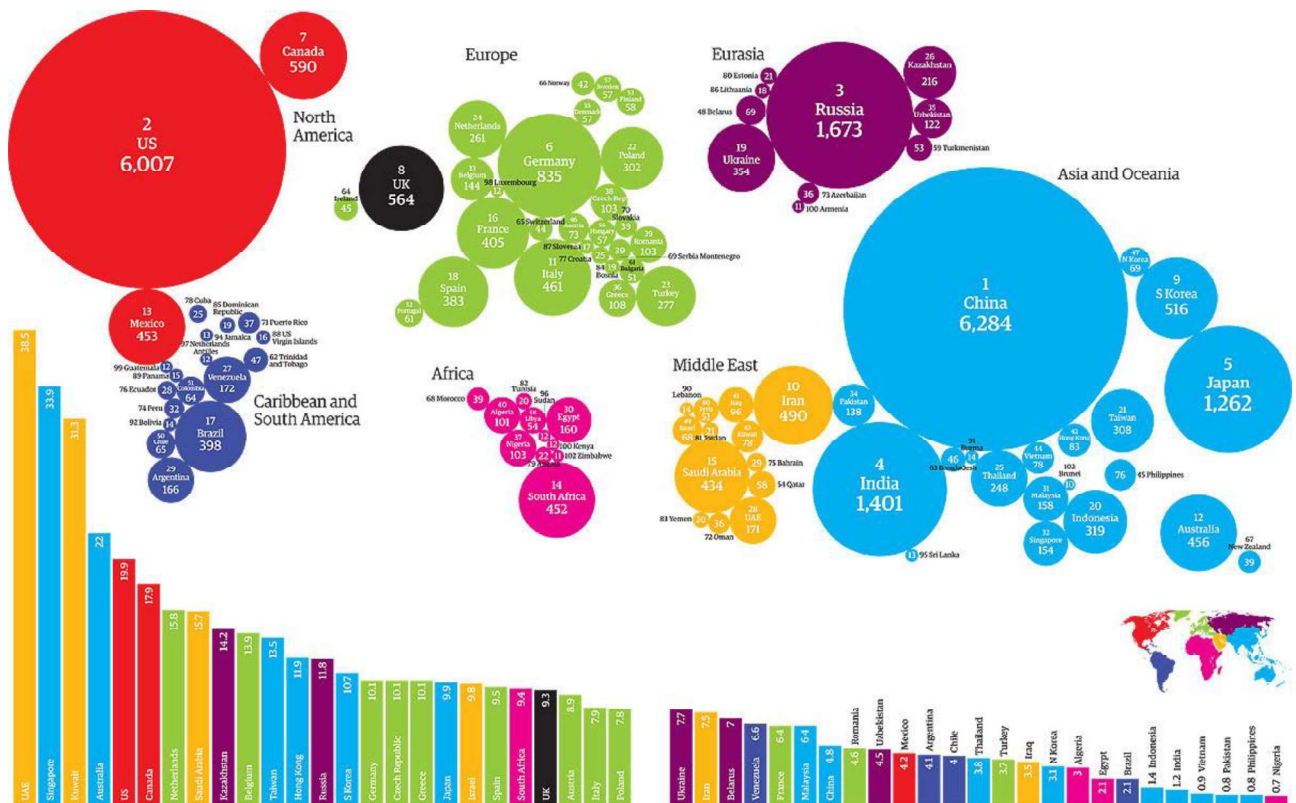


Figure 8 - Emission of Carbon Dioxide and Monoxide , Methane and Greenhouse gases

Exhaustion of finite energy such as Coal, Oil and natural gas  
 Impact of transportation and manufacturing  
 India ranks 133<sup>rd</sup> in the world (Carbon emission per capita)  
 But growing sustainably is key to developing countries

<b>'SMART' twentieth-century</b>	<b>'CLEVER' Twentyfirst century</b>
Dominion over nature	Harmony with nature
Command structures	Knowledge sharing
Material growth	Human fulfillment
<u>Mono-culturalism</u>	<u>Multi-culturalism</u>
International	Regional and local
National intervention	Local action and delivery
Bulk exporting	Niche exporting
Hard technology	Soft technology
Exploiting resource 'capital'	Living off resource 'interest'
Fordist production	Flexi-production
Land-use zoning	Sustainable planning
Driving a car	Walk-cycle-bus-train
Dump and forget	Repair-recycle-reuse
Urban expansion	Urban revitalization
Sprawl	Consolidation
Push through	Work around
Workplace employment	Home place employment
Postal services	<u>FAXing</u> and emailing
Impact assessment	Impact avoidance
Disposable packaging	Reusable packaging

*Figure 9 – Smart and Clever*

#### Impact of Built Density

- Building Footprint
- Urban Form
- Orientation of Street

on

#### Microclimate

- Light
- Ventilation
- Temperature

This affects the following

components in any urban scape.

- Population Density
- Vehicle usage and Fuel Consumption
- Local climate
- Public health
- Residential landscape

- Energy
- Waste management
- Safety

### Urban Sprawl

- One of the most significant sustainability issues facing the development of cities is urban sprawl.
- Urban sprawl is synonymous with the spread of cities and their characteristics of low-density suburban residential development, the predominance of detached housing and open streets and landscapes.

## Understanding Density

### ▪ Built Density | People Density

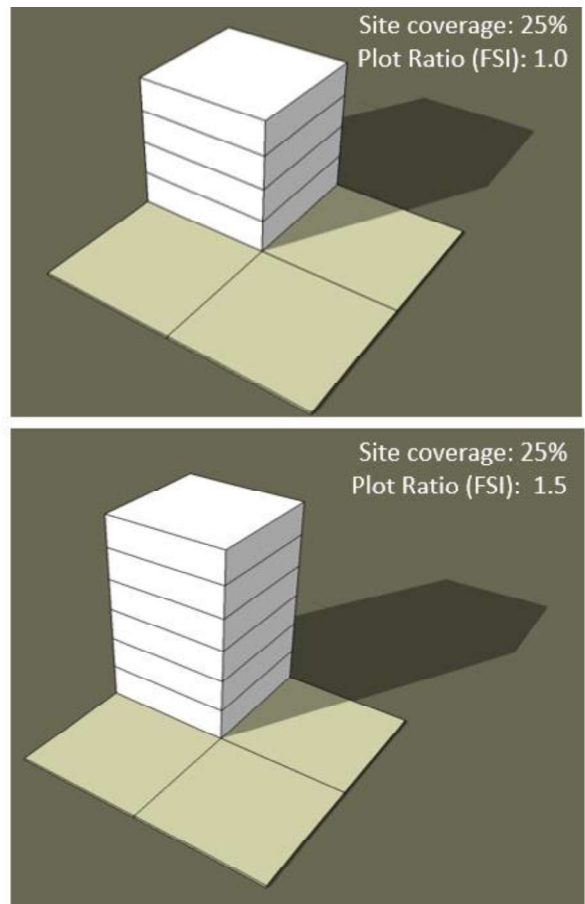
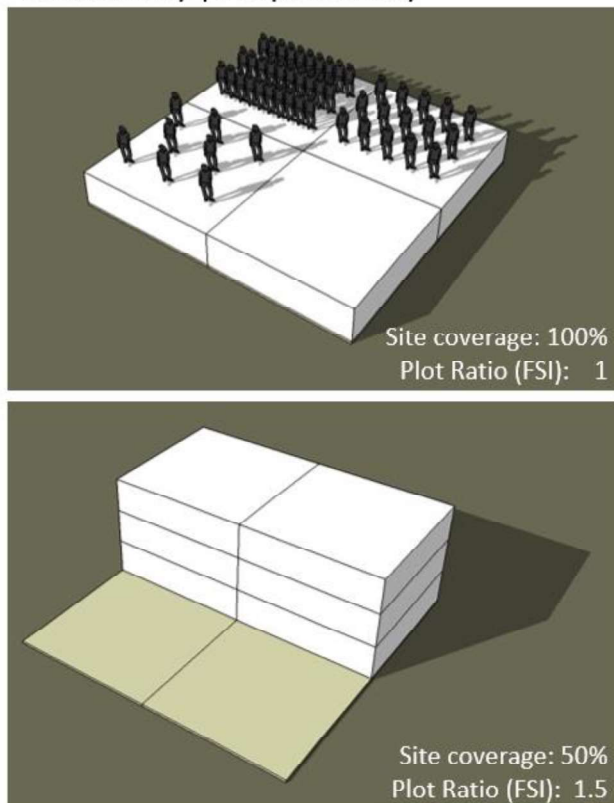
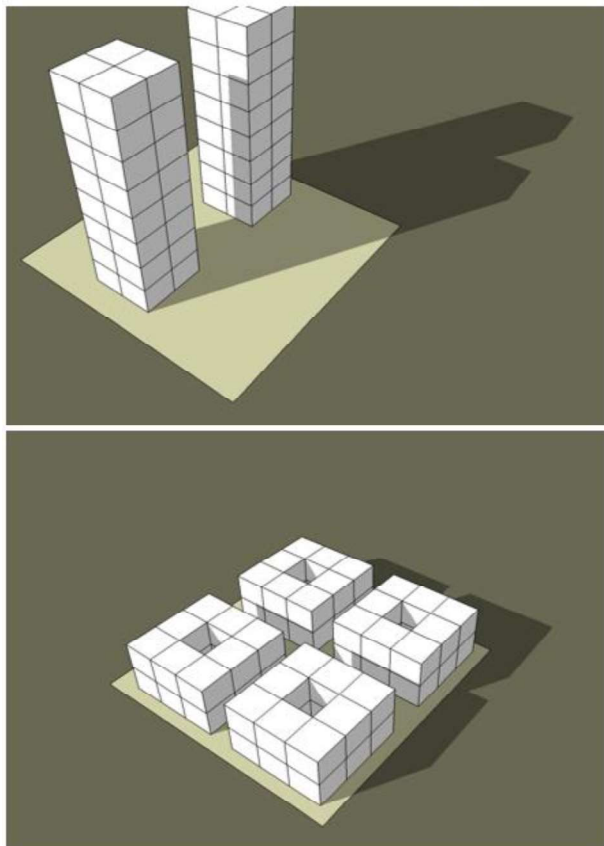


Figure 10 – Built Density1



## Understanding Density



What is the effect these different forms achieving the same volume of built density?

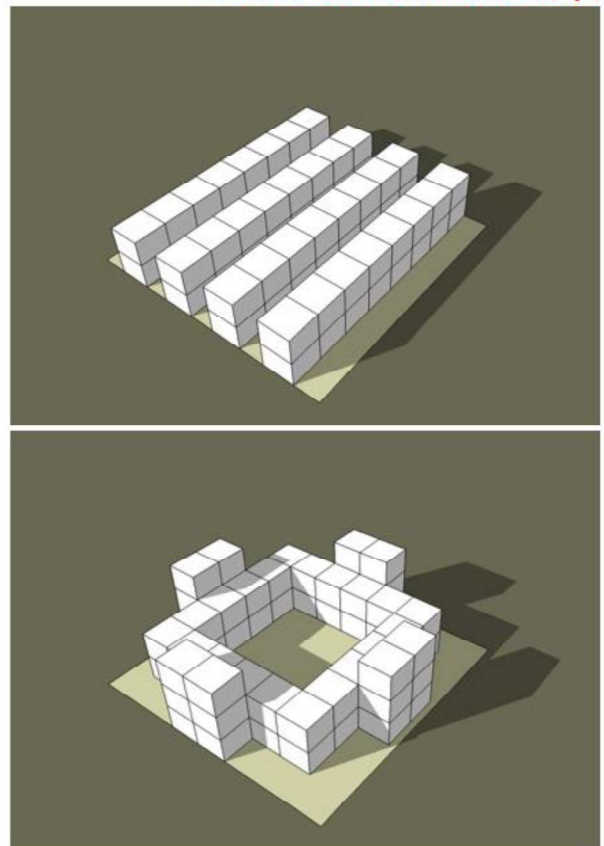


Figure 11 – Built Density 2

### High Density is the solution

Rapid urbanization has exerted tremendous pressure on urban development in many cities and has been confronted with the scarce supply of land in urban areas; densification has also become an important agenda in planning policies. High-density development has consequently been a topic of increasing interest worldwide.

- Urban Climate in Dense cities
- Urban Ventilation
- Thermal Comfort
- Urban environment diversity
- Natural Ventilation in high density
- Sound environment
- Design for Day lighting
- Waste minimization
- Sustainable Compact cities
- Microclimate in public Housing

### Urban Climate in Dense cities

The reasons for a special urban climate are heat storage, trapping of radiation, increasing roughness and less evaporation, which are seen in cities worldwide but are most evident in densely built-up megacities. With this the urban heat island is a storage of solar energy in the urban fabric during the day and the release of energy into the atmosphere at night. The process of urbanization and development alters the balance between the energy from the sun used for

raising air temperature (heating process) and that used for evaporation (cooling process)

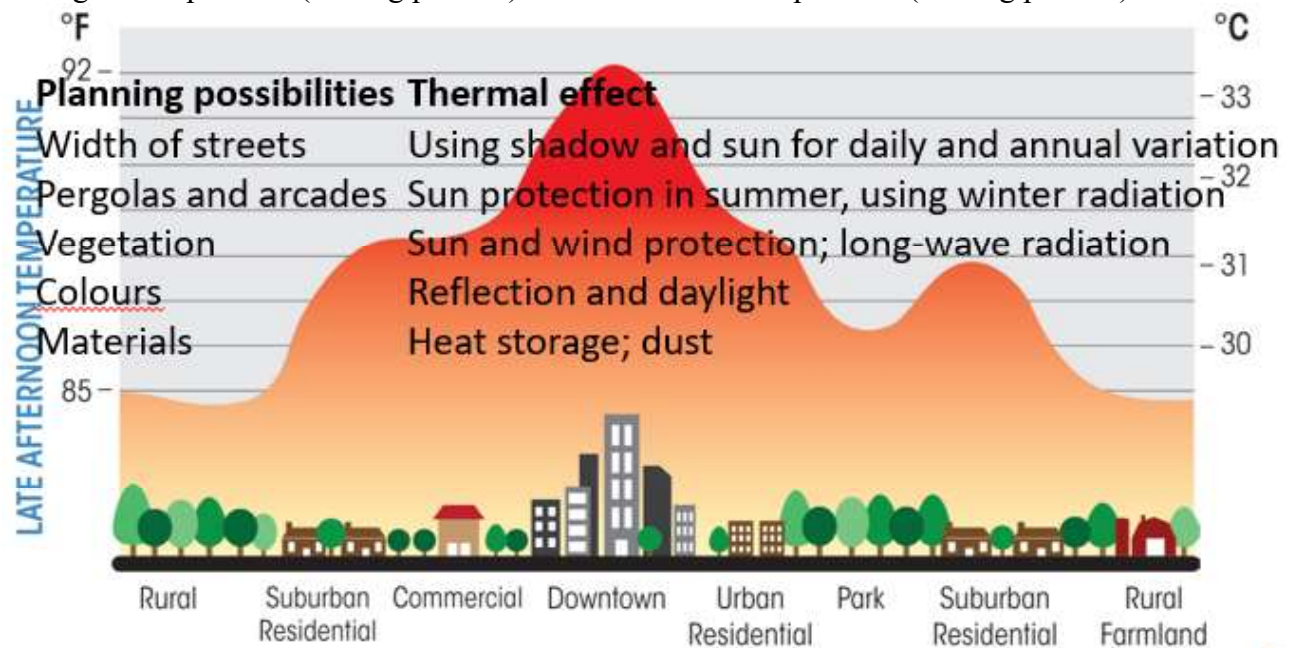


Figure 12 – Heat Island Effect

## Thermal Comfort

The heat exchange of the human body with the environment is governed by physical processes of heat flow (convection and radiation) and by heat loss through evaporation, and takes place at the skin's surface. Skin temperature over the body is not constant.

### Convection

Convection is the process of heat exchange between the skin and the surrounding air. It can be either positive (heat gain) or negative (heat loss), depending upon the relationship between the skin and air temperatures.

### Air speed and evaporative cooling

The speed of air around the body also affects the rate of sweat evaporation, per unit area, from the skin. Physiological cooling by evaporation occurs in two ways: first, continuous cooling by water evaporation in the lungs and then cooling of the skin by sweat evaporation.

### Radiation

Two types of radiation have to be considered when dealing with comfort in the context of cities: solar radiation when dealing with comfort in outdoor spaces, and infrared (heat) radiation when dealing with comfort inside buildings.

## Urban Ventilation

### Breezeway/air path

It is important for better urban air ventilation in a dense, hot humid city to let more wind penetrate through the urban district. Breezeways can occur in the form of roads, open spaces and low-rise building corridors through which air reaches inner parts of urbanized areas largely occupied by high-rise buildings.

Projecting obstructions over breezeways/air paths should be avoided to minimize wind blockage.

### Orientation of street grids

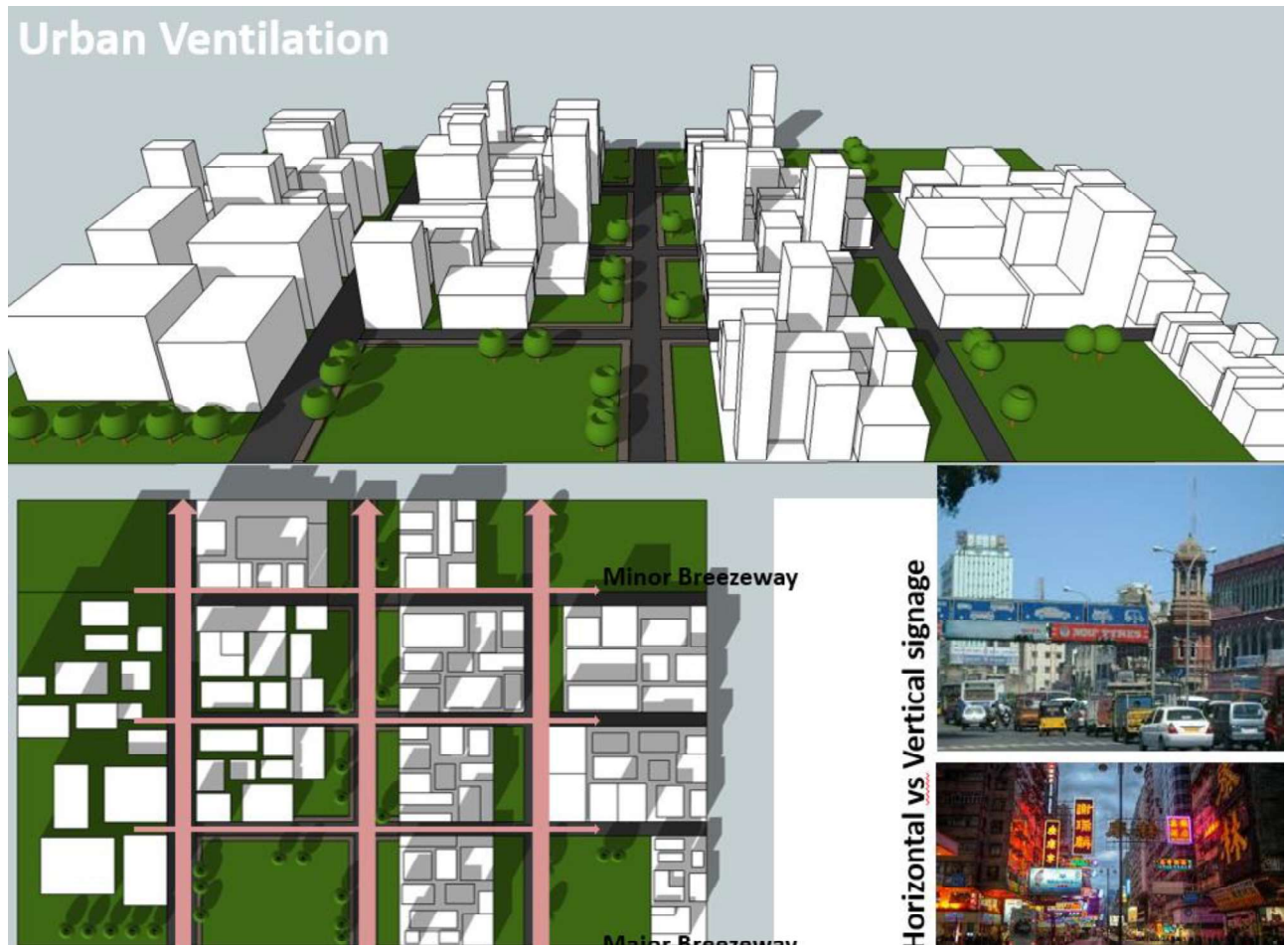
An array of main streets, wide main avenues and/or breezeways should be aligned in parallel, or up to 30 degrees to the prevailing wind direction, in order to maximize the penetration of prevailing wind through the district.

### Linkage of open spaces

Where possible, open spaces may be linked and aligned in such a way as to form breezeways or ventilation corridors. Structures along breezeways/ventilation corridors should be low rise.

### Waterfront sites

Waterfront sites are the gateways of sea breezes and land breezes due to sea cooling and sun warming effects. Buildings along the waterfront should avoid blockage of sea/land breezes and prevailing winds.



*Figure 13 – Urban Ventilation*



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### III. UNIT 3

#### Urban Design Strategy

Environmental quality includes

- **Clean air**
- **Water**
- **Healthy and productive soils and**
- **Habitat**

that is full of life—we all depend on.

The cleaner these resources are in the natural environment, the less we have to spend on purifying them in our homes and municipalities.

Clean environments also are safer, more attractive places for people to live, work, and play.

#### Energy Efficiency in Urban Planning

- **Technology**
- **Public Participation**
- **Policy Making**

Improving the energy efficiency of cities not only helps to save energy and reduce emissions, but also can help budget-constrained cities expand and improve services and increase competitiveness.

World Bank Guidance offers practical advice and examples on how to integrate energy efficiency into procurement, financing, buildings, transport, energy assessments, and urban planning



*Figure 14 – Multi modal transportation*

### **Energy Efficiency in Planning**

According to World Bank, Efficiency in urban Planning is achieved by effective planning and management of the following six elements that contribute an Urban center

- Procurement
- Financing
- **Buildings**
- **Transport**
- Assessments
- **Urban planning**

### **Only Buildings, Transport and Urban Planning are relevant to this study**

- What type of urban planning should we develop to satisfy housing, mobility and consumption needs in an energy-efficient way?
- What infrastructures can increase territories' energy sufficiency?
- How should we change our modes of transport and the way we use public space in the future?
- How can we encourage short supply chains?

### **TRANSPORTATION** Commuting & Cargo

#### **EFFICIENCY IN TRANSPORTATION IS EXPRESSED AS:**

- Distance per vehicle per unit fuel or energy volume

**EG: KM/L**

- Volume of fuel or energy consumed per unit distance per vehicle

**EG: L/100 KM**

- Volume of fuel consumed per unit distance per passenger

**EG: L/100 passenger/KM**

- Volume of fuel consumed per unit distance per unit mass of cargo transported

**EG: L/100 KG/KM**

### **REDUCING THE IMPACT AND INCREASING EFFICIENCY**

- Improving vehicle technology leading to increased vehicle energy efficiency;
- Changing driver behavior to use less fuel per mile driven;
- Reducing the distances travelled per vehicle; and
- Shifting travel to the most sustainable modes of transport.

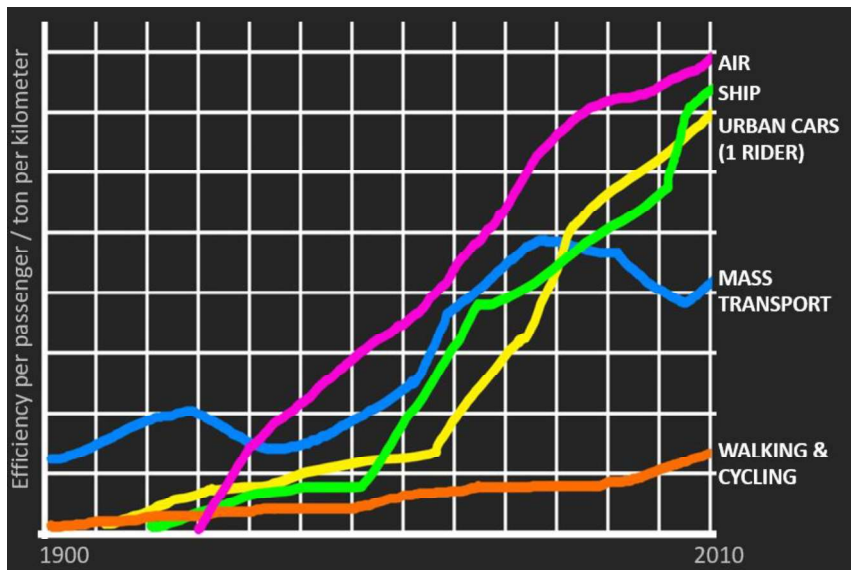


Figure 15 – Efficiency and Transportation

## **TRANSPORTATION** *Commuting & Cargo*

### **Ridesharing / Car Pooling:**

Learn about supporting rideshare and car sharing programs to help commuters to work, conserve fuel.

### **Mass Transit:**

Discover sustainable Mass transportation ways to encourage commuters to use them and conserve fuel.

### **Active Transit:**

Find ways for making the urban scape friendly for commuters to involve in active transit like biking and walking.

### **Multi-Modal Transportation:**

Explore ways to use multiple modes of transportation to conserve fuel and reduce vehicle miles traveled.

### **E-work:**

Find out how fleet managers and corporate decision makers can help employees e-work to conserve fuel.

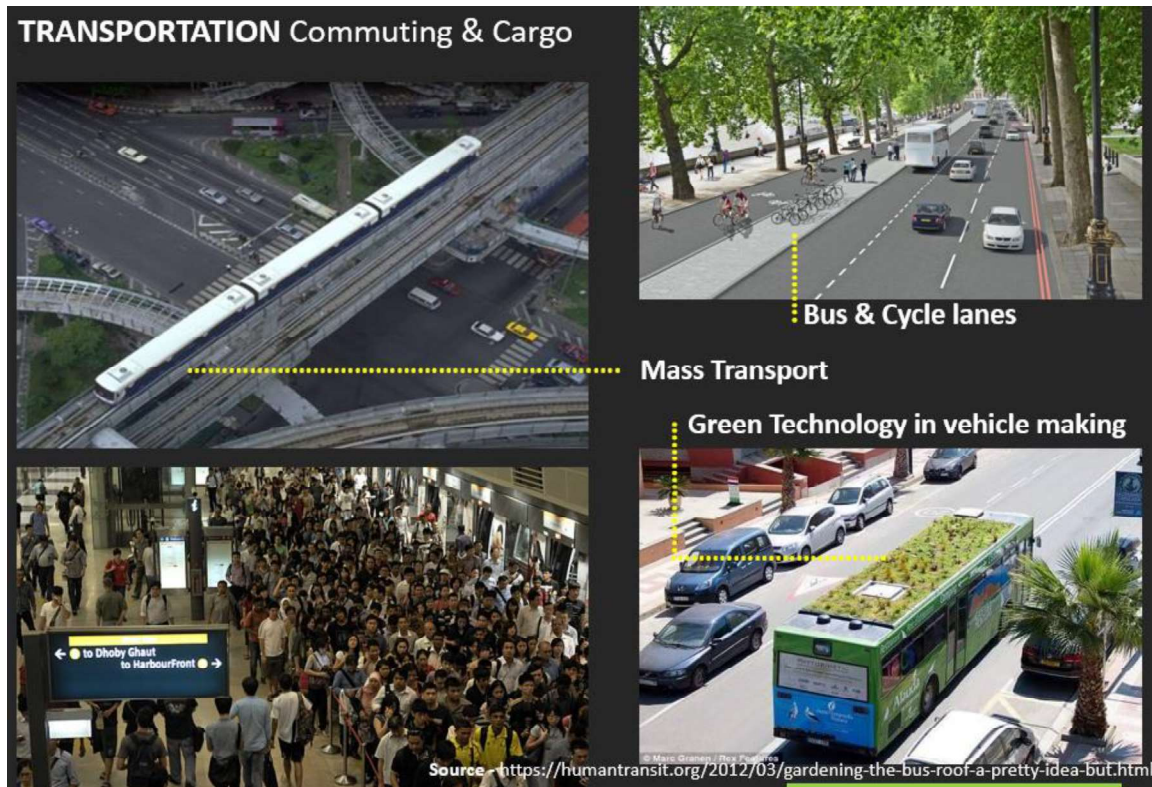


Figure 16 – Different modes of Transportation

A new strategy of sustainable neighborhood planning:

### **FIVE PRINCIPLES**

A major feature of fast growing cities is urban sprawl, which drives the occupation of large areas of land and is usually accompanied by many serious problems including inefficient land use, high car dependency, low density and high segregation of uses. Coupled with land use speculation, current models of city growth result in fragmented and inefficient urban space where urban advantage and city concept are lost. Cities of the future should build a different type of urban structure and space, where city life thrives and the most common problems of current urbanization are addressed.

1. Adequate space for streets & efficient street network
2. High density
3. Mixed land-use
4. Social mix
5. Limited land-use specialization

### **OBJECTIVES OF FIVE PRINCIPLES**

In supporting sustainable neighborhoods, the Five Principles seek to:

- Promote high density urban growth, alleviate urban sprawl and maximize land efficiency.
- Promote sustainable, diversified, socially equal and thriving communities in economically viable ways.

- Encourage walkable neighborhoods and reduce car dependency.
- Optimize use of land and provide an interconnected network of streets which facilitate safe, efficient and pleasant walking, cycling and driving.
- Foster local employment, local production and local consumption.
- Provide a variety of lot sizes and housing types to cater for the diverse housing needs of the community, at densities which can ultimately support the provision of local services

### **Principle 1: Adequate space for streets & efficient street network**

- Street network for vehicles, public transport and attracts pedestrians and cyclists
- The street network will also shape the urban structure, set the pattern of development blocks, streets, buildings & open spaces .
- Principle 1 provides the material basis for sustainable urban development
- Higher the density, more the street area. About 30% street & 15 % open area
- Walkability is measured by the walking distance to key services and public transport catchment usually 400-450 m.
- In a 1 sq.Km grid, with streets placed 100M away, the total length of streets per sq.KM is 18 KM and gives the perfect balance of street v built blocks ratio.

### **High density -at least 15,000 people per km<sup>2</sup>**

- Compared with low density, high density has economic, social and environmental benefits as follows:
- Efficient land use slows down urban sprawl because high density neighborhoods can accommodate more people per area.
- Reduced public service costs. High density neighborhoods tend to decrease the costs of public services such as police and emergency response, school transport, roads, water and sewage, etc.
- Support for better community service.
- Reduced car dependency and parking demand, and increased support for public transport.
- Provision of social equity.
- Support for better public open space.
- Increased energy efficiency and decreased pollution

### **Mixed land-use**

- Principle 3 is aimed at developing a range of compatible activities and land uses close together in appropriate locations and flexible enough to adapt over time to the changing market. The purpose of mixed land-use is to create local jobs, promote the local economy, reduce car dependency,



- encourage pedestrian and cyclist traffic, reduce landscape fragmentation, provide closer public services and support mixed communities.
- Mixed land-use can be applied at different spatial levels: city, neighborhoods, blocks and buildings.
- Principle 3 focuses on the neighborhood and block level.

#### **Principle 4: Social mix**

- Principle 4 aims to promote the cohesion of and interaction between different social classes in the same community and to ensure accessibility to equitable urban opportunities by providing different types of housing. Social mix provides the basis for healthy social networks, which, in turn are the driving force of city life.
- Social mix is a socio-spatial concept, with the following objectives
  - To promote more social interaction and social cohesion across groups
  - to generate job opportunities
  - to overcome place-based stigma
- To attract additional services to the neighborhood
- To sustain renewal / rejuvenation initiatives

#### **Principle 4: Social mix**

- To ensure the smooth implementation of the above criteria and achieve social mix there are many possible policy options. Depending on their social and economic development stage, cities should select proper policies to create a package that promotes a balanced, developed local community. Possible policies include:
  - promoting social mix by mixing tenures and developing sales programmes within public estates;
  - achieving social mix through allocation policies and the spatial distribution of poor households.;
  - investing in and improving public housing;
  - achieving social mix by urban and housing design; promoting multi-level employment within the community; working with private developers to increase public housing supply;
  - providing plots in different sizes and with different regulations, to increase the diversity of housing options



*Figure 17 – Greenwich millennium village*

### **Principle 5: Limited land-use specialization**

Principle 5 aims at adjusting/limiting the use of functional zoning to implement mixed land-use policies. Zoning may be use-based (regulating the uses to which land may be put), or it may regulate building height, lot coverage and similar characteristics or a combination of these.

At the city level, the unilateral application of land-use specialization creates many single-function neighborhoods, which is the source of contemporary urban challenges including city congestion, segregation, car dependency, etc.

Limiting land-use specialization is important to create mixed land-use

- to combine compatible land-uses into one block and neighborhood;
- to introduce mixed land-use zoning while respecting market demand and cities' urban by-laws and regulations

## Conclusion

The Five Principles can be applied in the following contexts:

1. Fast growing cities
2. New urban settlements and urban extensions
3. Urban renewal and renaissance - declining cities
4. Urban densification - growing cities that have no land for further extension

Figure 6: Sustainability analysis of a neighbourhood

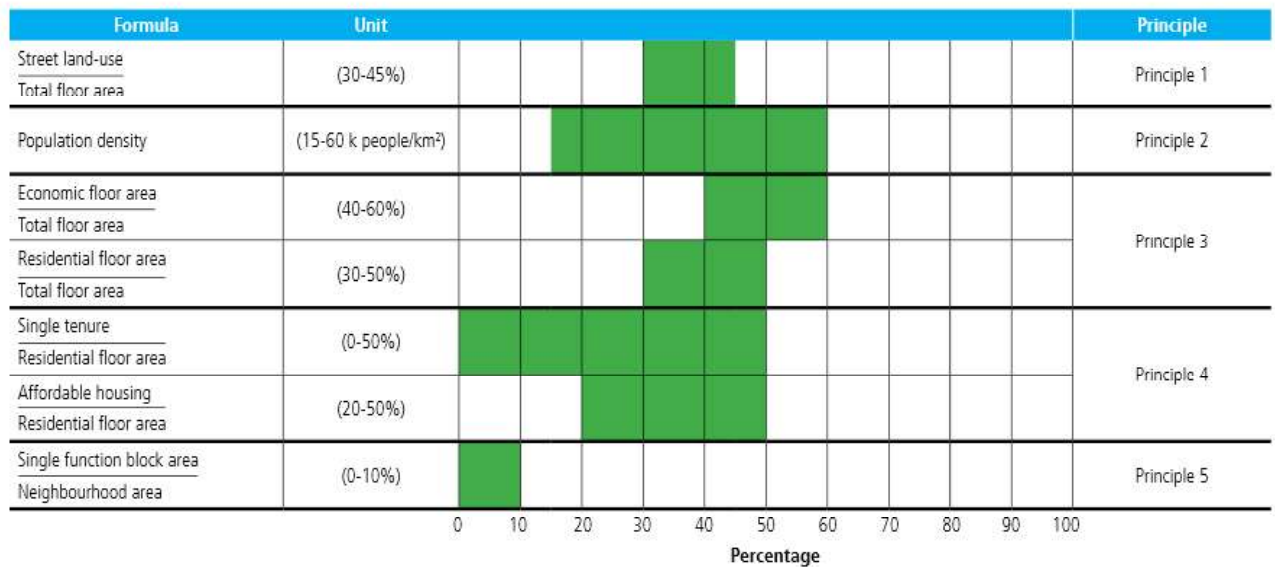


Figure 18 – Sustainability analysis of a neighbourhood

## Public Participation

Public Participation is the involvement of people in the creation and management of their built and natural environments. Its strength is that it cuts across traditional professional boundaries and cultures. This activity is based on the principle that the built and natural environments work better if citizens are active and involved in its creation and management instead of being treated as passive consumers.

To address participation effectively,

It has to be intended to

- Generate ideas
- Identify attitudes
- Disseminate information
- Resolve some identified conflict
- Measure opinions

- Review proposals
- Provide a forum to express

The Purposes are

- To involve citizens in planning and design decision making processes and as a result they will work within established systems
  - To provide citizens with a voice in planning and decision making in order to improve service delivery and overall quality
  - To promote a sense of community by bringing together people who share ideas
  - To create a sense of achievement for those who get involved
  - To reexamine the traditional planning principles and to ensure participation achieves more than a simple affirmation of the designers and planners.
- 
- Although there is not a unique way to define possible strategies and indicators, in most cases studies these can be structured over eight principles:
    - 1 – Vision and strategy
    - 2 – Biodiversity
    - 3 – Economy and partnerships
    - 4 – Society and culture
    - 5 – Sense of belonging and local identity
    - 6 – Empowerment
    - 7 – Sustainable production and consumption
    - 8 – Governance and participation

### **Land use zoning**

- The basic mechanism through which cities regulate allowable types and densities of development, following land use guidelines established in planning documents, is zoning. Every parcel of land is assigned zoning designation determining allowable uses, form and requirements of developments.
- Since the World wars, many communities are revising the zoning codes to implement the principles of New urbanism and Smart Growth.
- Producing a greater mix of land uses by reducing large areas of single use zoning and allowing shops, workplaces and community centers within residential districts
- Increasing residential density and there by giving more space for Streets, Landscape and open spaces
- Increasing height and reducing the footprint of the buildings



- Considering the energy potential of the particular area before zoning.
- Optimum utilization of any renewable resource in the specific zone

Open Space: Communities should contain an ample supply of open green spaces designed to encourage consistent active and passive use.

Establish open space and farmland protection programs

Establish priority setting criteria for open space acquisition

Establish guidelines to regulate development in critical areas such as wetlands, fish and wildlife conservation areas, frequently flooded areas, and geologically hazardous areas

Establish codes to guide environmentally compatible development in coastal communities

Establish market based mechanisms such as transfer of development rights (TDR) and financial incentives to protect, preserve and maintain natural assets

**Sustainable Water Sources:** The current and long term availability of water should be treated as the vital starting point of any land use decision. Community planning must include the provision and protection of local water supply.

Prepare Comprehensive Watershed Management Plans to address pollution, development patterns, water quality, degraded riparian habitat, wetlands, and restoration programs.

Provide for protection of groundwater supplies including well head protection programs

Direct development and development form where most appropriate for watershed health

Consider the cumulative impacts of growth management decisions on the watershed

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## Videos

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**SCHOOL OF BUILDING AND ENVIRONMENT**

**DEPARTMENT OF ARCHITECTURE**

## **UNIT – IV– Sustainable Urban Planning – SARA5331**

## **IV. UNIT 4**

### **Emerging Ideas & Concepts**

#### **Urban Renewal**

- The lack of a proper building care culture has led to serious problems of urban decay in most developed cities, threatening community health and safety. To arrest urban decay, redevelopment is a commonly adopted approach for regenerating rundown areas.
- Its modern incarnation began in the late 19th century in developed nations and experienced an intense phase in the late 1940s.
- The concept of urban renewal as a method for social reform emerged in England as a reaction to the increasingly cramped and unsanitary conditions of the urban poor in the rapidly industrializing cities of the 19th century.

The process has had a major impact on many urban landscapes, and has played an important role in the history and demographics of cities around the world.

Urban Renewal is important as

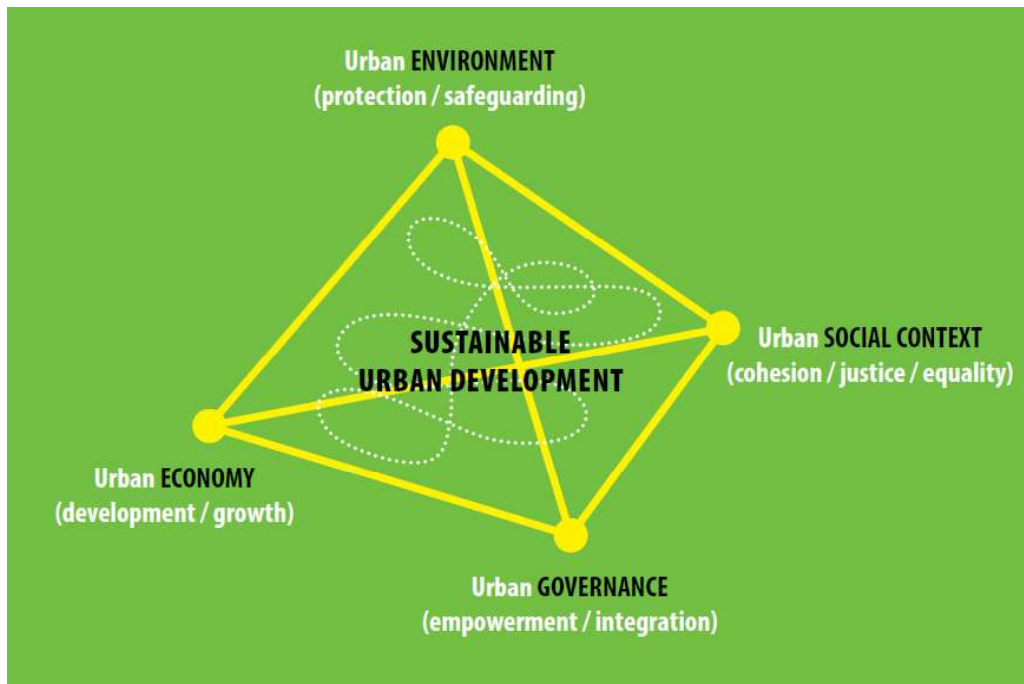
- Enhancing the sustainability of the derelict area
- Improving the life style standards of the inhabitants
- Attracting external investments to sustain financially
- Having major social cohesion impacts and representing the best option for making use of valuable and scarce land assets in the city centre
- Contributing more balanced urban structure and less demanding environmentally.

#### **Regeneration vs Revitalization**

It also sets out the new approach we intend to take, to:

- Improve the alignment of key private and public sector players;
- Maximize the impact of public and private sector investment in specific places;
- Focus our efforts on a small number of strategic geographic priorities;
- Support tightly targeted action to regenerate our most deprived neighborhoods;
- Tackle land issues which can inhibit regeneration; and
- Create mixed and vibrant communities.





*Figure 19 – Sustainable Urban Development*

### **Smart Grid**

Smart Grid is a system which includes a variety of operational and energy measures including smart meters, smart appliances, renewable energy resources, and energy efficiency resources. Electronic power conditioning and control of the production and distribution of electricity are important aspects of the smart grid.

The improved flexibility of the smart grid permits greater penetration of highly variable renewable energy sources such as solar power and wind power, even without the addition of energy storage. Current network infrastructure is not built to allow for many distributed feed-in points, and typically even if some feed-in is allowed at the local (distribution) level, the transmission-level infrastructure cannot accommodate it.

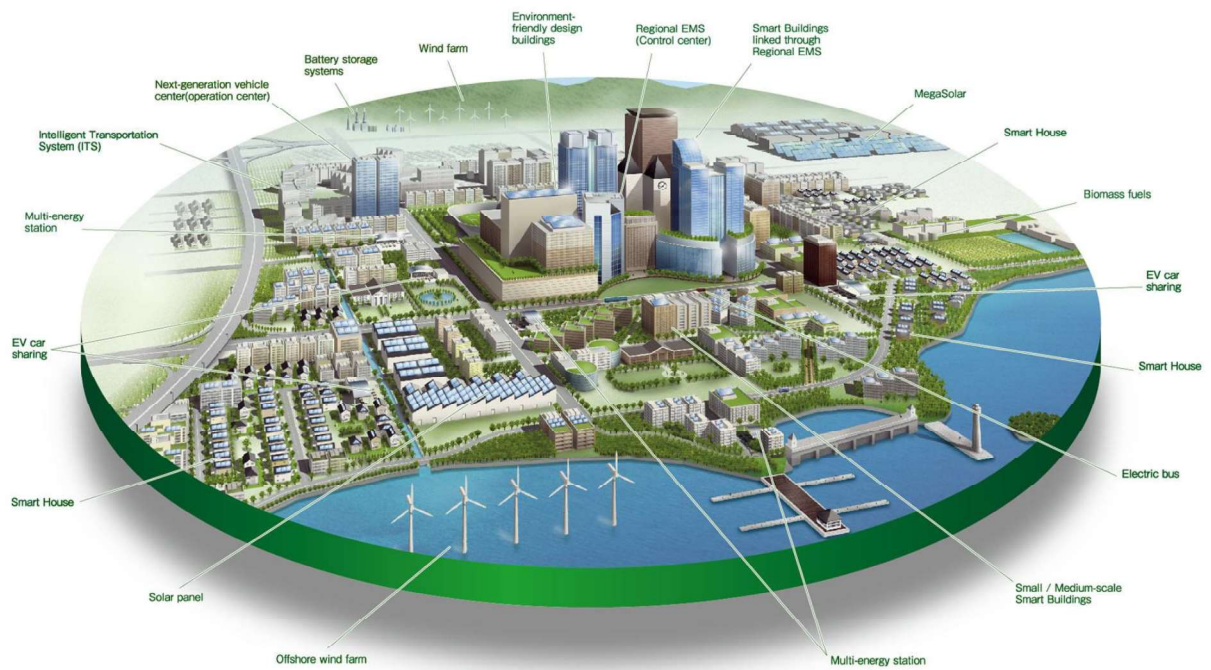
Rapid fluctuations in distributed generation, such as due to cloudy or gusty weather, present significant challenges to power engineers who need to ensure stable power levels through varying the output of the more controllable generators such as gas turbines and hydroelectric generators. Smart grid technology is a necessary condition for very large amounts of Renewable electricity on the grid.



*Figure 20 – Smart Grid*

## Smart Cities

- A **smart city** (also **smarter city**) uses digital technologies or information and communication technologies to enhance quality and performance of urban services, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Sectors that have been developing smart city technology include government services, transport and traffic management, energy, health care, water and waste.
- Smart city applications are developed with the goal of improving the management of urban flows and allowing for real time responses to challenges. A smart city may therefore be more prepared to respond to challenges than one with a simple 'transactional' relationship with its citizens.
- Major technological, economic and environmental changes have generated interest in smart cities, including climate change, economic restructuring, the move to online retail and entertainment, ageing populations, and pressures on public finances.



*Figure 21 – Smart Cities*

### **Smart Cities – Indian Mission**

Smart Cities Mission of the Government is a bold, new initiative. It is meant to set examples that can be replicated both within and outside the SmartCity, catalysing the creation of similar Smart Cities in various regions and parts of the country. The core infrastructure elements in a smart city would include:

- Adequate water supply,
- Assured electricity supply,
- Sanitation, including solid waste management,
- Efficient urban mobility and public transport,
- Affordable housing, especially for the poor,
- Robust IT connectivity and digitalization,
- Good governance, especially e-Governance and citizen participation,
- Sustainable environment,
- Safety and security of citizens, particularly women & children
- Health and education



Figure 22 - Smart Solutions

## Eco Cities

The term 'eco-cities' is synonymous with urban areas that, at scale, promote environmental preservation. However, decorating cities with boulevards and green buildings, as well as adopting energy- and waste-efficient technologies, are merely small parts of the modern eco-city. What do urbanists mean when they use this term; what socio-economic trends drive their development; and what do eco-cities need in

order to function successfully?

However, many claim the term today depicts a city that adheres to the three core pillars of sustainability: environmental stewardship, social equality and economic prosperity.

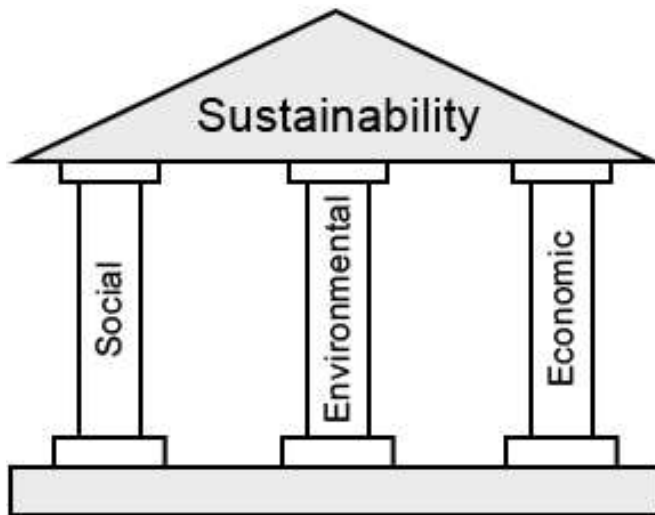
### An eco city is...

- An ecologically healthy human settlement modeled on the self-sustaining resilient structure and function of natural ecosystems and living organisms.
- An entity that includes its inhabitants and their ecological impacts.
- A subsystem of the ecosystems of which it is part — of its watershed, bioregion, and ultimately, of the planet.
- A subsystem of the regional, national and world economic system.

### Addresses:

- Population distribution
- Public health

- Transportation
- Urbanism
- Landscape
- Energy
- Water



*Figure 23 – Pillars of Sustainability*

### **Eco cities**

- Operates on a self-contained economy, resources needed are found locally
- Has completely carbon-neutral and renewable energy production
- Has a well-planned city layout and public transportation system that makes the priority methods of transportation as follows possible: walking first, then cycling, and then public transportation.
- Resource conservation—maximizing efficiency of water and energy resources, constructing a waste management system that can recycle waste and reuse it, creating a zero-waste system
- Restores environmentally damaged urban areas
- Ensures decent and affordable housing for all socio-economic and ethnic groups and improve jobs opportunities for disadvantaged groups, such as women, minorities, and the disabled
- Supports local agriculture and produce
- Promotes voluntary simplicity in lifestyle choices, decreasing material consumption, and increasing awareness of environmental and sustainability issues



## Videos

[https://www.youtube.com/watch?v=8ASC3kqBU\\_8](https://www.youtube.com/watch?v=8ASC3kqBU_8)

<https://www.youtube.com/watch?v=GbutCIcDjgo>

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