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Impact of Urban Development on Climate Change

Ar. Nikhil P. Mehare
Assistant Professor, Dr. D. Y. Patil College of Architecture Akurdi, Pune
Email; mehare0@gmail.com

Abstract: Climate change has severe impacts worldwide both on rural areas and on urban centers. Extreme weather conditions threaten human health and productivity, and natural disasters such as flooding, wildfires and cyclones increase. While on other hand cities have tremendous capacity to contribute in world economy by urbanization and development. The cities are adapting new concepts as green and sustainable buildings, sector specific policy and sustainable planning approach to make city more resilience and energy efficiency. In this paper there is brief introduction of urban development and their impact on climate. The relationship between city development and climate change .Why it has become area of concern and what should be adaptive and meditative measure to be taken at various level.

Keywords
Climate Change, Urban Development, Green House Gas etc

1.0 Introduction

1.1 About Climate Change & Urban Development

Our planet is surrounded by a blanket of gases which keeps the surface of the earth warm and able to sustain life. This blanket is getting thicker, trapping in heat as we release greenhouse gases by burning fossil fuels for energy. By trapping more of the sun's heat the earth's temperature is starting to rise. This phenomenon is known as Global Warming. Scientific research indicates that, because of climate change, we may experience more intense and more frequent extreme weather events. The gradual increase in temperature has major implications for ecosystems, growing seasons, animals and their delicate habitat. In just 200 years, the amount of carbon dioxide in the atmosphere – the major gas that causes climate change – has increased by 30 per cent. Concentrations of greenhouse gases are now higher than at any point in the past 800,000 years with an average near-surface global temperatures rise of 0.7°C over the past 100 years. The Intergovernmental Panel on Climate Change indicated that, if we could get greenhouse gas emissions to peak and then decline within the next 10–20 years, the risk of seeing temperature changes higher than 2° C would be greatly reduced. Urban Development is the expansion into natural areas such as deserts, forests and swamps.

The population growth and there need for housing causes urban development. As the demand of housing increases, cities begin to expand into new areas. The world population is estimated to be near 6 billion. As populations continue to grow the demand for more housing and new development will continue. The countries which our site are looking at are very different from each other.

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1.2 Relationship between Urban Development and Climate Change

Development and its environmental impacts are complexly bonded and evolved simultaneously. As per UNHABITA higher the population density impact will be higher in urban area. The rate of urbanization in world today is unmatched with near quintupling urban population in future. As the half of the world's population will be living in urban areas. The pace of urbanization in the world today is unprecedented, with a near quintupling of the urban population between 1950 and 2011.

In second phase, the rapid urbanization and development took place first by developing countries and followed by developing countries.

In third phase, reduction in the population at some area while increasing in number of large cities and size resulting the number of cities in the world with populations greater than 1 million increased from 75 in 1950 to 447 in 2011; while during the same period, the average size of the world's 100 largest cities increased from 2.0 to 7.6 million. By 2020, it is projected that there will be 527 cities with a population of more than 1 million, while the average size of the world's 100 largest cities will have reached 8.5 million. While institutionally weaker areas will find it difficult to promote effective mitigation and adaptation actions. On other hand area bigger institute redirected in the way to reduce their emission levels to a desired level (e.g. through the promotion of mono-centric urban structures based on the use of public transportation), and their resilience and ability to cope with climate hazards and other stresses enhanced.

Forth phase, the urban enterprises, vehicles and population who are main sources of GHGs, requires understanding the dynamic of the force and system that drive the urban generation of GHGs. Which will help the policy makers, enterprises and consumers target the readily available options to reduce those emission at same time that urban resilience to the impacts of climate change.

In fifth phase, innovative mechanization derived from cities to reducing or mitigating emissions, adapting to climate change, and enhancing sustainability and resilience. The economies and mechanisms process should be evolved to clean and cheap

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transportation, land-use patterns and the production and consumption patterns of urban residents which make it cheaper and easier to take the actions and provide the services necessary to minimize both emissions and climate hazards.

Last one is importance, dynamic relation between urban developing centers and geographical setting. Latitude defines city's need for more or less energy to run air-conditioning and heating systems within its buildings, industries and houses. However, cities also depend on biodiversity, clean water and other ecosystem services that they have developed over existing ecosystems or 'ecozones', such as coastal areas, wetlands and dry lands. The historical setting of the cities is also more important as major of them are flourished near water bodies such as lakes, river, seas. They are majorly dependent on the water for development for instant any of them get affected due to lack of recharging facility causes or get flooded rises the health-related risk like typhoid and cholera, while also has an ability to effect on infrastructure facility.

Many weather-related risk events which urban face will be exacerbated as climate change progresses and hazards such as sea-level rise, saltwater intrusion and more intense storms become day-to-day realities for the poor and vulnerable populations that inhabit many of the most hazardous areas in urban centres. Natural calamities like cyclones, flooding, landslides and draught affect many urban dwellers and their livelihoods, property, quality of life and future prosperity. Certain patterns of urban development can increase resilience which contributes mitigate human and encourage adaptation to the inevitable changes that climate change will bring. Appropriate urban planning can help to restrict growth of population and activities in risk-prone areas.

2.0 Material

2.1 The Factors Affecting Climate Change.

Half of the world's population lives in cities, a share that is likely to reach 70 percent in 2050 (the world bank, 2007).The International Energy Agency (IEA) estimates that urban areas currently account for over 67 percent of energy-related global greenhouse gases, which is expected to rise to 74 percent by 2030. It is estimated that 80 percent of the increase in CO_2 from energy use will be from developing countries (IEA 2008). Nearly 80 percent of the carbon dioxide and other greenhouse gases are generated due to development activities. Direct sources of greenhouse gas emissions include energy generation, vehicles, industry and the burning of fossil fuels and biomass in households. Emissions from vehicles and transport equipment are rising at a rate of 2.5 per cent each year, and contribute not only to CO_2 emissions, but also to local and regional pollution problems through the emission of carbon monoxide, lead, sulphur oxides and nitrogen oxides. The electrical energy for public lighting and transportation, and industrial**,** commercial and household consumption**,** is also a source of emissions. Industry is responsible for 43 per cent of the global CO_2 emissions from fossil fuel combustion. Loss of green cover increases CO_2 level and poor waste management releases CFCs and gases such as methane into the atmosphere.

2.2 The Sources of Greenhouse Gas Emissions

Towns and cities do not themselves emit GHGs. Rather, specific activities that take place within urban areas – and that are undertaken in different ways by people of different ages, genders and income groups – are the sources of these GHGs. Different activities or sectors emit different quantities of different gases – with diverse impacts upon climate change (see Figure).

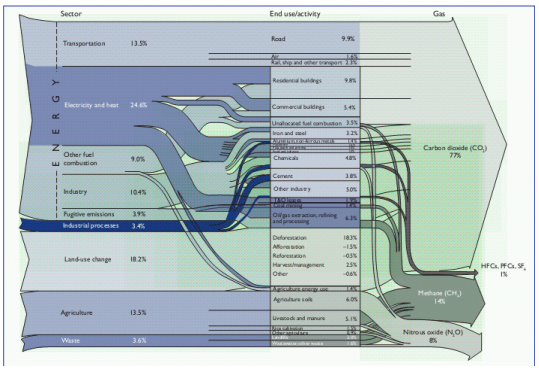

FIGURE: GLOBAL GHG EMISSIONS BY SECTOR AND END USE/ACTIVITY

Notes: All data are for 2000. All calculations are based onCO_2 eq, using 100-year global warming potentials based on an IPCC total global estimate of 41,755 million tonnes CO_2 eq. Land-use change includes both emissions and absorptions. Dotted lines represent flows of less than 0.1 per cent of total GHG emissions.

Source: World Resources Institute (http://cait.wri.org/figures/World-FlowChart.pdf)

(UNHABITAT) 2007

The main sources of GHG emissions from urban areas are related to the consumption of fossil fuels: whether this is for electricity supply, transportation or industry, transportation, commercial and residential buildings), industry, waste, agriculture, land-use change and forestry. It examines the activities that contribute to GHG emissions from this sector.

2.2.1 Energy Supply for Electricity Generation:

Energy is perhaps the broadest possible category for assessing GHG emissions. The combustion of fossil fuels is the major source of these, and is used throughout the world for electricity generation, heating, cooling, cooking, transportation and industrial production. Energy is obtained from fossil fuels, biomass, nuclear power, hydroelectric generation and other renewable sources. Urban areas rely heavily on energy systems (shaped by the quantity of energy used), the energy structure (types of energy forms used) and the quality of the energy (its energetic and environmental characteristics). The type of fuel used to generate electricity has a significant impact upon the volume of GHG emissions.

2.2.2 Transport

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Globally, transportation is responsible for about 23 per cent of total energy-related GHG emissions and per cent of global GHG emissions. In addition, transport activities increase as economies grow, and are expected to continue increasing in the decades ahead, especially with increasing levels of urbanization. Urban areas rely heavily on transportation networks of various kinds for both internal and external movements of goods and people. The proportion of journeys made by private as opposed to public transportation – particularly in larger cities – is an important factor influencing GHG emissions from an urban area. Urban areas, particularly in developed countries, often generate smaller amounts of GHG emissions per capita than rural areas due to the advantages of density. Urban density is one of the most important factors influencing the amount of energy used in private passenger transport, and therefore has a significant effect on GHG emissions. Innovative thinking in relation to the planning of transportation infrastructure can therefore meet both environmental and social needs

A key component of GHG emissions from transportation is the number of vehicle kilometers travelled. The number of vehicle kilometers travelled is affected by several key aspects of urban design, including:

• density (higher number of people, jobs and/or dwelling units per unit area);
• diversity (greater mix of land uses);
• design (smaller block sizes, more sidewalk coverage, smaller street width);
• destination accessibility; and
• distance to transit.

These 'five Ds' can be affected by the choices of planners and developers, and, in turn, will affect the travel choices of residents living in these areas. These aspects of urban design intersect with issues of personal choice and economic necessity – for example, there is some evidence from Sweden that women are more likely to use public transportation than men.

2.2.4 Commercial and residential buildings

GHG emissions from commercial and residential buildings are closely associated with emissions from electricity use, space heating and cooling. The type of fuel used for heating and cooling also deter-mines the amount of GHGs emitted.

Industry

Globally, 19 per cent of GHG emissions are associated with industrial activities It has been noted that 'when [cities] are able, they will get rid of polluting industries, pushing them away from city centers to suburbs or to other cities.

Waste

Emissions from waste represent about 3 per cent of total emissions. Although waste generation is linked to population, affluence and urbanization, emissions from waste may be lower in more affluent cities, as urban areas have the potential to greatly reduce or even eliminate emissions from waste. GHG emissions from waste are relatively low in many urban areas in developed countries.

2.3 Challenges due Climate Change on Urban Development / Area

As per the IPCC (2007) report lists the different aspects of climate change their impact, projection for the future impact and most affected group with zone is given. However the extreme weather condition such as heavy rainfalls, cyclone causing flood; causes damage and disruption. Coastal cities that are at risk from storms will be doubly at risk as sea-level rise increases hazards from coastal flooding and erosion.

TABLE: PROJECTED IMPACTS ON URBAN AREAS OF CHANGES IN EXTREME WEATHER AND CLIMATE EVENTS (SOURCE: IPCC 2007A

Climate phenomena and their Likelihood	Major projected impacts
Warmer and fewer cold days and nights; and Warmer and more frequent hot days and nights over most land areas Virtually certain	Reduced energy demand for heating Increased demand for cooling Declining air quality in cities Reduced disruption to transport due to snow, ice Effects on winter tourism
Warm spells/heat waves Frequency increases over most land areas Very likely	Reduction in quality of life for people in warm areas without air conditioning; Impacts on elderly, very young and poor;
Heavy precipitation events: frequency increases over most areas Very likely	Disruption of settlements, commerce, transport and societies due to flooding Pressures on infrastructures, potentials for use of rain in hydropower generation, Loss of property
Area s affected by drought increases Likely	Water shortages for households, industries and Services .Reduced hydropower generation potentials. Potential for population migration

2.3.1 Flooding

When rainfall occurs there is always present some risk of flooding in urban areas. The urban area is covered by buildings, roads; infrastructure and other paved areas which prevent rainfall from infiltrating into the soil and so produce more runoff. Heavy and/or prolonged rainfall produces very large volumes of surface water in any city, which can easily overwhelm drainage systems. In well-governed cities, this is rarely a problem because good provision for storm and surface drainage is easily built into the urban fabric, with

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complementary measures to protect against flooding for instance the use of parks and other areas of open space to accommodate floodwaters safely from unusually serious storms. In most cities, there is also scope for land-use management and incremental adjustments to increase flood-water management capacity. But in poorly-governed cities, this does not happen. Most residential areas have no drainage system installed and rely on natural drainage channels and it is common for buildings or infrastructure to be constructed that actually obstructs these drainage channels. There are also cases, cities without proper solid-waste management or drain maintenance, garbage and plant growth can quickly clog drains, leading to localized flooding with even light rainfall. There is also a growing documentation on the inadequacies in drainage and flood protection for urban centres in Africa and Asia and of the trend towards increased numbers of deaths and injuries from flooding in urban areas.

Climate change has the potential to increase flooding risks in cities in three ways: from the sea (higher sea levels and storm surges); from rainfall – for instance by heavier rainfall or rainfall that is more prolonged than in the past; and from changes that increase river flows – for instance through increased glacial melt. The IPCC Working Group II noted that heavy precipitation events are very likely to increase in frequency and will augment flood risk and the growing evidence of increased runoff and earlier spring-peak discharges in many glacier- and snow-fed rivers (Adger, Aggarwal, Agrawala et al.,2007). In addition to flood hazards, more extreme rainfall events associated with climate change will also generate increased hazard from landslides in many urban centres. As per IPCC, the dramatic impacts on water supplies that is likely under extremes of weather that could arise as a result of climate change. Water supply abstraction and treatment works are sited beside rivers and are often the first items of infrastructure to be affected by floods. Electrical switchgear and pump motors are particularly at risk. There also cause of failure of sanitary infrastructure and services which create substantial threat of intestinal disease.

2.3.2. Storms, Sea-Level Rise and Coastal Urban Populations

It can't be exactly estimate the numbers of people are at risk from the increased frequency and intensity of extreme weather events and rise in sea level which climate will occur. According McGranahan, 2007 analysis the number and proportion of urban dwellers (and total populations) living in the low-elevation coastal zone. In this zone the continuous area along the coast that is less than 10 meters above sea level – represents 2 per cent of the world's land area but contains 10 per cent of its total population (i.e. over 600 million people) and 13 per cent of its urban population (around 360 million people). Almost two-thirds of the world's cities with more than 5 million inhabitants fall in this zone, at least partly. Low-income and lower-middle-income nations have a higher proportion of their urban population in this zone than high-income nations. The least developed nations, on average, have nearly twice the proportion of their urban population in this zone, compared to high-income nations. As per IPCC 2007 report state the particular vulnerabilities to sea-level rise and changes in run-off of large sections of the urban and rural population in heavily populated Asian deltas such as the Ganges-Brahmaputra (that includes Dhaka), the Mekong, the Chang jiang (also known as the Yangtze, which includes Shanghai) and the Chao Phraya (with Bangkok).

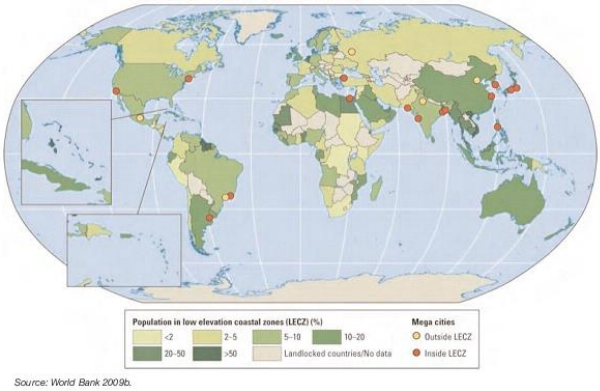

FIGURE: AT RISK: POPULATION AND MEGACITIES CONCENTRATED IN LOW-ELEVATION COASTAL ZONES (LECZ) THREATENED BY SEA-LEVEL RISE AND STORM SURGES (CITIES AND CLIMATE CHANGE: AN URGENT AGENDA)

McGranahan, Balk and Anderson, 2007 repot say there is increasing population concentrations in low-elevation coastal zones in most nations. Where China provides the most dramatic example as it is the nation with the largest number of urban and rural dwellers in the low-elevation coastal zone and it still has a very strong trend towards increasing population concentration in this zone. Increasing trade and market-driven movements, often supported by government incentives, are still attracting people to the coast. The coastal provinces of China experienced a net in-migration of about 17 million people between 1995 and 2000, creating pressures in an already crowded coastal zone (ibid). According to the Indian metrological department (2005) frequency of cyclone formation is five times higher in the Bay of Bengal than India's east coast. The high concentration of population, especially on the eastern coasts of India and Bangladesh, has led to extremely high vulnerability in this region, leading to very large loss of life and property (Revi, 2008)

2.3.3 Constraints on Water Supplies and Other Key Natural Resources

As the world populations is increasing and by 2020, between 75 million and 250 million people are projected to be exposed to an increase of water stress due to climate change (IPCC). According report of IPCC fresh water availability in Central, South, East and Southeast Asia, particularly in large river basins, is projected to decrease due to climate change which, along with population growth and increasing demands arising from higher standards of living, could adversely affect more than a billion people by the 2050. The people living in areas already suffering water scarcity or water stress – with poorer

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groups likely to be most affected if there is any decrease in the availability of freshwater resource by climate change. Many cities and their water catchments will get less precipitation (and have more constrained fresh water sources) – which is particularly problematic for growing cities and large cities already facing serious problems obtaining sufficient fresh water supplies (Anton, 1993; UN Habitat, 2006) . There is already a failure to manage water resources well in much of this region, independent of climate change the around half the urban population already lacks adequate provision for water and sanitation, although this is linked far more to inadequate governance than to water shortages (UN-Habitat, 2003).

2.3.4 Higher temperatures and heat waves:

Many cities will face more problems with certain air pollutants as concentrations of air pollutants change in response to climate change because a portion of their formation depends, in part, on temperature and humidity. This has particular importance for Asia and Latin America, which have most of the cities with the highest levels of air pollution.

The little increase 10C in temperature causes 4-5 tons of loss in annual rice production. Which will create the problem of food security? In regard to urban heat islands, higher temperatures occur in urban areas than in outlying rural areas because of diurnal cycles of absorption and later re-radiation of solar energy and heat generation from built/paved physical structures. These increase the frequency and severity of heat-stress events in cities and can affect the health, labor productivity and leisure activities of the urban population. There are also economic effects, such as the additional cost of climate-control within buildings, and environmental effects, such as the formation of smog in cities and the degradation of green spaces – and increased greenhouse gases if additional demand for cooling is met with electricity generated from fossil fuels.

3.0 Conclusion

3.1 Adaptation and Mitigation

Although climate change will bring about gradual change over time in some parameters (for example, mean annual temperatures and mean sea levels), it will also produce changes in extreme events (for example, a greater number and intensity of cyclones, heat waves, and flooding) in many locales.

3.2 Building Resilience In A City Requires Systems, Or Integrated Approach.

An 'ecosystems approach' can provide a useful context. A few key initiatives can yield large results. For cities, these include (i) robust decision making (incorporating broader-based cost and benefit assessments that include societal values, ecosystem services, risks, and longer time horizons); (ii)buttressing of key infrastructure (e.g. increased robustness of water and power supply systems); (iii)social inclusion (ecosystems abhor extremes, for example, pronounced differences between rich and poor); (iv) urban risk assessments; (v) emergency preparedness (practice, know where the risks are likely, make this information public)

3.3 Mitigation Measures

Cities need an integrated approach that considers mitigation, adaptation and urban development. The improvement of city services is related to the ability of cities to adapt to climate change and reduce their greenhouse gas emissions. Cities with excellent services are generally resilient cities.

Advanced drainage systems can alleviate flooding during intense storms. Healthcare services are equipped to respond to emergency situations Warning systems and transportation infrastructure allow citizens to evacuate in response to risk

As cities develop, it is essential to evaluate infrastructure and service improvements through a climate change lens so as to promote long-term mitigation, adaptation, and poverty alleviation. Cities that focus on provision of basic urban services to the poor tend to do so in an integrated manner that follows a simple hierarchy. Adaptation to, and mitigation of, climate change should follow a similar integrated city-wide approach: (i) fully providing basic health and environmental services (and primary education); (ii) encouraging and enhancing the resilience of community organizations; (iii) improving building quality, particularly residential; (iv) avoiding development in hazardous or sensitive areas; (v) protecting buffering capacities of local ecosystems and minimizing degradation (for example, groundwater, mangroves, and wetlands). Climate change forces an even more urgent imperative to move toward sustainable cities. Sustainable cities are the foundation of sustainable development; they drive local and global economies, protect the poor, and build in increasing adaptive capacity.

REFERENCE

i. *http://www.cleanerclimate.com/useful-information/what-is-climate-change*

ii. *Patricia Romero Lankao Ph.D. (Social Scientist), Urban Areas and Climate Change: Review of Current Issues and Trends, Issues Paper for the 2011 Global Report on Human Settlements December 2008*

iii. *http://library.thinkquest.org/J0110521/what_is_urban_development.htm*

iv. *http://www.unhabitat.org/downloads/docs/GRHS2011-1.pdf*

v. *http://www.unhabitat.org/downloads/docs/GRHS2011-3.pdf*

vi. *http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf*

vii. *Climate Change The Role of Cities involvement influence implementation(UNEP)*

viii. *Climate Change 2007: Synthesis Report See http://www.ipcc.ch/meetings/ar4-workshops-express-meetings/uncertainty-guidance-note.pdf*

ix. *Anthony G. Bigio, Cities and Climate Change (World Report 2003)*