

AMDA

Special bulletin

Association of Municipalities and Development Authorities



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Dear Members

AMDA thanks all its members for the cooperation and active participation in all AMDA's activities. AMDA will be organizing workshops in coming months in various parts of the country on issues of concern like innovative use of IT, solid waste management, rain water harvesting etc. for the Municipalities/Development Authorities. I look forward to the continued support and cooperation from all the members for organizing these events, as you have provided in the past.



AMDA believes in the dissemination of knowledge of good practices in each of these fields which will go a long way in improving the work and increasing the efficiency of our member-bodies. This special bulletin is also dedicated to dissemination of such knowledge, with articles on Indian urbanization, urban green spaces and municipal solid waste management.

The first article focuses on Urbanization in India. It describes the pace of urbanization, and levels of urbanization in comparison to last decade census, as well as number of statutory and census towns in various states of India.

The second article focuses on the conservation of urban green spaces. Due to rapid urbanization, urban green spaces are shrinking day by day. The declining quality of life in urban areas due to reduction of urban green spaces has been brought out as a matter of great concern.

The third article focuses on generation of methane gas from municipal solid waste. This project is unique of its kind in India. East Delhi Municipal Corporation setup the pilot project at Ghazipur Landfill site. Through its innovative technology it has helped to mitigate the Green House Gases emissions.

The fourth article is regarding the necessity of understanding responsibilities and helping the local authorities in managing municipal solid waste.

Once again, it gives me great pleasure in bringing to you this Special AMDA bulletin, our quarterly Newsletter.

We look forward to your feedback not only to improve the AMDA bulletin in terms of content and presentation but also to improve the quality of services in our Municipalities/Development Authorities.



Naini Jayaseelan

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URBANISATION: DATA ANALYSIS 2011 CENSUS

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Introduction

In India, urban areas are defined on the basis of two criteria. First, the state government grants municipal status, viz, corporation, municipal council, notified town area committee or nagarpanchayat, etc. to an existing settlement. Such settlements are known as statutory or municipal towns in the census definition of urban areas. Second, as per the census definition if a settlement does not have an urban civic status, but satisfies demographic and economic criteria, like a population of more than 5,000, a density of 400 persons per square kilometre and 75 per cent male workforce in the non-agricultural sector, it can be declared urban and are termed as census towns.

Both Eleventh and Twelfth Five-Year Plans have argued that urbanisation should be seen as a positive factor in overall development as the urban sector contributes about 62 per cent of the Gross Domestic Product (GDP). There is also a growing realisation that an ambitious goal of 9-10 per cent growth of GDP depends upon a vibrant urban sector (Planning Commission 2008, 2013). Given this background, the results of the 2011 Census assume enormous significance in enhancing our understanding of the magnitude, growth and interstate variation in the levels and pace of urbanisation in the country.

The Twelfth Plan envisages that urbanisation will be central to India's strategy of achieving faster and inclusive growth because agglomeration and densification of economic activities and habitations in urban conglomerations stimulates economic

efficiencies and provides more opportunities for earning livelihoods. Thus, as per the Twelfth Plan, urbanisation would increase avenues for entrepreneurship and employment compared to what is possible in dispersed rural areas and, thereby, enable faster inclusivity in the process of economic growth.

Level of Urbanisation

According to Census 2011, about 377 million Indians comprising 31.17 per cent of the country's population, live in urban areas in comparison to 45 per cent in China, 54 per cent in Indonesia, 78 per cent in Mexico and 87 per cent in Brazil. India's pace of urbanization over the previous decade was slower than projected earlier by United Nation experts (2000 and 2010) as well as Registrar General of India (2006).

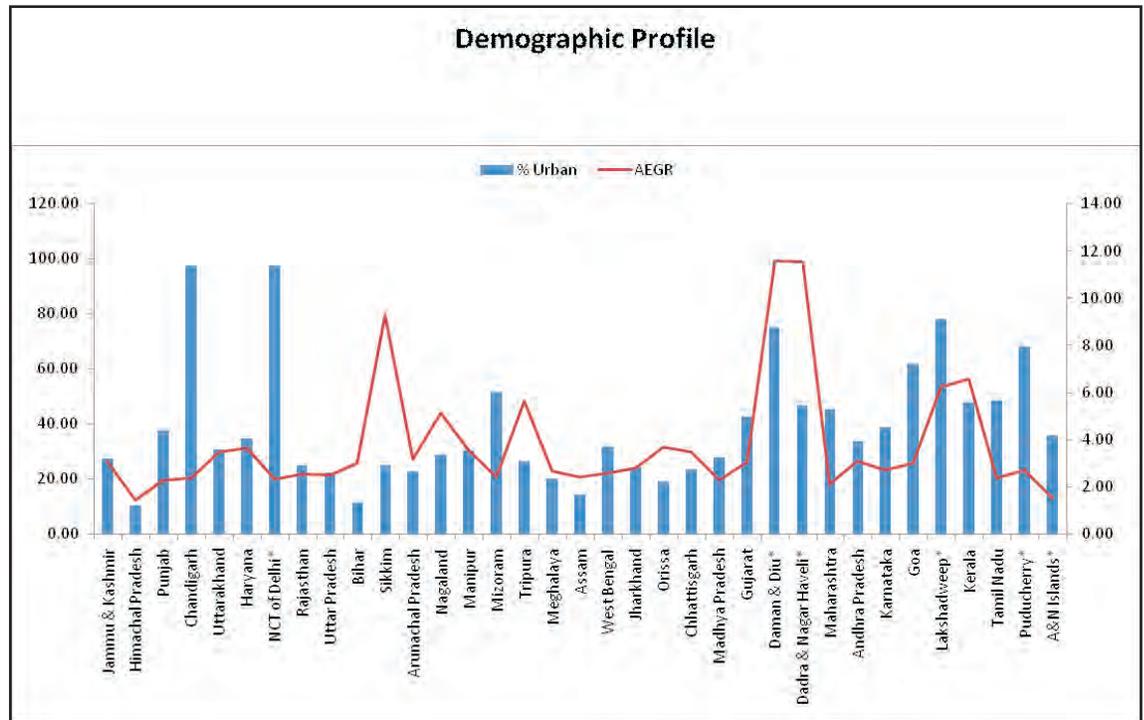
The urban population recorded an annual growth rate of 2.76 per cent during 2001-11 as compared to a growth rate of 2.73 in the previous decade (Table 1). The 2011 Census reported a dramatic increase in the number of urban agglomerations (UAs), 91 new UAs came up in the past decade. The Class I UAs/towns accounted for 70 per cent of the urban population, their number increasing by 74 during 2001-11, from 394 in 2001 to 468 in 2011. Furthermore, the 2011 Census also recorded an increase of million-plus UAs/cities from 35 in 2001 to 53 in 2011. These accounted for 42.6 per cent of the urban population. The largest UA in the country is Greater Mumbai followed by Delhi UA. Kolkata UA which was the 2nd largest UA in 2001 Census has been replaced by Delhi UA.

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Source: Census of India, 2001 and 2011

The level of urbanisation in the country increased from 27.82 per cent in 2001 to 31.16 per cent in 2011 (Table 1). Among states, Goa reported highest level of urbanisation (62.17 per cent), followed by Mizoram (51.51 per cent), Tamil Nadu (48.45 per cent), Kerala (47.72 per cent), Maharashtra (45.23 per cent), Gujarat (42.58 per cent), Karnataka (38.57 per cent) and Punjab (37.49 per cent). Himachal Pradesh reported lowest level of urbanisation in 2011 (10.04 per cent), followed by Bihar (11.30 per cent), Assam (14.08 per cent), Orissa (19.06 per cent), Meghalaya (20.08 per cent), Uttar Pradesh (22.28 per cent), Arunachal Pradesh (22.67 per cent), Chhattisgarh (23.24 per cent), Jharkhand (24.05 per cent), Rajasthan (24.89 per cent) and Sikkim (24.97 per cent). The level of urbanisation was reported high in the Union Territories. NCT of Delhi (97.50 per cent), Chandigarh (97.25 per cent), Lakshadweep (78.08 per cent), Daman & Diu (75.16 per cent) and Puducherry (68.31 per cent) reported very high level of urbanisation.

India has therefore reported an increase in the percentage of urbanisation by about 4 percentage points during 2001-11. The Union territories like Dadra & Nagar Haveli (23.73 per

cent), Daman & Diu (38.91 per cent) and Lakshadweep (33.62 per cent) have experienced the sharpest increase in their levels of urbanisation. Kerala registered an increase of 21.76 per cent in the share of urban population. States like Tamil Nadu (4.41 per cent), West Bengal (3.92 per cent), Maharashtra (2.81 per cent) and Rajasthan (1.51 per cent) have reported a moderate increase in their levels of urbanization. Himachal Pradesh reported the lowest increase of 0.25 per cent.

Pace of Urbanization

The highest growth was reported by the states of Sikkim (9.3 per cent), Kerala (6.56 per cent), Haryana (3.66 per cent) and Uttarakhand (3.5 per cent). The union territories like Daman & Diu (11.58 per cent) and Dadra & Nagar Haveli (11.53 per cent) also reported high growth rates. States like West Bengal (2.62 per cent), Rajasthan (2.57 per cent), Uttar Pradesh (2.53 per cent and Tamil Nadu (2.40 per cent) reported growth rates closer to the national average. The pace of urbanization improved from 2.73 during 1991-2001 to 2.76 during 2001-11 in India (Table).

Table Shows Level of Urbanization in India.

Table 1 : Level of Urbanisation				
State code	States/UTs	% of urban population		AEGR
		2001	2011	2001-11
0	INDIA	27.82	31.16	2.76
1	Jammu & Kashmir	24.81	27.21	3.05
2	Himachal Pradesh	9.80	10.04	1.45
3	Punjab	33.92	37.49	2.29
4	Chandigarh	89.77	97.25	2.38
5	Uttarakhand	25.67	30.55	3.50
6	Haryana	28.92	34.79	3.66
7	NCT of Delhi*	93.18	97.50	2.36
8	Rajasthan	23.39	24.89	2.57
9	Uttar Pradesh	20.78	22.28	2.53
10	Bihar	10.46	11.30	3.01
11	Sikkim	11.07	24.97	9.30
12	Arunachal Pradesh	20.75	22.67	3.19
13	Nagaland	17.23	28.97	5.15
14	Manipur	26.58	30.21	3.56
15	Mizoram	49.63	51.51	2.42
16	Tripura	17.06	26.18	5.66
17	Meghalaya	19.58	20.08	2.70
18	Assam	12.90	14.08	2.44
19	West Bengal	27.97	31.89	2.62
20	Jharkhand	22.24	24.05	2.80
21	Orissa	14.99	16.68	2.37
22	Chhattisgarh	20.09	23.24	3.49
23	Madhya Pradesh	26.46	27.63	2.28
24	Gujarat	37.36	42.58	3.06
25	Daman & Diu*	36.25	75.16	11.58
26	Dadra & Nagar Haveli*	22.89	46.62	11.53
27	Maharashtra	42.43	45.23	2.12
28	Andhra Pradesh	27.30	33.49	3.09
29	Karnataka	33.99	38.57	2.72
30	Goa	49.76	62.17	3.01
31	Lakshadweep*	44.46	78.08	6.24
32	Kerala	25.96	47.72	6.56
33	Tamil Nadu	44.04	48.45	2.40
34	Puducherry*	66.57	68.31	2.71
35	A&N Islands*	32.63	35.67	1.54

Source: Census of India 2001, 2011.



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It is important to note that the economically developed states have registered the highest level of urbanisation in the country in 2011. These states have also registered the highest growth rates and also the maximum increase in the number of census towns

Statutory Towns

India reported 4041 statutory towns in 2011 with an increase of total 242 statutory towns in the decade 2001-2011. These new towns were brought under urban governance for the first time. They are to fulfill the mandate of 74th Constitutional Amendment Act (1992) to become fully operational. Tamil Nadu reported the highest number of statutory towns (721) followed by Uttar Pradesh (648), Madhya Pradesh (364), Maharashtra (256) and Karnataka (220), in 2011 Census data. Smaller states like Kerala, Himachal Pradesh, Jharkhand and Manipur reported 59, 56, 40 and 28 statutory towns respectively in 2011. Union territories like Dadra & Nagar Haveli and Chandigarh reported the presence of only one statutory town whereas Lakshadweep reported an absence of Statutory Towns in 2011.

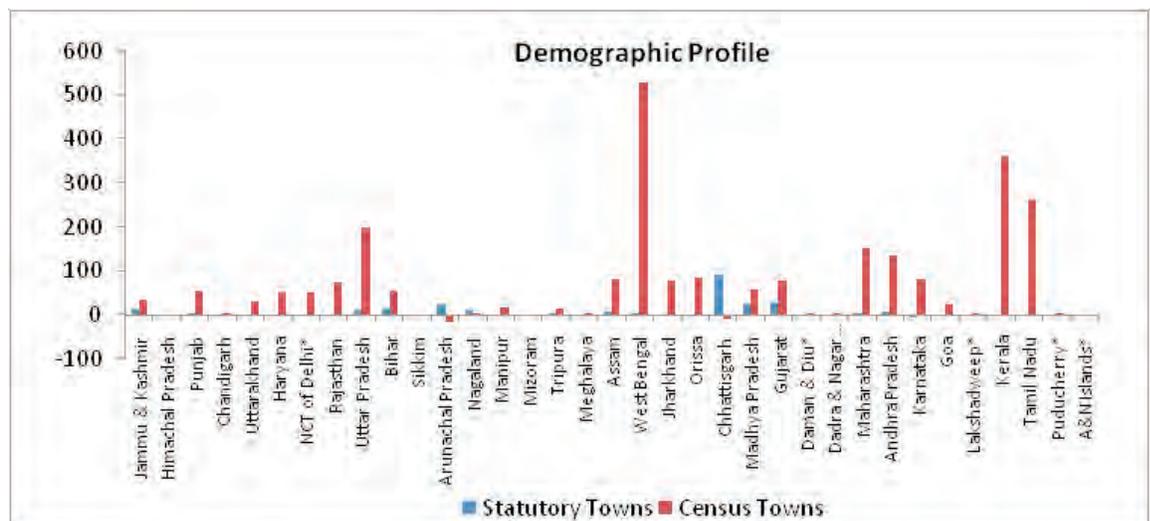
Madhya Pradesh reported an addition of 25 new statutory towns. Maharashtra reported an addition of only 5 statutory towns during 2001-2011. Some states, like Kerala, Haryana, Jharkhand and Karnataka, reported a decline in the number statutory towns.

Census Towns

There are 3894 census towns in India as per 2011 Census. West Bengal reported the

highest number (780) and also the highest increase of 528 census towns in 2011. Kerala (461 in 2011 as compared to 99 in 2001), Tamil Nadu (376 in 2011 as compared to 111 in 2001), Maharashtra (279 in 2011 as compared to 127 in 2001) and Uttar Pradesh (267 in 2011 as compared to 66 in 2001) also registered a very high increase in the number of Census Towns. Union Territories account for few census towns. Daman & Diu, Chandigarh and Puducherry, which showed an absence of census towns in 2001, now have 6, 5 and 4 census towns respectively. Two of the north-eastern states, namely, Sikkim and Mizoram reported no addition to the number of census towns during 2001-11. Chhattisgarh and Arunachal Pradesh reported a decrease in the number of census towns.

It is important to note that the economically developed states have registered the highest level of urbanisation in the country in 2011. These states have also registered the highest growth rates and also the maximum increase in the number of census towns, with the exception of Uttar Pradesh. Infact, a substantial rise in the level of urbanisation in the country could be attributed to the mushrooming of 2532 census towns during the last decade. These census towns which are actually rural settlements governed by gram panchayats need to be reclassified as statutory towns in order to bring about balanced urban development in the country.



GREEN SPACES FOR HEALTH AND HAPPINESS

Mr. Jaideep Kharb
Assistant Director
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Urban Green Spaces are squeezing day by day due to continuous and unplanned urban development. The need of the hour is a sustainable development. Economic development is also necessary for the growth of economy of the country but whether it could be achieved without disturbing the environment, is a big question. The Government should concentrate on the ways of economic development which are practical and environment friendly. We can sustain with lower economic growth but not against nature's anguish. This is also responsible for stressed lifestyle of modern urban Indian. We must understand benefits/importance of



urban green spaces and at the same time we should emphasize on development of more urban green spaces and conservation of existing green spaces (Parks & Stadiums/Forests, Rivers, Lakes) by improving our land use planning practices and make people aware about the impact of green spaces on their lifestyle.

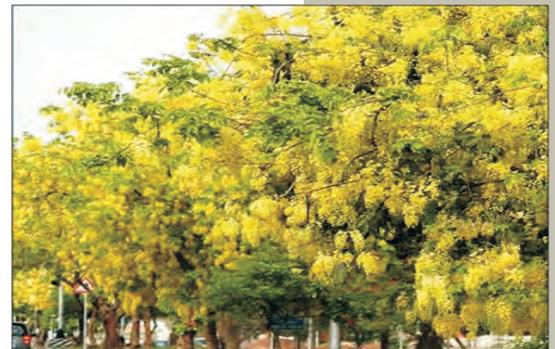
Green space in an office premises or home can help to reduce stress and enhance work efficiency. Even a view of greenery through the office window or a small stroll in the office garden can help a lot to uplift the mood and cheerfulness. That's why mostly people don't like to work in a basement office or don't like to live in a basement portion of home. These days due to excess workload, stress and stress-related diseases are increasingly becoming

major health challenges with an enormous cost for individuals, organizations and communities. The workplace green spaces provide employees the experience of serenity, wilderness, and intimate contact with nature at arm's length. Workplace is both a source of livelihood and a major contributor of stress related illness. Indeed, access to natural elements in urban systems has been found to promote physical health, relaxation, positive emotions, tranquility, revitalization, satisfaction, cognitive fitness and psychological well-being. Thus, provisioning of green space in the workplace can contribute to health and happiness of workers. Interestingly, workplace green spaces are among the least studied types of urban green infrastructure.

Urban green spaces form an integral component of planning of cities to serve a variety of important objectives. Urban green spaces are called "Lung Spaces" of the town/city. But now-a-days due to excess horizontal and leapfrog development it becomes a very difficult to find a scalable green space in urban areas. In India the situation is very worst in case of small & medium towns/cities. As we know the importance of green spaces on the health & happiness of people and environment of the cities. It becomes very important to retain our forest areas in the city limit. According to draft Urban & Regional Development Plans Formulation & Implementation (URDPFI) guidelines, 16 to 20 percent of area in land use plans for metro



Urban Green space in an office premises or home has helped to reduce stress and enhance work efficiency





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In a country like India where world's 18 percent population are residing only on world's 2.4 percent area, it is necessary to focus on vertical development.

cities should be proposed for recreational activities. But in a country like India with a large population living in urban areas (31.2% urban population according to 2011 census) the traditional land use planning is now become an outdated practice. Our urban local bodies are not capable to acquire the land and developed green spaces on proposed place, because many municipalities do not have funds to acquire land.

NEED TO GO VERTICAL

In a country like India where world's 18 percent population are residing only on world's 2.4 percent area now it become very necessary to focus on vertical development. Areas with large size plotted development need to redensify. Vertical development leads to a number of benefits:

- **Efficient Use of Scarce Land**
Vertical development promotes efficient use of scarce land. It leads to high residential density which also gives a good social and cultural interaction among residents at the same time it gives the feeling of safety.
- **Reduction of Travel Time**
Usually in high density areas mixed land use has been found. Therefore proximity of living and work place reduces travel time and cost. It promotes walking and cycling and reduces the pollution.
- **Reduction of Wastage of Agriculture land**
Vertical development reduces the wastage of precious agriculture and forest land. Compact settlements use the optimum utilization of land.
- **Less per capita Infrastructure Cost**
Vertical Development helps to reduce per capita infrastructure cost. It is also easy for an urban local body to operate and maintain.
- **Less Pollution**
Less travel means less pollution and optimum utilization of land means more

agriculture land to cities' vicinity which emits less polluted environment.

- **Encourage Planned Development**
Vertical development encourages planned development. The FAR/FSI is fixed according to available land and infrastructure.
- **Reduction of Collation between Local Authorities.**
A sizable area is easy to impose the rules and regulation it avoids collation between one or more urban local bodies.

PLANNING AND DESIGN

From the planning point of view, a network of high quality green spaces linking residential areas with business, retail and leisure developments can help to improve the accessibility and attractiveness of local facilities and employment centers. Well-designed networks of green spaces encourage people to travel safely by foot or by bicycle for recreation or commuting. We should also promote more and more green buildings to reduce our energy cost. Providing good pedestrian and cycle tracks and implementing landscape plan will help to replace rickshaw by cycle rickshaw.

In European Countries more than 60% household use green corridors in cities. Open spaces are often used as green corridors wherever travel times takes 10-15 minutes to reach the destination. Furthermore, well-designed urban green spaces provide a barrier to noise and can function as a visual screen.



Communities with more parks showed significantly higher level of walking and cycling for transportation.

Urban local bodies should take initiatives to develop some open spaces in already developed areas or core areas by providing Transferable Development Rights (TDR) benefits to people who are ready to take advantages in Floor Area Ratio (FAR) in the outer periphery of a city.

PROMOTE GREEN BUILDINGS

Green buildings should be encouraged by providing adequate facilities i.e. relaxation in FAR, providing low interest finance, fast tract approval and by giving relaxation in infrastructure cost. Compact city and green city approach shall help to enhance agricultural activities, reducing pollution levels, decentralizing waste handling, encouraging public transportation and simplifying land use segregation.



renewable energy, quality of indoor air quality for human safety and comfort, effective controls and building management systems.

PLANNING FOR GREEN INFRASTRUCTURE

Planning for green infrastructure here refers to policies and planning affecting urban green infrastructure, in particular through processes of land use and management and development of nature areas and elements. This planning enables, restricts, and regulates generation of ecosystem services and their distribution, i.e. who can benefit from them. At the normative policy level, general value-based goals are defined as guidelines for more specific policies and strategies and their operationalization. Strategic planning aims at specifying the value purposes defined at the normative level into precise practical goals, adapted to interests arising from local conditions.



Green Buildings in Delhi

The appearance of a green building is similar to any other building. However, the difference is in the approach, which revolves round a concern for extending the life span of natural resources; provide human comfort, safety and productivity. This approach results in reduction in operating costs like energy and water, besides several intangible benefits. Like minimal disturbance to landscapes and site condition, Use of recycled and environmental friendly building materials, use of non-toxic and recycled/recyclable materials, efficient use of water and water recycling, use of energy efficient and eco-friendly equipment, use of

What is a Green Building?

A green building is one which uses

- Less water
- Optimizes energy efficiency
- Conserves natural resources
- Generates less waste
- Provides healthier spaces for people as compared to a conventional building

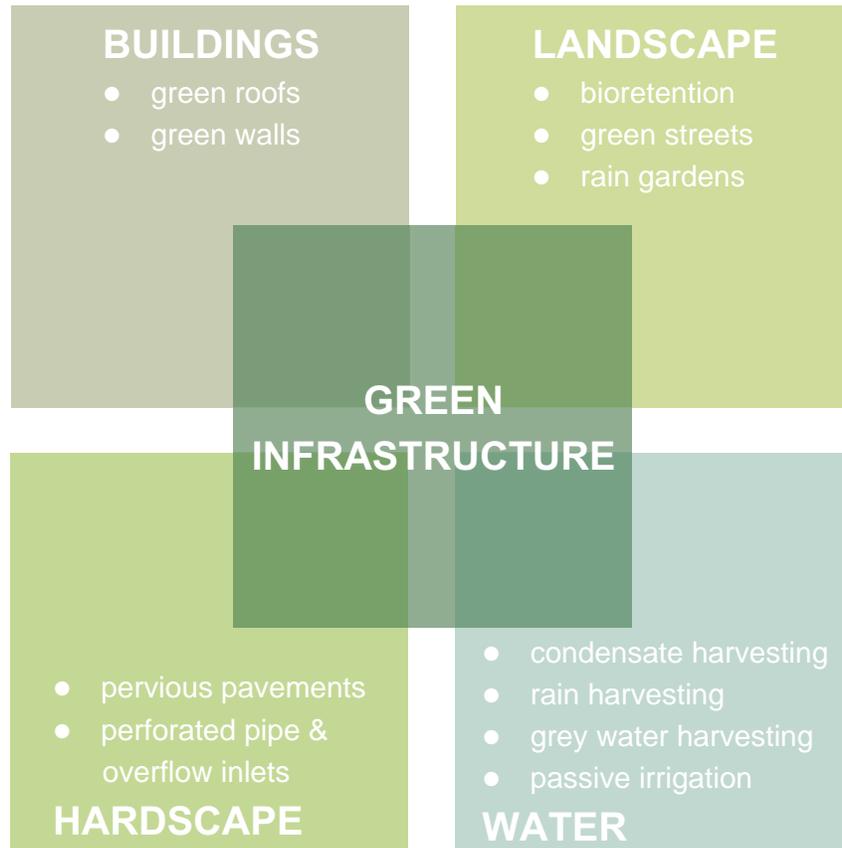
Source: Indian Green Building Council

A green building is one which uses less water, Optimizes energy efficiency, Conserves natural resources, Generates less waste.



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In an era of global climate change and rapid urbanization, innovations on governance of urban systems are critically required as 50% people are now living in less than 3% of the earth's urbanized terrestrial surface. Without careful dissemination of knowledge, and large investments to link that knowledge to action, cities will be overwhelmed with environmental challenges. Both policy and science now emphasize the critical necessity of green areas within urban limits. There is a large difference in per capita availability of green spaces in all over the world. There are, however, some discernible trends emerging from cities renowned for their urban green spaces: approximately 20 to 30 percent coverage of the total geographical area, and 15 to 25 m² urban green spaces per capita. World Health Organization (WHO) suggests ensuring at least a minimum availability of 9 m² green open space per city dweller. Besides resource extraction in mining, fishing, and forestry, most habitat loss and fragmentation is due to urban and agricultural development. It is clear from metapopulation theory that the greater the number of patches and the closer they are, the better the colonization.



What is Green Infrastructure?

Green Infrastructure is a network providing the “ingredients” for solving urban and climatic challenges by building with nature. The main components of this approach include storm water management, climate adaptation, less heat stress, more biodiversity, food production, better air quality, sustainable energy production, clean water and healthy soils, as well as the more anthropocentric functions such as increased quality of life through recreation and providing shade and shelter in and around towns and cities.

NEED FOR GREEN SPACES

With increasing urban population, environmental problems have become more and more serious e.g. mass destruction of natural landscapes, loss of biodiversity, and more CO₂ emission among others. World is getting increasingly urbanized. Urban areas in developing countries have multi-faceted problems like paucity of safe water, inadequate waste management, pollution hazards, occupation and degradation of sensitive lands, flooding and soil erosion in unauthorized settlements. Multi-resource urban forest management is one of the solutions to these problems. Urban parks/gardens and natural vegetation near cities are the green assets which are responsible for various environmental, social and educational benefits to the people living in or around cities. One of the

obvious indicators of sustainable urban development is the quality and quantity of green spaces in and around the cities. Urban greens are integral components of urban ecosystem, contributing towards quality of life and sustainable urban development.

INTERNATIONAL NORMS FOR URBAN GREEN SPACES

The issue of required open green spaces per capita in urban systems has remained controversial. In 20th century, experts in Germany, Japan and other countries proposed a standard of 40 square meters (m²) urban green space in high quality or 140 m² suburb forest area per capita for reaching a balance between carbon dioxide and oxygen, to meet the ecological balance of human well-being. Currently, developed countries have tended to adopt a general standard of green space of 20 m² per capita park areas.

International minimum standard suggested by World Health Organization (WHO) and adopted by the publications of United Nations Food and Agriculture Organization (FAO) is a minimum availability of 9 m² green open space per city dweller (Kuchelmeister 1998). The new Draft URDPFI guidelines suggests that there should be a 0.50 hectare organized open space (Park) for 5,000 population that means 1 sq. m. for each person. It is eight times less than the WHO standard.

In some countries there are city-specific local guidelines. For instance, Vancouver has declared the world's most liveable city by the Economist magazine. It is not only the most, but also Canada's model for using renewable energy sources. It has implemented the greenest building code in North America. 93% of Vancouver's electricity is generated from renewable sources.

Aarhus, with a population of 0.3 million is the second largest city in Denmark. The green structure plan was prepared as part of the planning reforms of the 1970s. The political vision of 'Aarhus surrounded by forest', had strong public support. It is used to control urban growth and to set standards: no dwelling should be more than 500 meters from a green area of at least 6,000 m² (Carmona et al. 2003).

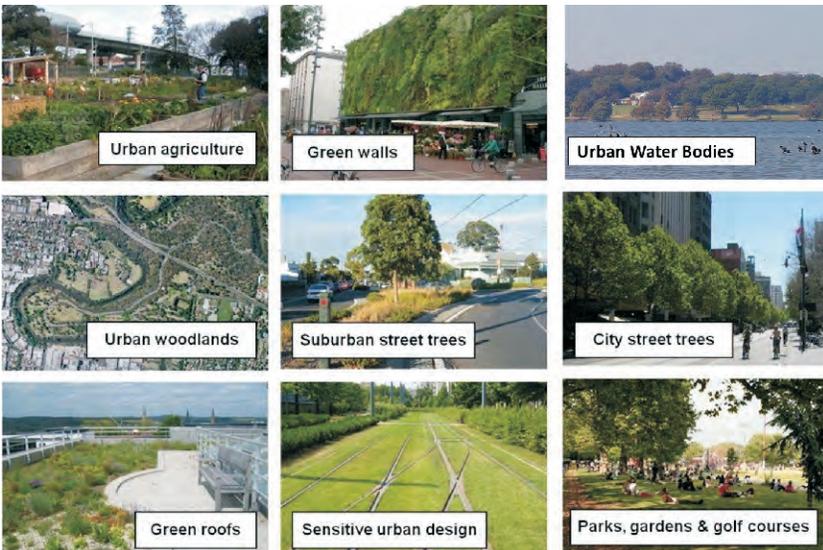
In terms of structural diversity, green spaces in urban systems should essentially be developed as networks (Cook 2002, Thompson 2002). Three main components of urban forest and green spaces are:

- **Patch** (urban domestic gardens, public and private parks, gardens, urban forest patches etc.)
- **Corridor** (roadside avenues, walkways and urban greenways etc.)

- **Network structure** (layout of all the patches and the corridors connecting the patches)

Green areas contribute to improved environmental conditions by increasing air quality, reducing the heat island effect, and sequestering carbon. Air pollution is reduced when dust and smoke

“Trees are the earth's endless effort to speak to the listening heaven”
Rabindranath Tagore



Urban Green Infrastructure



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particles, especially from vehicle exhausts, are trapped by trees and vegetation. Trees can influence the degree of solar radiation, air movement, humidity and air temperature and they provide protection from heavy rains. Vegetation in dense urban areas can reduce the urban heat island effect produced by the concentration of pavements and concrete.

Greening schemes bring significant pay offs. Increasing tree cover in some cities by 10 per cent can reduce the energy used for heating and cooling by up to 10 per cent. Proximity to green open space tends to increase property values by 3 per cent. A study in New York City in the United States calculated the monetary value of the city's five million trees based on estimations of the trees' impact on property values, the amount of carbon dioxide they removed from the air and the amount of energy their shade conserved. It concluded that for every dollar spent on trees the benefits for each resident could be quantified at USD. Budgeting for greening schemes in other sectors, such as water treatment, highway construction, flood-plain protection and business and industrial zones, can increase their feasibility. Securing resources for green schemes requires coordination across departments, engaging private developers and stimulating citizens and local businesses to participate in the upkeep of the area.

BENEFITS OF URBAN GREEN SPACES

Benefits of urban green spaces are wide-ranging including physical and psychological health, social cohesion, climate change mitigation,

pollution abatement, biodiversity conservation and provisioning of the ecosystem goods and service to urban inhabitants. People who have to stay indoors for a long time, such as office workers, are likely to benefit from green space by going outside and feeling the atmosphere for a short a period.

Urban green spaces provide town and country dwellers with significant environmental, recreational and material benefits. They are also home to a vast diversity of flora and fauna and are recognized as important repositories of bio-diversity. Urban green spaces and urban water bodies in most cases coexist. This makes various dimensions of aqua culture significant in an urban context as well. Urban green spaces are critical for keeping our cities habitable and make them health and energy efficient. Good quality of green spaces plays a vital role in enhancing the quality of urban life. Urban greens not only add aesthetic grace and quality to residential areas in towns and cities but also provide many environmental, ecological and economic benefits and play key role in making them more efficient, healthy

Ecological/Environmental Benefits



- Improve Air Quality
- Urban Heat Island Mitigation & Reduced Energy Demand
- Additional Wildlife habitat and recreational spaces
- Enhance Ground water Recharge
- Reduced and Delayed Storm Water Runoff Volumes
- Help in Noise Reduction
- Reduce the CO2 Emission

Social Benefits



- Improve Human Health
- Enhance Childhood Development
- Provide opportunities to people interact with each other
- Enhance Neighborhood Quality of Life
- Reduce Urban Glare
- Enhance Recreational Activities
- Provide adequate and cheap space for organizing some function or meeting

Economic/Fiscal Benefits



- Enhance Property Value
- Reduce medical expenses by Improving Health
- Cost Effective Storm Water Management
- Reduce Energy Consumption
- Encourage the people to walk and reduces the Lifestyle and Transportation cost.
- Provide manure for agriculture use

and more attractive for business and leisure. Green cities with extensive tree cover are more resilient to major weather events caused by climate change. Functional attributes of urban green spaces are as under:

- **Ecological and Environmental Benefits**

Trees moderate the impact of human activities by absorbing pollutants and releasing oxygen. They contribute to the maintenance of a healthy urban environment by providing clean air. Studies reveal that vegetation has helped in lowering down the wall surface temperature, which led to reduced air conditioners use. They improve the urban climate and maintain the balance of the city's natural urban environment and manage the effect of urban heat islands.

They preserve the local natural and cultural heritage by providing habitats for a diversity of urban wildlife and conserve a diversity of urban resources. Maidan of Kolkata, Ridge of Delhi, Lal Bagh of Bengaluru are some of the examples of well managed urban greens that serve as lungs of the city and have immense diversity.

- **Social Benefits**

Well-managed and maintained green spaces contribute to social justice by creating opportunities for people of all ages to interact. Urban green spaces emphasize the diversity of urban areas by

reflecting the different communities they serve and meeting their varying needs. They enhance cultural life by providing venues for local festivals, civic celebrations and theatrical performances.



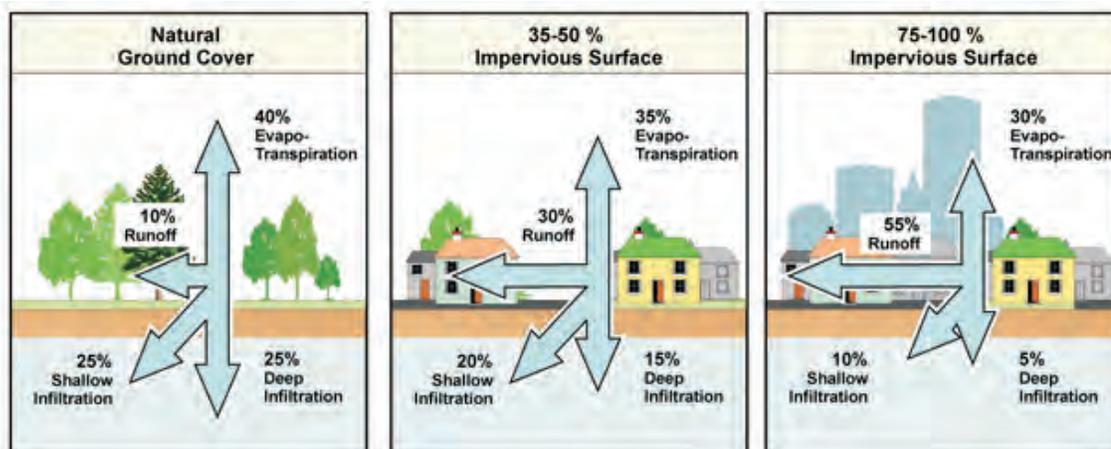
Particular types of green space can offer a bigger diversity of land uses and opportunities for a wide range of activities which help to foster active lifestyles and can be of real benefit to health.

Urban green spaces provide safe play space for children; contribute to children physical, mental and social development particularly regarding environment and nature. Urban green spaces help in delivering key benefits for public health and wellbeing. Evidence shows that green spaces assist in improvement in level of physical activity, health, psychological and mental wellbeing. Studies show that about 83% individuals living closer to green spaces engage more in social activity.

- **Economic Benefits**

Research from around the world indicates that property owners value the premium they pay to live in neighborhood of urban green spaces and public parks. According

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Research from around the world indicates that property owners value the premium they pay to live in neighborhood of urban green spaces and public parks.



to some study on the subject just one kilometer increase in the distance to the nearest open space leads to decrease in the market price of the dwelling. Dwellings with a view onto park or open space are on average more expensive than dwellings with otherwise similar characteristics. In densely populated areas this effect is even more pronounced.

Urban shade trees offer significant benefits in reducing building air-conditioning demand and improving urban air quality by reducing smog. The savings associated with these benefits vary by climate region. Urban forestry provides employment and livelihood to a large number of people and often acts as an economic safety net in times of need.

MITIGATING CLIMATE CHANGE

Urban greens help in mitigating the climate change reducing carbon emissions and by providing better physical living environment. In fact, green spaces are the Important assets in fighting against climate change and act as climate modifier. Urban green spaces can act as 'park cool islands' by cooling air. The extent of the cooling effect is greater when temperature beyond the park is higher.

Green spaces which are permitted to dry out and lost soil moisture actually result in a higher absorption of day time solar energy and higher night time radiation adding to the urban heat island effect. Green space can help with water management as it provides a permeable surface, reducing surface run-off drains and therefore lowers the risk of flooding during peak flows.

In addition, green spaces allow water to filter down and replenish ground water. Urban green spaces provide valuable habitats for animals and plants and species can respond strongly to environmental change.

There is a need to wildlife corridors within towns and cities to help plants and animals move in response to climate change. Vegetation and soils, particularly trees, can counter poor air quality by absorbing greenhouse gases such as carbon dioxide and other air pollutants, i.e. green space can act as 'carbon sinks'.

How one can contribute to save Earth?

Many in this world are not Environmental Friendly. However, They can contribute to nature by adopt theseten measures to save the planet.

- 1) Turn off the main power switch whenever you go out of home.
- 2) Carry a reusable bag to the supermarket to hold my groceries & Vegetables.
- 3) Try to shower with cold water whenever possible.
- 4) Turn off the air-conditioner when you sleep and use the fan more often.
- 5) Turn off all fans and lights if no one in the room.
- 6) Shut down your laptop/computer when ever go for lunch.
- 7) Print reports double-sided to save paper.
- 8) Make use of public transport more often.
- 9) Recycle plastic bottles instead of throwing them away with other rubbish.
- 10) Everyone should plant at least one tree in his/her life span.
- 11) Stick to the above ten rules and try to influence others to adopt similar practices.

CONCLUSION

World's 50% urban population is living in less than 3% of the earth's surface. At the same time they are consuming 75 percent of natural resources and generating 80 percent of CO₂. Many policy instruments and robust scientific evidence in last two decades have emphasized the critical necessity of green areas within urban social-ecological systems to ameliorate several problems of urban areas. Strengthening urban green infrastructure as adaptation and mitigation to climate change is necessary on the face of climate change, particularly in India where the urban population is likely to grow by around 500 million over the next 50 years.

As suggested in draft URDPFI guidelines, to moderate the environmental impacts of urbanization, sustainable ways of planning are

required. Urban centers by its form play a significant role in mounting urban heat islands. Green city modules such as street orientation in lines with sun direction and wind direction not only help reduce the impact, but also slow down the gas emissions from artificial cooling systems.

Government should take initiatives to make people aware about the benefits of green spaces through print and electronic media. The campaigning should be on priority basis and at all levels i.e. Central, State, City, Ward and Mohalla-shabha.



Relevant News

POOR AIR QUALITY KILLS

In 2009, the Capital registered 10,900 premature deaths due to ambient particulate matter (PM) pollution. These were the findings of a study that was conducted to monitor the adverse health effect of rising air pollution in the city.

The effect of breathing toxic air laced with harmful particles, gases and a range of toxic compounds are now associated with an array of health outcomes that include respiratory problems, cancer, eye-related symptoms, adverse effect on foetus, hypertension, diabetes, and brain development in children among others.

Studies done by the environmental watchdog the Central Pollution Control Board (CPCB), too, have noted that high levels of pollution raises concerns for the health of the city's inhabitants.

A report by the Centre for Science and Environment (CSE) has noted that since then

particulate levels have increased dramatically by 75 per cent.

"This indicates that Delhi is in a grip of multi-pollutant crisis," said CSE executive director, research and advocacy, Anumita Roychowdhury.

Additional recent reports have indicated that about 55 per cent of Delhi's 17 million people, who live within 500 metres from any road side, are directly exposed to toxic vehicular fume.

Some of the available local health evidences are also very stark. An epidemiological study on children in Delhi carried out by the CPCB and the Chittaranjan National Cancer Institute of Kolkata and published in 2012 covered 11,628 school-going children from 36 schools in different parts of Delhi and in different seasons.

It found that every third child had reduced lung function. Sputum of Delhi's children contained four times more iron-laden macrophages than those from cleaner environment, indicating pulmonary haemorrhage.



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MSW in open dump yards leads to uncontrolled emissions of LFG to atmosphere. The Methane in the LFG is a Green House Gas (GHG), considered 25 times more potent than CO₂ in causing Global Warming.

16 AMDA
Bulletin

AN INNOVATIVE PROJECT BY EAST DELHI MUNICIPAL CORPORATION AND GAS AUTHORITY OF INDIA LIMITED : LAND FILL GAS UTILISATION

Mr. Pradeep Khandelwal
Chief Engineer,
(East Delhi Municipal Corporation)

Introduction:

Millions of Tons of municipal solid waste (MSW) is generated daily across the world. This MSW is disposed off in landfill sites. MSW then starts degrading under anaerobic conditions and generates Land Fill Gas (LFG). The LFG principally contains Methane (40-50%) and CO₂ (50-60%) and other minor constituents like H₂S in ppm level apart from few micro constituents. Developing countries are disposing their MSW in open dump yards which are not scientifically managed leading to uncontrolled emissions of LFG to atmosphere. The Methane in the LFG is a Green House Gas (GHG), considered 25 times more potent than CO₂ in causing Global Warming. Methane emissions from waste handling are the 2nd largest anthropogenic source of Methane emissions after coal mining. Thus capturing of LFG for energy recovery or destructing it by combustion leads to mitigation of GHG emissions. In addition, open Landfill sites have safety risks like fire hazard, explosion, and asphyxiation etc. apart from health risks. GAIL had taken up a project to capture LFG (in Phase-1) at Ghazipur landfill site in Delhi and purify it for use as CNG (in Phase-2).

LFG Generation Process:

LFG generation process consists of complex series of biological and chemical reactions as the refuse decomposes. The earlier studies indicate that at least four types of decomposition happens : (i) An Initial aerobic phase; (ii) An aerobic acidic phase; (iii) An initial methogenic phase and (iv) A final stable methogenic phase. As the waste is initially dumped at the site it undergoes aerobic digestion leading to depletion of Oxygen and production of CO₂. This phase extends only for a brief period as the waste is being dumped

continuously and compacted. The bottom lying waste starts getting subjected to anaerobic condition and supports fermentation reaction. The biodegradable organic constituents of waste are subjected to three types of bacterial actions: (I) Hydrolytic and fermentative bacteria hydrolyze polymers and ferment the resulting monosaccharides to carboxylic acids and alcohols; (ii) Acetogenic bacteria convert these carboxylic acids and alcohols to acetate, hydrogen and carbon dioxide; and (iii) Lastly, the methanogenic bacteria convert the end products of the acetogenic reactions to methane and carbon dioxide. The above reactions of LFG generation are greatly influenced by the field conditions like the actual composition of organic waste, moisture in the landfill, compaction level, ambient temperature etc. Various theoretical & experimental studies report generation of around 100-200 M³ of LFG per tonne of waste with 60% of bio-mass content. Considering a Methane content of 50% in LFG, the methane generation potential works out to 50-100 M³/Tonne of MSW.

MSW Management in India:

Currently, nearly 210 million metric tonnes/annum of MSW is generated in India & most of it is disposed in open landfills. The typical Indian MSW contains 50% of organic biodegradable components, 20% of recyclable portions, 22% inerts and others 8%. The biodegradable waste is contributed by food and yard waste. It is estimated that the level of per capita waste generation in India is 0.1kg, 0.3kg and 0.5 kg for small, medium and big cities respectively and is expected to grow at a rate of 1.3% per annum. Most of this collected waste (>90%) is not processed and gets disposed off in landfills that are not scientifically managed and lack safe disposal

practices like landfill compaction, soil covering etc. Rapid population growth and accompanying urbanization is putting huge pressure on the existing waste handling infrastructure. New landfill sites cannot be developed due to acute scarcity of land. **Consequently, municipal bodies are not able to improve their waste management system which is leading to overflowing and vertical growth of the existing landfills & the LFG generated in these landfills is not being captured and utilized for energy recovery or destroyed for GHG mitigation.**

GAIL's LFG Pilot Project:

GAIL entered into a MoU with MCD for implementation of LFG Pilot project. MCD earmarked 4 Hectares of Landfill site out of 29.6 Hectares at the Ghazipur landfill site for the pilot project. The objective of the pilot project was to assess the potential of LFG recovery from an active landfill site (in Phase-1) and study the suitability of its use as an alternate renewable fuel source by purifying it for use as CNG (in Phase-2).

GAIL's R&D pilot project area comprises of 4 Hectares (10 Acres) in the North-Eastern part of the Ghazipur landfill site. The area can be subdivided into three parts – Slice A, Slice B & slice C. A detailed topographical survey of the earmarked site was carried out. Based on the topographical survey, the natural topography and elevation of the area was obtained and the quantity of waste accumulated above ground level was estimated at 0.45 Million Tonnes which is about 10% of the total accumulated waste of Ghazipur.

LFG Pilot Project Implementation:

As this project is first-of-a-kind Project in India, to mitigate the risks, the project is being implemented in 2 Phases viz.

- i) Phase-1 –Involving scientific closure of landfill, construction of LFG collection wells, LFG extraction and LFG Flaring.
- ii) Phase-2–Implementation of LFG purification to enriched natural gas to utilise it as CNG based upon techno

economic feasibility study based on actual LFG Quality and Quantity.

Phase-1 Field work: The Phase -1 field work was started in August-2012 with a project schedule of 7 months involving the following activities:

- i) Waste leveling & Slope reformation
- ii) Provision of Surface Liner (Geo-Membrane & Geo Textile cover)
- iii) Construction of LFG wells and Leachate recirculation system
- iv) Installation of LFG Collection Network
- v) Installation of enclosed Flare System
- vi) Infrastructure Development

Waste leveling & Slope reformation:

The project area had non-uniform side slopes. Therefore engineered slopes with maximum steepness up to 1V:2H to 1V:3H was proposed with flat benches along the slope for stability purpose. The steep slope was maintained to reduce the earth work to avoid the escape of LFG & maximise the collection efficiency.

Slice A is the flat area with an average height of more than 30m and Slice B&C are steeper with height varying between 15-20 meters.

Provision of Surface Liner:

A cover layer was provided over the final finished profile of the fill (i.e. on the top and side slopes). The final cover for closure of landfill is composed of several layers, each with a specific function. Various components of the surface cover are designed to maximise surface drainage, minimize infiltration and erosion and control the release of the LFG:

- i) Protective layer: A protective layer of 200 mm thick soil layer is provided along the reformed slope and top portion.
- ii) Impervious Layer: An impervious layer of 1.5 mm thick HDPE liner (Geo-membrane) was provided as a waterproof layer and to prevent the escape of LFG into the atmosphere. Further a 1.5 mm thick Geo-composite layer was provided to act as a drainage layer.
- iii) Top cover: The top layer was formed by

Municipal Bodies are not able to improve their waste management system the existing landfills. The LFG generated in these landfills is not being captured and utilised for energy recovery or destroyed for GHG mitigation.



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The huge quantity of MSW generated in India offers a good potential for collection and utilization of LFG but its economic utilisation is a serious challenge.

450mm thick soil layer and vegetative cover was provided over the area where the slope is 1:3

- iv) Top liner in steep slopes : In the steep slopes top cover is provided by paver block in the area adjoining to the active landfill & in other areas grass paver block and GeoCell with grass cover is provided as the top liner to provide stability to the steep slopes.

Construction of LFG wells and Leachate re-circulation System:

The LFG pump test data indicated the radius of influence of each well as 25m, i.e. equal to 1.25 and 2.5 times its depth. Typically, to minimize gaps in collection system coverage, some degree of overlap in wells' radius of influence is also permitted. Accordingly, 20 LFG wells were constructed in the earmarked area with maximum no. of wells in Slice-A. The bore diameter of wells is 500 mm and drilled up to 75% of depth of waste in which HDPE pipe of 160mm, with bottom 2/3 slotted is inserted. The annular core between the HDPE pipe and extraction well are filled with gravels of 25-40 mm size. The top of the LFG well is sealed with Bentonite seal (1500 mm in Length) and capped. Out of the 20 wells, 11 wells are dual wells and provided with Leachate pumps.

The leachate extraction pumps are pneumatic type, capable of extracting the leachate from the same bore of LFG hole and each pump is capable of extracting minimum 7.5 litres per minute of leachate from the landfill.

Installation of LFG Collection Network:

Gas collection network comprising of adequate number of inter-connected header and feeder HDPE pipes were provided for collection of LFG. The feeder pipe (110mm dia.) collects LFG from the well and transfers the same to the header pipe (200/160 mm dia.). The gas piping network was laid in trenches at a depth of approximately 30cm from the finished level of landfill. Suitable protection was provided to the gas collection network in those areas where vehicular

movement is anticipated.

Installation of enclosed Flare System:

An enclosed Flare System with Blowers and associated Controls was designed with a residence time of greater than 0.3 seconds at 800-1000°C with a destruction efficiency of 99% with smokeless flame under steady state for lean burning of LFG with CH_4 concentration as low as 25%. The flare stack height is 10 m. Controlled Automatic/Motorized air dampeners provide ambient air to the flare for combustion and for controlling exit gas temperature. The ignition is auto controlled and initial pilot ignition is provided by LPG. A deflagration type flame arrester is provided for preventing back flow.

Infrastructure Development:

The project entailed construction of a Control Room for monitoring the activities during construction phase and O&M after commissioning. Associated infrastructure development viz. Approach Road, Street Lighting, Fencing etc. was also carried out as part of the Project.

LFG Operations:

The LFG collection and Flare System was commissioned in Apr-2013. After the trial run, LFG plant was operated on continuous basis. The flare was stabilised and steady state operating process parameters were established.

Results Analysis:

On careful analysis of LFG operations, it is observed that the average LFG Flow rate has stabilised at $130 \text{ m}^3/\text{Hr}$ with CH_4 concentration of 28%. It is further observed that the CH_4 concentration falls with increasing LFG Flow rate and comes down to 15% at a Flow rate of more than $350 \text{ m}^3/\text{hr}$, leading to tripping of flare. It is also observed that at a reduced LFG flowrate of $80-100 \text{ m}^3/\text{Hr}$ the CH_4 concentration goes above 30%.

The average yield of CH₄ from LFG is dependent on Flow rate and composition (which are inversely related) and comes to about 30-40 m³/hr. Further, it is observed that the LFG flowrate, CH₄ concentration & yield have considerably reduced from the trial period indicating that the landfill site is in matured stage & the yield could further drop in future based on FOD Principle.

It was also observed that the oxygen content in the LFG remained consistently below 2% even though part of closed landfill is in continuation with active landfill. This was possible due to proper design & construction to minimize the influence of the active landfill site. The N₂ content varied between 2-15% and observed H₂S concentration is well below 15 ppm. Thus, the design and operation of Landfill was managed well and did not allow ingress of air from adjoining active landfill site.

Phase-2 Implementation:

As the actual Flow rate of CH₄ as well its concentration is very low its upgradation to natural gas quality i.e as CNG may not techno-

economically feasible, accordingly other alternate utilisation like power generation is being explored.

Conclusion:

The huge quantity of MSW generated in India offers a good potential for collection and utilization of LFG but its economic utilization is a serious challenge. The whole gamut of MSW management system is un-planned as it starts with mixing of organic waste with inerts at the source level itself and finally leading to dumping at landfill sites with C&D material. Eventhough utilization of LFG may not be viable in the short term, but its collection and flaring should be practiced as it helps to destroy Methane, a GHG 25 times more potent than CO₂ (Incidentally, the CO₂ present in LFG is not considered as a GHG but considered to be biogenic, and therefore a natural part of the carbon cycle) and thereby reduces Global Warming. This shall not only generate carbon credits but also improve the aesthetics of the landfill sites thereby improving the quality of life of people living nearby. These projects shall also help strengthen India's case on CO₂ emissions target-setting at World Forums on Climate Change.



National Workshop on Innovative Initiatives in IT for Urban Local Bodies and Development Authorities with Collaboration of Surat Municipal Corporation On 7th & 8th August, 2014



Executive Summary:

Innovation in Information and Technology can address any key challenges of rapid urbanization. It Proposes policy options for consideration by national governments and the community, with a view to promoting sustainable urban development. We are seeing day by day advancement in Information and Technology especially in transportation, communication systems, public health, and Urban Infrastructure and industrial production have significantly contributed to the evolution of cities. In recent decades, many important new discoveries have been made in essentially all aspects of the Information and Technology. A much broader discussion is needed on how the range of existing technological and scientific research findings can be translated into actions at the national, regional and local levels.

Workshop Structure

- Theoretical session on Innovative Techniques of IT and their role for Development Authorities & ULBs.
- Case studies of successful Innovative IT Techniques used by various Development Authorities & ULBs in the country for helping their routine work and solving day to day problems.
- Technical session on Innovative Information and Technology Tools.
- Field Trip and Interactive Discussions.

Objective:

- To make aware of Development Authorities & ULBs about various innovative techniques of Information and Technology which proved or could be prove helpful for Development Authority & ULBs to make their decision making power faster, make their work easier, Improve the quality of work and help reducing human error.

Participation Profile

The programme is exclusively for CEO's/Chairman/Vice Chairman of the development authorities and commissioners of the municipal corporations.

For More Details Please Contact :

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*Waste is
Waste if
Wasted,
Waste is
Productive if
Managed*

MUNICIPAL SOLID WASTE MANAGEMENT –A SHARED RESPONSIBILITY

Mr. Jaideep Kharb

Assistant Director

Planning & Capacity Building, AMDA

Waste is waste if wasted, waste is productive if managed. As our towns grow, so does our waste. India's Urban Population has reached 377 million (31.2 % of total Population). No. of statutory towns has reached 4041 instead of last census 3799 at the same way Million Plus cities has reached 52 which were 35 in last census. This increase our responsibility to keep our cities clean, healthy, environment friendly and livable.

It is estimated that 1 lakh MT of Municipal Solid Waste (MSW) is generated per day in India and hardly 60 to 70 percent of waste is collected. Large portions of total generated waste are being disposed of in open dumps without processing. As there are an urgent need for recycling and better recovery of waste so as people's responsibility to help local authority.

TREATS OF MUNICIPAL SOLID WASTE

Apart from contamination of water resources and air pollution and emission of green house gases due to lack of proper disposal & open burning, the health hazard is also another major issue due to improper collection, segregation, storage, transportation and disposal. All activities in solid waste management involve risk, either to the persons directly involved or to the nearby residents, especially the vulnerable groups like children.



TYPES OF SOLID WASTE

Impacts of rapidly increasing urbanization and economic development can be seen in the form of heaps of municipal solid waste. Urban waste typically comprises Municipal Solid Waste (generated from homes, Institutional buildings, Commercial Complexes & Street Sweeping), Construction and Demolition waste (generated from construction activities), Biomedical waste (generated from Hospitals, Laboratories & Slaughter Houses) Packaging Waste (waste generated by packed material i.e. Water & Cold Drinks Bottles, Milk Pouch or any other Packed substance), e-waste (when electronic items became un-useful), industrial waste (generated by various Kind of Industrial units) and Radio Active Waste (by-products of nuclear power generation and other application of nuclear fission or nuclear technology).

QUANTITY OF MUNICIPAL SOLID WASTE GENERATION

The quantity of municipal solid waste generation depends on a number of factors such as food habit of people, life style, degree of commercial activities and seasons. With the increasing urbanization and changing life styles, Indian cities now generates eight times more municipal solid waste than they did in

Table shows -Municipal Solid Waste generation in different states in India.

	Name of the State	No. of Cities	Municipal Solid Waste (t/day)	Pre Capita generated (kg/day)
1.	Andhra Pradesh	132	3973	0.364
2.	Assam	4	196	0.223
3.	Bihar	17	1479	0.280
4.	Gujarat	21	3805	0.451
5.	Haryana	12	623	0.276
6.	Himachal Pradesh	1	35	0.427
7.	Karnataka	21	3118	0.376
8.	Kerala	146	1220	0.393
9.	Madhya Pradesh	23	2286	0.316
10.	Maharashtra	27	8589	0.378
11.	Manipur	1	40	0.201
12.	Meghalaya	1	35	0.157
13.	Mizoram	1	46	0.296
14.	Orissa	7	646	0.366
15.	Punjab	10	1001	0.312
16.	Rajasthan	14	1768	0.355
17.	Tamil Nadu	25	5021	0.467
18.	Tripura	1	33	0.210
19.	Uttar Pradesh	41	5515	0.467
20.	West Bengal	23	4475	0.321
21.	Chandigarh	1	200	0.397
22.	Delhi	1	400	0.475
23.	Pondicherry	1	60	0.295

Source: CPCB, 2000

1947. Per capita waste generation varies between 0.2 Kg to 0.6 Kg per day in cities with population ranging from 1.0 lakh to 50 lakh.

It is estimated that the Urban Local Bodies spend about Rs.500 to Rs.1500 per tonne on solid waste for collection, transportation, treatment and disposal. About 60-70 percent of amount is spent on street sweeping of waste collection, 20 to 30 percent on transportation and less than 5 percent on final disposal of waste, which shows that hardly any attention is given to scientific and safe disposal of waste. Landfill sites have not yet been identified by many municipalities and in several municipalities, the landfill sites have been exhausted and the respective local bodies do not have resources to acquire new land. Due to

lack of disposal sites, even the collection efficiency gets affected.

There are a number of government schemes, such as Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Rajiv Awas Yojana (RAY) etc. Despite this, nearly half of municipal waste generated remains unattended in many cities.

GOVERNMENT LAWS

- National Urban Sanitation Policy, 2008
- Municipal Solid Waste (Management & Handling) Rules, 2000
- The Bio -Medical Waste (Management and Handling) Rules, 1998
- The Recycled Plastics Manufacture and Usage Rules, 1999

*In India
formally
Waste
Management
is a
responsibility
of the Local
Bodies.*



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- The Hazardous Wastes (Management and Handling) Rules, 1989
- Model Municipal Law, 2003
- Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987.

OTHER INITIATIVES

- Technical Manual on Municipal Solid Waste Management
- Technology Advisory group on Municipal Solid Waste Management
- Tax free bonds by Urban Local Bodies permitted for MSW
- Public Private Partnership (PPP) is initiated in Solid Waste Management
- City Sanitation Plans have been Prepared under Sanitation Policy
- Cities ranking under National Urban Sanitation Ranking
- Income tax relief granted to agencies indulges in Waste Management.
- Financial assistance through various schemes like JnNURM, UIDSSMT & RAY etc.

SHARED RESPONSIBILITY

Although India has formulated very powerful & good legislation relating to municipal solid waste, hazardous waste and biomedical waste, PPP involvement, public participation and awareness generation. But at implementation stage communities and municipalities are lagging behind. Waste collectors and rag pickers take out the recyclable portion of solid waste and sell it to retailers, which is recycled in the informal sector.

In India formally waste management is a responsibility of the local bodies. But these days' local bodies are

involving NGOs, CBOs and some other vulnerable organizations and private players on various stages. They provide those skilled staff and latest technology to manage their waste. At present in India a number of PPP projects are running in the country.

But in real term it is not entirely local bodies duty at all. Every person living that area/locality is equally responsible to keep their surrounding clean.



This mentality should be changed quickly that local body is only responsible to keep city clean. If every citizen only at least try to keep his/her surrounding clean then the situation will improve within a month. In India we don't care to put garbage in bins sometime bins are not there but if bins are there then also we put waste near to dustbins and dustbins remains empty. Some people do not even look around to find some disposal point to dispose the waste, they through it on the street. By seeing one another soon it will convert an unauthorized disposal site and people moving around keep a handkerchief on their nose and passes away.

But this mentality should be changed. Large scale campaign needs to be start on the issue. government should add a chapter in notebooks of children at least till 10th level to



BIRD

DOG

HORSE



HUMAN



tell them the importance of good sanitation and to aware them about their responsibility toward society. Children are good communicators sometime parents only listen their children if they say that teacher told us not to through rubbish on the street. People will not dare to through their garbage in street in front them again.

Littering is also a main problem in Indian cities the situation is very critical in case of small cities. A number of tourists come in India every year. They see pills of garbage in streets and animals are standing in the middle of the roads that look filthy and present wrong picture of our country they took photographs of those and will definitely think is this India is going to be a Super Power?

Spitting is another problem in our country wherever you see in the Bus Stand, railway stations, market places, government offices people often spit wherever they want. Even heritage buildings and monuments are not spare from this. They do not bother whose property is this; those people do not spit at their own home.

The all it happens because people don't consider public property to their own property and lack of education. So municipal corporation is not capable to tackle all these problems so people should stop criticizing the local body and do some pioneering efforts by each citizen then our cities also surely will become clean, green & healthy very soon.

CONCLUSION

SWM systems are complex, and many players are involved in the processes. Therefore, a clear and well-defined institutional framework, in which the roles and responsibilities for each task are properly assigned, is very important. Some municipal authorities are losing people trust due to improper monitoring of private agency who has been involved with them in waste management.

From the last one decade, in India a number of NGOs & CBOs and private companies have come in this sector. And register their active participation in improving the condition of solid waste in cities. Municipal staffs collect waste only from street sweeping and public bins; NGOs, CBOs and private players are providing their services in door-to-door collection, segregation, transportation and processing & safe disposal and sometime generation of energy or manure.

Problem should be cured from its roots it is very hard to manage all the waste on final disposal site. It increases the cost of transportation as well. It should be segregated at source to reduce its volume. Local bodies should involve regpickers in this process with the help of some local NGO/CBO. The ULBs also need to acknowledge the important role of rag pickers and the informal sector in general. Rag pickers receive training on how to collect and sort waste and on how to deal with



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the intermediaries or households that they serve. It will also improve their health and living standard of life.

Solutions are possible only if this group of people is involved in new recycling concepts. As for financing SWM, municipal authorities need to increase their financial resources to meet their statutory obligations instead of solely depending on government grants.

Several success stories show that such efforts have significantly improved the living conditions of hundreds of rag pickers. The

challenge remains on how such NGO-led initiatives can be further replicated on a large scale and have the desired effects for the whole sector. This session brings together some of the initiatives in India by the formal and informal sector.

In India it becomes habit of people, to avail facilities without paying anything. People are not interested to pay even a very small amount to someone who picks their garbage. Government shouldn't provide any facility to anyone without taking any cost. It gives wrong message to them who are paying for that.



Use the right Bin

Relevant News

PEOPLE UNAWARE, SO NO SEGREGATION

New Delhi: Almost eight years after the erstwhile Municipal Corporation of Delhi (MCD) outsourced waste management, the civic agencies are still struggling to streamline the system. From installing GPS in trucks carrying waste to uploading pictures of dhalaos online, they have tried everything but without any results. Poor monitoring, lack of infrastructure, accountability and awareness, and multiplicity of authorities are prime reasons for the failure of all the schemes introduced by the civic bodies ever since waste management was privatized in 2005. Private concessionaires claim they didn't get the "desired" assistance from these agencies. "The first P (Public) in PPP is missing in the project. It is only the private party's responsibility to implement the project. For the success of door-to-door collections, waste

segregation at source and awareness among people was crucial. But the civic agency didn't do much," said Abhay Ranjan, collection and transportation head, Ramky. Officials admit it has been a one-sided partnership. Also, the civic agencies have done little to create awareness about the need for effective waste management. "Till now, we have left everything to the private concessionaire. The fact that it is a PPP project means the civic agency has some responsibilities," said Manish Gupta, commissioner, South Delhi Municipal Corporation. They have now floated fresh tenders under which the civic agency will be responsible for creating awareness. "We will hire a consultant for developing information education communication material and planning programmes to create awareness. The material will be printed by us, but workshops in residential colonies will be organized by the private concessionaire," said Gupta. In 2009, the erstwhile MCD started

door-to-door waste collection in two zones — Rohini and Civil Lines. It outsourced the project for effective implementation. The scheme was to be subsequently implemented in other zones but it never happened. At present, private concessionaires are responsible for lifting waste from the dhalaos and dumping it at the landfill site, which are maintained by the civic agencies. The civic agencies still manage waste collection in colonies and at landfill sites. “Multiplicity of authorities and lack of coordination between all the players is responsible for poor implementation of the scheme. In case of a problem at the landfill site, we are not able to lift the entire waste from dhalaos and we are penalized for it,” said Ranjan. While the south and north corporations are struggling to streamline the system, the east corporation has made considerable improvement. Post-trifurcation, it has streamlined its collection system by improving surveillance. “Earlier, we used to collect 1400 metric tonnes of waste. Now, it has increased to over 2000 metric tonnes. We have improved monitoring of vehicles by installing GPS,” said Sanjay Surjan, chairman of standing committee, east Delhi. But all corporations admit they have not focused on creating awareness. Experts believe waste management in Delhi is oriented towards generating more and as a result land-filling more. “Private parties are not concerned about what is going to the landfill or what is at the dhalao, simply because they get paid as per the weight of garbage. They

don’t encourage segregation because they prefer more weight. Had the corporations involved the waste pickers from the informal sector, they would have taken out every bit of the recyclables which is about 20% and ensured segregation. We think the system has failed completely,” said Chitra Mukherjee, manager, advocacy and outreach at Chintan, an NGO that is working with NDMC on involving the informal sector in collecting waste. Chitra said the corporation’s awareness building efforts failed because they neither incentivized segregation, nor penalized non-segregation. “The policy should be to make it mandatory. Otherwise nobody cares,” she said. In fact, most big cities have failed in dealing with dhalaos and unsustainable landfills. A few municipalities are taking small steps now. Anjor Bhaskar, a research scholar with Tata Institute of Social Sciences who is studying the benefits of decentralizing waste management, cites the example of Pune Municipal Corporation. In association with NGOs and waste pickers, it is working on a 'zero waste ward'. The ward, called Katraj, lies in the south of the city and consists of a population of nearly 10,000 households. The municipality set up a bio-methanation plant to convert organic waste into biogas within the ward. Waste pickers are engaged to collect segregated wet waste from households and are provided a sorting shed where they are able to sit and sort through the day’s collection.

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