दून विश्वविद्यालय
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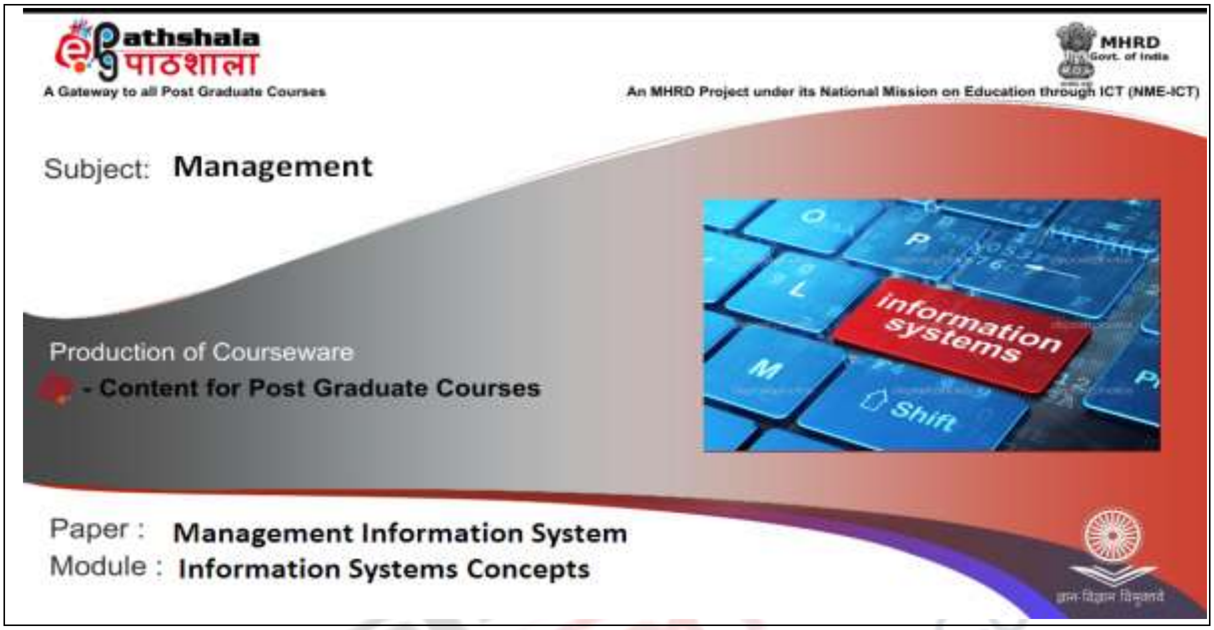

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Quadrant-III

Description of Module	
Subject Name	**Management**
Paper Name	Management Information System (MIS)
Module Title	Information System Concepts
Module Id	Module- 1
Pre-requisites	Basic Knowledge of Computer Fundamental and Management Systems
Objectives	1. To understand the concept, definitions and Scope of Information Systems 2. Understanding various types of Information System 3. To understand interrelationship between various Information Systems and their applications
Keywords	Information Systems, Management Information System (MIS),efficiency, Levels of Management

Learning Objectives:

The module provides an introduction to IS; historical perspective; types of information systems and their mission; information management; typical business applications; structure and components of modern computer systems; basics of data communication.

Learning Outcomes:

On successful completion of this module, students should be able to:

- Discuss the roles and functions of information and information systems (IS) in the decision and communication processes of modern organizations;
- Recognize the basic theories, concepts, methods and terminologies used in IS;
- Describe the main categories of IS including both functional and cross functional IS;
- Demonstrate an understanding of how are applications are developed, implemented and managed;
- Demonstrate an ability to employ a number of IS tools commonly utilized in organizations.

Suggested Readings:

(a) Laudon (2016): Management Information System. Pearson Education India

(b) O'Brien and Marakas (2013): Management Information Systems. McGraw Hill Education.

(c) Davis and Olson (2001): Management Information System: Conceptual Foundations-Structure and Development. McGraw Hill Education.

(d) Weber (1998): Information Systems Control and Audit. Prentice Hall.

(e) Magal (2009): Essentials of Business Processes and Information systems. Wiley

(f) Jawdaekar (2013): Management Information Systems: A Global Digital Enterprises Perspective Paperback. McGraw Hill Education.

(g) Rajaraman(2011): Analysis and Design of Information System. Practice Hall India Learning Private Limited.

(h) Laudon (2012): Management Information Systems: Managing the Digital Firm. Pearson Education.

Point to Ponder:

- Organizational culture can act as an essential influential factor in analyzing organizations in various contexts.
- Culture strengthens bonds between people and can easily change and evolve by adding new trends or removing old traditions.
- The set of characteristics in a firm leads to reflect the corporate value, viz., integrity, fitness, Peal Attitude, Innovation, Communication, Trust, Care, Passion, Performance
- Strategic orientation can be categorized into six factors, namely, leading, future analytic, aggressive, defensive, adventurous, and conservative

Component-I (A) - Personal Details

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Component-I (B) - Description of Module

Items	Description of Module
Subject Name	**Geography**
Paper Name	**Climatology**
Module Name/Title	**URBAN CLIMATOLOGY**
Module Id	37
Pre-requisites	
Objectives	• Define urban climatology, • distinguish between urban and rural climatology, • define and explain urban heat island, • discuss the concept and effect of heat island • establish the relationship between air pollution and urban climate

	• explain the climate extremes in the cities, and; • suggest mitigation and control measures to contain urban heat island and urban air pollution.
Keywords	

Contents

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Introduction

All of us are living either in urban or in rural areas. You might beliving in an urban area, but most likely you might have visited the rural areas as well. In the same way, you might be living in rural area; but most likely you might have visited some urban areas as well. I hope, you must be aware about the rural as well as urban scenario. You may notice the difference between the two with respect to living space, ventilation, dwelling houses, roads, traffic, accidents, markets, industries, crowd, purity of air and water etc. Both of the spaces are distinctly different. You may know very well that the urban places have more percentage of construction or black topped surface cover than the rural space. Huge and many times unmanageable traffic creates unimaginable noise and air pollution. Waste disposable is a big challenge there leading to both air and water pollution. Many of these are a day-to-day affair in the urban areas and have a great difference with that of the rural areas. With this perspective in mind, in this module, an attempt has been made to study the urban climatology which is distinct from its surroundings rural areas.

Concept of Urban Climatology

Only when we possess sufficient knowledge of the bright and dark sides of city climate are we in a position to use this information and to formulate a technique for city construction based on considerations of climate. Yet something is already accomplished, when we realise that we do not have to accept city climate simply as a fact but can influence it.(Kratzer, 1956)

The term “urban climatology” came into vogue because of the ability of cities to modify the local atmospheric conditions owing to its distinct characteristics such as presence of large numbers of concrete buildings, emissions from traffic, waste heat, materials etc. All these apart from others as well, give cities distinct climatic conditions than that of its surrounding rural areas. Hence, urban climatology is basically a relative term which compares cities climatic conditions with that of its surrounding rural areas.

To put into perspective, urban climatology is concerned with the study of the climate effect of urban areas and the application of the knowledge acquired to the better planning and design of cities. It is defined primarily by its focus on the city and incorporates aspects of many different disciplines, including meteorology, climatology, air pollution science, architecture, building engineering, urban design, biometeorology, amongst others. Each of these disciplines has its own focus and has developed distinctive tools and methods appropriate to their interests. As a result, much of the knowledge base that urban climatology draws upon is fragmented and is still in the process of being assimilated into a comprehensive and coherent field of study. (Mills, 2014).

The present day demographic data of population for the planet earth has reached more than 7.5 billion of which 54% lives in urban areas, a proportion that is expected to increase to 66% by 2050 (UN, 2014, web ref).The 2014 revision of the World Urbanization Prospects by UN DESA’s Population Division notes that the largest urban growth will take place in India, China and Nigeria. Thus, the continued urbanization of the populated areas will lead to inhabitation of more large cities and megacities. The substantial increase in the population is reflected through changes in the living patterns as well as the alteration of the natural topography and land-cover.

Urbanization and Micro Climate Change

The first Assessment Report on Climate Change and Cities (ARC3) (Rosenzweig, 2011) notes that Citiesbeing home to over half of the world's people and are at the forefront of the climate change issue. Climate change exerts added stress on urban areas through increased numbers of heat waves threatening the health of the elderly, the infirm, and the very young; more frequent and intense droughts and inland floods compromising water supplies; and for coastal cities, enhanced sea level rise and storm surges affecting inhabitants and essential infrastructure, property, and ecosystems. At the same time, cities are responsible for about 70% of the greenhouse gas emission while they cover only two percent of the global land area (UN-HABITAT, 2011). With the passage of time, it is likely to increasefurther. These challenges highlight the need for cities to rethink how assets are deployed and people protected how infrastructure investments are prioritized, and how climate will affect long-term growth and development plans.

Approaches to Urban Climatology

A number of studies suggest that the cities modify the overlying atmosphere significantly in nearly every respect. These modifications are the result of changes in the surface cover, fabric and geometry (urban form) and the attendant anthropogenic emissions of waste heat, water vapour and materials (urban function) (Mills, 2014). Hence, cities face special climatic conditions that can broadly be covered under the following three categories:

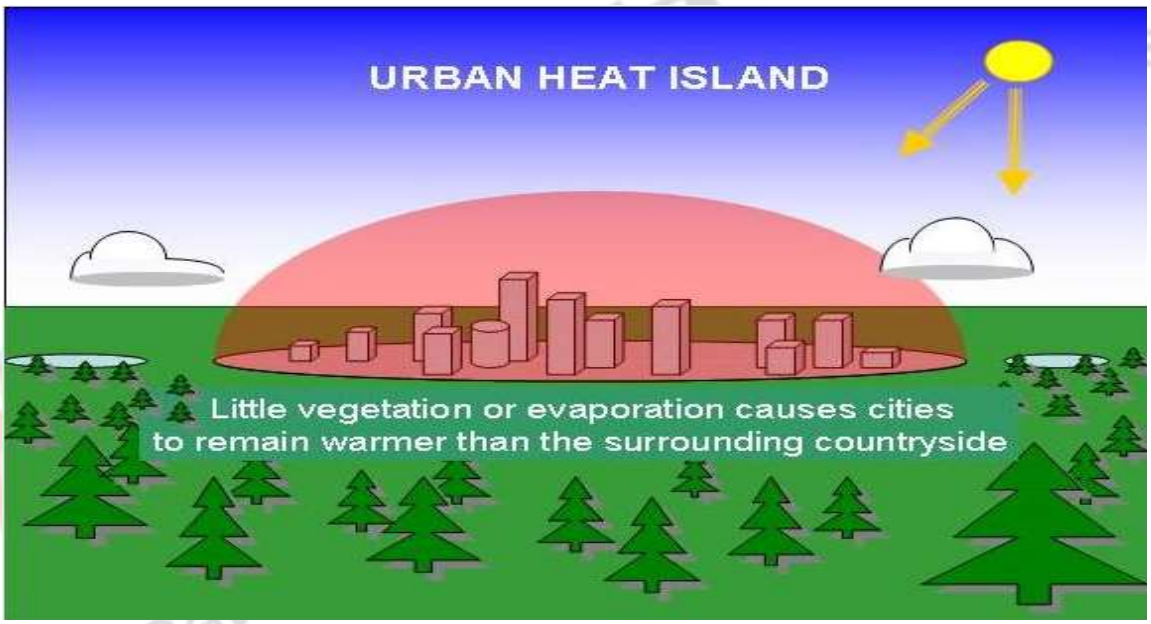
1. Urban Heat Island (UHI)
2. Air Pollution and Urban Climate
3. Climate extremes

Let's explore each of these one by one.

1. Ubran Heat Island

Cities already tend to be hotter than surrounding suburban and rural areas due to the absorption of heat by concrete and other building materials and the removal of vegetation and loss of permeable surfaces, both of which provide evaporative cooling (Rosenzweig, 2011). This is further triggered by the green house gases (GHG) in the atmosphere which also absorb heat and reradiate it towards the earth. This overall effect of cities getting significantly warmer than the surrounding areas is known as Urban Heat Island effect. In other words, an urban heat island is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities. The temperature difference usually is larger at night than during the day, and is most apparent when winds are weak. UHI is most noticeable during the summer and winter (Solecki, 2005).

Figure 1: Schematic representation of Urban Heat Island



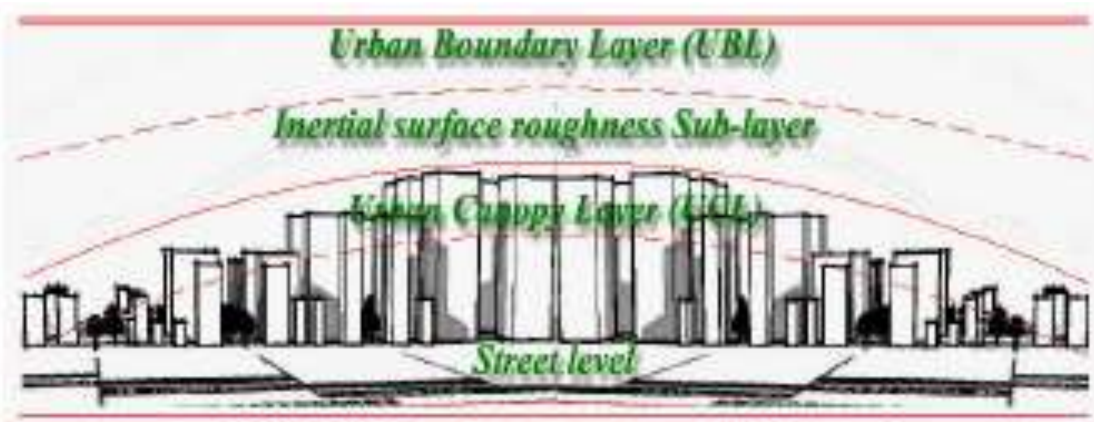
Source: **http://www.weatherquestions.com/What_is_the_urban_heat_island.htm**

Urban Volume Layers

The urbanclimatic conditions leading to UHI and other effects can better be understood if the urbanvolume layers that hold the climate interactions are taken into account (Fahmy et al, 2008). There are three main urban volume layers that holds the climate interactions (Oke, 1976) (Figure 2):

i. The urban canyon/surface layer (UCL) that has the street level microclimate circumstances.
ii. The urban boundary layer (UBL) that has the inertial surface roughness sub- layer (ISL) as an envelope for urban roofs.
iii. Urban air dome layer that has the regional mesoscale climate conditions.

Figure 2: Urban Climatology Vertical Layers



Source: Fahmy M, Sharples S, Al-Kady A-W (2008)

The heat transfers between these layers are due to the following:

i. Radiant heat exchanges in between human and canyon surfaces and in between canyon surfaces itself.
ii. Convective heat exchanges between canyon surfaces due to reflections and emissions.
iii. Heat generation within homogeneous patterns (i.e. a continuous pattern which is not separated by highways or regional roads), that heat if trapped, it is called heat islands.
iv. Up/down air flows within the three levels of urban spatial layers.

Monitoring the parameters of UHI: To study the effect of urban heat island requires continuous**monitoring** of following meteorological parameters in and around the city:

i. Temperature
ii. Wind Velocity
iii. Relative Humidity
iv. Cloud Cover
v. Solar Insolation

Radiosonde data [provides for vertical profile of the meteorological parameters (temperature, relative humidity, pressure etc)] would definitely aid to the study of UHI effect.

Modelling the UHI Processes: Monitoring provides for the observational data only at the selected locations. To study the overall impact of UHI on the city, it is necessary to interpolate these data throughout the city using the physical laws that can define the processes, interaction of different urban climatic layers. This task is accomplished through computer **simulation and modelling.** The urban climate models focus on the interaction between ***surface layer*** comprising of roughness (RSL) and inertial (ISL) sub-layers (the urban canopy layer is immersed in the former) and ***mixed layer*** above where the urban "surface" exchanges are blended into the wider atmosphere and transported downwind. This urban climate model is further coupled with the meso-scale meteorological model in order to understand the impact of climate change on the cities and vice-versa.

Heat-island effects

The UHI effect is suspected of warming urban areas 3.5-4.5 °C more than surrounding rural areas and this differential is expected to increase by approximately 1°C per decade (OECD, 2010). The temperature differences between urban and surrounding rural areas can reach up to 10 °C for large urban agglomerations. The built environment, including buildings and roadways that absorb sunlight and re-radiate heat, combined with less vegetative cover to provide shade and cooling moisture, all contribute to cities being warmer and susceptible to dangerous heat events.

UHI and Health*:*The UHI effect can have negative public health effects in urban area as the impacts of heat waves can be worse in urban areas (OECD, 2010). For example, in the 2003 European heat wave that is estimated to have caused 70 000 victims, a higher percentage of the causalities in France came from urban areas. Increasing temperatures can affect mortality in a number of ways, including heat-induced mortality, famine, exacerbation of non-infectious health problems and spread of infectious disease (OECD, 2008).

UHI, local climate, Air Pollution and Health:UHI effects can generate changes in local atmospheric cycles. Changes in solar influx and chemical composition of near-ground air masses can cause formation of photochemical smog and reduce air circulation, which would otherwise diffuse the concentration of air pollutants. Warmer temperatures due to climate change and UHI effects, all other things held constant, may increase concentrations of conventional air pollutants, such as ozone and acid aerosols, as well as emissions of particulates and allergens. Moreover, higher temperatures due to climate change may actually make it more difficult to control the formation of some pollutants, such as ozone, which can exacerbate chronic respiratory diseases and cause short-term reductions in lung function.

UHI and Energy Demand: By aggravating heat-related climate change impacts, UHI effects are likely to increase future energy demand (Ruth and Gasper in OECD, 2008). In the United States, for example, an estimated 3% to 8% of annual electricity use is required to offset UHI effects (OECD, 2008). Adaptation to rising temperatures by increasing air conditioning can also further increase UHI effects. For instance, massive air conditioning has been shown to increase UHI effects up to 1 °C (OECD, 2010).

In India, recent studies (e.g., Pandey et al, 2012; Mathew et al, 2017) suggest that UHI effect on cities like Delhi, Lucknow, Jaipur, Guwahati among others) is clearly visible. The increase of air-conditioning (AC) usage in cities like Delhi has grown manifold. This must be triggering the UHI effect even further.

2. **Air Pollution and Urban Climate**

Air pollution in cities is an ever rising concern for both the developed and developing world. Historically, Los-Angeles Smog and London smog are two infamous incidents of cities choking under the pressure of air pollution (Masters, 1998). In recent times, Paris smog in March, 2014 and Delhi smog in 2016 have been continuously been in news because of dense smog laden with loads of air pollutants covering the entire city. Indoor air pollution and poor urban air quality are listed as two of the world's worst toxic pollution problems in the 2009 Blacksmith Institute World's Worst Polluted Places report (Blacksmith Institutes's report, 2009, web ref). According to the 2014 World Health Organization report, air pollution in 2012 caused the deaths of around 7 million people worldwide,(WHO, 2014, web ref) an estimate roughly matched by the International Energy Agency (World Energy Outlook, 2016, web ref).

Air Pollutants

Air pollutants can be gases such as CO, NO_2, O_3, SO_2, VOCs (volatile organic compounds) among others and the particulates (aerosols). These air pollutants are released in the atmosphere mainly through anthropogenic sources such as industry, traffic, power plants, release from waste marshy lands etc. Some of these gases have greenhouse properties, thereby, altering the temperature of the atmosphere. Black carbon among particulates also causes warming effect. In general, the gaseous and particulate components emitted into the atmosphere lead to a change in the composition and transparency of the air over large parts of the world, mainly over the large cities, and in this way nearly every element of the climate in these areas is modified (Georgii, 1969).

Components of Significant change in Urban Climate due to Air Pollution

Investigations by different researchers show clearly the significance of change in the following components of the climate of cities:

i. intensity of solar radiation,
ii. visibility,
iii. temperature distribution,
iv. relative humidity,
v. local wind distribution, and
vi. precipitation distribution

i. **Intensity of Solar radiation**: Modifications of the composition of urban atmospheres such as those described above lead to considerable changes in the radiation budgets of densely populated areas. Besides the increase of turbidity of incoming radiation by atmospheric pollution, a reduction in the duration of bright sunshine in large cities is also found (Georgii, 1969). McCormick and Ludwig (1967) compares the duration of sunshine at several stations in and around the center of London. The average duration of bright sunshine decreased considerably towards Central London. The loss of sunshine in Central London was greatest during the winter months, when atmospheric pollution was heavy due to the higher level of domestic heating. It is evident that the change of the radiation budget in large cities affects the temperature distribution compared with that of the countryside, and is the cause of some of the specific characteristics of urban climates. It is also evident that the effects of a typical urban climate are more marked under calm, sunny weather conditions. With respect to the reduction of incoming solar radiation due to the haze-dome above cities it is generally agreed that the decrease of direct solar radiation amounts to 10 %-20%, the decrease of scattered sky radiation, however, being less (Georgii, 1969).

ii. **Visibility:** There is no question that the visibility in cities is greatly reduced under certain conditions. Accumulation of condensation nuclei produced from many anthropogenic and industrial sources in and around cities leads to a decrease of visibility and often to the formation of fog. It should be noted that the frequency of fog in urban environments is higher in spite of the fact that the air temperature is higher and the relative humidity lower in cities compared with the countryside. The explanation for this contradiction lies in the mechanism of fog formation. With high concentrations of sulfur dioxide, the formation of sulfuric acid by catalytic oxidation on the surface of particulate matter in a humid environment leads to the formation of small droplets of fog under conditions in which fog would not form in a pure atmosphere. This has many unpleasant and dangerous consequences with respect to the harmfulness of urban fog (Georgii, 1969).

iii. **Temperature distribution*:*** As discussed under UHI section, temperature over urban area is higher than that of its rural surroundings because of urban forms and structure itself, the increase of air pollutants, particularly green house gases and black carbon aerosols aggravates the problem and enhance the urban temperature further.

iv. **Local Wind distribution*:*** The “heat-island "effect is also the main factor leading to the formation of an urban wind system. But, as is the case with the temperature difference between cities and the surrounding countryside, the development of an urban wind-system is associated with low wind speed and with stable temperature lapse rate, that is, predominantly with anticyclonic weather situations. The wind direction was changed within the city and the wind speed was considerably reduced within the built-up area due to the increased roughness. Undoubtedly, the urban circulation system is very important in connection with the dispersion and distribution of pollutants produced from sources in the city-area. When we reduce our observations to the micrometeorological scale, very interesting information can be gained on the distribution of pollutants in streets and on their dispersion in relation to wind velocity and wind direction.

v. **Precipitation distribution*:*** The increasing air pollution, particularly, the aerosols (particulates) also alter the precipitation distribution over the city. Aerosols provide the site for CCN (cloud condensation nuclei) and as a result heavy downpour for a short duration occur over an aerosol filled area instead of long duration drizzling rain, the general characteristics of rain. This also alters the distribution of precipitation over spatial areas, as most of clouds get exhausted in the heavy downpour over the aerosol filled areas and thereby devoid the rain in the nearby areas lacking aerosols content.

The city which produces so many pollutants is itself an obstacle to the dispersion of these pollutants, and thus increases the dangers associated with the accumulation of the obnoxious components. There seems to be general agreement that the increased concentration of pollutants in city air constitutes a hazard as far as respiratory diseases are concerned apart from altering the general urban climate.

3. Climate Extremes

IPCC-WG1 (2014, web ref) report clearly indicates that warmer region of the world is getting warmer and warmer while colder regions are getting colder and colder, and, areas lacking rain will suffer further scarcity of rain while region receiving high amount of rainfall will receive further heavier rainfall. In fact, the climate of metropolitan cities like Delhi is shifting towards climate extreme. The hotter (summer) months are getting hotter and hotter, precipitations are getting heavier but of short duration, cold months are getting colder and colder. These all are signs of climate extremes and the factors discussed above might have significant role to play to modify the urban climate.

Wasko and Sharma (2017) analyzed real world effects of river flows and rainfall data from over 160 countries. They noted that there is a radical shift in streamflow patterns with more intense rainfall in cities, overwhelming infrastructure and causing flooding. But there is also observed phenomena of drier soils and reduced water flow in rural areas. The reason turned out to be other facet of rising temperatures: more evaporation from moist soils is causing them to become drier before any new rain occurs. It’s a double whammy, more people are moving to cities where floods are becoming more frequent and intense. At the same time, rural areas may be becoming drier with reduced river flows impacting on agricultural productivity and food security.

Mitigation and Control measures

Since urban climate is being adversely affected by UHI and air pollution. To mitigate or to minimize these adverse effects, a two pronged strategy is needed. One that concerns with city planning, design of buildings, use of suitable materials etc so as to minimize the UHI effect and second taking strong control measures to check the rising air pollution in the city.

Urban climatologists work with architects, planners and engineers to design new buildings and developments. They also work with regulatory bodies and local authorities setting requirements in terms of what types of buildings or developments can occur.

Urban Forms, Structure and Emissions

As noted earlier, a combination of various factors together contributes towards the peculiarities of the urban climate such as (Mills, 2010; Grimmond, 2007):

Materials: the original or pre-existing landscape comprising of natural materials (soil, trees, grass etc) have a striking contrast with respect to the material building up the cities cities (concrete, brick, asphalt). The difference in thermal and hydrological properties is attributed to the varying levels of absorption and storage of heat and water by the surface. The building materials used to construct cities - bricks, concrete, asphalt etc. – have high heat capacities and ability to conduct heat. These materials absorb and store large amounts of heat in the day which is slowly released at night.

Morphology: The shape also gets changed in an urbanized landscape because of extensive developmental activities. The walls and roofs (for houses, factories, shops, high rise buildings, parking space etc) -increase the surface area exposed at the surface which results in greater absorption of incoming radiation (energy) from the sun and affects the flow of air across the surface. The vertical walls and roofs of buildings increase the area exposed at the surface, further enhancing the absorption and storage of heat. They also reduce the ability for surface cooling - energy emitted from the surface is trapped in the urban canyons. The removal of vegetation and high impervious surface covers (parking lots, buildings, roads that don't allow water to infiltrate) reduces water availability, limiting evapotranspiration. This means that available energy heats the building fabric and air and is not used up evaporating water.

Emissions*:*A crucial component in the urban landscape, emissions through various source e.g. heat (from traffic, industry, the heating of buildings) or gases (carbon dioxide from burning of fossil fuels) or particulates (from industrial processes or traffic) largely form the chunk of the proportion which contribute towards absorption and transmission of energy, affecting the urban atmosphere. Human activities release heat - from traffic, from factories, from homes (heating and air conditioning). This is an additional source of heat not available in rural areas

Measures to mitigate urban warming

Accordingly, the following measures and strategies can be used and enforced to mitigate urban warming (Grimmond, 2007).

1. Changing the material properties of individual buildings and /or the spatial arrangement of individual buildings and vegetation.

2. Painting roofs and streets in light colours or using different types of road or roofing materials increase the amount of incoming solar radiation that is reflected and thus not absorbed by the surface, resulting in cooling. This approach has been extensively adopted in cities in hot environments (e.g. around the Mediterranean) for a long time. Changes in materials have the advantage that they can be used on current buildings, so do not require the costs or time of new development.

3. Planting vegetation provides shade and thus provides cooling at local level. It also increases evapotranspiration reducing the amount of energy available to heat the ground or air, in case of scarce availability of water. This process also results in cooling.

4. the addition of water detention ponds and wetlands

5. Innovative residential developments employing water-sensitive urban design (rain water harvesting system for the large buildings) involving the use of grey water (reused water to irrigate residential vegetation reduces the demand for water to be diverted into a city for irrigation purposes).

Air Pollution Control Strategy

Second strategy is to implement strong control measures to check the rising emissions leading to growing air pollution. Traffic, industrial and power plant emissions are the major culprits for the air pollution in the city areas. Others include unmitigated construction activity, emissions from waste infested marshy lands etc. There are already emission norms in place for each of the sector industry, traffic and power plant.

In designing an Effective Air Quality Control Strategy, following considerations are important (EPA, 2017 web ref):

Environmental: factors such as ambient air quality conditions, relevant meteorological conditions, location of the emissions source, legal requirements, noise levels, and any ancillary pollution from the control system itself.

Engineering: factors such as pollutant characteristics (such as abrasiveness, reactivity and toxicity), gas stream characteristics, performance characteristics of the control system, and adequate utilities (for example, water for wet scrubbers).

Economic: factors such as capital cost, operating costs, equipment maintenance, equipment lifetime, and administrative and enforcement costs.

Sustainable Cities / Cities contributing to Global Sustainability

Nowadays, there is talk of "sustainable cities" treating the urban system as though it was an organism requiring sustenance (Mills, 2014). One approach that has been applied is to examine its metabolism – the inputs, storage and outputs that allow an urban area to function. Inevitably, these exchanges cross the urban–rural boundary so that the impact of cities is felt beyond theirlimits. In this sense, cities are not, and cannot be made, sustainable. It is possible, however, to assess the intensity of the exchanges and the geographical extent of a city's resource catchment. Urban sustainability then becomes a relative concept: the more sustainable city is the one which uses fewer resources to fulfil its functions. Generally, relative sustainability is evaluated on a per capita basis, though there is a sense in which a city with a high natural population growth rate can be less sustainable as a result. Alternatively, a city that attracts more population from outside its boundaries will also increase its own resource use, but may actually decrease net resource use if the migrants would be using more resources if they had not migrated. Again, this serves to emphasize the importance of treating urban sustainability in a global context. In any case, there is an important sense in which the goal is not to have sustainable cities, but cities that contribute to global sustainability, or to sustainable development

Summary and Conclusion

The focus of this module has been to explain the distinctive features of urban climate, causes, interactions between urban areas and the atmosphere, the effects they have on one another, impact on local climate, human health and others, and the possible mitigation measures to contain the adverse impact that so happens.

Though the beginning of the observations of urban climatology is considered to be as old as to start with Luke Howard's book "The Climate of London (published in 1833)", the major progress in terms of urban climate modifying local weather, its interaction with global climate, impact and vulnerabilities has been achieved only in last few decades, especially, the simulation and modelling studies. These studies put it beyond doubt that rising population, increasing built-up area, reduction in green space, growth in traffic volume and emissions, industrial and power plant emissions, all of these have led to modify the city's weather considerably that too adversely. And hence we observe the Urban Heat Island effect, extreme weather in urban areas, choking urban air due to air pollutants, rise in respiratory diseases, children’s vulnerability to such diseases, adverse impact on plants among other impacts.

As stated in earlier section, there are many studies on Indian cities which clearly show that Indian cities are witnessing all of these adverse impacts. It is inevitable that these factors must be taken into account for any city planning. The city planning must include considerations for adequate green space, use of right kind of materials, encouraging public transport for daily commuting so as to reduce traffic load and emissions, proper control measures for the industrial and power plant emissions, making cities eco-friendly by using renewable energy sources such as solar, wind and large apartment/buildings should be made rainwater harvesting system enabled. Nowadays, the Government has been focusing on these factors when they plan for city’s infrastructure but it is largely up to the public to keep Government on its toes to keep up the pace in real spirit and never give up because it is the public which are the ultimate sufferers.