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The Effect of Urbanization on Environment in India

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ABSTRACT: This paper examines the relationships between population dynamics and environment, but the emphasis would be mainly on urbanization, whose impact considered as strongly negative on the environment. The negative effects that urban areas have on the environment have drawn substantial attention, especially concern about the effects of greenhouse gas emissions and so-called 'heat island effect' on climate change (IPCC, 2001). Urbanization is significantly exaggerated emissions of carbon dioxide over the next 40 years as the Executive Director of the United Nations Centre for Human Settlements has specified that cities are responsible for seventy-fivepercent of global energy consumption and eighty percent of greenhouse gas emissions. This paper will describe the major causes of increase in greenhousesgasses due to the urbanization and its effect on the local community. The study will focus on mainly major cities of India, which contribute more in greenhouse gasses. The data for the paper would be collected only by the secondary source.

I. INTRODUCTION

The third world countries areexperiencing a major demographic transition from a rural, agrarian society to an urban, industrial one.By 2050, seventy percent of the global population will reside in urban areas, up from about half today (United Nations, 2001). Urbanization is the increase in the proportion of people living in towns and cities.Urbanization is defined by the United Nations as the movement of people from the rural areas of a country to the urban areas with population growth equating to urban migration.Most of this increase in urban population will occur in third world countries and more than half the growth will occur in just two countries, India and China (Cohen, 2004). As Walsh notes, "in developing nations, the move from rural areas to cities often leads to an accompanying increase in income - and that increase in income leads to an increase in the consumption of food and energy, which in turns produces an uptick in carbon emissions."

India is no longer consideredas Bharat of villages. Because, in 1961, seventy-nine million people were living in urban areas but in 2001, approximately 285 million people reside in urban areas. In 1991, there were onlytwenty-three metropolitan cities in India which increased to 35 in 2001. Some of the main cities, areDelhi, Chennai, Mumbai, Kolkatta,etc. with the rapid process of urbanization, the demand for land for various urban activities also increases.

In India, the process of urbanization increased with the start of the globalization and industrial revolution in the 1970s.For the urbanization, Forests were cleared, grasslands grazed, wetlands drained and croplands encroached.

According to the 2001 Census, 27.8 percent population of India residing (286 million) in urban areas, thus, approximately more than ten times increase in total urban population from 1901 to 2001. However, The percentage of the people residing in urban areas increased from 17.35 percent to 31.2 percent in 2011 and the annual growth of urban population 3.52 percent(Census 2011). Recently, one out of three is living in the urbanarea, and it is estimatedthatas much as fifty percent population will reside in next ten year (Khursheed and Sethuram 2011).

The links between urbanization and environment are complex (Sánchez-Rodríguez *et al.* 2005).With the urbanization, more challenges happen. Where the urbanization creates more opportunities for people, for example, jobs, modern life style, easy access to facilities, hospital, schools, railways,etc., but there is also createdthe biggest challenge to the environment. The main cause of degradation of the environment is rapid urbanization because of all industries, which created GHGs, located in urban area.

Urban areas are the main sources of anthropogenic carbon dioxide emissions from the burning of fossil fuels for industrial processes; transportation of people and goods etc.

Svirejeva-Hopkins *et al.* (2004) recommend that approximately more than ninety percent of anthropogenic carbon emissions are produced in cities. This increase has been rapid increased since the mid of the 1990s century which has affected the quality of the environment. Urbanization effects the environment in many ways: its relationto the discharge of pollutants and generation of solid/liquid/gaseous wastes, secondly, its relation with the depletion of natural resources and its relationto the social costs of population explosion, pollution, poverty and sustainable development.

II. ENVIRONMENTAL PROBLEMS DUE TO URBANIZATION IN INDIA

A. Impacts Of Solid Waste On Environment

Waste generation has observed cumulative trend equivalent to the development of urbanization and industrialization. This problem has become one of the primary urban environmental issues. A huge amount of waste is produceddaily, and its management is anenormous task. Similarly, the rapid increase in urbanization combines with anxious poverty to deplete and pollute local resource basis on which the livelihood of the present and future generation depends.

The main source of urban environmental pollution is decomposition of waste material into constituent chemicals. Urbanization directly contributes to waste generation and intuitive waste handling which causes health hazards and urban environment degradation. As the result of arapid increase in production and consumption, urban cities generates solid material frequently which leads to considerable increase in the volume of waste generated from several sources such as, industrial waste, commercial waste, domestic wastes, and institutional waste. Wastes that arise from a typical urban society contains garbage, construction and destruction wastes, leaf litter, hazardous wastes, etc. (Rajput et al. 2009). The survey conducted by the FICCI(Federation of Indian Chambers of Commerce & Industry) (2009) shows that the small cities for example Shimla, which generates 65 TPD(tons per day) to Delhi which generates 6800 TPD. Among the class one cities, Agartala produces least quantum of waste (200 TPD), and Delhi generates 6800 TPD of waste. The class two cities, Shimla generates the least quantum of waste and Chandigarh generates the maximum quantum of waste. This data shows that the cities where urbanization rate is high, waste generation rate is also high as Chandigarh whereas the cities where urbanization rate is the low production of waste is also less, for example, Shimla. This shows a direct link of urbanization with waste production (Vij, 2012). This problem of waste generation totallydegrades the environment.

A major environmental concern is a gasreleased by decomposing garbage. Methane is a by-product of the anaerobic respiration of bacteria, and these bacteria flourish in landfills[1] with large amounts of moisture. Methane concentrations can spread to fifty percent of the composition of landfill gas at maximum anaerobic decomposition (Cointreau-Levine, 1997). In the absence of proper methane emitting, the gas leaks into porous soil surrounding the waste and migrates into basements and homes, posing an explosion risk. Carbon dioxide is a second predominant gas emitted by landfills; although less reactive, build up in nearby homes could be a cause of suffocation. The second problem with these gasses is their contribution to the enhanced greenhouse gas effect and climate change.

B. Water Pollution Due To Urbanization

With increasing urbanization, there is also growing amount of wastes, in term of water, huge quantities of waste water enter into rivers and canals and have over-taxed their natural recycling capabilities. The Yamuna River once had ‘clear blue’ water, but with the most urbanization of the Delhi, now the river have become one of the most polluted rivers in the world especially around New Delhi. The capital dumpsfifty-eightpercent waste into the Yamunariver and Pollutants are increasing at an alarming rate. At present seventy percent of Delhi is drinking treated water of the Yamuna River. The many problems associated with increasing wastes, the problem of fresh water pollution in India came to the forefront towards the beginning of 1970’s with the domestic sewage and industrial waste discharges being the most critical sources of pollution in cities.The decomposition of waste into chemicals constituent is a common source of local environmental pollution which contaminates air and water systems.

C. Air Pollution Due To Urbanization

Rural areas are being converted to urban areas continuously, and unplanned industrialization is taking place, and Air pollution has increased by urbanization and industrialization.Air pollutants consist of odours, gaseous pollutants, and SPM, (suspended particulate matter) such as dust, fumes, mist, and smoke.

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[1] Landfilling refers to the more modern sites where waste is placed in lined disposal areas which are environmentally isolated, and where waste is naturally degraded. Within best practices, emissions produced by decaying waste (gas and leachate) are recovered through drainage systems and treated. The amount and quality of these emissions are variable in time and depend on the composition of the stored waste. Organic waste decomposition produces landfill gas (comprised of methane and carbon dioxide in nearly the same amounts).

The largest sources of anthropogenicair pollution are energy generation, transportation, and industries that use alotof energy sources. Depending on their source and interactions with other components of the air, they can have different chemical compositions and health impacts.The quality of air in cities is a major environmental concern. It indirectly affects climatic conditions and directly affects the health of the community. Major air pollutants are gaseous lead, CO, ozone, respirable suspended particulate matter (RSPM) and sprays. The highest concentrations of air pollutants are found in the urban areas due to congestion of traffic, bad maintenance of motor vehicles, poor quality of fuel, inefficient engines.

III. CAUSES OF INCREASE IN GREENHOUSEGASSES DUE TO THE URBANIZATION

The major effect of the urbanization on the environment is amajor increase in green housegasses. These gasses mostly created anexcessive risk to the environment. The main source ofthese gassesis the urbanization. Greenhousegasses are those gaseous constituents of the atmosphere, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds.The concentration of greenhousegasses (GHG's) in the atmosphere has increased rapidly due to anthropogenic activities attached with the urbanization growth and resulting in an irrelevant increase in the temperature of the earth. The energy radiated from the sun is absorbed by these gasses making the lower part of the atmosphere warmer. This leadingphenomenonis known as a natural greenhouse gas effect. These effects were augmented with the emission of gasses from various anthropogenic activities consequent to industrialization and urbanization.

Atmospheric concentrations of GHG gasses have increased due to increasing emissions of GHGs during post-industrialization era due to human activities. Greenhouse gasses are: Carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6) . Among the GHG's, Carbon dioxide is the most dominant gas causing global warming which accounts early seventy-seven percent of global total CO_2 equivalent GHG emissions.

A. GHGs emissions in transportation sector

The transportsector, in India, contribute most to the green house gasses emission. Because the Emissionsfromtheroadtransportsectoraremainlyrelatedto dieselconsumption.The increase in emissions has been due to increasing both in the number of motorvehicles on the road. Traffic structure of the megacities of India (Delhi, Mumbai, Kolkata, Chennai, Bangalore and Hyderabad) illustrationsthat thereis asubstantial shiftfromtheshareofslowmovingvehiclesto fast movingvehiclesandpublictransporttoprivate transport.For example, Delhi's transport sector produces six times as much greenhouse gas emissions (GHG) as that of Kolkata's, five times as much as Ahmedabad's and three times as much as Greater Mumbai and Chennai (Ramachandra Aithal 2015).Delhi's transport sector emits 12.39 million ton of carbon-dioxide (CO_2) equivalent, followed by Greater Bangalore (8.61) and Hyderabad (7.81). The transport sector in Hyderabad emits the greatest proportion (56.86percent) of GHG emissions compared to other Indian cities (Mallapur2015).

Since 1960's, there is continuously increase in the number of motor vehicles evenincreasing faster than the population. Vehicle production in India is increasing at the rate of 15-20 per cent per year. As per a recent media report (T.O.I.), Delhi is adding 963 vehicles on its road every day while Bangalore is adding 500 vehicles. The problem has been further compounded by astable increase in urban population and alarger concentration of vehicles in urban cities especially in four mega cities namely, Delhi, Mumbai, Chennai and Kolkata which account for approximately more than fifteen percent of the total vehicular population of the country. Simultaneously, more than forty other metropolitan cities (with a human population more than 1million) accounted for thirty-five percent of the vehicular population of the country. Further, twenty-five percent of the total energy (of which 98 percent comes from oil) is consumed by road sector. Vehicles in major mega-citiesare estimated to account for seventy percent of CO^2, fifty percent of HC. These high level of pollutants are largely responsible for respiratory and other air pollution related diseases including lung cancer, asthma, etc., which is significantly higher than the national average.

B. Industrial sector

The industry is a major source of green house gas emissions. The industrial sector is responsible for approximately one-third of global carbon dioxide emissions through energy use. In India, these industries are the main source of emission, named: cement plant, steel industry, thermal power, cement plants, chemical production and other industries. Carbon dioxide emissions have been estimated from cement and steel, fertilizer, iron and other industries like lime production, and aluminum production. Six industries in India have been identified as energy-intensive industries: Aluminium, cement, fertilizer, iron and steel, glass, and paper.

The cement industry emitted 129.92 million tons of CO_2, which is 32 percent of the total CO_2eq emissions from the Industry sector[2].
Chennai figured as the top emitter (4.4 million) in the industrial sector. The emission comes from ammonia production for fertilizer industries, and petro products.

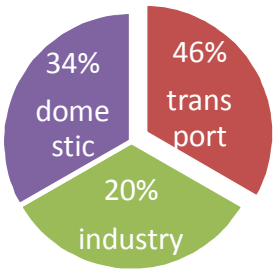
C. Waste generation

The waste sector main contributes to carbon dioxide emissions due to the waste burning of the inorganic matter when there is no energy recovery. Approximately 10-23 per cent of annual global anthropogenic methane produced and released into the atmosphere is a by-product of the anaerobic decomposition of landfilledwaste (IPCC, 2001).
Wastewater treatment may be responsible forten percent of anthropogenic methane emissions, both from domestic and industrial Waste sources. From industrial sources, pulp, and paper, as well as food and beverages processing industries, responsible for most of the emissions. Changes due to waste management affect mainly themethane emissions. The contribution of Waste sector to the global methane emission is projected to be around 90 Mt (million tons) annually, during the 1990s.

V. DELHI 'S URBANIZATION AND EFFECT ON ENVIRONMENT

Urbanizationhad increased rapidly since 1911 when the capital of India was shifted from Calcutta (presently Kolkata) to Delhi. The pace of urbanizationwas enhanced during 1941-51 when the country was divided into two parts (India and Pakistan), and most migrant people settled in Delhi. With rapidurbanization, the rural area is shrinking; it has shrunkfrom 1157.52 sq km in 1961 to 591.91 sq km in 2001. In 2001, the population density was 14,387 and 1,627 persons/km^2 in urban areas and rural areas respectively. Villages of Delhi, which have coexisted with the sprawling urban settlements, still retain a great deal of rural tradition. The rapid urbanization has led to the development of new settlements colonies in Delhi.
The rapid growth of Delhi in past decades has resulted in significant decrease in the quality of theenvironment. The increase in urban population area and growth in economic activity has led to environmental degradation in Delhi. There has been thehighly unplanned development of industries and factories. Previous studies had revealed that the only about twenty percent of the industrial unit are set up in the approved industrial area whereas the rest of the industries and factories are in residential and commercial areas.The industrial activities contribute. Twelve percent of air pollution.
With the urbanization of Delhi, as the capital of India, the environmental problem al around the City. Among environmental problems, pollution is the main problem. As per the World Health Organisation (WHO), Delhi got the fourth rank in most polluted cities in the world.The main source of Air pollution is road transport.Road transport is the chief means of public transport; there has been a continued increase in the vehicle and pollution. Which has increased from two lakh in 1971 to 32 lakh in 1999[3]. Delhi isfirst ina number of thevehicle among the three mega cities of Mumbai, Calcutta and Chennai combined. It means the total number of thevehicle in Delhi is equal to three mega cities. In Delhi mainly people depends on thesingle transport system, i.e., road. The continued increase in vehicle population has responsible for theincrease in pollutants emitted by vehicles. Two-wheelers, which constitute sixty six percent of the vehicles registered in Delhi, are the major source of air pollution.

The contribution of greenhouse gasses from different sector in Delhi



Source:http://www.nicraicar.in/nicrarevised/images/State%20Action%20Plan/States-SAPCC-delhi.pdf

In Delhi, Pollution from thedomestic sector is mainly due to theuse of kerosene, LPG, diesel and huge consumption of electricity. LPG is the most normally used as cooking fuel (68.4percent) followed by kerosene (24.4 percent) while biomass is also used in 3.9 percent households. There is a continuedincrease in carbon dioxide emission from the domestic sector of Delhi. In 2000-2008, it was 4.56 MMT whereas, in 2007-08, it reached to 5.35 MMT, this is rise five times within one year.

[2] Source: India: Greenhouse Gas Emissions 2007, available at;http://envfor.nic.in/sites/default/files/EXECUTIVE%20SUMMARY-PS%2BHRP.pdf

[3]Source:http://www.delhi.gov.in/wps/wcm/connect/DoIT_Planning/planning/economic+survey+of+dehli/content/environmental+concerns.

Carbon dioxide emission from the industries was 1.37 MMT. Simultaneously, power consumption alone contributing 1.21 MMT while the contribution from fossil fuel combustion in industrial processes was 0.01 MMT The average concentration of CO_2 monitored at degradation of theenvironment and Delhifollowed by the Chennai which first amongst theothe mega cities in environmental degradation as per GDP growth.

The data shows that the urbanization badly effects the environment. Because with urbanization and industrialization, the main source of environmentaldegradation had emerged. The main problems of environments had emerged due to urbanization and human activities that are water pollution, air quality degradation, global warming, etc. There should be need of proper maintenance of theurban city which isresponsible for an environmentaldegradation. The only policy making is not enough to tackle the environmental problem, but there is need of taking strong steps towards the maintenance of the urban cities and safeguard of theenvironment. Development is necessary, but development should be sustainable.

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