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Edited by
SANJIT KUNDU
SRIMANTA SATPATI

Since 2017

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Sub-Theme:

1. Development Issues in Geography. (ভূগোলের যেকোনো উন্নয়ন প্রসঙ্গে।)
2. Social Problem. (সামাজিক সমস্যা।)
3. Fluvial Geomorphology. (নদী সংক্রান্ত ভূমিরূপবিদ্যা।)

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Preface

"Not a surprise on advertising, not even a guarantee of success,
maybe your epsilized success is on this page!!
What is geography? How about the topic? Demand of Geography
and future, higher studies, research, field of employment and
everything else. Above all, think when geography."

Education is the science of human culture and development, Geography is part of that science. So, the Geography has the well-planned, necessary modern curriculum for human development. That is why Physico-Environmental Science likes as Geography; we think that as our midwife. With the experience of knowing and recognizing Geography in its own way, we have tried to highlight the positive side of Geography to the Real World, in the Vol. 1, Issue 2 of our published 'ভূগোল শিক্ষা @bhugolsiksha'. In this journal, an attempt has been made to bring all the important aspects into the discussion of ভূগোল শিক্ষা @bhugolsiksha as important as it has been in the context of our needs, and has spread its understanding in the context.

Geography is a collection of all things, but it has own unique personality. Over time geographical discussion is dynamic and variable. Learning of Geography in the whole world is not only the means of earning livelihood - it works as a guide for the theoretical and practical knowledge of the world for all the students. It is very ridiculous to limit the boundaries of this Geography to a magazine. But in the meantime, some parts of this vast range of Geography have been discussed in our small effort "ভূগোল শিক্ষা @bhugolsiksha" Magazine. Expecting the whole thing like other magazines may not guarantee the success of this magazine, but hopefully you will find the success of your knowledge.

Looking forward to constructive criticism and suggestions for adding and presenting better topics for the overall development of the magazine, which will make this magazine more prosperous in the future and will end up making a promise that will give more beautiful magazines in the future.

May 2018,   Sincerely,
Bankura   ভূগোল শিক্ষা @bhugolsiksha

মুখবন্ধ

"বিজ্ঞাপনের চমক নয়, সাফল্যের নিশ্চয়তাও নয়,
হয়ত আপনার ইঙ্গিত সাফল্য এই পেজটিতে!!
ভূগোল কি? বিষয় হিসাবে কেমন? ভূগোলের চাহিদা
ও ভবিষ্যৎ, উচ্চতর গবেষণা, চাকুরীর ক্ষেত্র এবং
অন্যান্য, সবকিছুই। সর্বোপরি ভূগোল যখন ভাবায়।"

শিক্ষা মানব সংস্কৃতি ও উন্নয়নের বিজ্ঞান, ভূগোল সেই বিজ্ঞানের অংশ। তাই ভূগোলে মানব উন্নয়নের সুচিন্তিত, প্রয়োজনীয় আধুনিক পাঠ্যক্রম যুক্ত থাকে। তাই ভৌগোলিক পরিবেশের বিজ্ঞান ভূগোলকে আমাদের ধাত্রী হিসাবে ভাবতে হবে। ভূগোল কে নিজের মতো করে জানা ও চেনার অভিজ্ঞতা নিয়ে, বাস্তব অবস্থায় দৃষ্টি নিক্ষেপ করে ভূগোল চর্চার সদর্থক দিশা তুলে ধরার চেষ্টা করা হয়েছে আমাদের প্রকাশিত 'ভূগোল শিক্ষা' প্রথম খন্ডের দ্বিতীয় সংখ্যায়। আমাদের প্রয়োজনের তাগিদেই ভূগোল শিক্ষা যে ভাবে গুরুত্বপূর্ণ হয়ে তার ভাবনার বিষয় থেকে বিষয়ান্তরে বিস্তার লাভ করেছে, তার সকল গুরুত্বপূর্ণ দিক গুলি আলোচনার জায়গায় নিয়ে আসার চেষ্টা করা হয়েছে এই পত্রিকায়।

ভূগোল সকল বিষয়ের সমষ্টি হয়েও তার নিজস্ব অনন্য সত্তায় দ্যুতিমান। সময়ের সাথে সাথে ভূগোলের আলোচনা হচ্ছে গতিময় ও পরিবর্তনশীল। বর্তমানে পৃথিবী জুড়ে ভূগোল শিক্ষা তো কেবল জীবিকা উপার্জনের মাধ্যমই নয় - শিক্ষার্থীর জন্য পৃথিবীর যাবতীয় বিষয়ে তাত্ত্বিক ও ব্যবহারিক জ্ঞানের দিশারী হিসাবে কাজ করে। ভূগোলের এই অসীম পরিধিকে একটি পত্রিকাতে সীমায়তকরন করা খুবই হাস্যকর। তবুও এরই মধ্যে ভূগোলের এই বিশাল পরিধির কিছু অংশ আলোচিত হয়েছে আমাদের ক্ষুদ্র প্রয়াস "ভূগোল শিক্ষা" পত্রিকায়। অন্যান্য পত্রিকার মতো সম্পূর্ণ বিষয় তুলে ধরে সাফল্যের নিশ্চয়তা হয়তো এই পত্রিকায় নেই, কিন্তু আপনার জ্ঞানের ইঙ্গিত সাফল্য হয়তো খুঁজে পাবেন বলে আশা রাখি।

পত্রিকার সর্বাঙ্গীন উন্নতির জন্য আরো ভালো বিষয় সংযোজন ও উপস্থাপনের গঠনমূলক সমালোচনা এবং পরামর্শের প্রত্যাশায় রইলাম, যা আগামী দিনে এই পত্রিকাটিকে আরো সমৃদ্ধ করবে এবং ভবিষ্যতে আরো সুন্দর পত্রিকা উপহার দেব এই অঙ্গীকার করে শেষ করছি।

মে ২০১৮,
বাঁকুড়া

ধন্যবাদান্তে,
ভূগোল শিক্ষা

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Valuable Feedback for Vol. 1, Issue 1

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খুব ভাল একটা পদক্ষেপ। এই ই-পত্রিকার মাধ্যমে ভূগোল বিষয়ের আলো আরও প্রসারিত হবে আশা করা যায়।

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Wow...fantastic magazine

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Hi I am kalyani mondal. . . . . . A follower of your bhugol sikhsha e_magazine. ..it is very beautiful study space where junior, senior geographer together catch up their all interested geographical knowledge and many known unknown terms..
It is also necessary for wbcs main students.
Not only students but also every body from different stream will benefited by it....as a reader i wel come it in all sense ....
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I read continuously of all the articles and papers published in bhugol sikskha.The wrinting quality are so good.I am very thankful to bhugol siksha. I think this page get more and more success in future and more people get benifit from this page.

I also thankful to all of the members of this page.It is a best platform from where we can start our journey.

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Magazine ta te j samaysto information roache se gulo khub help korbe.magazine ta pore upokrito holum .

Contents

Smart Cities in India

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Every city has its own history, culture and identity. There is no doubt that we need to nurture, preserve and renew the urban fabric with changing times. However, there is also a need to build new cities. A city is an economy of agglomeration; it provides various advantages and opportunities. That is why we all flock to the cities in search of a better future. However, there would be limits beyond which things would become very difficult to sustain. What was once a village grows into a town, a city, a metropolis, a megapolis and then slowly begins to decay into a 'necropolis'.

India's economy is expanding rapidly. By 2030 it is expected to have grown by five times, buoyed largely by the country's urban centres. During the same period, the country's labour force is expected to grow by 270 million workers, with urban jobs accounting for 70% of that growth.

Today, India is less than 30 per cent urban and the quality of life in its cities is chronically low. However, with $2/3^{rds}$ of GDP already generated in India's cities and rural to urban migration patterns accelerating, the country faces a critical challenge: managing this rapid urbanization in a way that enhances the liveability of India's urban spaces.

What is Smart City?

People migrate to cities primarily for employment. To support their happy and comfortable living, people also need good quality housing; cost-effective physical and social infrastructure, such as water, sanitation, electricity, clean air, education, healthcare, security, entertainment, etc. In this context, Smart Cities are those that are able to attract investments for development of infrastructure and other social facilities. Good infrastructure, simple and transparent online processes that make it easy to establish an enterprise and run it efficiently are important features of an investor-friendly city. Without this a city loses attraction as an investment destination. A Smart City investor is considered as someone who helps a city rather than someone who only profits from it.

Why Smart Cities?

Abraham Maslow a psychologist suggested that the first and most basic need people have is the need for survival: their physiological requirements for food, water, and shelter. People must have food to eat, water to drink, and a place to call home before they can think about anything else. If any of these physiological necessities is missing, people are not motivated enough to meet the growth needs. Maslow has identified seven categories of basic needs common to all people. Maslow represented these needs as a hierarchy in the shape of a pyramid *(Fig. 1.1.)*. A **hierarchy** is an arrangement that ranks people or concepts from lowest to highest. According to Maslow, individuals must meet the needs at the lower levels of the pyramid before they can successfully be motivated to tackle the next levels. The lowest four levels represent **deficiency needs,** and the upper three levels represent **growth needs.**
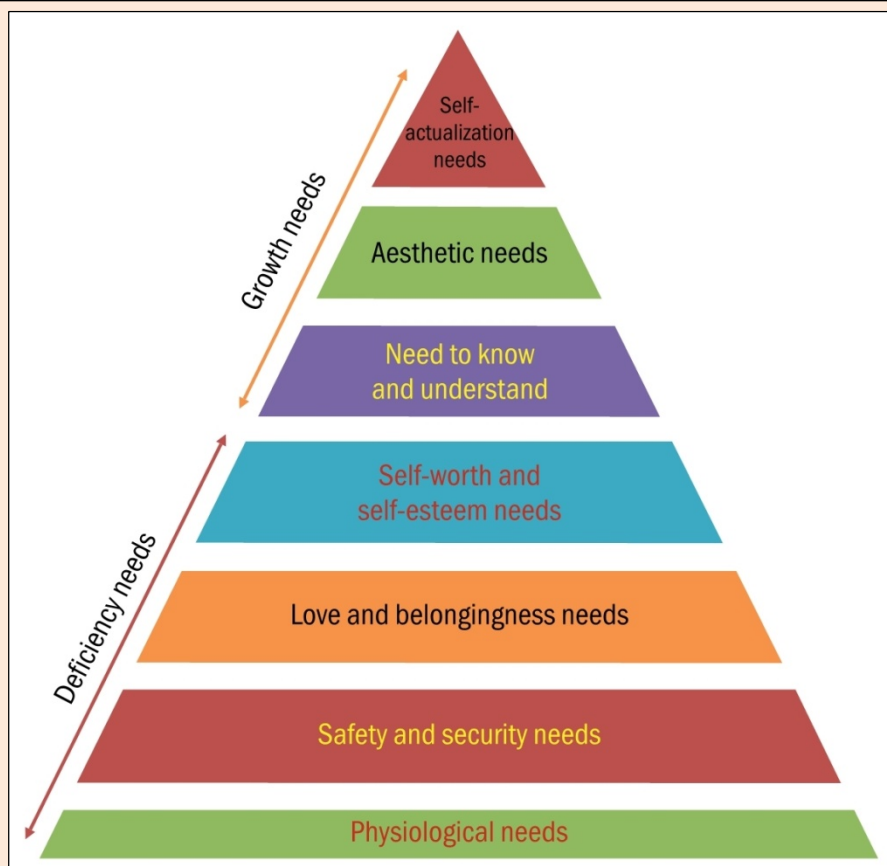
Fig. 1.1.: Maslow's hierarchy of needs.

One will need to fulfil growth needs once their deficiency needs are fulfilled. In India, many cities have the infrastructure where deficiency needs are fulfilled and Smart City concept will fit in, while in other cities citizens are even struggling for their deficiency needs to be fulfilled. Due to dense population and lack of streamlined civic facilities and processes, such deficiencies remain unattended leading to complex problems in cities. To overcome this difference, the Government needs proper strategy that helps in successful implementation of Smart City concept. India is at a point of transition where the pace of urbanization will speed up. The relatively low base allows us to plan our urbanization strategy in the right direction by taking advantage of the latest developments in technology especially in Information and Communication Technology (ICT).

Smart City framework:

Towards this objective, an integrated Smart City framework *(Fig. 1.2.)* comprising the key enablers like **Smart Governance, Smart Living, Smart People, Smart Mobility, Smart Environment**, and **Smart Economy** may be followed to facilitate implementation.
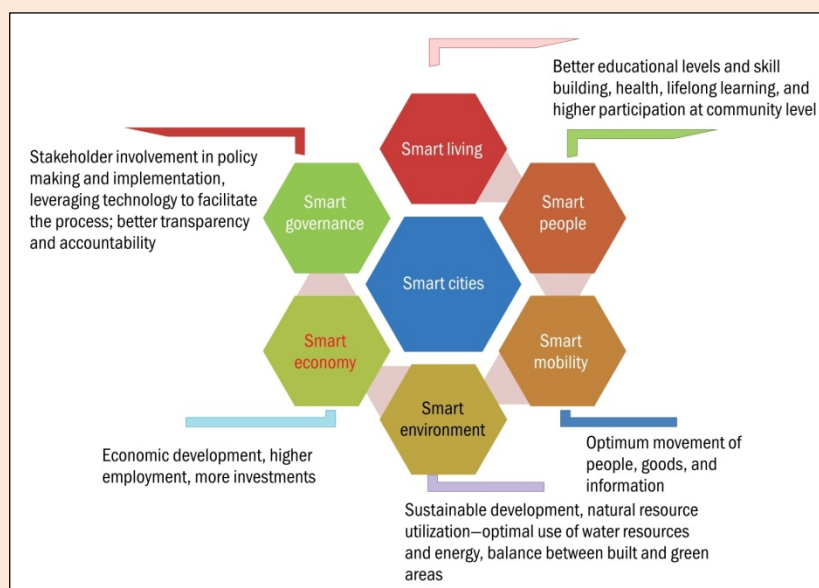
Fig. 1.2.: Smart City Components.

Status of Indian cities considered under Smart City project:

As per the Smart City concept, none of the cities are well prepared to be termed as Smart City. Existing cities are facing several challenges starting from urban governance to internet penetration. Here, we intend to carry out a comparative analysis of status of some of the existing cities (Delhi, Varanasi, Bengaluru, Kochi, and Ahmedabad) with respect to Smart City indicators.

In Smart City concept, ICT plays a key role in integrating different components *(Fig. 1.3.)*. The data reveals that most of the cities are lacking infrastructure, social awareness, and skills to upgrade into the Smart Cities. Further to this, while some of the cities have ICT infrastructure, they are not utilized up to its optimum. There need to be an effective plan or layout by the city governance and government implementing agencies to build awareness, skills, and infrastructure to develop existing cities into future Smart Cities.

Energy

- Smart grid for electricity supply and monitoring
- Use of clean technologies like renewable energy
- Energy efficiency in transportation systems, lighting

Sustainable Transport

- Maximum travel time of 30 minutes in smaller cities and 45 minutes in metropolitan areas
- Footpath of 2 m width on either side of all roads
- Bicycle tracks 2 m wide, one in each direction
- High-frequency mass transport within 800 m
- Access to Para transit within 300 m

ICT
Extensive use of information and communications technology

Water Management

- Citizen participation and transparency
- 135 l per capita water supply 24X7
- 100% metering of water connections

Spatial Planning

- 175 people per hectare along transit corridors
- 95% homes should have daily needs retail, parks, schools, and recreational areas within 400 m
- 95% homes should have access to jobs and public services by public transport, bicycle, or foot
- 20% residences to be occupied by economically weaker sections

Fig. 1.3.: Features Required for Smart Cities.

How existing cities become smart?

Experts at the recently concluded Smart Cities India Expo have called for focus on making these people oriented and socially inclusive because, even with excellent infrastructure, several global cities have failed to retain people and businesses. Technology is important but so are the economy and people. Research states 60% jobs can be generated within these sub-cities. There can be many opportunities for decentralized production and related services. They should act like a sponge where money comes in and keeps circulating. There has to be a business model. It also requires citizen's participation in planning.

For Example, Melbourne is one of the most liveable cities where footpaths have been widened to reduce space for cars and a vibrant economy created in the prime real estate of the city's central business district. Yokahama and Singapore are successful Smart Cities where people have automatically moved towards public transport.

Identifying the Smart City:

In order to modernize our cities and make them internationally competitive, the Government has decided to support the development of 100 Smart City in the country. In view of this, cities with a 1-4 million population would seem to be the most appropriate. Besides, satellites to larger cities would also make very

good candidates. Accordingly, the current thinking is that 100 cities to be developed as Smart City may be chosen from amongst the following:

- One satellite city of each of the cities with a population of 4 million people or more (9 cities).
- All the cities in the population range of 1-4 million people (44 cities).
- All State/Union Territory (UT) capitals, even if they have a population of less than 1 million (17 cities).
- Cities of tourist and religious importance (10 cities).
- Cities in the 0.5–1.0 million population range (20 cities).

Table 1.1.: Population in India and Decadal Growth (Focused on Urban)

	Persons (in millions)		Decadal Growth (%)	
	2001	2011	1991–2001	2001-11
Total	1029	1210	21.5	17.6
Rural	743	833	18.1	12.2
Urban	286	377	31.5	31.8
Percentage of total population	*27.81	*31.16		

Source: http://www.moud.in/. (***** Urban Population)

Total Number of Cities - 100.
₹ 48,000 crore over five-year's outlay.
₹ 100 crore per year for five years per city.

Smart Cities Mission:

In June 2015, the Government of India (Ministry of Urban Development) announced the Mission Statement and Guidelines for creating 100 smart cities. While there is no universally accepted definition of "smart city", examples of smart solutions are given in an illustrative list of elements that compose a smart city, as provided in *(Table 1.2.)* On August 27, the same year, 98 cities out of the original list of 100 cities were selected (one city from Jammu & Kashmir and one city from Uttar Pradesh were taken off the list) *(Table 1.3.)*. Potential cities include 24 state capitals, 24 business and industrial centres, 18 cultural and environmental centres, 5 port areas, and 3 education and healthcare hubs.

The 98 cities will submit Smart City Proposals which will be evaluated for selection. The selection process involves three rounds and is due to be finalized in August 2016.

Table 1.2.: Elements of a smart city

Smart solutions	Examples
(1) E-governance and citizen services	Electronic service delivery, crime monitoring, etc.
(2) Waste management	Waste to energy, fuel, compost; water, construction and demolition (C&D) waste, etc.
(3) Water management	Smart meters & management, leakage identification, water quality monitoring, etc.
(4) Energy management	Smart meters & management, renewable sources of energy, energy efficient and green buildings, etc.
(5) Urban mobility	Smart parking, intelligent traffic management, etc.
(6) Others	Tele-medicine, tele-education, incubation, trade facilitation centres, skill development centres, etc.

Source: Ministry of Urban Development, *Mission Statement & Guidelines* (announced in June 2015) http://smartcities.gov.in/upload/uploadfiles/files/SmartCityGuidelines(1).pdf.

Components of a smart city:

In 2015, the Government of India announced some of the smart solutions proposed by 97 cities (as understood based on interviews). As provided below, the solutions announced are more or less in line with the smart solutions from the *Mission Statement and Guidelines* listed in *(Table 1.2.)*.

- E-governance harnessing ICT (27 cities),

- Smart water management using smart meters (21 cities),
- Improved solid waste management (20 cities),
- Smart public transport (16 cities),
- LED street lights (16 cities),
- Installation of CCTV cameras for public security (14 cities),
- Control centre for traffic and water supply monitoring (9 cities),
- Smart applications for the general public (6 cities),
- WiFi (5 cities),
- GIS (geographic information system) mapping (4 cities).

Table 1.3.: 98 potential smart cities (28 states, 7 union territories)

No.	Name of States / UTs	Name of City	No.	Name of State / UTs	Name of City
1	Andaman & Nicobar Islands	1.Port Blair	2	Andhra Pradesh	2.Vishakhapatnam, 3.Tirupati, 4.Kakinada
3	Arunachal Pradesh	5.Pasighat	4	Assam	6.Guwahati
5	Bihar	7.Muzaffarpur, 8.Bhagalpur, 9.Biharsharif	6	Chandigarh	10.Chandigarh
7	Chhatisgarh	11.Raipur, 12.Bilaspur	8	Daman & Diu	13.Diu
9	Dadra & Nagar Haveli	14.Silvassa	10	Delhi	15.New Delhi Municipal Council
11	Goa	16.Panaji	12	Gujarat	17.Gandhinagar, 18.Ahmedabad, 19.Surat, 20.Vadodara, 21.Rajkot, 22.Dahod
13	Haryana	23.Karnal, 24.Faridabad	14	Himachal Pradesh	25.Dharamshala
15	Jharkhand	26.Ranchi	16	Karnataka	27.Mangaluru, 28.Belagavi, 29.Shivamogga, 30.Hubballi-Dharwad, 31.Tumakuru, 32.Davanegere
17	Kerala	33.Kochi	18	Lakshadweep	34.Kavaratti
19	Madhya Pradesh	35.Bhopal, 36.Indore, 37.Jabalpur, 38.Gwalior, 39.Sagar, 40.Satna, 41.Ujjain	20	Maharashtra	42.Navi Mumbai, 43.Nashik, 44.Thane, 45.Greater Mumbai, 46.Amravati, 47.Solapur 48.Nagpur, 49.Kalyan-Dombivali, 50.Aurangabad, 51.Pune
21	Manipur	52.Imphal	22	Meghalaya	53.Shillong
23	Mizoram	54.Aizawl	24	Nagaland	55.Kohima
25	Odisha	56.Bhubaneshwar, 57.Raurkela	26	Puducherry	58.Oulgaret
27	Punjab	59.Ludhiana, 60.Jalandhar, 61.Amritsar	28	Rajasthan	62.Jaipur, 63.Udaipur, 64.Kota, 65.Ajmer
29	Sikkim	66.Namchi	30	Tamil Nadu	67.Tiruchirapalli, 68.Tirunelveli, 69.Dindigul, 70.Thanjavur, 71.Tiruppur, 72.Salem, 73.Vellore, 74.Coimbatore,

					75.Madurai, 76.Erode, 77.Thoothukudi, 78.Chennai
31	Telangana	79.Greater Hyderabad, 80.Greater Warangal	32	Tripura	81.Agartala
33	Uttar Pradesh	82.Moradabad, 83.Aligarh, 84.Saharanpur, 85.Bareilly, 86.Jhansi, 87.Kanpur, 88.Allahabad, 89.Lucknow, 90.Varanasi, 91.Ghaziabad, 92.Agra, 93.Rampur	34	Uttarakhand	94.Dehradun
35	West Bengal	95.New Town Kolkata, 96.Bidhannagar, 97.Durgapur, 98.Haldia			

Source: http://www.moud.in/.

Process of selection of Smart City:

Union Cabinet approved building of 100 smart cities and upgradation of basic infrastructure—Atal Mission for Rejuvenation and Urban Transformation (AMRUT)—across 500 cities with outlays of `48,000 crore and `50,000 crore, respectively. With the country aspiring for a manufacturing-led rebound in GDP growth rate, it is imperative that cities prepare themselves for more people moving into the cities. Experts feel that making them 'smart', with adequate core infrastructure—clean water supply, efficient public transportation, affordable housing, power supply, robust IT connectivity, better health and education, and sustainable urban environment—could make a big difference and, if implemented well, the sector could attract private sector investments. Along with this, a push from State governments and Urban Local Bodies (ULBs) could ensure that the sector has the potential to ensure an economic revival across the country and generate incremental employment.

Letter to all State governments to shortlist potential Smart Cities based on Stage-I criteria according to number of Smart Cities distributed across states/UTs by the MoUD. This is the first stage of intra-state competition.

On the basis of response from States/UTs, the list of potential 100 Smart Cities is announced. The second stage of all India competition begins.

By stipulated date Stage 2 proposals submitted. Evaluation by a panel of experts.

Each potential SC prepares its proposal assisted by a consultant (from a panel prepared by MoUD) and a hand-holding external agency (various offers received such as the World Bank, ADB, GEF, USTDA, JICA, DFID, AFD, KfW, UN Habitat)

Selected cities declared—Round 1 Smart Cities

Selected cities set up SPV and start implementation of their SCP. Preparation of DPRs, tenders, etc.

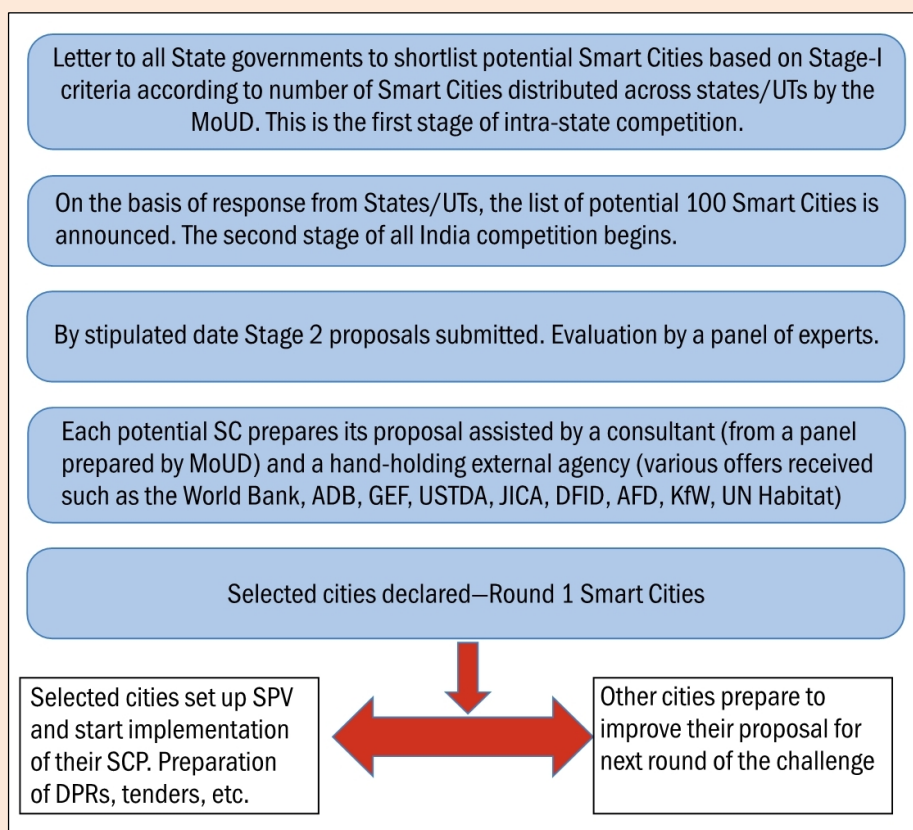Other cities prepare to improve their proposal for next round of the challenge

Fig. 1.4.: Steps in the selection of Smart cities.

Table 1.4.: Top 45 smart cities in India (Cities Profile of Round 1)

Ranking	Name of City	Name of State / Union Territory	Score (%)
1	Bhubaneswar	Odisha	78.83
2	Pune	Maharashtra	77.42
3	Jaipur	Rajasthan	73.83
4	Surat	Gujarat	68.16
5	Kochi	Kerala	66.98
6	Ahmedabad	Gujarat	66.85
7	Jabalpur	Madhya Pradesh	63.03
8	Visakhapatnam	Andhra Pradesh	61.12
9	Solapur	Maharashtra	60.83
10	Davanagere	Karnataka	59.93
11	Indore	Madhya Pradesh	59.89
12	New Delhi Municipal Council	Delh	59.63
13	Coimbatore	Tamil Nadu	58.74
14	Kakinada	Andhra Pradesh	58.19
15	Belagavi (Belgaum)	Karnataka	57.99
16	Udaipur	Rajasthan	57.91
17	Guwahati	Assam	57.66
18	Chennai	Tamil Nadu	56.16
19	Ludhiana	Punjab	55.84
20	Bhopal	Madhya Pradesh	55.47
21	Ujjain	Madhya Pradesh	55.03
22	Gwalior	Madhya Pradesh	54.82
23	Warangal	Telangana	54.79
24	Chandigarh	Chandigarh	54.73
25	Amritsar	Punjab	54.55
26	Shivamogga	Karnataka	54.36
27	Jalandhar	Punjab	53.82
28	Madurai	Tamil Nadu	53.34
29	Lucknow	Uttar Pradesh	53.24
30	Newtown Kolkata	West Bengal	53.10
31	Nagpur	Maharashtra	53.00
32	Panaji	Goa	52.99
33	Salem	Tamil Nadu	52.95
34	Nashik	Maharashtra	52.75
35	Agra	Uttar Pradesh	52.69
36	Thane	Maharashtra	52.34
37	Rajkot	Gujarat	52.33
38	Kalyan-Dombivali	Maharashtra	52.30
39	Pasighat	Arunachal Pradesh	52.26
40	Vellore	Tamil Nadu	52.04
41	Kanpur	Uttar Pradesh	52.00
42	Tirupati	Andhra Pradesh	51.78
43	Greater Mumbai	Maharashtra	51.77
44	Hubballi-Dharwad	Karnataka	51.71
45	Navi Mumbai	Maharashtra	51.68

Source: Ministry of Urban Development, Smart Cities Mission website
http://smartcities.gov.in/.

Challenges before Indian Smart Cities:

The concept of smart cities has its challenges, especially in India. For instance, the success of such a city depends on residents, entrepreneurs, and visitors becoming actively involved in energy saving and implementation of new technologies. There are many ways to make residential, commercial, and public spaces sustainable by ways of technology, but a high percentage of the total energy use is still in the hands of end users and their behaviour. Few of the challenges are discussed below:

1. *Mobility:*
   a. **Migration of population to urban locations for jobs:**

      Migration from one area to another in search of improved livelihoods is a key feature of human history. While some regions and sectors fall behind in their capacity to support populations, others move ahead and people migrate to access these emerging opportunities. Industrialization widens the gap between rural and urban areas, inducing a shift of the workforce towards industrializing areas. Moreover, numerous studies show that the process of migration is influenced by social, cultural, and economic factors and outcomes can be vastly different for men and women, for different groups, and different locations.

   b. **Migration for work:**

      The primary motive for migration, recorded by the census as well as the NSS, is an important indicator of how mobility is influenced by conditions of the labour market. Of the 27.4% who changed place of residence, as per 1991 census, 8.8% moved for employment reasons and 2.3% had business motives. The proportion moving due to economic motives was higher for males (27.8% moved for employment reasons and 7.1% for business reasons), compared with females (only 1.8% moved for employment reasons and 0.5% for business reasons).

   c. **Education:**

      Rural areas, by and large, lack educational facilities, especially those of higher education and rural people have to migrate to the urban centres for this purpose. Many of them settle down in the cities for earning a livelihood after completing their education.

   d. **Lack of security:**

      Political disturbances and interethnic conflicts drive people away from their homes. A large number of people have migrated out of Jammu and Kashmir and Assam during the last few years due to disturbed conditions there. People also migrate on a short-term basis in search of better opportunities for recreation, healthcare facilities, and legal advices or for availing service that the nearby towns provide.

2. *Transport:*

   City efficiency largely depends upon the effectiveness of its transport systems, that is, efficacy with which people and goods are moved throughout the city. Poor transport systems stifle economic growth and development, and the net effect may be a loss of competitiveness in both domestic as well as international markets. Although Indian cities have lower vehicle ownership rate, number of vehicles per capita, than their counterparts in developed countries, they suffer from worse congestion, delay, pollution, and accidents than cities in the industrialized world. Few of the major challenges in India are listed below:

   - Vehicular growth and availability of transport infrastructure in metropolitan cities.
   - Vehicular emission, congestion, and road safety issues.
   - Policy measures to improve urban transportation in India.

3. *Energy management:*

   In the past few years, the level of energy waste in India has been on the rise, underscoring the need for the government and other stakeholders to address issues of sustainable development. India has the world's fourth largest electricity installed capacity, according to the Ministry of Urban Development's 2014 Concept Note (Smart cities council India (2014)) on Smart City. Yet, it continues to be a country with scarce electricity distribution. Here, smart grids can be a good way of bringing in transformative operations. There are many challenges:

   - The old traditional system lacks good financial planning, resulting in losses due to poor revenue collection methods.
   - The system is also ageing with poorly maintained infrastructure, such as transmission lines, among others.
   - The government and other stakeholders to address issues of sustainable development.

Electricity theft:

Smart energy technology entails laying a secure and ubiquitous communication link between power sources to the endpoint to ensure a good and efficient communication channel that will enhance good connectivity. Smart grids can be a good way of bringing in transformative operations. The smart grid technology is also able to predict and monitor possible failures and help technical teams to pre-empt possible solutions. This technology allows systems (the grid) to be fed by alternate energy sources such as solar, wind, and hydrocarbons, among others. The integration of this power generation into the smart grid enables further decentralization of distribution and boosts nationwide generation.

4. *Information and Communication Technology:*

A common infrastructure pool allows the creation of a truly interconnected system with seamless communication between services. The sharing and unifying of the information infrastructure, or even the sharing of meaningful information/data such that it can improve efficiency and the quality of life (QOL) of its citizens is an opportunity that will be recommended. However, there are many challenges:

- All resources and information generated by the city from different sources, systems, and services are distributed in different departments, regions, and their respective information systems.
- While the interconnection of different government departments and agencies is not the current focus, the sharing of meaningful data that can improve efficiency and the quality of life-a recurrent theme of a Smart City-of citizens is a challenge that can be explored.
- Technology challenges; the existing status quo in how cities are run; and technology is not well understood across city sectors and by its administrators.
- Among the main barriers to adopting such solutions is the complexity of how cities are operated, financed, regulated, and planned.
- Rapid urbanization adds pressure to the resource base and increases demand for energy, water, and sanitation, as well as for public services, education, and healthcare. Consequently, social, economic, and environmental issues have become closely interrelated.

5. *Land acquisition:*

The issue of land acquisition in the region further complicates matters. The absence of a regulated land tenure system in most parts of the region means that acquiring tribal land for development will be a tedious task. While many factors of the scheme for selection of smart cities in India doesn't match the geographic, economic, and geographic profile in north-eastern states, the scheme will have minimal role in implementing smart cities in the region. However, newly announced Smart City Mission can achieve geographical spread in the North East Region (NER) by adopting measures, such as *(i)* Direct Central funding for a majority of the Smart City projects; *(ii)* Active participation from the State Governments; *(iii)* Mandatory special purpose vehicle (SPV) to manage and fund each Smart City; *(iv)* Ensuring full implementation of the 74th Constitutional Amendment Act; and *(v)* Special consideration during the city selection process on aspects of urban population and existing city infrastructure status.

6. *Challenges for Smart City in North-Eastern States:*

This scheme can play a crucial role in reshaping the troubled socio-economic conditions of many cities, including those in the N-E States—Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. However, North-Eastern States have their own issues in implementing Smart City concept primarily due to geographic locations, economic issues, low city growth, and low migration of population to urbanization.

a. **Urbanization Scenario:**

As per the 2011 census, the decadal rate of urbanization of **NER (37%)** is higher than the national figure (32%) but the average urbanization level of NER is 18%, and only **Mizoram (52%)** is above the national urbanization level (31%). Also, the NER states comprise only 2.2% of India's urban population. Considering the motive of the Central government—to

focus on Smart City development in states with bigger urban population—the NER states are likely to be side lined in this scheme.

b. **Public–Private Partnership (PPP):**

The ministry is relying heavily on industry involvement through public– private partnership to achieve these targets. However, most infrastructure development projects in the NER are usually taken up by the State governments, through investment from the Central Plan Fund, and there is minimal private intervention.

Policies and trends regarding the development of smart cities in India:

1. *Developments leading to the proposal of the Smart City Mission:*

India has promoted economic activity under the Special Economic Zone Act, enacted in June 2005. Later in December 2006, Japan and India joined hands in constructing a dedicated freight railway system running through six states, followed by the launching of the Delhi-Mumbai Industrial Corridor concept which would establish special economic zones around the railway system, thereby creating an economic region with infrastructure including roads and electric power plants, as well as industrial zones, logistic hubs, and commercial establishments. In addition to DMIC, the Golden Quadrilateral was conceptualized to construct a highway connecting Delhi, Kolkata, Chennai and Mumbai. However, infrastructure development failed to progress as planned and left many special zones non-functional. Furthermore, in India, drastic annual increases in urban population have raised demand for basic social infrastructure, such as water and electric power supply and urban transportation.

Against this backdrop, the Indian government, in its efforts to improve industrial and urban infrastructure, has launched an initiative to create 100 smart cities across the nation by 2022 ("Smart Cities Mission") and the Atal Mission for Rejuvenation & Urban Transformation (AMRUT), an urban renewal scheme covering 500 cities.

2. *Policies relevant to smart city development:*

Major initiatives implemented alongside the Smart Cities Mission and AMRUT include the Pradhan Mantri Awas Yojana (PMAY) scheme and the Swachh Bharat Mission (SBM) that address urban population growth, which is forecasted to jump from 377 million people (2011) to 600 million people (2031). The paragraphs below will briefly introduce each initiative and discuss the relationship among them.

3. *Relationship among policy measures relevant to smart city development:*

This subsection will compare the four projects (Smart City Mission, AMRUT, PMAY, SBM) described above. Although the coverage area of each measure is varied, comparisons reveal some overlap *(Table 1.5.)*. Furthermore, the Smart City *Mission Statement and Guidelines* provide for collaboration with other related policy measures.

Table 1.5.: Comparison of major components of policy measures

Components	Policy measures (The number of cities covered is provided in bottom row)			
	Smart City Mission	**AMRUT**	**PMAY**	**SBM**
	100 cities	**500 cities**	**All cities and towns (4041 locations)**	**All cities and towns (4041 locations)**
Water management	○	○	○	
Waste management	○	○		○
Transport	○	○		
Energy management	○			
Tele-medicine, tele-education	○			
E-governance	○			

Environment-friendly parks, etc.		○		
Construction of toilet systems (households / public)			○	○
Sanitation improvements, awareness-raising			○	○

Source: http://www.moud.in/.

An observation of the coverage of each policy measure shows that 89 cities are covered by both the Smart Cities Mission and AMRUT (Atal Mission for Rejuvenation & Urban Transformation). Furthermore, both PMAY (Pradhan Mantri Awas Yojana) and SBM (Swachh Bharat Mission) apply to all 4,104 Indian cities and towns, and therefore the coverage areas overlap completely. The implementation of these initiatives will enable focused infrastructure development in specific cities. Therefore, although they are diversified, the initiatives will serve as a means of fund procurement to improve infrastructure and upgrade local infrastructure and living standards.

As abovementioned, other policy measures addressing related fields tend to be simultaneously implemented in areas where smart city initiatives are currently implemented. Therefore, in order to understand the status of efforts to develop smart cities in India, we must take note of the financial support available under other policy measures.

City development concepts:

The various concepts of city developments uptill now:

- #### *The New Town Concept:*

  The 'new town' concept, which came up a long time ago took cognisance of the inherent nature of things and tried to overcome urban decay by creating new planned settlements far away from the big metropolitan cities so that population aggregation at one place could be arrested and a more balanced distribution could be achieved. It was believed that this would over time help in building new communities and helps the parent metropolis to remain healthy and survive longer. Regional development became a new area of interest and practice. At times, new towns have also come to be called 'satellite towns' as they are attached and function along with a parent metropolis.

  Existing cities have had huge extensions which are almost like new towns. Some examples are Rohini, Dwarka and Narela as extensions to Delhi, Navi Mumbai to Mumbai, Salt Lake City to Kolkata and Yelhanka and Kengeri to Bangalore. Noida, Greater Noida, Manesar, Pimpri-Chinchwad, Rajarhat, Dankuni, etc are other examples of such new towns.

  What needs to be noted here is the active and prime moving role of the government here. Unless and until the government takes a keen interest in this, the procurement of large tracts of land and the development of a town, bearing in mind all the social requirements and making it inclusive will not just happen. Most states in India today have township policies. State governments, instead of themselves developing land, have now started encouraging the private real estate sector to come in and develop towns. More often than not, areas of conflict of interest would come about. The basic motive of profit makes the realisation of the social objective secondary. Unfortunately, most of these private sector real estate initiatives have ended up in developments, which are too small, fragmented, in odd shapes and sizes and mostly catering to the very high income population and far from inclusive.

- #### *Industrial Townships:*

  Many industrial townships as part of steel plants or large public sector undertakings have also been developed on modern lines from scratch. Bokaro, Bhilai, Rourkela and Vizag are such examples. In the private sector, Tata Steel's town at Jamshedpur were the pioneers and other large business houses such as the Birlas, Modis, etc have also contributed to town building, basically to house their employees close to their factories.

Where even new settlements have been developed, they have come up with a completely new infrastructure and are well planned. Over a period, they have been able to acquire their own identity and have successfully provided a reasonably good quality of life to the residents.

- **Private Cities:**

    The concept of private cities is gradually gaining acceptance in India. If all goes well, India should have at least 30 private cities across the country by the end of this decade. The number could be even greater, depending on the manner in which India's policy makers allow this concept to germinate.

    India is now home to various types of private cities. There are private housing and commercial enclaves like those of DLF in Delhi and Hiranandani in Mumbai where the entire security, street maintenance and administration of the estate is managed by the developers. Then there are the larger industrial townships like Jamshedpur, Mithapur and Modinagar, where the entire town's administration is managed by the industry promoter (often uneasily) with the consent of the state government.

- **Lavasa: India's first fully planned Hill City:**

    Great dreams are realised only by planning. Lavasa, a planned hill station in Maharashtra, is one such. Billed as India's first hill city since Independence, it is developed primarily by Hindustan Construction Company (HCC) India and is set amidst 7 hills and 60 km of lakefront and spread over 25,000 acres. It is a convenient 3 hours drive from Mumbai, an hour's drive from Pune and is a whopping quarter size of Mumbai Lavasa is planned across four town centres. Lavasa city will have a wide range of residences, from sprawling hillside villas, to up to 3 BHK homes and will offer homes which fit budgets across socio-economic classes. It is expected to provide abundant opportunities as global leaders in Hospitality, Health and Wellness, Education. Lavasa Tourism will be setting up their institutions. Added to this, this hill station in Maharashtra has diverse work possibilities appealing to the IT and biotech industry, KPOs and R&D companies, and the world of art, fashion and animation. One of the largest private infrastructure projects in India, Lavasa city is planned for a permanent population of 0.2 million residents and a Lavasa Tourism inflow envisaged at 2 million per annum.

    Key Features:
    - o   India's first planned hill city since independence.
    - o   It is a convenient three hours' drive from Mumbai, an hour's drive from Pune.
    - o   Has 3 BHK homes and will also offer homes that fit budgets across socio-economic classes.
    - o   It is expected to provide abundant opportunities as global leaders in hospitality, health, and wellness, education.
    - o   Diverse work possibilities appealing to the IT and biotech industry, KPOs, and R&D companies, and the world of art, fashion, and animation.
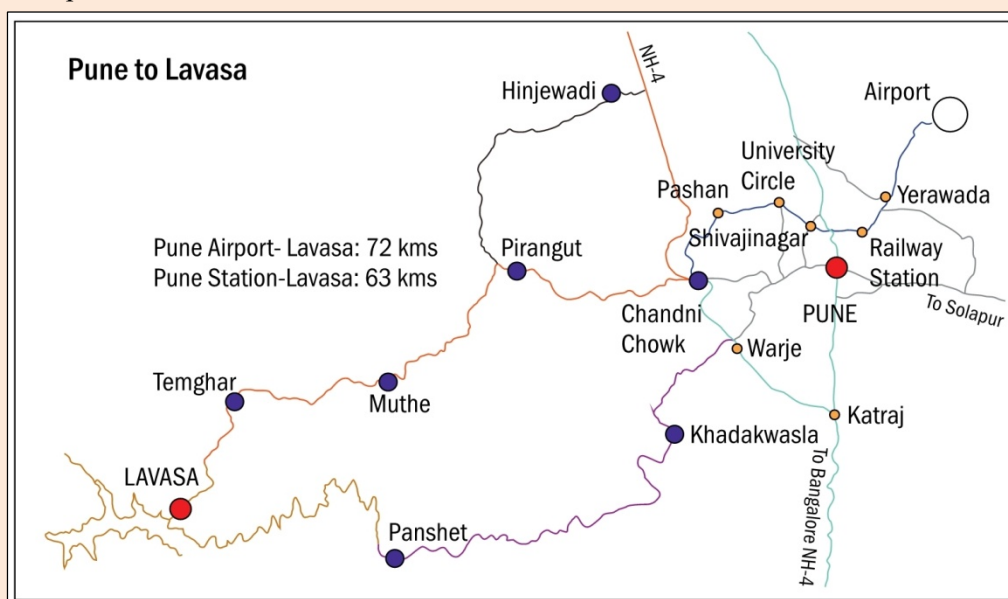

Fig. 1.5.: Route map: Pune to Lavasa.

o   Permanent population of 0.2 million residents and a Lavasa Tourism inflow envisaged at 2 million per annum.

- *New Cities:*

With the mess that most Indian megacities are in, it is inevitable not only to drastically take steps to rehabilitate infrastructure in existing cities but build new cities to accommodate this burst in urban population. In many cases, if not all, retrofitting old cities with improved infrastructure and playing the 'catching-up' game is a more expensive and difficult-to-implement agenda. It is logical and quicker to build entire new smart cities from scratch instead.

These new cities need to take advantage of new transport infrastructure that is being planned, such as the high-speed rail (HSR). Railway Budget 2012 announced formation of *High Speed Rail Authority* to run these trains and that feasibility study of Pune-Mumbai-Ahmedabad corridor is now complete, with detailed surveys to be undertaken shortly. Studies have also been commissioned on six other corridors after which implementation of these projects would begin. Once completed, HSR will reshape the urbanisation process in the country. The urban sprawl presently limited to 30-50 km from the city centre will change into a 300-500 km long conurbations linking central business districts of multiple cities, forming urban economies of global scale and size.

Once complete, HSR will convert southern cities such as Thiruvananthapuram, Bangalore and Chennai into one urban agglomeration with combined economies comparable to state-level GSDPs. Similarly, Delhi will be linked right up to Amritsar via Chandigarh and Ludhiana. People will live in *Pune* or *Ahmedabad* and work in *Mumbai* with HSR making this daily commute possible within cities. This presents a huge opportunity for setting up new cities along the HSR route. These cities can be developed as smart and intelligent, focused on becoming engines for innovation and research. Linked with HSR, they will get the momentum to survive and develop independently.

The new cities in India would also be frontiers of modern technology and forward looking urban planning techniques developed around HSR stations. These cities would typically house 0.5- 1.0 million residents over the next 10-15 years, spread over around 100 sq km, similar to ones being developed along the Delhi-Mumbai Industrial Corridor. The *real estate* potential of HSR would be fully exploited by developing these new cities and, instead, be used as a tool to cross-subsidise the development costs for constructing and operating the HSR lines.

- *Call for New Urbanism:*

India struggles with a number of significant barriers that continue to hamper the development of urban infrastructure: complex leadership structures, land valuation challenges, capability gaps, and funding shortfalls are all part of the urban challenge that is effectively holding India back from a new round of dramatic economic growth. India also needs to address the current problems of developing good infrastructure, solid waste disposal, flood management, storm water and sewerage system etc. resulting in urban decay, traffic gridlock and thereby a deteriorating quality of life for many of its citizens.

The wave of urbanisation that is sweeping across India represents one of the country's greatest opportunities as well as one of its most serious challenges. According to the report on *'India's Urban Awakening'* by McKinsey Global Institute, in the next 20 years, India will have 68 cities with a population over one million – up from 42 today. That is nearly twice as many cities as all of Europe. Most cities in Europe and America were established in the 19th century when there was easy availability of land, gas and water. India is a late starter and is far more crowded and complex. Therefore India requires a far more efficient and sustainable solution for servicing urban areas and can reap the benefits by using technology to learn from practices from other parts of the world.

Thus India, too, is on the road to building smart cities-world-class, self-sustainable habitats with minimal pollution levels, maximum recycling, optimised energy supplies and efficient public transportation. The cities would come along Delhi Mumbai Dedicated Rail Freight Corridor which is under implementation. In this endeavour to transform the rapidly growing urban areas into smarter cities, a collaborative partnership between government, industry, academia, and civil society will the pave way for attainment of this dream.

Upcoming Smart City Projects: Delhi-Mumbai Integrated Corridor:

India is finally set to give shape to its futuristic smart cities - world-class, self-sustainable habitats with minimal pollution levels, maximum recycling, optimised energy supplies and efficient public transportation. The Union industry ministry has sought Rs 185 billion to develop seven cities around the Delhi-Mumbai Industrial Corridor (DMIC) that will criss-cross six states.
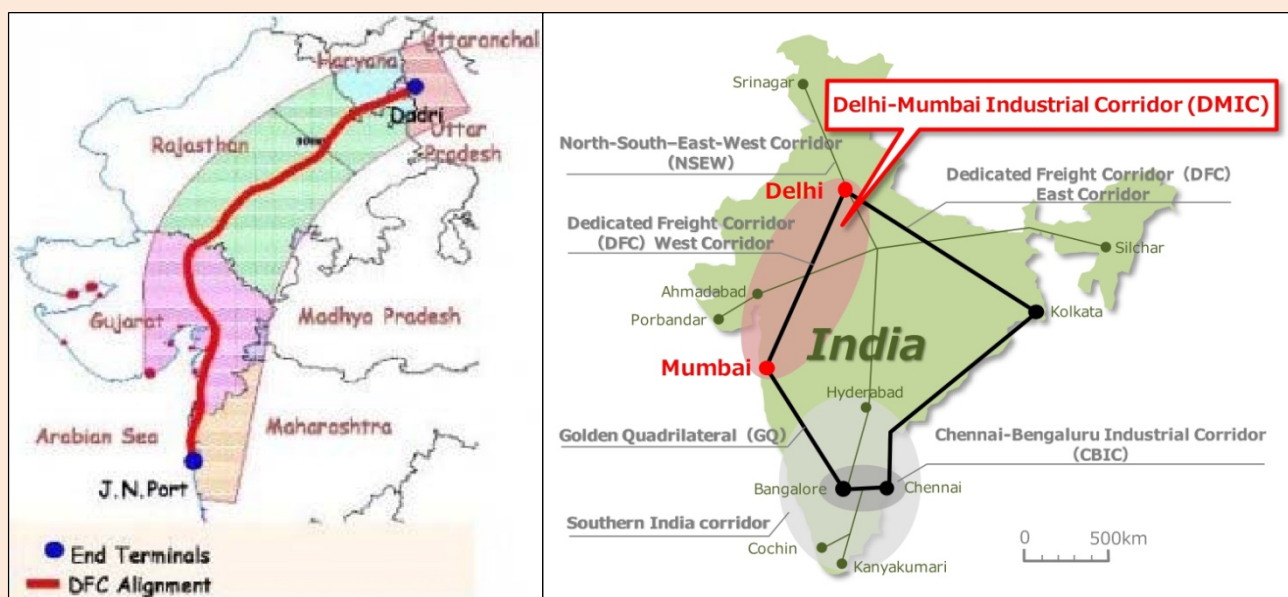

Fig. 1.6.: India's Infrastructure Improvement Scheme: Delhi-Mumbai Industrial Corridor (DMIC).

The $90-billion DMIC project, comprising -- Uttar Pradesh, Haryana, Rajasthan, Gujarat, Maharashtra and Madhya Pradesh -- is being developed in collaboration with Japan as a manufacturing and trading hub. The plan is to have brand new cities along Delhi-Mumbai Dedicated Rail Freight Corridor which is under implementation.

The eco-friendly cities would provide world-class facilities with 24-hour power supply and drinking water, mass rapid urban transportation, with bicycle and walking tracks, complete waste and water recycling, systems for smart grids - digitally managed systems to control energy consumption - and smart metering. The industrial hubs and eco-friendly cities along the Delhi Mumbai Industrial Corridor (DMIC) are expected to double employment opportunities, triple industrial production and increase exports by four folds over the next decade. The first of these cities would come up in Dholera investment region in Gujarat, 110 km from Ahmedabad. The master-plan for the city is ready and talks are on with farmers for the acquisition of land.

Dholera is just one of the five similar-sized greenfield cities that India hopes to build in the next few years. They are Manesar-Bawal in Haryana, Indore-Mhow in Madhya Pradesh, and Dighi and Nasik-Igatpuri in Maharashtra -- all along the Delhi-Mumbai Industrial Corridor.

According to Amitabh Kant, managing director and chief executive officer, Delhi Mumbai Industrial Corridor Development Corporation (DMICDC), "There is a very strong case for planned cities. India is going to experience rapid urbanisation involving around 300 million people within the next two to three decades. This means that they will either drift to existing cities, thus congesting them further, or move into new cities. If it is new cities, then they will have to be either cities that are planned, or cities that evolve, more or less in an unplanned manner.

Master plans are ready for seven brand new cities spanning six states in what will be the biggest urban development project .Their key features are compact, vertical developments, an efficient public transportation system, the use of digital technology to create smart grids for better management of civic infrastructure, recycling of sewage water for industrial use, green spaces, cycle tracks and easy accessibility to goods, services and activities designed to foster a sense of community. This Industrial Corridor includes developments of all means of transport including renewing or establishment of airports and seaports in the corridor cities, building and expansion of roadways and rail networks. Later 17 more cities are planned to be

developed on a similar pattern. A total of 24 such new generation cities are being planned for phased development across UP, Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. The first phase will see seven of them opening their doors by 2018-19. The processes of acquiring land, getting government clearances and generating investment have already started.

Plans are also in place to integrate these cities through new airports, new rail links and arteries of ten-lane highways. The creation of a new urban vision was not the original intention, though. The DMIC was an economic and commercial initiative of the government, intended to boost manufacturing through the development of industrial centres along the western leg of the Mumbai-Delhi-Kolkata dedicated railway freight corridor. The estimated cost of building the new cities varies from Rs 300 billion to Rs 750 billion at current prices, depending on their size. The central and state governments will carry the burden of financing trunk infrastructure while a public-private partnership model is being tried out for the first time to build houses, schools, hospitals and other facilities. "The master plans for the cities are unique in that an effort has been made to look at the future by putting in infrastructure ahead of the demand. "We have planned for 2040", said Kant.

Some of the innovative ideas are - For instance, each city will have underground utility corridors for parking, sewage disposal and communication lines to give it a neat look and leave enough space for facilities that are missing in most existing cities, like pavements, parks and cycle tracks. The transportation axis is designed to discourage the use of private vehicles. The emphasis will be on dedicated bus and light rail corridors. The rule that the planners have tried to follow is that some form of public transport should be available within a 10-minute walk from home or office.

Eventually, the success of these cities will depend on the way they are managed and promoted. This will require a strong administrator who works like a city-CEO, the way most mayors are in many big and successful cities in the world. Such cities can also become benchmarks for other conventional cities to adapt, or risk losing people as they would move away to these new centres. The list is seeing new additions at a rapid pace.

Other Planned Corridor Projects:

Following the successful operationalization of the **Delhi-Mumbai Corridor** similar projects are planned pan India. On these lines the Chennai-Bangalore Industrial corridor and Chennai-Hyderabad Industrial Corridors are proposed and are being developed. The focus of these corridors will be automobile and ancillaries in Chennai, Aerospace in Bangalore and pharmaceuticals in Hyderabad.

The **Chennai-Bangalore Industrial corridor** is expected to cover the cities of Ranipet and Hosur. Social infrastructure is also encouraged along this corridor which is an integral part of any industrialization. Karnataka government wants to extend this corridor to Belgaum and Mangalore with plans to integrate mining, food parks and cements as part of the corridor industries.

Tamil Nadu government is also planning industrial corridors along **Chennai-Madurai-Tuticorin-Tirunelveli corridor and Coimbatore-Salem corridor**. These corridors are expected to encourage industrialization and integration of regional economies. This could also be seen in the rising real estate prices along the upcoming and proposed corridors.

Smart City Kochi:

Smart City Kochi (SCK), a joint venture between Smart City Dubai and the Kerala government, has approved the concept master plan of the project. The first phase of the project is expected to be operational within 18 months which includes a building spread over 3.5lakh sq.ft. The project will enjoy a single special economic zone (SEZ) status due to the revision of guidelines for SEZs being initiated by the Union government. The project will be considered single even though there is a water body separating the land into two parts. With the notification of the revised guidelines, the entire 246 acres will receive a single SEZ status. This stage includes final detailed master plan, environmental and sustainability study, urban design landscape

guidelines, traffic impact study and plot development guidelines. The project, sprawling over 246 acres at Edachira, Kakkanad is expected to generate 90,000 direct jobs.

Key Features:

- Smart City Kochi (SCK), a joint venture between Smart City Dubai and the Kerala government.
- Project includes environmental and sustainability study, urban design landscape guidelines, traffic impact study and plot development guidelines.
- The project, sprawling over 246 acres at Edachira, Kakkanad is expected to generate 90,000 direct jobs.
- It will adhere to international sustainability standards that protect the environment and provide its inhabitants with comfortable, healthy and productive spaces for work and leisure.
- Already home to over 4,500 different knowledge-based companies making them the largest networked business spaces in the world.
- Companies operating in Smart City Kochi can plug into this global network and leverage a host of benefits; such as, networking events and forums where companies share best practices, forge partnerships, access new talent and enter new markets.
- Smart City Kochi will claim the most advanced and reliable ICT infrastructure available in Kochi today.

Smart Cities in West Bengal:

- ### New Town:

    New Town traces its origin to a project of the erstwhile Left Front government in West Bengal which, then eager to walk the neo-liberal way, wanted to develop a modern satellite township on a fringe of Kolkata. The New Town Kolkata Development Authority (NKDA), the governing body of the township, was constituted under The New Town Kolkata Development Authority Act, 2007, and has become operational since January 2009. This nominated body is responsible for rendering various civic services and amenities and undertaking uniform developmental works within New Town, Kolkata.

- ### Bidhannagar:

    Named after the second chief minister of West Bengal, Bidhan Chandra Roy, Bidhannagar was built on reclaimed swamp land. The city, now popularly known as Salt Lake, is the IT hub of Kolkata, with Sector-V housing the offices of major IT companies like TCS, Wipro and Accenture. The East-West metro network, when completed, will connect Salt Lake with Kolkata's main railway station, Howrah. The Bidhannagar Commisionerate, which was the first one to recognise cab aggregator Uber as a technology company, is responsible for the law and order situation of the area.

- ### Haldia:

    A major riverport and industrial belt approximately 125 km southwest of Kolkata, Haldia is being developed as a major trade port for bulk cargoes. The industrial city has several major factories, including South Asian Petrochemicals Ltd, Indian Oil Corporation, Exide, Shaw Wallace, Tata Chemicals, Haldia Petrochemicals and Hindustan Lever, besides various light industries. The European Business and Technology Centre (EBTC) plans to initiate a pilot project to demonstrate "smart city concept" at the industrial town of Haldia in West Bengal. The project would focus on lowering carbon footprint. EBTC is an European Union initiative to assist business units in India and Europe on clean technology transfer. EBTC has roped in the Bengal Chamber of Commerce and Industry for the pilot project. According to Mr Poul V. Jensen, Director, EBTC, the pilot project would focus on bringing down environment related hurdles that the industrial units in Haldia face while expanding their operations. "We are planning to implement a pilot project to showcase smart city concepts in lowering carbon footprint. We have decided to carry out a feasibility study in Haldia," Mr. Jensen told newspersons on the sidelines of a seminar - 'Water, Wastewater and Green Buildings Mission 2012' .The estimated investment in the pilot project would be close to €10 million, according to EBTC's Regional Manager. According to Mr Jensen, Denmark is a leader in clean

technologies and through its arrangement with the Copenhagen Cleantech Cluster, will provide cleantech solutions to India. "Copanhagen Cleantech Cluster and EBTC will together work to identify projects, undertake their execution, and facilitate research and innovation related to green technology initiatives in the energy and environment sectors," he added.

Key Features:

o The European Business and Technology Centre (EBTC) plans to initiate a pilot project to demonstrate 'smart city concept' at the industrial town of Haldia in West Bengal.

o Project would focus on lowering carbon footprint.

o EBTC is a European Union initiative to assist business units in India and Europe on clean technology transfer.

o Estimated investment in the pilot project would be close to €10 million

o Copanhagen Cleantech Cluster and EBTC will together work to identify projects, undertake their execution, and facilitate research and innovation related to green technology initiatives in the energy and environment sectors.

- **Durgapur:**

One of the fastest-growing cities of West Bengal, Durgapur is the third-biggest city of the state both in terms of area and population. Popularly known as the steel city of East India, Durgapur is also rising in the fields of medical and education. Durgapur, also one of the most industrialised cities of West Bengal, houses some major industrial units like the Durgapur Steel Plant (DSP) and Alloy Steel Plant (ASP) of Steel Authority of India Ltd.

Gujarat International Finance Tech City (GIFT):

Gujarat International Finance Tech-City or GIFT is an under-construction city in the Indian state of Gujarat which is about 12 kms from Ahmedabad International Airport. It will be built on 500 acres (2.0 km2) of land. Its main purpose is to provide high quality physical infrastructure (electricity, water, gas, district cooling, roads, telecoms and broadband), so that finance and tech firms can relocate their operations there from Mumbai, Bangalore, Gurgaon etc. Where infrastructure is either inadequate or very expensive. It will have a special economic zone (SEZ), international education zone, integrated townships, an entertainment zone, hotels, a convention centre, an international techno park, Software Technology Parks of India (STPI) units, shopping malls, stock exchanges and service units. GIFT aims at providing transportation network which ensures accessibility, easy & fast mobility and zero road accidental deaths. This would be achieved by:

1. Using a multimodal mix of Transport systems *(MRTS/LRTS/BRT, etc.)* for both inter region (Ahmedabad, Airport, Gandhinagar and the City) and intra-city.
2. Using walk-to-work concept as part of urban planning with a nodal split of 10:90 between private and public transport.
3. Use of electric Personnel Rapid Transport systems within the City. In future, City will be linked with *Ahmedabad BRTS*, operated by *Ahmedabad JanMarg Ltd.*

Currently, two commercial towers, each of 29 floors each are under construction, while the work on a third residential tower of 33 floors will start soon. Tendering for the next bunch of towers is going on.

GIFT is conceptualized as a global financial and IT services hub, a first of its kind in India, designed to be at or above par with globally benchmarked financial centres such as Shinjuku, Tokyo, Lujiazui, Shanghai, La Defense, Paris, London Dockyards etc.

Its Target Business Segments are:

- Financial Services Operations (Back-office of banking, Insurance and Asset,
- Management Companies),
- IT services (Software Application development and maintenance),
- Capital Markets & Trading,
- ITeS,
- BPO Services,

- KPO Services.

Project Phases:

❖ *First Phase:* As of now, proposed GIFT city's land levelling work is finished. Two commercial towers, each of 29 floors are under construction. They are slated to be completed by 2012 end.

❖ *Second Phase:* The second phase's construction of roads and bases of buildings - 2011-2013

❖ *Third Phase:* The third phase's planned period for construction and commencement - 2013-2017.

Consultants Engaged in GIFT:

➢ Design and Architecture - *East China Architectural Design & Research Institute (ECADI) and Fairwood Consultants India.*

➢ ICT Advisory Services - *British Telecom.*

➢ Market Demand Assessment - *McKinsey & Company.*

➢ Talent Demand Assessment - *Hewitt Associates.*

➢ Environmental Assessment - *IL&FS Ecosmart Ltd.*

➢ Process Management - *IL&FS Infrastructure Development Corporation Ltd.*

➢ ICT Management - *Cisco Systems International.*

➢ Power Management – *ABB.*

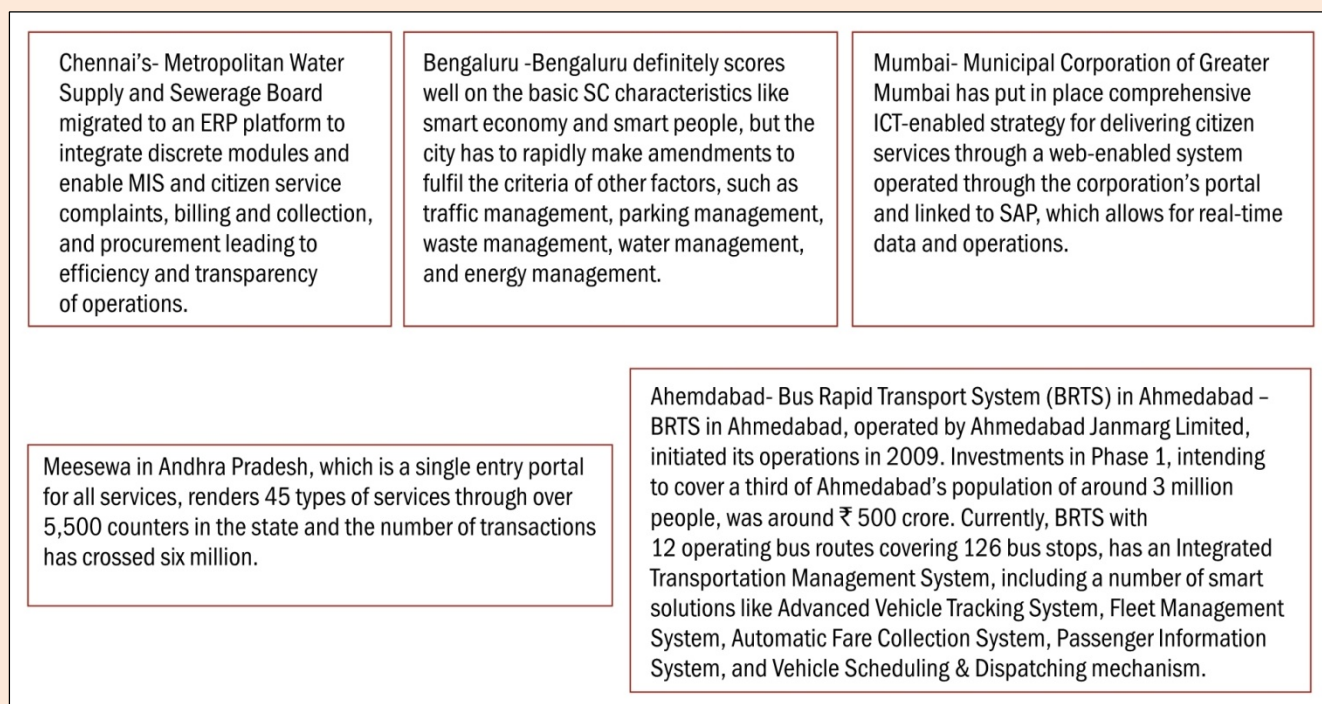## *Smart City activities in other locations:*

Chennai's- Metropolitan Water Supply and Sewerage Board migrated to an ERP platform to integrate discrete modules and enable MIS and citizen service complaints, billing and collection, and procurement leading to efficiency and transparency of operations.

Bengaluru -Bengaluru definitely scores well on the basic SC characteristics like smart economy and smart people, but the city has to rapidly make amendments to fulfil the criteria of other factors, such as traffic management, parking management, waste management, water management, and energy management.

Mumbai- Municipal Corporation of Greater Mumbai has put in place comprehensive ICT-enabled strategy for delivering citizen services through a web-enabled system operated through the corporation's portal and linked to SAP, which allows for real-time data and operations.

Meesewa in Andhra Pradesh, which is a single entry portal for all services, renders 45 types of services through over 5,500 counters in the state and the number of transactions has crossed six million.

Ahemdabad- Bus Rapid Transport System (BRTS) in Ahmedabad – BRTS in Ahmedabad, operated by Ahmedabad Janmarg Limited, initiated its operations in 2009. Investments in Phase 1, intending to cover a third of Ahmedabad's population of around 3 million people, was around ₹ 500 crore. Currently, BRTS with 12 operating bus routes covering 126 bus stops, has an Integrated Transportation Management System, including a number of smart solutions like Advanced Vehicle Tracking System, Fleet Management System, Automatic Fare Collection System, Passenger Information System, and Vehicle Scheduling & Dispatching mechanism.

Fig. 1.7.: Smart City initiatives taken in India.

Proposed benchmarks for Smart City:

Table 1.6.: Benchmarks under each component

GoI proposed benchmarks for smart cities under each component	
Parameter	**Benchmark**
Transport	☻ Maximum travel time of 30 minutes in small and medium size cities and 45 minutes in metropolitan areas. ☻ Continuous unobstructed footpath of minimum 2 m wide on either side of all street with **right-of-way (**RoW**)** 12 m or more. ☻ Dedicated and physically segregated bicycle tracks with a width of 2 m or more, one in

each direction, should be provided on all streets with carriage way larger than 10 m (not RoW).

☺ High-quality and high-frequency mass transport within 800 m (10–15 minutes walking distance) of all residences in areas over 175 persons/hectare of built area.

☺ Access to para-transit within 300 m walking distance.

Spatial Planning	☺ 175 persons/hectare along transit corridors. ☺ 95% of residences should have daily needs retail, parks, primary schools, and recreational areas accessible within 400 m walking distance. ☺ 95% residences should have access to employment and public and institutional services by public transport or bicycle or walk. ☺ At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented Development (TOD) Zone 800 m from transit stations. ☺ At least 30% residential and 30% commercial/institutional in every TOD Zone within 800 m of transit stations.
Water Supply	☺ 24 × 7 supply of water. ☺ 100% household with direct water supply connections. ☺ 135 litres of per capita supply of water. ☺ 100% metering of water connections. ☺ 100% efficiency in collection of water-related charges.
Sewerage & Sanitation	☺ 100% households should have access to toilets. ☺ 100% schools should have separate toilets for girls. ☺ 100% households should be connected to the waste water network. ☺ 100% efficiency in the collection and treatment of waste water. ☺ 100% efficiency in the collection of sewerage network.
Solid Waste Management	☺ 100% households are covered by daily door-step collection system. ☺ 100% collection of municipal solid waste. ☺ 100% segregation of waste at source, i.e., biodegradable and non-degradable waste. ☺ 100% recycling of solid waste.
Storm Water Drainage	☺ 100% coverage of road network with storm water drainage network. ☺ Aggregate number of incidents of water logging reported in a year = 0. ☺ 100% rainwater harvesting.
Electricity	☺ 100% households have electricity connection. ☺ 24 × 7 supply of electricity. ☺ 100% metering of electricity supply. ☺ 100% recovery of cost. ☺ Tariff slabs that work towards minimizing waste.
Telephone connections	☺ 100% households have a telephone connection including mobile.
Wi-Fi Connectivity	☺ 100% of the city has Wi-Fi connectivity. ☺ 100 Mbps internet speed.
Health Care Facilities	☺ Availability of telemedicine facilities to 100% residents. ☺ 30 minutes emergency response time. ☺ 1 dispensary for every 15,000 residents. ☺ Nursing home, child welfare and maternity centre—25 to 30 beds per lakh population. ☺ Intermediate hospital (Category B)—80 beds per lakh population. ☺ Intermediate hospital (Category A)—200 beds per lakh population. ☺ Multi-speciality hospital—200 beds per lakh population. ☺ Speciality hospital—200 beds per lakh population. ☺ General hospital—500 beds per lakh population. ☺ 10,020 Family welfare centre for every 50,000 residents. ☺ 1 Diagnostic centre for every 50,000 residents. ☺ 1 Veterinary hospital for every 5 lakh residents. ☺ 1 Dispensary for pet for every 1 lakh residents.
Pre Primary to Secondary Education	☺ Area equivalent to 15% of residential area for building hospitals. ☺ 1 pre-primary/nursery school for every 2,500 residents. ☺ 1 Primary school (class I to V) for every 5,000 residents. ☺ 1 Senior secondary school (Cass VI to XII) for every 7,500 residents. ☺ 1 Integrated school (Class I to XII) per lakh of population. ☺ 1 School for physically challenged for every 45,000 residents. ☺ 1 School for mentally challenged for per 10 lakh population.
Higher Education	☺ 1 College per 1.25 lakh population.

	☺ 1 University.
	☺ 1 Technical education centre per 10 lakh population.
	☺ 1 Engineering college per 10 lakh population.
	☺ 1 Medical college per 10 lakh population.
	☺ 1 Other professional college per 10 lakh population.
	☺ 1 Paramedical institute per 10 lakh population.
	☺ 1 Veterinary institute.
Fire Fighting	☺ Fire station per 2 lakh population /5–7 km.
	☺ Radium.
	☺ 1 Sub-fire station with 3–4 km radius.
Others	☺ Use of renewable energy in all sectors.
	☺ Rooftop solar panels on all public, institutional, and commercial buildings as well as multi-storied residential housings.
	☺ Adherence to green building norms.
	☺ Common ducting for all services.
	☺ Double entry accounting on real-time basis.
	☺ 3D maps on GIS of property and all services—power, water supply, sewerage, etc.
	☺ Cities to formulate building and parking standards.

Source: http://smartcities.gov.in/.

Conclusion:

The concept of Smart City envisioned by the current Government is a much needed and timely one. The current urban population is 1.5 billion and over a period of time, this can reach up to 60% of total population contributing 75% of GDP. In this context, making the city smart is both necessary and challenging. The framework of such cities has been discussed in some details in the preceding pages. The international comparison clearly shows that in Europe and elsewhere, a great deal of emphasis is being put for preserving and developing Smart City. Multidimensionality of smart cities concept crosscutting ICT applications on transport, energy management, water management, healthcare, etc., is an important aspect.

In India, converting the existing congested cities into smart ones is a formidable task. While Greenfield cities as planned along the Delhi–Mumbai corridor are a little easier to set up, but conceptualization and implementation of the same have to be done with a forward vision and continuous monitoring in existing cities.

GoI has already identified possible Smart City and has asked for responses from the State governments within the financial framework laid down for this purpose. The concept of Smart Cities in India is an evolving one and therefore, a great deal, as stated above, will depend upon proper formulation and careful implementation.

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Terrace Formation and Types of Various River Terrace

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Introduction:

In fluvial geomorphology studies are distinctly converged on drainage basin as a holistic approach, but partial approaches of study are also attempted on channels, banks, valley-side slope and terraces which are completely treated as River Corridor. ***Terraces are remnants of previous channel and partially floodplains abandoned by the parent stream due to the changes in long established climatic, tectonic, erosional eustatic conditions, and human interference with the natural flow regime of rivers.*** The feature is common to both ephemeral and perennial rivers, and can develop in a variety of climatic and physiographic conditions. The river may be big and small and may traverse through mountains, plateaus and plains; so, this portion of the river corridor (Terraces) is arranged and re-oriented by both natural and anthropogenic interference.

In Morphology and in sediment characteristics, terraces embody the earth's history of climatic fluctuations, tectonic movements and sea-level oscillations which may generally be traced to the beginning of the Pleistocene era. Thus, the timetable of geological processes is faithfully recorded by terrace morphology, deposits and stratigraphy.

Development of Terraces:

Incision into the floodplain surface leads to floodplain abandonment and the formation of river terraces. River terraces may occasionally be produced by the incision of bedrock surfaces but they are most usually the remnants of floodplains which have been trenched by rivers. These are relatively flat-topped benches, greatly extended or narrow, found at the edge of valleys. A steep scarp slope separates the original floodplain surface from the present day floodplain below. Stair like sequences of terraces can also form, with each 'step' representing a former floodplain surface. Terraces are partly destroyed when the river erodes into them sometimes, as it migrates across the floodplain. This means that terraces may be presented only as fragments. The terrace is composed of two parts, *the scarp* and *the stair thread* above and behind it. The headward surges of rejuvenation leading to composite polycyclic stream segments, graded to different base levels, separated by nick points and correlated downstream with river terrace remnants which may be paired on opposite sides of the valley.

In such a circumstance the flood-plain level previously associated with the stream is abandoned, either by down cutting or by aggradations. During down cutting the previous flood plain is dissected, and portions may remain as continuous benches brooding the river or, more often, as remnants of flat or nearly flat spurs jutting into the river valley, this sequence of the events is pictured in A and B. A different sequence of events that results in the same surface geometry is shown in C, D, and E.
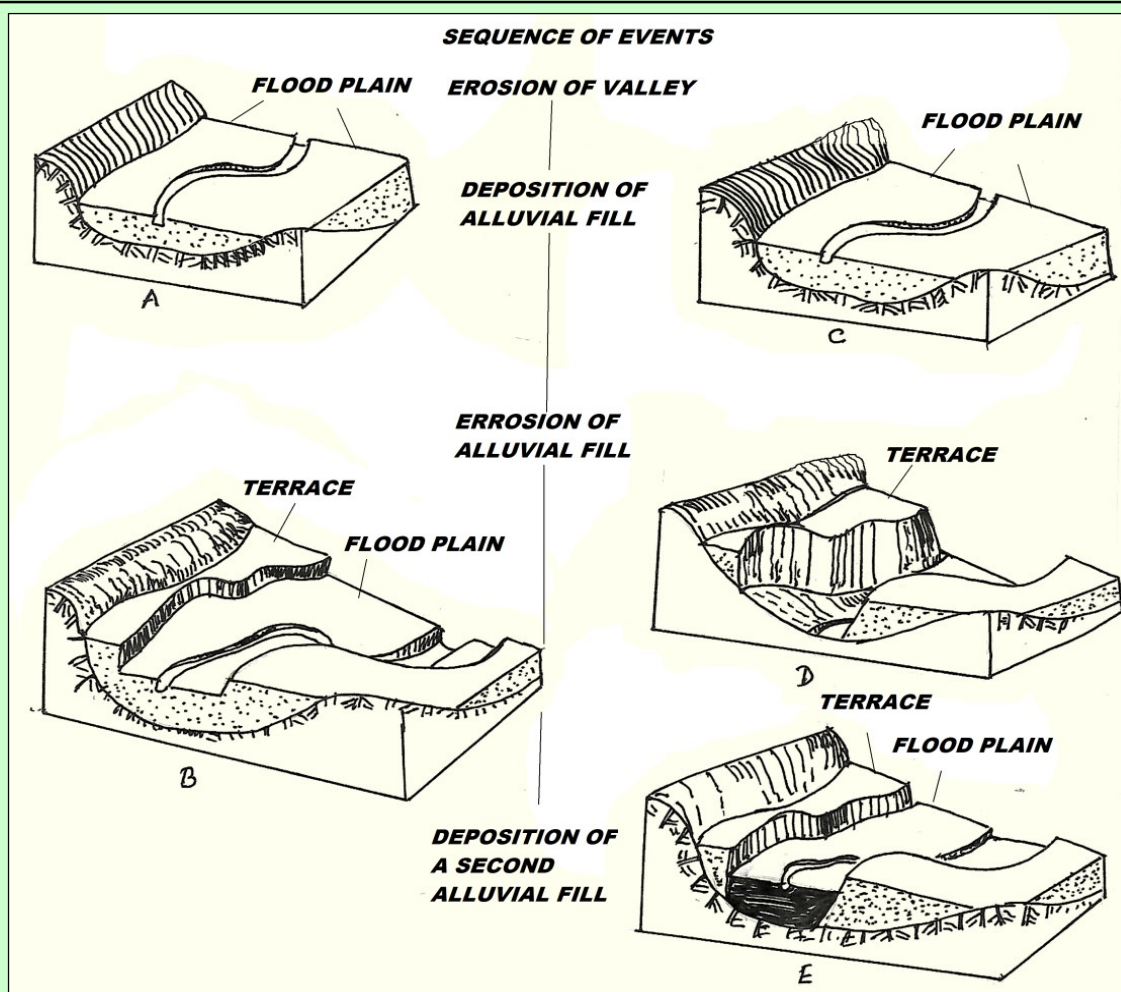
Fig. 2.1.: Fluvial Processes in Geomorphology (Leopold, Wolman, Miller).

In humid climates, flood plain tend to be absent in the most head Water channels but appear at the point where flow in the channel changes from ephemeral to perennial-that is, where ground water enters the channel in the surface quantity to sustain flow through non-storm periods. In the study area is Sub-Himalayan humid climatic region. Here bedrock cut terrace or strath terraces and irrational terrace are mostly found along the banks of the river Neora. It was observed that this development of terraces sequences was not continuous but abrupt and normally distinctly formed along any one side i.e. either the right bank or the left bank of the river.

Fluvial Mechanism of the Formation of Terraces:

River terraces, like floodplains, may be cut across bedrock so that they are essentially rock cut-surfaces bearing a veneer of fluvial sediments or they may be formed on thick alluvium.

Rock cut-terraces result from stream incision into underlying resistant rock. The incision may result from either uplift of the land or from a fall in sea-level; in either case it is the relative fall of base level which causes incision.

Terrace formed in fluvial sediments are very common. They may result from infilling of a valley with sediment, as a result of an increase in load, a decrease in discharge, or a rise in base level, and therefore a decrease in channel slope.

River terrace may occasionally be produced by the incision of bedrock surfaces but they are most usually the remnants of floodplains which have been trenched by river. Terraces border most valleys, and where the valley has been filled with alluvium, it is logical to assume that buried terraces lie beneath the floor of the valley in a wide variety of possible configuration.
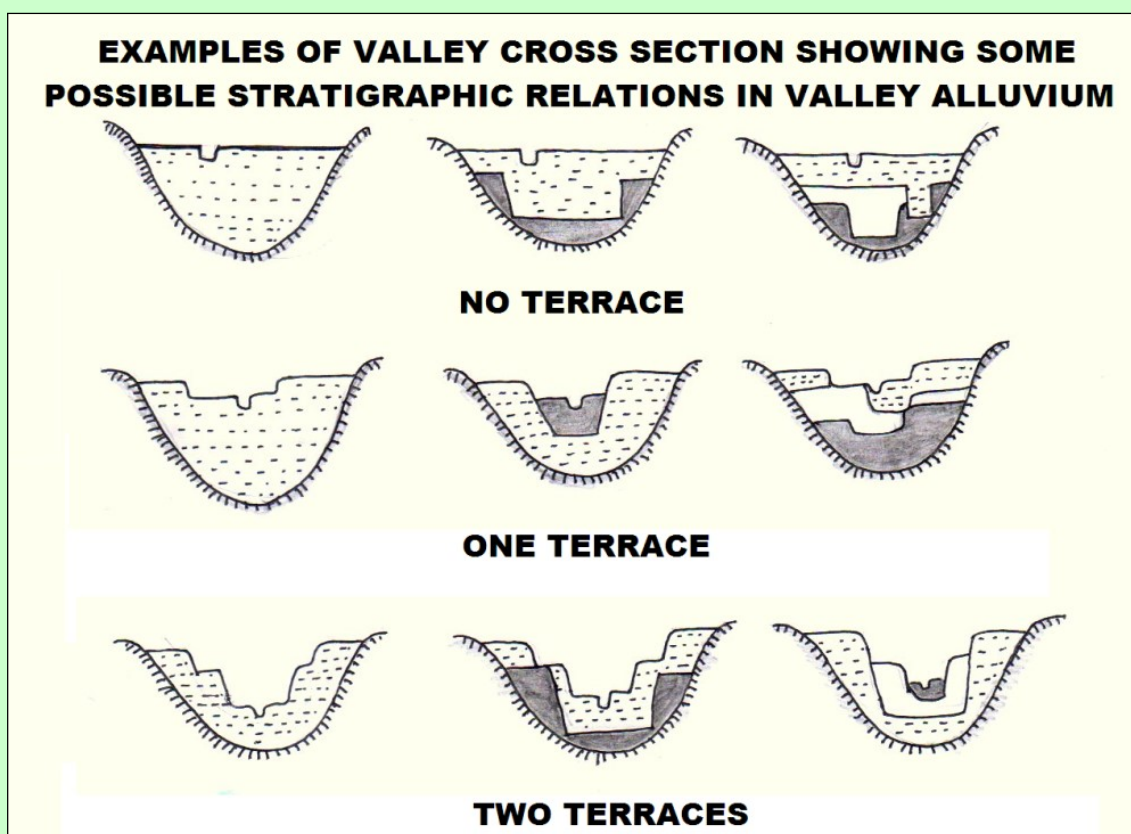
EXAMPLES OF VALLEY CROSS SECTION SHOWING SOME POSSIBLE STRATIGRAPHIC RELATIONS IN VALLEY ALLUVIUM

NO TERRACE

ONE TERRACE

TWO TERRACES

Fig. 2.2.: Mono-tier, Two-tier and Multi-tier Terraces.

Causes of Terrace Formation in Fluvial Environment:

Terraces are most significant feature in the evolution of river corridor of fluvial system. A number of litho-structural and fluvio-dynamic factors and agents are involved for their formation. There are few fundamental or ultimate causes for terrace development in the study area. These are mainly the 'tectonic', the 'structural-lithological', the 'climatic' and the 'fluvio-dynamic' causes. These may be explained in the following manners.

1. *Tectonic Forces*:
    Such as faulting, folding, wrapping or tilling – usually affect river system through differential changes in gradient. In some conditions, upliftment places the watershed in a different climatic environment, or produced changes in the hill slope of the river system.

2. *Structural and Lithologic Factors:*
    The structural and lithological composition of the channel bed form an important cause of terrace formation. The grain size distribution, shape attributes of sediments, sedimentary structures and heavy mineral assemblages forms the basis for categorization of river valleys confined or unconfined in nature. The confined river valleys are less prone to terrace formation because their banks are confined by anthropogenic structures. The case is completely opposite in terms of unconfined valleys which are still naturally present and shows distinct terrace sequences.

3. *Climatic Factor:*
    It is normally indirect in nature. A change in climate creates a change in the hydrologic regime of the river affecting the delivery of both water and sediment to its drainage system. The sediment yield from the drainage basin is closely related to both vegetation and precipitation.

4. *Fluvio-Dynamic Forces and Factors:*
    These forces include the effects of fluvial parameters such as depth, width, slope, velocity and gradient of the river channel. The broader the channel higher is the chances of terrace formation, steeper the gradient of the channel less would be the chances of the terrace development. With depth of the channel, velocity increases leading to swift entrainment activities in the hilly terrains resulting in the destruction of terrace features.

Apart from those fundamental causes, there are few subsequent causes that can be assumed to have created identical conditions for the river system. Those are, the abrupt break in gradient of the river profile or knick point produced by tectonic cause, lowering of sea level i.e., base level fluctuation and subsequent change in flow pattern.

Classification of the Terraces:

Terrace from when the river channel increases into alluvial valley fills or into bedrock. A distinction is usually made between the terraces cut on the bedrock, which are called 'strath terraces' and those comprising former floors of alluvial valleys. Since long Terraces are classified into several categories. A number of geomorphologists have attempted in this regard. *Cotton (1940) classified terraces into two categories –*

1. *Paired poly cyclic terrace:*

    Cyclic terrace represent former valley floors formed during periods when valley depending had largely stopped and lateral erosion had became dominant. The vertical distance that a terrace is above the present flood plain or another terrace is bellow it represents the amount of valley deepening which took place after rejuvenation. The distinguishing feature of cyclic terraces is that, for any set of terraces, remnants on opposite sides of the valley will be paired or will correspond in altitude along any particular valley stretch.

2. *Unpaired non-cyclic terrace:*

    There the meander belt of stream shifted back and forth over the valley and, the time that it moved from one side of the valley to the other, the valley floor had been lowered somewhat and terraces left on opposing valley sides were at different altitudes.
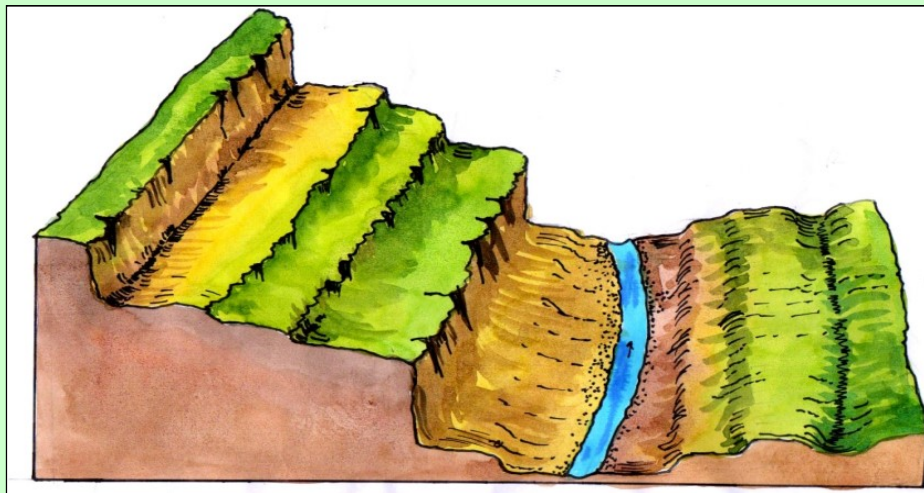

Fig. 2.3.: Cross-section of unpaired –multi terrace.
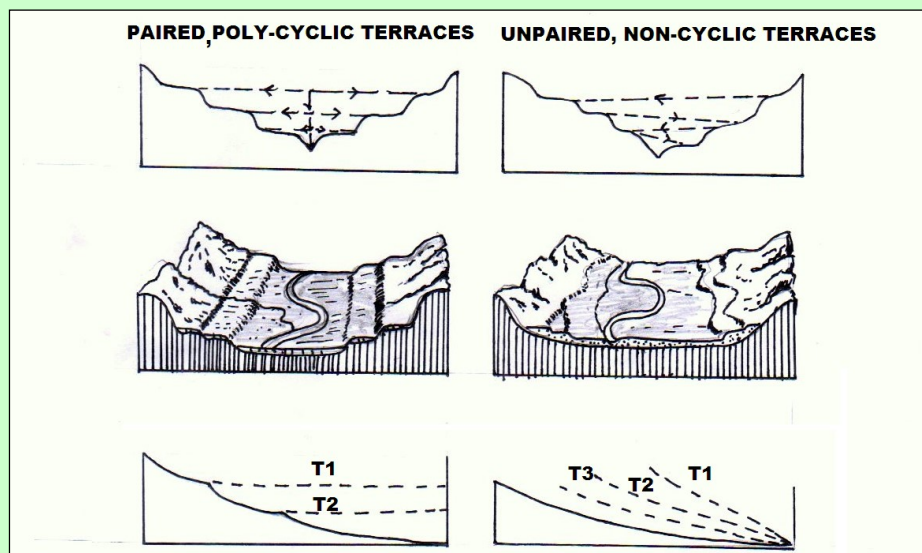

Fig. 2.4.: Paired, Poly-Cyclic and Unpaired, Non-Cyclic Terraces.

Generally unpaired non-cyclic terrace are most found in riverine terrene. Non paired terraces imply continue slow uplift of the land or other changes that would have a similar effect upon a stream. In some valleys, where the vertical range between successive terraces is not great and there has been appreciable modification of the terraces surfaces, it may be difficult or impossible to say whether the opposite terraces are to be classed as paired or non-paired. Moreover in the year of 1948 Cotton has further classified terraces into following categories. These are:

a) **Rock cut terrace i.e., strath terraces- hard rocky benches along both sides of the river.** Strath terraces are similar to gravel terraces in that they lie along the sides of a valley. Their uniqueness lies in that they are elongated planation surfaces cut in bedrock and covered with a thin layer of gravel, cobbles, and boulders. Uniformitarian scientists think strath terraces are remnants of a flat, broad valley floor (a strath) that was covered flat in bedrock, with subsequent down cutting leaving the side of the old rock floor hanging along the sides of the valley.

Photo 2.1.: Strath terrace, Left bank of the River Neora near Chalsa, Jalpaiguri District.

b) **Valley plain terraces i.e.,** surviving parts of former continuous valley flood plain. This terrace is formed with sediment and it is spreading the river terrene gently.

Photo 2.2.: River Neora left bank terrace near Lataguri, Jalpaiguri District.

c) **Slip-off slope terrace i.e., formed by brief halts during vertical corrosion of a stream.** The slip-off slope of an entrenched meander is a gently sloping bedrock surface that rises from the inside, concave bank of an asymmetrically entrenched river. A thin, discontinuous layer of alluvium often covers this gently sloping bedrock surface. This type of slip-off cuts downward into bedrock. A terrace on the

slip-off slope terrace, can formed by a brief halt during the irregular incision by an actively meandering river.

Photo 2.3.: Slip-off cut terrace in the river Ashes Hollow, UK.

d) ***Rock defended terraces.*** A river terrace having a ledge or outcrop of resistant rock at its base which serves as protection against undermining.

Photo 2.4.: Rock defended terrace, Tsok rock avalanche, Dumordo River.

Importance of River Terrace:

In human life, terrace used variously. Old valley plain terrace is used as agricultural land, because it is very fertile. And terrace is also use as settlement ground.

Photo 2.5.: Terrace use as agricultural land, in the river Jaldakha, Jalpaiguri District.

Photo 2.6.: Terrace use for settlement, in the river Neora, Jalpaiguri District.

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দাও ফিরে সে অন্ধকার..............। হয়ত কিছু দিন বাদে এই আর্জিই শুনতে পাওয়া যাবে নগর বাসির মুখে! কেন নয়? আধুনিক জীবনের সাথে পাল্লা দিতে সবাই ছুটছে আলোর পিছনে। আলোই ঝলমল করছে সারা শহর। মায়াবী আলয় চেনা শহরকেও যেন অচেনা লাগে। কিন্তু কে জানতো, সেই আলোর আড়ালে লুকিয়ে বিপদের ঘন অন্ধকার।

শহরকে আলোক মালায় সাজিয়ে তুলতে এখন বিশ্বজুড়ে ইঁদুর দৌড় শুরু হয়েছে। আবাসিক বাড়ি, অফিস ভবন, সেতু, ফ্লাইওভার, শহরের রাজ পথ, হাইওয়ে সর্বত্র আলোর বন্যা। হাজার হাজার ওয়াটের আলোই ঝলসে যাচ্ছে চোখ। মুছে যাচ্ছে রাতের অন্ধকার। আর সেটাই সভ্যতার কাল হয়ে দাঁড়িয়েছে। অত্যাধুনিক আলোর ব্যাবহার জন্ম দিচ্ছে 'আলোক দূষণ' বা 'লাইট পলিউশন' এর।

আলোক দূষণের প্রভাব:

আমাদের দেশে আলোক দূষণ নিয়ে গবেষণা তো দুরের কথা, কন ভাবনা চিন্তাই শুরু হয় নি। সম্পূর্ণ অন্ধকারে পরে রয়েছে সরকার ও প্রশাসন। ফলে সবার অজান্তেই আলোক দূষণের শিকার হচ্ছে আম নাগরিকরা। সব থেকে বেশি ক্ষতিগ্রস্ত শহর অঞ্চলের মানুষ।

মানুষের ওপর প্রভাব:

একাধিক রিপোর্ট বলছে, অতিরিক্ত আলো মানুষের শরীরের ওপর বিরূপ প্রভাব ফেলছে। আলোর প্রভাবে বিভিন্ন রোগ-ব্যাধির শিকার হচ্ছে মানুষ। যেমন-

➢ আলোর প্রভাবে মাথা ব্যথা, চোখ জ্বালা করা, চর্ম রোগ, শারীরিক ক্লান্তি ও মানুষিক অবসাদ তৈরি হচ্ছে।

➢ আলোর প্রভাবে উবে যাচ্ছে মানুষের রাতের ঘুম। বাড়ছে মানুষিক উদ্বেগ। তৈরি হচ্ছে যৌন অক্ষমতা। কমে যাচ্ছে দৃষ্টি ক্ষমতাও।

➢ একসময় রাতের অন্ধকারে খালি চোখে মহাকাশে নক্ষত্রদের বিচরণ, ছায়াপথ সবকিছুই মায়াবী হয়ে চোখের সামনে ভেসে উঠত। কিন্তু আলোর দাপটে শহরের জীবন থেকে হারিয়ে যেতে বসেছে রাত।

➢ ২০০৭ সালে বিশ্ব স্বাস্থ্য সংস্থার অধীন 'ইন্টারন্যাশনাল এজেন্সি ফর রিসার্চ অন ক্যান্সার' মারণ রোগটির জন্য যে সব বিষয় কে কারণ হিসাবে চিহ্নিত করেছেন তার মধ্যে অন্যতম রাতের ডিউটি। সমীক্ষাই দেখা গিয়েছে, রাতে যাদের কর্মস্থানে কাটাতে হয় তাদের মধ্যে স্তন ও প্রস্টেট ক্যান্সারের আক্রান্তের সংখ্যা অনেক বেশি।

➢ ২০০৯ সালে হার্ভার্ড মেডিক্যাল স্কুলের গবেষক প্রোফেসার স্টিভেন লকলে 'ব্লাইন্ডেড বাই লাইট' নামক গবেষণা পত্রে তিনি বলেন অতিরিক্তও আলো মানুষের রাতের ঘুম কেড়ে নেয়। দীর্ঘ দিন ধরে এই অবস্থা চলতে থাকলে হরমোন ক্ষরণের উপর প্রভাব পরে।

বাস্তুতন্ত্রের ওপর আঘাত:

রাতের আলো যে শুধু মানুষের স্বাস্থ্য হানি ঘটাচ্ছে তা নয়, প্রকৃতির ভারসাম্যও সমূলে বিনষ্ট করছে। যার ফলে বাস্তুতন্ত্রের ওপর বিরূপ প্রভাব পরছে।

উদ্ভিদের ক্ষতি:

➤ জীবজগতের অনেক উদ্ভিদ আছে যাদের ফুল রাতে ফোটে। রাতে অন্ধকারে কিট পতঙ্গরা খাবারের টানেই এক ফুল থেকে অন্য ফুলে ঘুরে বেড়ায়। এর মাধ্যমে তারা অজান্তেই পরাগ মিলন ঘটিয়ে দেয়। তা থেকেই ওই সব উদ্ভিদের ফল ও বীজের জন্ম হয়। কিন্তু সেই প্রক্রিয়ায় বাঁধার প্রাচীর গড়ে তুলেছে রাতের কৃত্রিম আলো।

➤ কৃত্রিম আলোর তরঙ্গ দৈর্ঘ্য এমন জায়গায় পৌঁছেছে যে কীটপতঙ্গরা রাতে ঘর ছেড়ে বেরতে ভয় পাচ্ছে। ফলে তারা ফুলে গিয়ে বসতে পারছে না। তার জেরে জুই, টগর, হাসনুহানা, কচু এবং শিষ্প গোত্রীয় উদ্ভিদের বংশবিস্তার থমকে যাচ্ছে।

➤ অ্যাফিড জাতীয় পতঙ্গরা রাতেই ডুমুর, বট ও অশ্বত্থের ফুলের ভিতর তারা ডিম পারতে যায়। এর মধ্যে অন্য কোন কীটপতঙ্গ ঢুকে পরাগ মিলন ঘটাতে পারে না। তাই এই জাতীয় গাছে ফল ও বীজ উৎপাদনে এই সব নিশাচর কীটপতঙ্গ গুরুত্ব পূর্ণ ভূমিকা নেই। কিন্তু আলোর দাপটে পরাগ মিলন থমকে যাচ্ছে।

➤ আলোর তরঙ্গ দৈর্ঘ্যের প্রভাবে উদ্ভিদের পত্র-রন্ধ্রও সারা রাত খোলা থাকছে। ফলে উদ্ভিদের রস বাষ্পের আকারে বেড়িয়ে যাচ্ছে। তাতে জলের অভাব ঘটছে উদ্ভিদ দেহে। আর সেই কারণে কলকাতা শহরের গাছের পাতা বিবর্ণ হয়ে যাচ্ছে।

➤ উদ্ভিদের শারীরবৃত্তিও কার্যকলাপে আলোক পর্যায়বৃত্তি একটি গুরুত্ব পূর্ণ ভূমিকা পালন করে। যেখানে একটি উদ্ভিদের লাইট পিরিয়ড এবং ডার্ক পিরিয়ড দুটির মধ্যে একটি নির্দিষ্ট অনুপাত থাকে। যা উদ্ভিদের ফুল ফোটা নিয়ন্ত্রণ করে, কুড়ি উৎপাদনে সাহায্য করে। কিন্তু রাতভর আলো জ্বলে থাকায় সেই ভারসাম্যে ব্যাঘাত ঘটছে।

প্রাণীদের ক্ষতি:

➤ এমন অনেক কীটপতঙ্গ রয়েছে যারা রাতের বেলায় খাদ্য সংগ্রহ করে। কিন্তু কৃত্রিম আলো রাতের অন্ধকার কেড়ে নেওয়ায় তার এখন জীবন সঙ্কটে।

➤ জীবজন্তুর জীবনেও গভীর বিপদ ডেকে আনছে রাতের আলো। আলোর দাপটে প্যাঁচা, বাদুড়, চামচিকের মত নিশাচর প্রাণীরা কলকাতা থেকে কার্যত উধাও হতে বসেছে।

➤ এক সময় ময়দান অঞ্চল ও বাইপাস ধরে জাওয়ার সময় শিয়াল ও ভামের মতন নিশাচর প্রাণীদের দেখা মিলত। কিন্তু এখন তাদের দেখা পাওয়া রীতিমত সৌভাগ্যের ব্যাপার।

➤ মার্কিন পক্ষী বিশেষজ্ঞরা দীর্ঘদিন ধরে গবেষণা চালিয়ে দেখেছেন উত্তর অ্যামেরিকায় প্রায় ২০০ টি পরিযায়ী পাখি তাদের গতিপথ বদলে ফেলেছে। উরে যাওয়ার সময় শহরের বহুতল ও টেলিফোন টাওয়ারের আলো দেখে তারা হতভম্ব হয়ে পরেছে। মারাও পরেছে বেঘোরে।

➤ রাজ্যের হাওড়ার সাতগাছি ঝিলে পরিযায়ী পাখি কমার পিছনে ল্যাম্পপোস্টের আলো ও মোবাইল টাওয়ারের দূষণকে দায়ী করেছেন পরিবেশ প্রেমীরা।

➤ রাস্তার ভেপার ল্যাম্প থেকে নির্গত হয় ক্ষুদ্র তরঙ্গ দৈর্ঘ্যের অতিবেগুনী রশ্মি (২০০-৩৫০ nm) যার প্রভাবে ছোট ছোট নিশাচর পোকা, পাখি, এবং প্রাণীদের দেহ কোষের জিনগত পরিবর্তন ঘটে। ফলে তাদের গায়ের রং চোখের রং বদলে যেতে পারে। প্রজনন ক্ষমতাও হ্রাস পায়।

➤ তীব্র আলো দীর্ঘক্ষণ জ্বললে ইঁদুর, ছুঁচোর প্রজনন ক্ষমতা বেড়ে যায়। কলকাতায় ইঁদুরের উৎপাত বেড়ে যাওয়ার পিছনে আলোর প্রভাব কাজ করছে। অনেক পাখির ক্ষেত্রে এর উলটো ঘটনা ঘটে। এর ফলে শহরে পাখীর সংখ্যা কমে যাচ্ছে।

➤ জলাশয়ে অনেক ছোট ছোট প্রাণী যেমন- জাফানিয়া, সাইক্লোপস রাত হলেই খাবারের সন্ধানে জলাশয়ের উপরে উঠে আসে। জলাশয়ের ধারে আলো থাকলে তারা আর খাবার সংগ্রহ করতে বের হয়

না। ফলে তাদের ফলে তাদের খেয়ে যারা বেঁচে থাকে তারা সমস্যায় পড়েছে সব মিলিয়ে পুর বাস্তুতন্ত্রের উপর প্রভাব পড়ছে।

বিপদ কলকাতারও:

আলোক দূষণে দেশের বাকি শহরগুলিকে রীতিমত টেক্কা দিচ্ছে শহর কলকাতা। কলকাতাকে লন্ডনের মতন করে তুলতে শহর সাজানোর কাজ শুরু করেছে কলকাতা পৌরসভা। তারই অঙ্গ হিসাবে শহরকে আলো ঝলমলে করতে চেষ্টার কোন ত্রুটি করছেন না পৌরসভার কর্তারা। রাস্তার ধারে বসানো হয়েছে ত্রিফলা আলো, এলইডি আলো। রাস্তা, জলাশয়, পার্ক কোন যায়গা বাদ থাকছে না। এর ক্ষতির সম্মুখীন হচ্ছে সমগ্র জীবকুল।

কিন্তু প্রশ্ন উঠছে, শহরে কি সত্যিই এত আলোর প্রয়োজন আছে? রাজনৈতিক নেতাদের নির্দেশ পালন করতে গিয়ে যেখানে প্রয়োজন নেয়, সেখানেও আলো বসাতে হচ্ছে। যেখানে আগে থাকতেই উচ্চ ক্ষমতার ভেপার ল্যাম্প রয়েছে তার তলাতেও ত্রিফলা বসানো হয়েছে। পার্ক ও জলাশয়ের পাশেও অসংখ্য আলো লাগানো হয়েছে।

ত্রিফলা আলো বসানো নিয়ে কাগের রিপোর্টে বলা হয়েছে, যে ভাবে বিশেষজ্ঞদের সঙ্গে পরামর্শ না করে যত্রতত্র আলো লাগানো হয়েছে সেটা অবৈজ্ঞানিক। আর কলকাতা বাসীরা সত্যি সত্যিই আলোক দূষণের শিকার হচ্ছে কিনা সেব্যাপারে কোন মাথা ব্যথা নেই পৌরসভার।

চিত্র ৩.১.: আলোক দূষণ।

কী করবেন:

➢ কাজ শেষ হলেই বাড়ি ও অফিসের আলো বন্ধ করে দিন।
➢ এমন আলো ব্যাবহার করুন যার থেকে ক্ষতিকারক তরঙ্গ বের হয় না।
➢ কতটা আলো দরকার আছে সেটা দেখে নেওয়ার পরই আলো লাগান।
➢ এলইডি আলোর পরিবর্তে সিএফএল আলো ব্যাবহার করতে হবে।
➢ অপ্রয়োজনীয় আলো বর্জন করুন।
➢ এলইডি আলোর অতিবেগুনি রশ্মিকে প্রতিহত করে এমন প্লাস্টিক বা কাঁচের ঢাকনা ব্যাবহার করুন।
➢ এলইডি আলোর হাত থেকে বাঁচতে রাতে নাইট গ্লাস ব্যাবহার করতে পারেন।

গৃহীত ব্যবস্থা:

➢ ২০০৯ এ আমেরিকান মেডিকেল অ্যাসোসিয়েশান একটি সুনির্দিষ্ট নিতি প্রণয়ন করে। তাতে আলোর হাত থেকে রেহাই পাওয়ার জন্য বিভিন্ন ব্যবস্থা গ্রহণের উপর জোর দেওয়া হয়।
➢ ইউরোপের বিভিন্ন দেশের বড় বড় শহর অঞ্চলে আলোর ব্যাবহার কমান হচ্ছে।

➢ পৃথিবীর বড় বড় শহরে একটি নির্দিষ্ট দিনে রাতের বেলায় আলো বন্ধ রাখা হয় একে আর্থ আওয়ার বলে। যেমন প্রতি বছর মার্চ মাসের শেষের দিকে সাধারণত সন্ধ্যা ৮.৩০টা থেকে ৯.৩০টা পর্যন্ত পৃথিবীর বিভিন্ন দেশের বড় বড় শহর গুলি আলো বন্ধ রাখে।

➢ বর্তমানে লন্ডন শহরে রাতে রাজপথের আলো নিভিয়ে দেওয়া হচ্ছে।

➢ সমীক্ষার ফলের উপর নির্ভর করে পরিকল্পনা করে শহরে আলো লাগাতে হবে। যেমন ভারতের পরিকল্পিত শহর চণ্ডীগড়ে বিশেষজ্ঞদের পরামর্শ নিয়ে তবেই আলো লাগানো হচ্ছে।

মন্তব্য:

আলো ছাড়া সভ্যতা অচল। কিন্তু অতিরিক্ত আলোও ক্ষতিকারক। আজের দুনিয়ায় আলোক দূষণে ক্ষতিগ্রস্ত সমগ্র জীবজগৎ। এই নিয়ে ভাবনা তো দুরের কথা, চলছে আলোর তীব্র প্রতিযোগিতা। তাই অপ্রয়োজনীয় আলো পরিহার করায় ভাল। তাতে বিদ্যুতের খরচও বাঁচবে আবার আলোর ক্ষতিকারক প্রভাবও এড়ানো যাবে।

আলোর যেমন প্রয়োজন রয়েছে তেমন অন্ধকারেরও দরকার আছে। স্নায়ু শিথিল্য এবং ঘুমের জন্য অন্ধকার অত্যন্ত জরুরী। অন্যথায় জৈবিক ঘড়ি (Biological clock) বিঘ্নিত হয়। এর থেকে অবসাদ আসে এবং অবসাদ থেকে নানা মানসিক ব্যাধির সূত্রপাত হয়। বড় বড় শহরাঞ্চলে আলোর ব্যাবহার কমানোর পরিবর্তে ক্রমাগত আলোর ব্যাবহার বৃদ্ধি পাচ্ছে।

"আলোর অন্ধকার কতটা ঘন, এতেই তা পরিষ্কার।"

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Mid-Day Meal Scheme: A Study on the Development of Indian Educational System

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Indian Government is trying to upgrade the quality of education and literacy level of our country and they have taken many necessary steps in recent times to improve the overall education system in both city and rural areas. Many schemes like Non-Formal Education Scheme (NFE), Mahila Samakhya Programme, District Primary Education Programme (DPEP), Sarva Shiksha Abhiyan and operation Black Board have been started to achieve this goal. In the same way, "National Programme of Nutritional Support to Primary Education" is such scheme which is properly known as "Mid-Day Meal" scheme.

On **August 15, 1995**, National Programme of Nutritional Support to Primary Education (NP-NSPE) was launched as a Centrally Sponsored Scheme with a view to enhancing enrolment, retention, attendance and simultaneously improving nutritional levels among children and in the year 2001, the Supreme Court of India ordered all the state governments and union territories to implement Mid-Day Meal Scheme and provide cooked meals to school children from Government and Government-aided schools. The scheme was then extended to upper primary Schools also in 2006-2007.

Objectives:

The objectives of Mid-Day Meal as issued by the government:

- Improving the nutritional status of children in class I - VIII in Government (primarily class I - V) at Local Body and Government aided schools.
- Encouraging children, belonging to disadvantaged sections, to attend school more regularly and help them concentrate on classroom activities.
- Providing nutritional support to children of primary stage in drought affected areas during summer vacation.

Implementation of the MDMS by State:

The mid day meal scheme started all over India in 2001, and has proved very successful so far. The scheme provides school children with a lunch free of cost on all working day. In 2001 the literacy gap between male and female students was 25%. 120 million children across India are a part of the scheme. The enrolment rate has increased by 15.3%. The attendance rose by 10% over the past decades.

Note: This map depicts the states and pilot regions of India covered in DISE 2002-2004. States are shaded according to the timing of midday meal implementation.
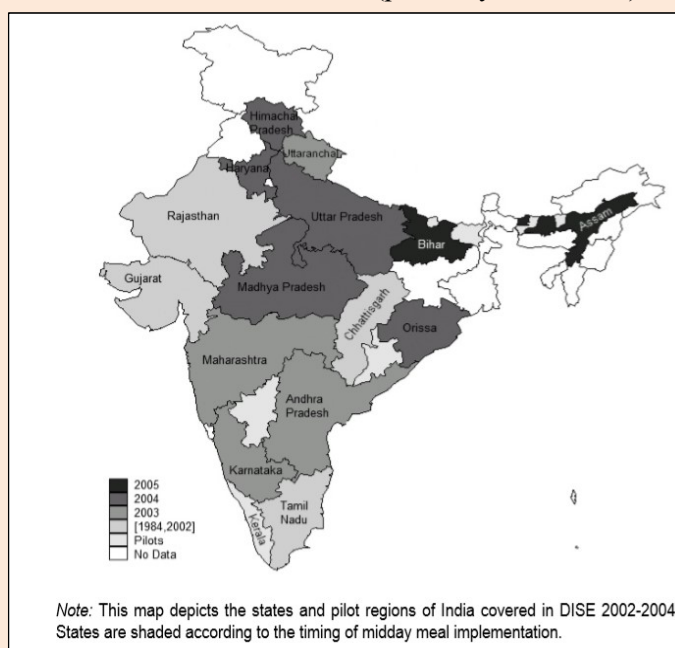
Fig. 4.1.: Mid-Day Meal Implementation by States.

Rajasthan was the first state to implement the order of the Supreme Court. **Kerala**'s MDMS was recognized as one of the most successful and transparent systems in the country. At present 97.71%of the students enrolled in govt. And aided school are covered by the scheme.

In line with this positive track record, **Karnataka, Kerala and Tamil Nadu, Gujarat** has made comparatively good progress for the MDMS. As a part of this infrastructure other supporting staffs like the cooks, the assistants, helpers as well as organizers have had the conducive facilities.
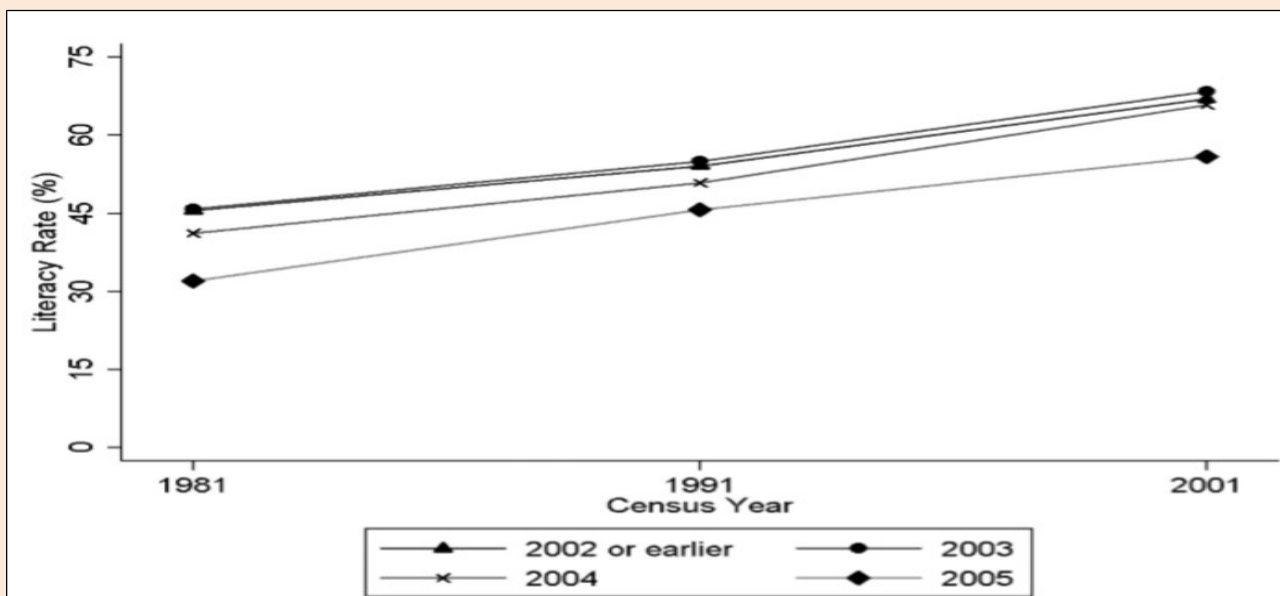
Fig. 4.2.: Progress Line for the MDMS.

2002: Gujarat, Tamil Nadu and Rajasthan in 2002 or earlier.
2003: Andhra Pradesh, Karnataka, and Maharashtra.
2004: Haryana, Himachal Pradesh, Madhya Pradesh, Orissa and Uttar Pradesh.
2005: Assam and Bihar.

The 2011 ASER Reports provides data on the trend of increasing enrolment in rural students of **Tamil Nadu**.
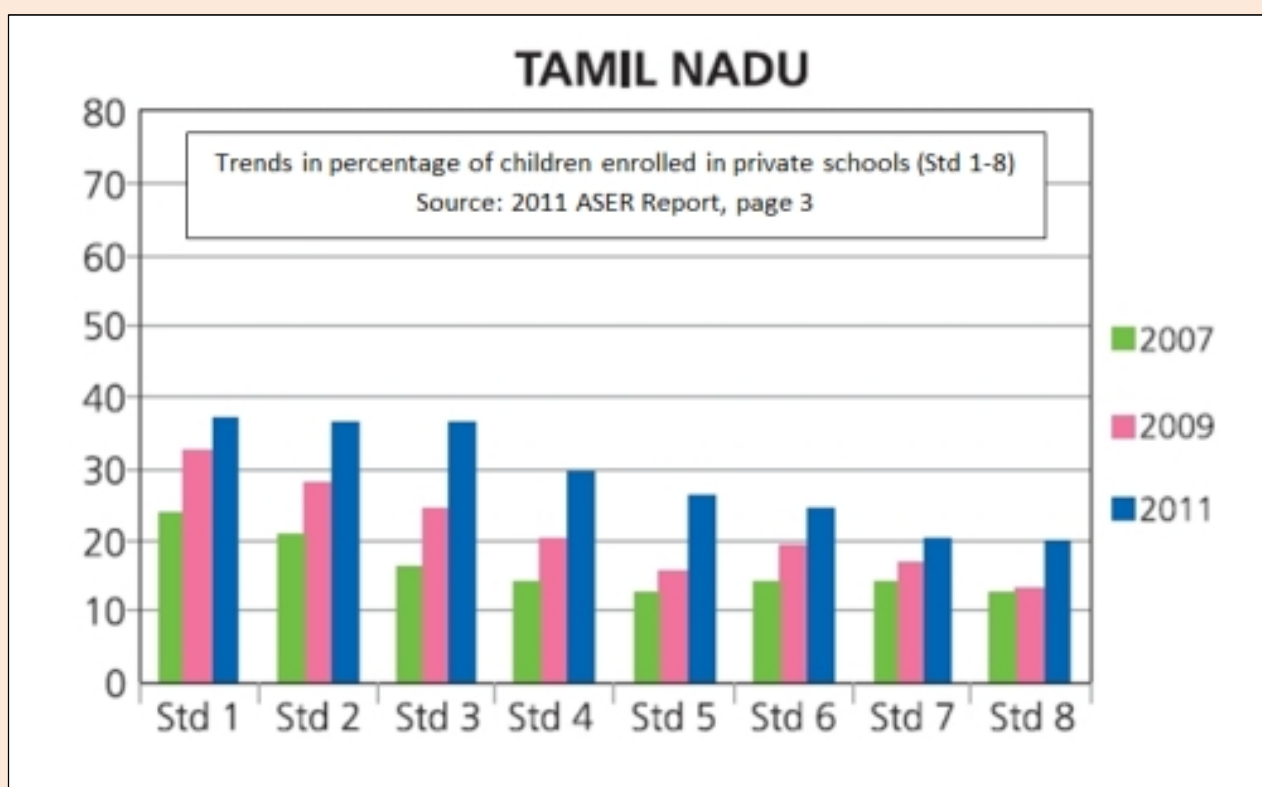
Fig. 4.3.: Trends in percentage of children enrolled in private schools (Std. 1-8).

The incremental benefit of mid-day meal scheme in terms of daily attendance is more in case of rural students than urban students of the upper primary schools in **Burdwan** district **in West Bengal**. The students of tribal communities or untouchable communities have gotten more benefits of mid-day meal schemes of **Kumargram** Block at **Alipurduar** district of **West Bengal**.

Table 4.1.: Gross Enrolment Ratio in India

| Year	Primary Education (class I to Vth)		
	Boys	Girls	Total
1951-51	60.6	24.8	42.6
1960-61	82.6	41.4	62.4
1970-71	95.5	60.5	78.6
1980-81	95.5	64.1	80.5
1990-91	114.0	85.5	100.1
1991-92	112.8	86.9	100.2
1992-93	95.0	73.5	84.6
1993-94	90.0	73.1	81.9
1994-95	96.6	78.2	87.7
1995-96	97.1	79.4	88.6
1996-97	98.7	81.9	90.6
1997-98	97.7	81.2	89.7
1998-99	100.9	82.9	92.1
1999-2000	104.1	85.2	94.9
2000-2001	104.9	85.9	95.7

Source: *Educational Statistics 2001*

Overall Findings of Mid-Day Meal Schemes:

1. The quality of food need to be improved.
2. 84% of the household reported that children enjoy varied menu of this schemes.
3. This scheme undoubtedly resulted on attendance and retention of children in schools.
4. This scheme helps to reduce classroom hunger in sample schools.
5. It also helps to increase social equity among children of schools.
6. Delay in release of funds is a big problem in Midday Meal programmers.
7. Proper infrastructure should be mandatory and need to be improved.

Conclusion:

In conclusion we can say that the above different educational programmes have a great positive impact on the education system of India specially in some selective cases (like- enhancing enrolment, attendance, lowering retention and drop out of students) which are essential for achieving the higher level of academic performance of students particularly belongs to BPL level students in the rural areas in India. It is true that recently Government has taken a lot of measures to improve the education system of India through the above schemes. In order to get more satisfactory outcomes, these schemes should be linked with the ongoing awareness programmes of Government of India.

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Development of Slums in India

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Rapid urbanization has triggered the phenomenon of slum growth. Recent years have seen a dramatic growth in the number of slums as urban population has increased. Slums have developed all over the world and India is no exception. The origin of the word 'slum' is thought to be Irish phrase 'slome' meaning it is a bleak or destitute place.

In India, there are regional differences in the nomenclature of slums. It is called 'jhugy jhopari' where as in Mumbai it is called 'jhopadpatti' or 'chawls'. In Kanpur 'ahats', in Kolkata 'bustty', in Chennai 'cherish' and in Bangaluru they are known as 'cheris'.

R. E. Dickinson has defined slum "As extreme condition of blight in which the housing is unfit as to constitute a menace to the health and the morale to the health and the morale of the community".

Cooper believes that "God made the country, man made the town, whereas anti social people have made this slums".

Factors Responsible for the Development of Slums:

A number of demographic, social, political, economic factors responsible for the continuity and development of slums. Some of the common causes are given below:

- **Rural urban migration:**

  Rural-urban migration is the foremost cause in slum formation and expansion. Science 1950, world population has increased and the percent of agricultural land has dwindled perceptibility. The proportion of people working in agriculture is mainly of subsistence type.

  With the increase of the functions of the city, cities are offering more jobs, better schools, and better job opportunities. The trend of migration has set in India too after independence; people have started migrating from rural and small cities to major urban areas in search of employment, better infrastructure, safety etc.

- **Urbanization:**

  With the rise of urbanization, people living in urban Areas have increased by 10% in the world. The U. N. Habitat reports that 43% of urban population in developing countries and 78% of those in least developed countries are slum dwellers. Another type of urbanization but slow economic growth leading to slum growth. Slums also grow when urbanisation influences land use by transforming agricultural land into urban areas and increased land values.

- **Poor household planning:**

  Another reason of emergence of slum can be attributed to lack of low coast housing and poor planning. Slums have developed where there is sufficient gap in growing demand for housing and insufficient supply of houses. Insufficient financial resources and lack of co-ordination in government bureaucracy are also one of the causes of slum growth.

In India recent years have seen rapid growth in the number of substandard houses and slums containing insanitary mud huts of flimsy construction , poorly ventilated, over congested house due to lack of enforcing bye-laws regarding building and sanitation.

- *Colonism and segregation:*

  Urbanization brought by colonism. The Europeans gave rise to colonism. They created urban centres especially in Nairobi and temporary migrating people were just used for labour supply. There was no housing policy for their settlements. Same was the case of Dharavi slum. Europeans segregated themselves from such colonies which supplied labour force. There was no infrastructure planning for sanitation, public amenities and housing. Sometime large slums have developed on the fringe of segregated areas.

- *Poor infrastructure and social exclusion:*

  Social exclusion and poor infrastructure have triggered some of the slum growth. People settle within walk able distance as there is lack of transportation. Squatting is the result among poor. People start living in semi-permanent houses huts for living unhygienic condition prevails. Economic stagnation also produced uncertainties among poor. Poorly performing economy increases poverty has people prefer living in slums.

- *Unemployment and Poverty:*

  Most of the slums are occupied by people of the lowest income group who are employed on temporary basis. Poverty coupled with unemployment aggravates the problem for three-quarter times of the year; the labour class remains without job and rest of the people are engaged in poorly paid informal services of unorganized nature. These urban poor have no access to shelter, basic urban services and social amenities.

- *Social-Tension:*

  The most important characteristics of the slum is isolation and alienation which make them not merely separate from one another but also different in views. With increasing slum population crime rate are increasing rapidly in the cities- murders, kidnapping, robbery, house breaking, dacoits, cheating and theft are common crimes found in slums.

- *Natural Disaster:*

  Major natural disasters lead to migrations of disaster affected families. Creation of temporary tents in safe areas often led to growth of slum like situations. People are not ready to leave their homes in some conditions as in case of floods, cyclones, etc.

Table 5.1.: Selected State wise projected slum population, 2011

States	Population in lakh
Maharashtra	181.5
Uttar Pradesh	108.8
Tamil Nadu	86.4
West Bengal	85.5
Andhra Pradesh	81.8
Madhya Pradesh	63.9
Gujarat	46.6
Rajasthan	38.2
Karnataka	36.3
Haryana	32.8
Delhi	31.6
Punjab	27.9
Chattisgarh	21.7
Odissa	17.3
Bihar	16.8
Total in India	930.5

Source: Report of the committee on slum statistics, 2011.

Conclusion:

In the 1970's and 1980's the Indian government had a policy of 'no slum cities'. This needed resettlement and rehabilitation of slum dwellers which did not help in making cities slum free. Later government started implementing slum upgradation programmes in which infrastructure redevelopment was encouraged.

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Potholes

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Potholes are cylindrical holes drilling in to the bed of a river that very in depth and diameter from a few centimetres to several meters .They are found in the upper course of river where it has enough potential energy to erode vertically and it's flow is turbulent .in the upper course of a river, its load is large and mainly transported by traction along the river bed. When flowing water encounters bed load, it is forced over it and down cut behind the bed load in swirling edding current .These current erode the rivers bed and create small depression in it.

As these depression deepen, pebbles end become trapped in them. As a result of the Eddie currents ,the pebbles drill into the depression making them more circular ,wider and deeper pebbles will only be able to erode a river's bed through if the rock the pebbles made of it strong then the rock the river bed is med off.

Formation of Potholes:

Potholes form mainly in the upper course of the river, in high altitude where the river channel cuts directly into the bed rock. Potholes are direct consequences of abrasion .The sequence of the development is quite easy to understand .As we know the river channel in the upper course is characterized by roughness, associated with large bed load .As water flow over still standing on river bed it is forced over the obstacle and to Eddie behind the rock downstream .This turbulence force water down on to the bed rock .Over time small depression within the bed rock develop .We can see similar process of turbulent wind collides with tall building in cities .This is illustrated below:

Wind turbulence over a building similar to river eddie development

The creation of eddie currents as a result of bedload in a river.
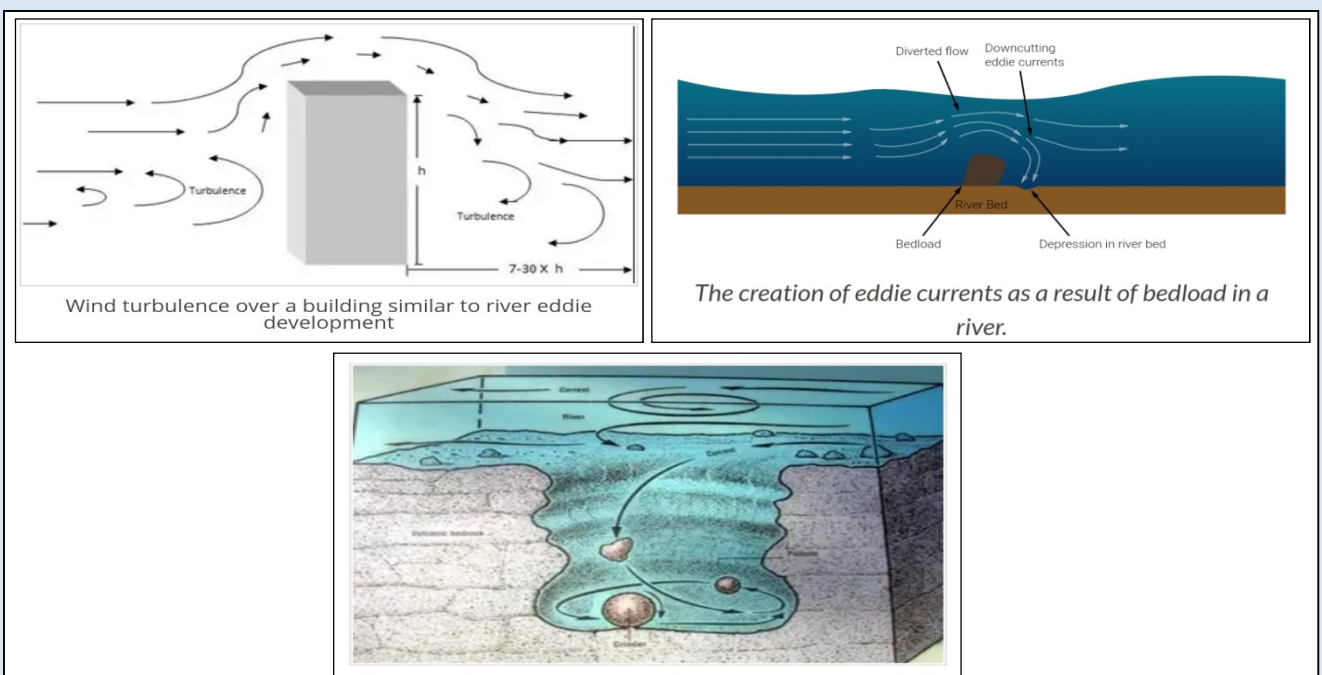
Fig. 6.1.: Formation of Potholes.

Over time ,the turbulent flow deepens in the bedrock to the depression in the bedrock to form a small circular basin ,just a few centimetres in diameter .This development creates a positive feedback ,which further increase the turbulence of the water and the development of Eddie's current .It is this turbulence which creates localized variation in the speed of Ericsson ,as we can see in the diagram below ,the hollow deepens further to form an established pothole .It is the possible for smaller bedload trapped in pothole .This debris is then used to abrade the sides of the pothole .over time the potholes will deepen and become more circular ,then diameter of the potholes increase in size and often multiple pothole form and Marge as shown in the Blyde River the Bourke Luck potholes are particularly spectacular as the sand stone bedrock rapidly erodes forming a gorge within the river valley.

(a)

(b)

(c)

(d)

(e)

(f)

Photo 6.1.: (a – f) Different Shape and Size of Potholes.

Characteristics of Pothole:

1. Pothole is mainly form upper course of the river and bedrock channel bed.
2. Potholes are mainly form of turbulence flow of water.
3. Pothole size few centimetres to few metres in diameter.
4. Potholes, also known as caldron, cisterns, ephemeral pools, tanks, tinjas, waterpockets and weathering pits.

Example of Pothole:

Few well known potholes are found in Canyonlands National Park, Capitol National Park, and Moab. The prairie pothole region is an area of the northern Great Plains that contains thousands of shallow wetlands known as pothole.

Shape and Size of Pothole:

A pothole can be form few inches wide to several feet or more. Some that occur in desert plain regions can be over 300 feet wide. A pothole can be form one or two inches to many feet in depth, some large pothole are over 50 feet deep. Pothole has different shapes like oval, round, elongated, funnel etc.

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Crime Begins at Home

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"Charity begins at home" - ইহা আমরা ছোটবেলা থেকে শুনে আসছি কিন্তু "Crime as a big social problem, begins at home"- এটা কখনো ভাবিনি; চলো এটা নিয়ে কিছু বিশ্লেষণ করা যাক।

আগে জানতে হবে Crime কি? অনেকেই অনেক ভাবে সংজ্ঞায়িত করেছেন, আসলে এককথায় 'সমাজের যা কিছু ক্ষতিকর তাই Crime অর্থাৎ অপরাধ বা অপকর্ম। এবার এই অপরাধ বা অপকর্মের সৃষ্টি কোথায় হচ্ছে অর্থাৎ এগুলোর ভিত্তি কি সে সম্পর্কে জানা যাক –

১. Self Centeredness:

'আমি শ্রেষ্ঠ' -এটা ঠিক, কিন্তু আমিই শ্রেষ্ঠ এটা কি ঠিক?

নিজেকে ভালোবাসা ভালো, কিন্তু নিজের আত্ম-অহংকার ভালো না। একটা শিশু যখন বেড়ে ওঠে তখন সে তার বাড়ি ও সমাজ থেকে সবটা শেখে। একটা শিশু যখন স্কুলে গিয়ে Tiffin share করে অথবা তার গরীব বন্ধুকে তার দামী জিনিস গিফট করে, তখন বাড়ি থেকে বারন করা হয় সে যেন এরকম না করে তাহলে তার খাওয়া ঠিক হবে না বা দামী জিনিস চলে যাবে।

শুধু শিশু নয়, তরুন যুবক, যে কোনো বয়সের ছেলে মেয়েরা যদি অন্যের সাহায্যের হাত বাড়িয়ে দেয়, তাহলে তার প্রথম বাধা আসে বাড়ি থেকে,....বাবা মায়ের থেকে..... তার ফলে স্বার্থপরতা ও আত্মকেন্দ্রিকতার সৃষ্টি হয়।

"বাবা তুই সব টাকা ঐ ফালতু ছেলে/মেয়ের জন্য খরচা করবি?" বা 'তুই তো তোর বন্ধুর Mental Support দিচ্ছিস তাতে তোর সময় নষ্ট হচ্ছে না?'

এরকম বহু বহু কথা উঠে আসবে। বাবা মায়েরা Support করার বদলে তাদের Discourage করছে তাতে তাদের মন শুধু মাত্র নিজের নিয়ে ভাবতে থাকছে, কিন্তু আমরা যদি আমাদের চারপাশের পরিবেশের কথা না ভাবি তাহলে ভূগোল কেন, কোন বিষয় পড়ার যোগ্য নই ...ঠিক তো?

আজকে খুন ধর্ষন বা যেকোন সামাজিক হিংসা ঘটছে তাতে দেখা যাচ্ছে যে অপরাধী বা অপরাধ করার প্রবনতা যার আছে তাকে সংশোধন মূলক জ্ঞান দেবার মতো কেউ নেই। অপরাধ করার পর তাকে সংশোধনাগারে নিয়ে গিয়ে treatment করা হচ্ছে তাতে ফল কী হচ্ছে?

একজন অপরাধ করছে জেনেও আমরা প্রতিবাদ করছি না, voice raise করছি না শুধুমাত্র স্বার্থের কথা ভেবে, যদি আমরা সমস্যায় পড়ে যাই। এই ভাবে এড়িয়ে যেতে যেতে যখন নিজের blood relation crime করছে তখন depress এ ভুগছি না হয় তাকে ignore করছি, ঘর থেকে তাড়িয়ে দিচ্ছি, বা ঘুষ দিয়ে মিথ্যা প্রমান করে তাকে support করছি; এককথায় অন্যায়ের আপোস করছি.... আর এই ভাবেই অপরাধ বাড়ছে।

স্বার্থপরতা হল সমাজের এক জ্বলন্ত সমস্যা,যার সূত্রপাত বাড়িতে হয়, আর জ্বালিয়ে দেয় দেশ তথা সমগ্র পৃথিবী কে। *"so, be self relianced not self centered".*

২. *Dishonest:*

অসৎ ব্যক্তি এবং ছদ্ম সৎ ব্যক্তি সমাজে ভীষন ভয়ংকর। ছোটো বেলা থেকে একটা শিশুকে সৎ হতে না শেখালে সে কি হিতকর হতে পারে? বাড়িতে যেকোন সদস্য, বাবা,মা,কাকা, কাকিমা বা অন্য কেউ যদি অসৎ উপায়ে টাকা অর্জন করে, যদি কথায় কথায় মিথ্যাচার করে থাকে তাহলে তার বাড়ির সন্তান কখনোই সৎ হতে পারে না। যেমন একজন উকিলের উপর নির্ভর করে বিচারের একটা অসহায় নারী, একটা গোটা দেশ তথা একটা গোটা সমাজ কিন্তু উকিল কে অর্থ উপার্জনের জন্য মিথ্যা বলতেই হবে,তাহলে অপরাধী Criminal নাকি ঐ উকিল criminal? ইহা বিচার্য!

৩. *Characterless:*

একটি বাড়ির অভিভাবক যদি চরিত্রহীন হয়, বেশ্যাবৃত্তি করে যদি সংসার চালায়, তাহলে সন্তানরাও চরিত্রহীন হয়ে পড়বে। তার থেকে খুন, ডিভোর্স, আত্মহত্যা, মানসিক রোগ বাড়বে।তাই চরিত্রহীনতা এক বড়ো অপরাধ।

এক Teacher যদি এক Student কে molest করে, আর Student টিও যদি কিছু নাম্বার বা অন্য স্বার্থের আশায় সেই কাজে উৎসাহিত হয় তাহলে সমাজের সবচেয়ে বিশ্বাসযোগ্য স্থান তথা 'বিদ্যার আলয়' তাহা Cheater এ পরিনত হবে।

আজকের দিনে ডিভোর্স বেড়ে যাওয়ার পিছনে যদি অনুসন্ধান করা হয় তাহলে দেখা যায় বেশীরভাগ পরশ্রীকাতরতা বা unstable mind বা Unstable desire কারনে হচ্ছে, যেখানে একটি পরিবারের Background ভীষন বড় ভূমিকা পালন করছে।

৪. *Violence against women:*

ছোট বড়ো যাই হোক,বেশীরভাগ Family তে এই একবিংশ শতকেও মেয়েদের অত্যাচার করা হচ্ছে। হয়তো শারীরিক অত্যাচার কমছে কিন্তু মানসিক অত্যাচার কি আদৌ কমছে?

Physically এবং Economically strength না হওয়ায় খুন ধর্ষণ এই সব অপরাধ এর শীর্ষে মেয়েরাই রয়েছে। বর্তমানে সমাজের Treatment এর জন্য, মহিলা সমিতি, Feminism Education, Women empowerment, এর ব্যাবস্থা করা হয়েছে......কিন্তু একটি শিক্ষিত পরিবারে মেয়েদের অধিকার ছেলেদের সমান আজও নেই।

পনপ্রথা নিষিদ্ধ অথচ, ভালো ছেলে পেতে গেলেই ১০-২০ লাখের নিচে নয়। একজন শিক্ষিত ছেলে বা একজন শিক্ষিত মেয়ের বাবা এই অপরাধ করছে, আর তারাই সমাজে বুক ফুলিয়ে ঘুরে বেড়াচ্ছে। প্রশ্ন টা হল " আমার কথা আমার বাড়ির লোক শুনছে না,তারাও যেহেতু এই সিস্টেমের দাস তাই তারা এটা করবেই- আমি যদি প্রতিবাদ করি তাহলে তারা কষ্ট পাবে কারন তারা মানুষ করেছেন।

এই ধরনের ছেলে বা মেয়েরা হচ্ছে অমেরুদণ্ডী প্রানী, যাদের কোন যোগ্যতা নেই সমাজের হাল টানার,এরা তো অশিক্ষিতের অধম, এরা তো বড়ো অপরাধী, নয় কি?

বাড়ির বউ চাকুরি করুক অনেক শিক্ষিত পরিবারের ছেলেরা চায় না,তাহলে মেয়েরা বাইরে যাবে কি করে আর তাদের empowerment হবে কি করে,এদিকে উচ্চ শিক্ষিতা মেয়ের পাত্র পাওয়া দায়,বয়স বেশী মেয়েকেই বা বিয়ে করবে কে - এই ভেবে বাবা মা মেয়েকে আর পড়াতে ভয় পায়, সামাজিক চাপের মুখে পড়তে হবে কিনা তাই মেয়েদের উচ্চ শিক্ষা এক বড় সমস্যা। পি এইচ ডি, এম ফিল, মেডিক্যাল বা ইঞ্জিনিয়ারিং ইত্যাদি উচ্চশিক্ষার উপর অনুসন্ধান করলে দেখা যাবে মেয়েদের Economic Background ছেলেদের থেকে ভালো,অর্থাৎ গরিব মেয়েরা (কিছু ব্যাতিক্রম) কি বুদ্ধিমতী নয়, নাকি এরা পড়ার যোগ্য নয়? ব্যাপারটা হলো গরিব মা বাবা কম বয়সে মেয়েদের বিয়ে দিয়ে

দায়িত্ব খালাস করেন, কারন বেশী পড়ালে বেশী যোগ্যতার পাত্রের সাথে বিয়ে দিতে হলে বেশী পন দিতে হবে।

শুধুমাত্র Education, Economy বা Political discrimination ই নয়, মেয়েদের আজও নগন্য করার যে ক্ষমতা তা পুরুষেই হোক বা নারীর বিরুদ্ধে নারীই হোক, যেই কায়েম করুক না কেন, ইহা একটি সামাজিক অপরাধ।

৫. *Anti Social Behaviour:*

একান্নবর্তী পরিবার আর নেই তাই সবার সাথে মিলে মিশে থাকার প্রবনতাও নেই, তার উপর বাবা, মা দুজনেই Whatsapp, Facebook এ ব্যস্ত,তার উপর বন্ধুদের সাথে খেলাও বারন,মেলামেশা বারন, কারন পাছে সে খারাপ হয়ে যায় অথবা Status চলে যায়,তখন বাচ্চাটিও মোবাইল কে বন্ধুভেবে এক virtual জগতে belong করে, তার মন প্রসারিত হয় কি? সে ধীরে ধীরে সংকীর্ণ হয়ে ওঠে, সে শুধু নিজেকে ছাড়া কাউকে জানে না, শেখে না আত্মীয়তা, মিলেমিশে থাকার আনন্দ,খেলাধুলার মধ্য দিয়ে চরিত্র গঠন গুরুত্বও সে উপলদ্ধি করে না, সে ঠিক একটা যন্ত্রের ন্যায় বেড়ে , আর ওঠে, তার কাছ থেকে কী আমরা খুব friendly behaviour পেতে পারি ? যার জন্য আজকের ছেলে মেয়েরা তাদের বাবা-মা,শ্বশুর-শাশুড়ি কে দেখছে না ;আর বাবা-মা তাতে কষ্ট পাচ্ছে।

যখন একজন মানুষ দশ জনের সাথে মিশতে না পারে, friendly behave করতে না পারে, হাসির কথায় হাসে না আবার মৃত্যু দেখে কাঁদে না অর্থাৎ emotionless তখন তার মধ্যে অপরাধ করার প্রবনতা বহুলাংশে বেড়ে যায়।

৬. *Poverty:*

'Poverty, not only determined by economy or money actual poor is he, whose mind is poor'.

গরিব শুধুমাত্র অর্থনীতি কম হওয়ার জন্য হয় না, যারা মনের দিক থেকে অসন্তুষ্ট, তারাই হল গরিব। একজন ধনী ব্যক্তি তার কাছে যথেষ্ট টাকা থাকা সত্ত্বেও সে মনে করে তার কিছুই নেই, আর এই মানসিকতা থেকেই সূত্রপাত হচ্ছে অপরাধবোধের।

৭. *Unemployment:*

বর্তমানে সরকারী চাকুরীর অভাবের দিনেও বেশীরভাগ মা-বাবা রা সন্তানদের বেসরকারি কাজ বা ব্যবসা করার দিকে উৎসাহিত না করে বরং বাধা সৃষ্টি করেন শুধুমাত্র নিজেদের Status বজায় রাখার জন্য। অনেক সময় দেখা যায়,মা-বাবা বাড়ি বাড়ি কাজ করে সংসার চালায় অথচ ছেলেকে বেসরকারি কাজ বা ব্যবসা করতেও পাঠান না, ফলে টাকার দরকার অথচ যুবক ছেলে বাড়িতে বসে থাকছে,বেকারত্বে ভুগছে, ফলে তাদের মধ্যে অপরাধ করার মনোভাব তৈরী হচ্ছে। 'অলস মস্তিষ্ক শয়তানের কারখানা '-কাজের অভাবে তারা অলস হয়ে পড়ছে আর অপরাধমূলক চিন্তাভাবনা তাদের মাথায় বাসা বাঁধছে।

৮. *Suicide:*

শুধুমাত্র ধার্মিক ভাবেই নয় ভারতীয় Penal Code অনুযায়ী ইহা এক অপরাধ।

Suicide এর পিছনে কারন হল মানসিক আশ্রয়ের অভাব,পূর্বে মানুষ ধর্মের আশ্রয় নিয়ে এই সংকটপূর্ণ মুহূর্ত কে অতিক্রম করতে পারত,কিন্তু বর্তমান প্রজন্ম আস্তিক থেকে নাস্তিকবাদী হয়ে উঠেছে। তারা ধর্ম আর বিশ্বাস করছে না, ফলে মানসিক আশ্রয়ের জায়গাও খুজে পাচ্ছে না,আর ক্রমাগত এই অপরাধ বেড়ে চলেছে।

উপসংহার:

বাড়ি থেকে এইভাবে যে সমস্ত সামাজিক রোগ সৃষ্টি হচ্ছে যা ধীরে ধীরে সমাজ, রাজ্য, দেশ তথা সমগ্র জগৎ কে গ্রাস করছে। প্রাচীনকালে, সাতবছর বয়সের পর সমস্ত শিশুকে তার গুরুদেবের গৃহে শিক্ষালাভ

করতে যেতে হত, ফলে তারা ন্যায়পরায়ণ, চরিত্রবান, পরোপকারী, নিঃস্বার্থ হয়ে উঠত ফলে তাদের সংসার জীবন, তাদের সমাজ সবকিছু সুস্থ থাকত।বর্তমানে প্রতিটি বাচ্চাকে বাড়ি থেকেই সেইভাবে শিক্ষা দিতে হবে যাতে তাদের মনে অপরাধের কোন ভিত্তি গড়ে উঠতে না পারে, তাহলেই আমাদের পরিবার, সমাজ, রাষ্ট্র স্বাস্থ্যবান হয়ে উঠবে।

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Poverty: A Social Problem

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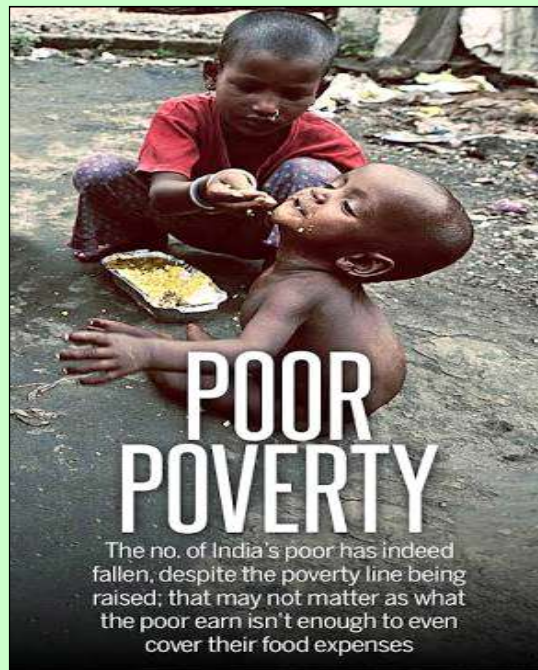
"Racism is not nearly as important as poverty. That's the same around the world. What look like ethnic problems are really economic issues? If you look closely at all these conflicts around the world, they come down to poverty and economics and resources. The more poverty, the worse the war." - Marjane Satrapi

Fig. 8.1.: Poverty: A Social Problem.

"POVERTY" is one of the most important social problems and main social problems in the world. Poverty in the society is the main cause of many other social problems. It leads to poor education, environmental degradation and a whole lot of other social problems. Poverty is the scarcity of the lack of a certain amount of material possessions or money. Poverty is multifaceted concept, which may include social, economic and political elements. Poverty is a situation that gives rise to a filling of a discrepancy between what one has and what one should have.

Berstein Henry (1992) has identified the following dimensions of poverty:

1. Lack of livelihood strategies,
2. Inaccessibility to resources,
3. Feeling of insecurity and frustrations,
4. Inability to maintain and develop social relations with other as a consequence of lack of resources.

The term poverty is interconnected with the notion of the poverty line/threshold that may be defined as the minimum figure of income that is required in a particular country for maintaining the socially acceptable, clothing and sheltering needs.

The World Bank forecasted in 2015 that 702.1 million people were living in extreme poverty, down from1.75 billion in 1990. Of the 2015 population, about 347.1 million people lived in Sub-Saharan Africa and 231.3million lived in South Asia. According to the World Bank, between 1990 and 2015 the percentage of the world's population living in extreme poverty fell from 37.1% to 9.6%falling bellow10% for the first time.

Types of Poverty:

1. **Situational Poverty:**
   Is generally caused by a sudden crisis or loss and is often temporary. Events causes' situational poverty includes environmental disasters, divorce or severe health problems.
2. **Generational Poverty:**
   Occurs in families where at least two generations have been born in to poverty is not equipped with the tools to move out of their situations.
3. **Absolute Poverty:**
   This is rare in the United States, involves a scarcity of such necessities as shelter, running water and food. Families who live in absolute poverty tend to focus on day to day survival.
4. **Relative Poverty:**
   It's refers to the economic status of a family whose income is insufficient to meet its society's average standard of living.
5. **Urban Poverty:**
   It's occurring in metropolitan areas with populations of at least 50,000 people. The urban poor deal with a complex aggregate of chronic and acute stressors and dependent on often-inadequate large city services.
6. **Rural Poverty:**
   Rural poverty occur nonmetropolitan areas with populations below 50,000.In rural areas, there are more single guardian households, and families often have less access to services, support for disabilities, and quality education opportunities.

Causes:

There are two extreme perspectives on the basis of which we can analyze the causes of poverty - the old and the modern. *First view -* Poverty is that it is providential and it is result of an individual's past sins. *Second view -* Poverty to be the result of a failure of an individual's working abilities or due to his lack of motivation.

A. **Economic Causes of Poverty:**
1. **Slow economic growth and development:** A country that has slow economic growth due to bad governmental policies causes widespread poverty .Stagnant and slow paced economic development also leads to poverty.

2. ***Increasing unemployment:*** The population to job ratio if unbalanced can cause unemployment between masses and is a leading cause of poverty. Increased and uncontrolled population in any area is the biggest threat of unemployment related poverty.

3. ***Decreased agricultural output:*** Decreased agricultural output leads to some serious inflation issues. No country can be economically balanced without the aid of a strong agricultural backbone.

Other economic causes of poverty are-

4. Inadequate industrialization in certain areas.
5. Under developed infrastructure.

B. *Social Causes of Poverty:*
1. Unethical abuse of power.
2. Widespread ignorance and illiteracy.
3. Overpopulated places increases competition in the employment sector.
4. Practicing caste system.
5. High divorce rates and Feminization of poverty.
6. Inequality of available opportunity.

C. *Geographical Factors:*
1. Density of population.
2. Selective fertility of land.
3. Uneven distribution of fertile land.
4. Variable farm output.
5. Differential rural and urban poverty.

D. *Environmental and Climatic Factors:*
1. Flooding of lands.
2. Long time drought.
3. Lack of seasonal rainfall.

Effects of Poverty:

1. ***Illiteracy:***
   Poor people constitutes greater share of illiterate population. Education becomes extremely difficult when people are deprived of basic necessities of life.

2. ***Child Labour:***
   In India, a large number of young boys and girls are engaged in child labour. Also read, article on Poverty and Child labour in India.

3. ***Nutrition and diet:***
   Poverty is the leading cause of insufficient diet and inadequate nutrition. The resources of poor people are very limited, and its effect can be seen in their diet.

4. ***Poor living condition and Housing problems:***
   They don't get proper living conditions. They have to fight the hardship of poverty to secure food, clothes and shelter. A large number of poor families live in houses with one room only.

5. ***Unemployment:***
   Poor people move from villages to towns and form one town to another in search of employment / work. Since they are mostly illiterate and un-skilled, there is very few employment opportunities open for them. Due to unemployment, many poor people are forced to live an unfulfilled life.

6. ***Hygiene and sanitation:***
   These people have little knowledge about hygiene and proper sanitation system. They are not aware of the harmful consequences of not maintaining proper hygiene. The government is taking initiatives to make available clean and safe water, and proper sanitation system to them.

7. ***Feminization of poverty:***
   Women are the worst victims of poverty. Poverty effects greater number of women than men. The total of poor women outnumbers the total population of poor men. The causes include low income, gender-inequality, etc. They are deprived of proper-diet, medicines and health treatment.

8. *Social tensions:*

   Poverty is often characterized with income disparity and unequal distribution of national wealth between the rich and the poor. Concentration of wealth in the hands of few rich people leads to social disturbances and revolts. Fair or even distribution of wealth leads an overall improvement in general standard of living of people.

:: *Urban Poverty* ::

Over half the poor populations in developing nations will be living in urban poverty is usually defined in two ways: as an absolute standard based on a minimum amount of income needed to sustain a healthy and minimally comfortable life, and as a relative standard that is set based on average standard of living in a nation .

At the beginning of this century only 12% of the world's population lived in urban areas. Half-way through the century that number increased to 30% percent and will reach 50% as we enter the next Century. By 2005, for the first time in the history of the world, more people will live in and around cities than in rural areas. Less than 25 years after that, urban populations will be twice that of rural areas. The impact of those demographic milestones on poverty and unemployment and the quality of life should not be underestimated. Today, the World Bank estimates that close to 25% of the urban population in developing nations live in absolute poverty - approximately 330 million people or the equivalent of the total populations of Belgium, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the UK combined.

According to an unpublished UNICEF report, 90 percent of the poor in Latin America will live in urban areas, with 40% in Africa and 45% in Asia. UNICEF estimates that by the year 2000, 74.3 million households will live in poverty as compared to 33.5 million households in 1975 - a 220% increase. In 1960 the ratio of the richest 20% to the poorest was 30: 1; today it is 60:1 with 25% of the world's population controlling in excess of 85% of the world's industries and consuming 80% of its energy supplies.

Poverty in Urban Area:

Just like most of the growing and developing countries, there has been continuous increase in urban population.

- Poor people migrate from rural areas to cities and towns in search of employment/financial activity.
- The income of more than 8 corer urban people is estimated to fall *below poverty line (BPL)*.
- In addition to this, there are *around 4.5 crores* urban people whose income level is on borderline of poverty level.
- An income of urban poor's is highly unstable. A large number of them are either casual workers or self-employed.
- Banks and Financial institutions are reluctant to provide them loan because of the unstable income.
- Five states that constitutes around 40% of all urban poor people of India are *Uttar Pradesh, Bihar, Rajasthan, Odisha, and Madhya Pradesh*.
- *Around 35%* of the total population of the four metro cities (Delhi, Kolkata, Chennai and Mumbai) consists of slum population.
- A large portion of people living in slums are illiterate.
- The initiatives taken to deal with the problem of urban poverty has not yielded the desired results.

Table 8.1.: Percentage of Poor in Different Size Classes of Cities / Towns

	1993-94 (%)	1999-2000 (%)
Large city / town	18.4	14.2
Medium city / town	27.6	20.4
Small town	33.2	24.2
All urban areas	27.4	19.9
All rural areas	35.7	23.9

Source: Kundu & Sarangi (2005).
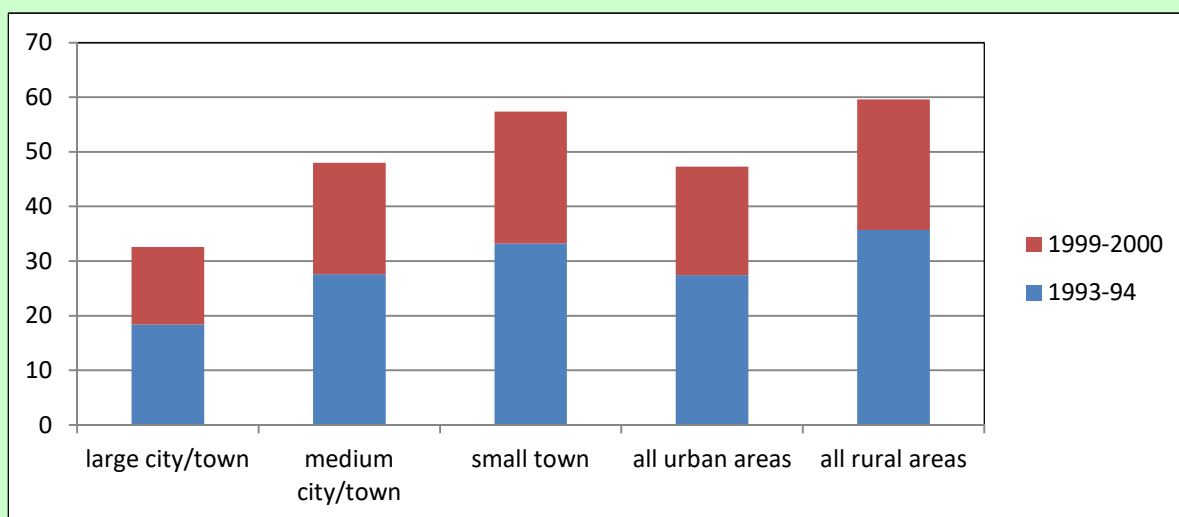
Fig. 8.2.: Percentage of Poor in Different Size Classes of Cities / Towns.

2014, World Bank data: 21.3% of Indians live below $1.90 per day on purchasing power parity. In simple words, 21.3% Indians live on less than 120/- per day.

Table 8.2.: Increase in Poverty & GDP Growth Rate (2004-05 to 2009-10)

State	Increase in Poverty & GDP Growth Rate
Nagaland	12.01%
Manipur	9.02%
Mizoram	5.70%
Assam	3.50%
Delhi	1.20%
Meghalaya	1.90%

Source: GDP Growth Rate of India, Planning Commission, Government of India.
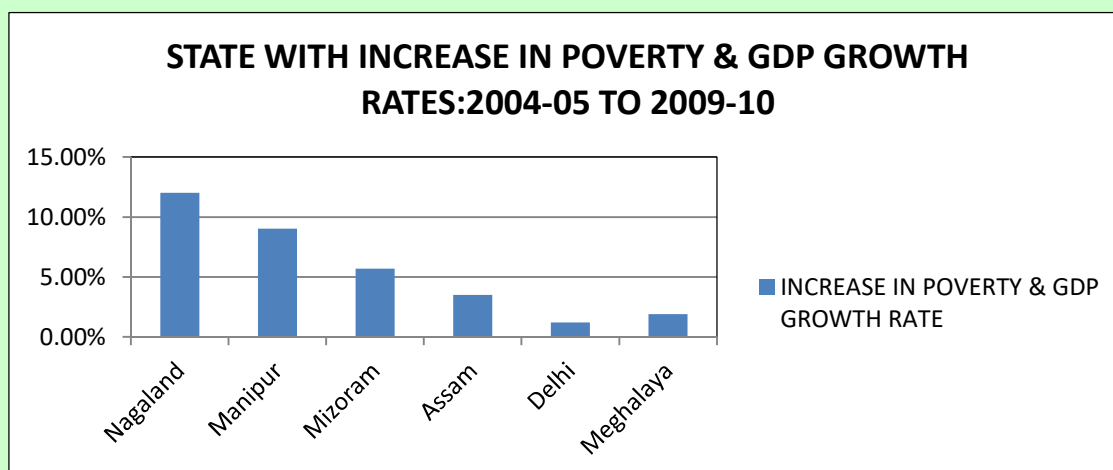
Fig. 8.3.: State with Increase in Poverty & GDP Growth Rates: 2000-05 to 2009-10.

Table 8.3.: Poverty in India based on caste (conducted during 2011-12)

Caste	No. of People	Percentage of Poverty	No. of People under Poverty
FC	393 M	12.5%	49.1 M
OBC	524 M	20.7%	108.5 M
SC	251 M	29.4%	73.8 M
ST	108 M	43.0%	46.4 M

Source: Caste system and poverty in India, Planning Commission, Government of India.

Table 8.4.: Poverty in India based on Social and Religious Classes

Social and Religious Class	Percentage of Living in Poverty
Urban Hindus	20.4%
Urban Hindu General	8.3%
Urban Hindu OBC	25.1%
Urban Hindu SC/ST	36.4%
Urban Muslims	38.4%
Urban Other Minorities	12.2%
Rural Hindus	22.6%
Rural Hindu General	9.0%
Rural Hindu OBC	19.5%
Rural Hindu SC/ST	34.8%
Rural Muslims	26.9%

Source: The Sachar Committee.

Table 8.5.: List of Indian States by Poverty Rate

Rank	States	Poverty (% of People Below Poverty Line)
1	Goa	5.09
2	Kerala	7.05
3	Himachal Pradesh	8.06
4	Sikkim	8.19
5	Punjab	8.26
6	Andhra Prasesh including Telengana	9.2
7	Jammu & Kashmir	10.35
8	Haryana	11.16
9	Uttarakhand	11.26
10	Tamil Nadu	11.28
11	Meghalaya	11.87
12	Tripura	14.05
13	Rajasthan	14.71
14	Gujarat	16.63
15	Maharashtra	17.35
16	Nagaland	18.88
17	West Bengal	19.98
18	Mizoram	20.87
19	Karnataka	20.91
20	Uttar Pradesh	29.43
21	Madhya Pradesh	31.65
22	Assam	31.98
23	Odisha	32.59
24	Bihar	33.74
25	Arunachal Pradesh	34.67
26	Manipur	36.89
27	Jharkhand	36.96
28	Chhattisgarh	39.93

Source: Annual Report of Reserve Bank of India (2013).

* All Indian average percentage of poverty= 21.92%.

* Least poverty =Goa (5.09%).

Table 8.6.: Dimension, Controlling factors and Policy-related causes of Poverty

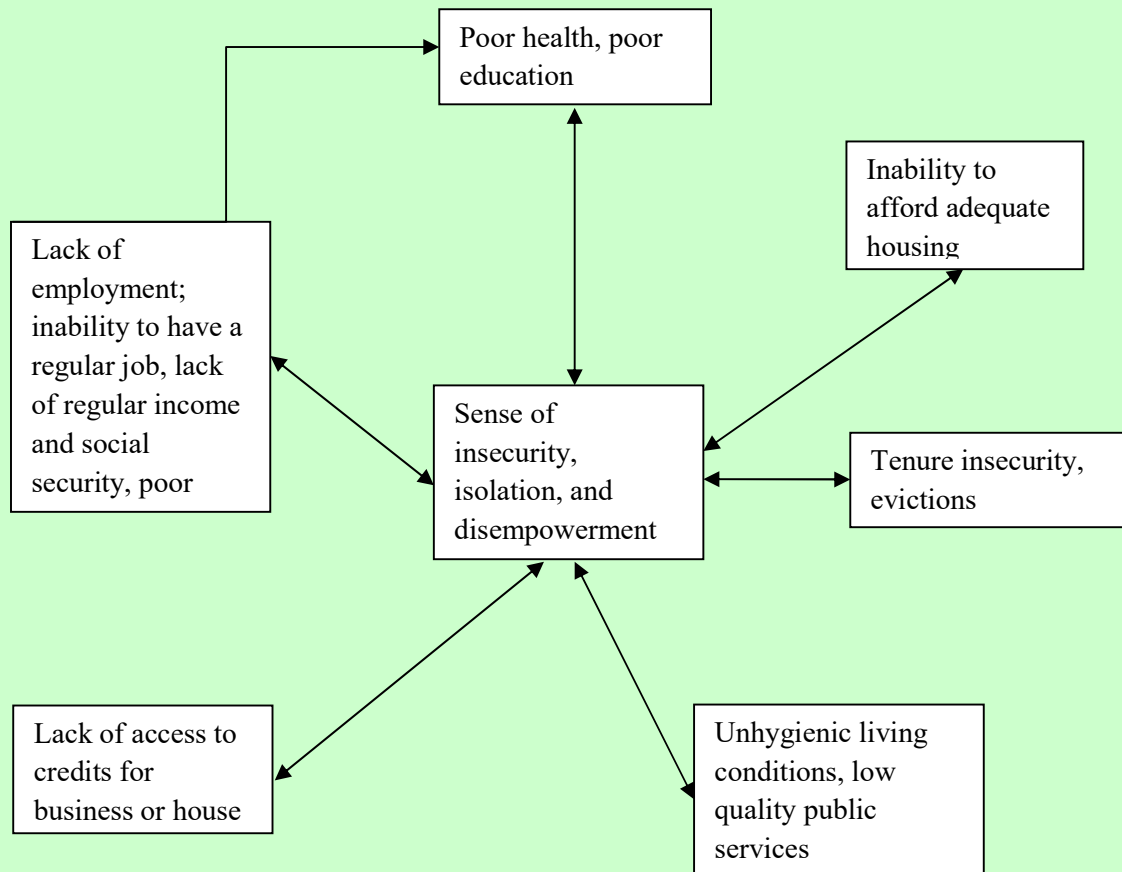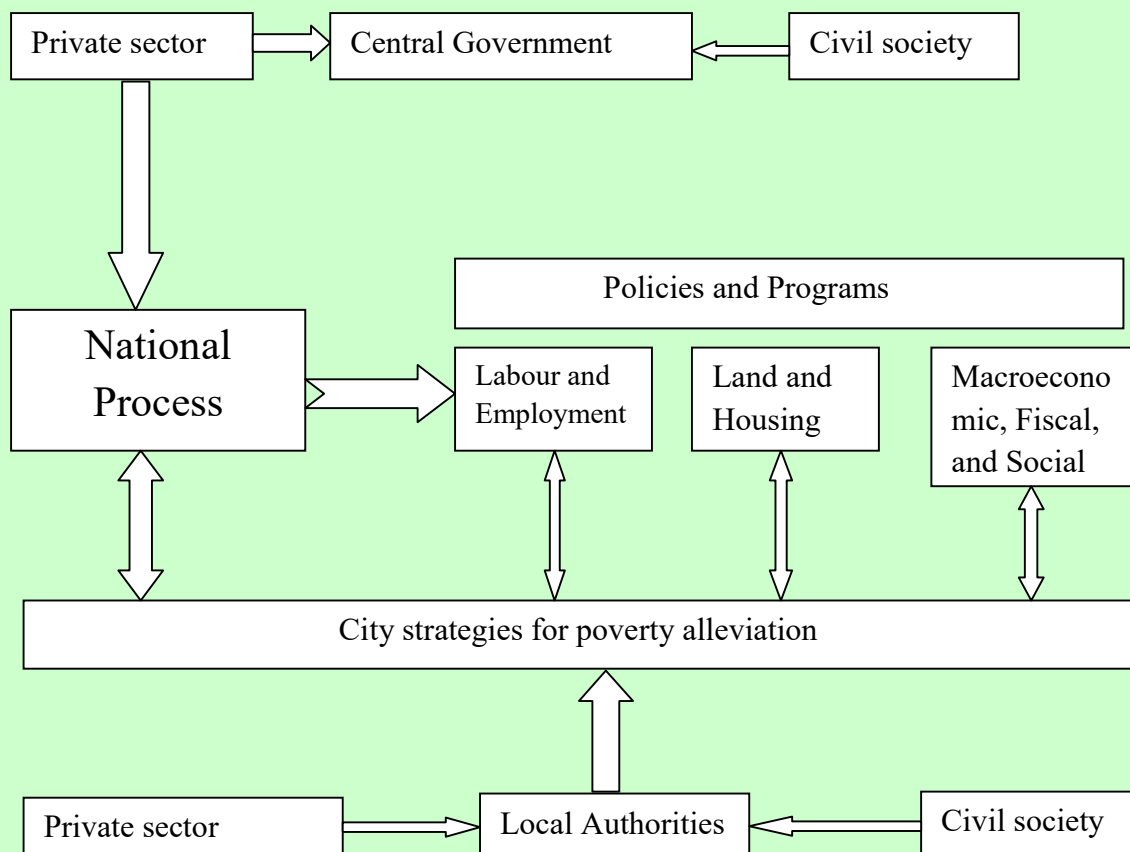| Dimension of poverty	Contributing factors	Policy-related causes	Impacts on other dimensions of poverty
Income	*1.* Dependence on cash for purchases of essential goods and services. *2.* Employment insecurity/casual work. *3.* Unskilled wage labour/lack of qualifications to get well-paid jobs. *4.* Inability to hold a job due to bad health. *5.* Lack of access to job opportunities.	*1.* Macroeconomic crises reduce real incomes. *2.* Failure of public services such as education, health, infrastructure, transport to serve the urban poor.	*1.* Inability to afford housing and land, thus, underdeveloped physical capital assets. *2.* Inability to afford adequate quality and quantity of essential public services e.g., water, thus unhygienic living conditions and depreciated health. *3.* Poor human capita. *4.* Depreciated social capital resulting in domestic violence and crime.
Health	*1.* Overcrowded and unhygienic living conditions. *2.* Residential environments are prone to industrial and traffic pollution due to juxtaposition of residential and industrial functions in cities. *3.* The poor in cities settle on marginal lands, which are prone to environmental hazards, such as landslides and floods. *4.* Exposure to diseases due to poor quality air, water, and lack of sanitation · Injury and deaths rising from traffic.	*1.* Land and housing regulations can make proper housing unaffordable and result in living in disaster-prone and polluted areas. *2.* Bad policy frameworks and failure of public services such as environmental and health related services. *3.* Poor traffic management and pedestrian facilities. *4.* Lack of safety nets and social support systems for families and youth.	*1.* Inability to hold a job. *2.* Inability to earn sufficient income. *3.* Reduced ability of children to learn due to illness (e.g., lead poisoning). *4.* Risk of injury and associated income shocks. *5.* Poor education outcomes.
Education	*1.* Constrained access to education due insufficient school sizes in rapidly growing cities. *2.* Inability to afford school expenses. *3.* Personal safety/security risks deterring school attendance.	*1.* Lack of safety nets to ensure ability to stay in school despite family economic hardships. *2.* Insecure and unaffordable public transport.	*1.* Inability to get a job. *2.* Lack of constructive activity for school age youth, contributing to delinquency.
Empowerment	*1.* Illegitimacy of residence and work. *2.* Isolation of communities that are disconnected from jobs and services.	*1.* Regulatory and policy frameworks (for service provision, housing and land, and income generating activities) make the settlements and/or occupations of the poor "informal" or "illegal". This denies them the same rights as other urban citizens.	*1.* Lack of access to urban services. *2.* Sense of isolation and powerlessness. *3.* Violence. *4.* Inefficient use of personal time.

Source: Ministry of Housing and Urban Poverty Alleviation.

Cumulative Impacts of Urban Poverty:

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                          ┌─────────────────────┐
                          │ Poor health, poor   │
                          │ education           │
                          └─────────────────────┘
                                                        ┌──────────────────┐
                                                        │ Inability to     │
                                                        │ afford adequate  │
                                                        │ housing          │
┌──────────────────┐                                    └──────────────────┘
│ Lack of          │         ┌────────────────┐
│ employment;      │         │ Sense of       │         ┌──────────────────┐
│ inability to have│         │ insecurity,    │         │ Tenure insecurity,│
│ a regular job,   │◄───────►│ isolation, and │◄───────►│ evictions         │
│ lack of regular  │         │ disempowerment │         └──────────────────┘
│ income and social│         └────────────────┘
│ security, poor   │
└──────────────────┘
┌──────────────────┐                    ┌──────────────────┐
│ Lack of access to│                    │ Unhygienic living│
│ credits for      │                    │ conditions, low  │
│ business or house│                    │ quality public   │
└──────────────────┘                    │ services         │
                                        └──────────────────┘
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National –Local Feedback Process for Urban Poverty Reduction Strategies:

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┌──────────────┐      ┌────────────────────┐      ┌──────────────┐
│ Private      │ ═══► │ Central Government  │ ◄═══ │ Civil society│
│ sector       │      └────────────────────┘      └──────────────┘
└──────┬───────┘
       ║                   ┌────────────────────────────────────────┐
       ║                   │        Policies and Programs           │
       ▼                   └────────────────────────────────────────┘
┌──────────────┐      ┌────────────┐  ┌────────────┐  ┌────────────────┐
│   National   │ ═══► │ Labour and │  │ Land and   │  │ Macroecono     │
│   Process    │      │ Employment │  │ Housing    │  │ mic, Fiscal,   │
└──────┬───────┘      └──────┬─────┘  └──────┬─────┘  │ and Social     │
       ║                     ║               ║        └────────┬───────┘
       ▼                     ▼               ▼                 ▼
┌─────────────────────────────────────────────────────────────────────┐
│             City strategies for poverty alleviation                 │
└─────────────────────────────────────────────────────────────────────┘
                                 ▲
┌──────────────┐      ┌────────────────────┐      ┌──────────────┐
│ Private      │ ═══► │ Local Authorities  │ ◄═══ │ Civil society│
│ sector       │      └────────────────────┘      └──────────────┘
└──────────────┘
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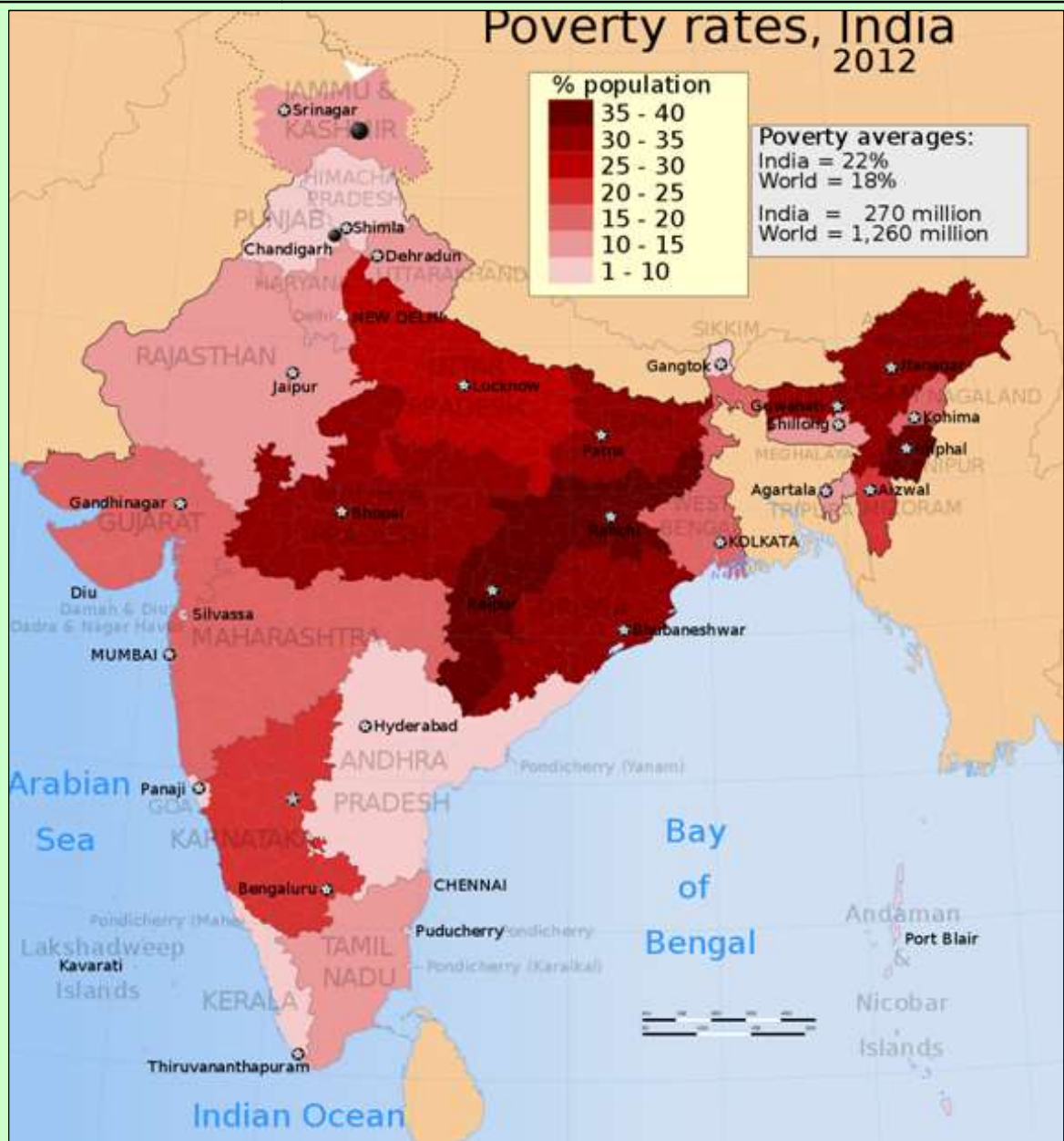
Fig. 8.4.: Poverty Rate in India, 2012.

Solutions:

We have to solve this problem of India's poverty –

- Farmers must get all facilities for irrigation.
- They should be trained and educated.
- Agriculture must be made profitable.
- The ever-rising population should be checked.
- Family planning schemes should be introduced.
- More and more industries should be set up to meet the needs of our country.

Conclusion:

Poverty is our national problem. The government is taking a number of steps to solved poverty problems. Poverty is fully man-made problem. It can be removed by the actions of human beings.

"Overcoming poverty is not a task of charity; it is an act of justice.
Like slavery and Apartheid, poverty is not natural." - Nelson Mandela

"Poverty is the worst of violence." - Mahatma Gandhi

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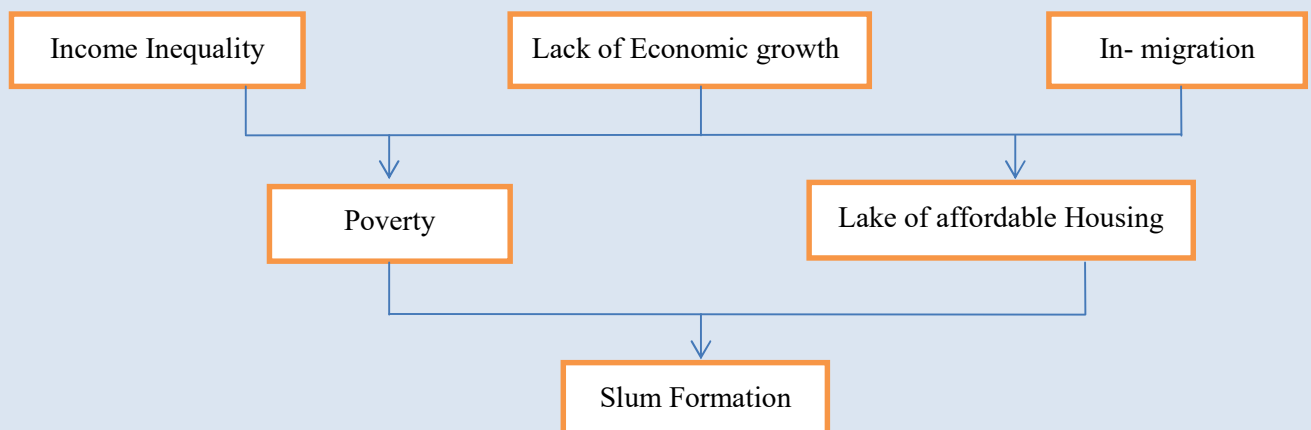## Problems of Slums and Sustainable Urban Rehabilitation: A Case Study on Kolkata

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Slum has constituted a considerable part of urban landscape of India cities as well as other developing cities in the world. Cities on account of better employment opportunities have always attracted migrant workers from rural and other smaller towns in a big volume. Growth of slums in a problem peculiar to the urban areas. Slum comes up near industrial areas, railway lines, platforms, river bank, and large drains. They emerge a metropolitan cities and in the million plus cities.

The word 'Slum' was first use in London at the beginning of the 19th century to describe a "room of low repute" or "low unfrequented parts of the town ", but has since undergone much modification in meaning and application. The term 'slum' is usually used to describe a wide range of low income settlement or poor human living conditions. These inadequate housing conditions exemplify the variety of manifestations of poverty. Slum at its simplest is a heavily populated urban area characterized by substandard housing and squalor. This definition encapsulated the essential characteristics of slum: high densities and low standard of housing 'structure & services ' and squalor. The first two criterions are physical and spatial, while the third is social and behavioral.

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┌──────────────────┐     ┌─────────────────────┐     ┌──────────────┐
│ Income Inequality│     │ Lack of Economic    │     │ In- migration│
│                  │     │ growth              │     │              │
└────────┬─────────┘     └──────────┬──────────┘     └──────┬───────┘
         │                          │                       │
         ▼                          ▼                       ▼
   ┌──────────┐                ┌──────────────────────────────┐
   │ Poverty  │                │ Lake of affordable Housing   │
   └────┬─────┘                └───────────────┬──────────────┘
        │                                      │
        └──────────────┬───────────────────────┘
                       ▼
              ┌─────────────────┐
              │ Slum Formation  │
              └─────────────────┘
```

A Slum has been defined by the United Nations Program on Human Settlement: "A contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services. A slum often recognized and addressed by the public authorities as an integral or equal part of the city."

The UN defines a slum as "One or a group of individuals living under the same roofs in an urban area, lacking in one or more of the following amenities-

1. Durable housing (a permanent structure providing protection from extreme climatic conditions).
2. Sufficient living area (no more than three people sharing a room).
3. Access to improved water (water that is sufficient affordable and can be obtained without extreme

effort).

4. Access to improve sanitation facilities (a private toilet or a public one shared with a reasonable number of people).
5. Secure tenure (de facto or de jure secure tenure status and protection against forced eviction).

Characteristics of Slum:

According to NSSO "A compact settlement with a collection of poorly built tenements, mostly of temporary nature, crowded together usually with inadequate sanitary and drinking water facilities in unhygienic conditions". As can be seen from the above definition, despite challenges faced to other basic necessities like electricity, roads and safe housing, the lack of access to adequate water and sanitation and unhygienic living conditions remain the major concerns by which one defines a slum settlement. Some characteristics of slum are given below:

1. **Lack of basic service:**

   Lack of basic service is one of the most frequently mentioned characteristics of slum. Lack of access to sanitation facilities and safe water sources is most important feature, sometimes supplemented by absence of waste collection system, electricity supply, surface roads and footpaths, street lighting and rain water drainage.

2. **Sub standard housing or illegal and inadequate building structure:**

   Many cities have building standards that set minimum requirements for residential buildings. Slum areas are associated with a high number of sub standard housing structures often build with non permanent materials unsuitable for housing given local conditions of climate and location. Various space and dwelling placement laws may also be intensively violated.

3. **Over Crowding and high density:**

   Overcrowding is associated with a low space person, high occupancy rates, cohabitation by different families and a high number of single room units are overcrowded, with five or more person sharing a one room unit used for cooking, sleeping living..

4. **Unhealthy living condition:**

   Unhealthy living condition is the result of a lack of basic services, with visible, open sewers, Lack of Pathway, uncontrolled dumping of waste, polluted environment etc.

5. **Poverty and Social exclusion:**

   Income or capability is considered, with some exceptions, as central characteristics of slum area.

6. **Maximum Settlement Size:**

   Many slum definitions also require some minimum settlement size for an area to be considered a slum so that the slum constitutes a distinct and is not a single dwelling. Example are the Municipal slum definition of Kolkata that requires a minimum of 700 sq meters to be occupied by huts, or the Indian census definition which requires at least 300 people or 60 households living in a settlement cluster.

Slums Scenario in India:

The census defines a slum as "residential areas where dwellings are unfit for human habitation" because they are dilapidated, cramped, poorly ventilated, unclean, or "any combination of these factors which are detrimental to the safety and health", Registrar General of India C. Chandramouli said. Roughly 1.37 crores households or 17.4% of urban Indian households lived in a slum in 2011, data released by the registrar general and census commissioner's office showed. The new data is difficult to compare with previous years, because the 2011 Census covers all 4,041 statutory towns in India, as compared to 2001 when only statutory towns with population over 20,000 were covered. The 2001 data had set India's slum population at 15% of the total population. With the exception of sanitation, the indicators on housing amenities for slum and non-slum households in most of India are more similar than most would expect. Over 77% are permanent and 70% are owned, and not rented. Close to half are made up of just one room and most are home to one married couple.

Over 70% of slum households get their water from a tap but just half get water inside their homes. Over 90% get electricity and most use LPG for cooking; 70% have a TV and 10% even a computer. The census

data seems to indicate that the "more cell phones than toilets" line might be wrong for urban India: two out of three slum households have a toilet within the premises, while slightly fewer have a mobile phone. More than one in five urban households in Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Odisha, West Bengal and Maharashtra lives in a slum. In absolute terms, Maharashtra has the highest number of slum blocks of any state – over 21,000 out of a total of just over 1 lakh for the whole country. Over a third of India's slum population lives in its 46 million-plus cities. Of the metros, Mumbai has the highest proportion of slum-dwelling households (41.3% of its population). Kolkata is next at nearly 30% with Chennai not far behind. Delhi has 14.6% of its households living in slums while Bangalore is the best off of the five metros at less than 10%. Among all million-plus cities, Vishakhapatnam has the highest proportion of slums (44.1% of households). However, Census authorities were treating with scepticism the unexplained spurt in slum populations across cities in Andhra Pradesh.

Table 9.1.: Slum Population in Million Plus Cities in India, 2011

Name of the million plus city	Slum population	(%) of city slum population to all India slum population	(%) of city slum population to all million plus cities slum population
Chennai	1342337	2.05	5.35
Delhi	1617239	2.47	6.44
Greater Mumbai	5206473	7.95	20.74
Kolkata	1409721	2.15	5.62
Hyderabad	2287014	3.49	9.11
All India Slum Population	65494604		
Slum population on million plus cities	25099576	38.32	

Source: Office of the Registrar General and Census Commissioner, India, 2011.

The 21[st] century has witnessed a rapid growth of urban population coupled with in commensurate development of social facilities which has resulted in the creation of slums and associated problems of an alarming magnitude. Owing to lack of employment and suitable jobs in the countryside, people from rural areas migrate to the towns/ cities. In cities they obtain jobs, but their income hardly allows them to have good accommodation or neighbourhood. Hence they occupy vacant land or try to adjust themselves in the existing slums. This results into a growth of slums and squatter settlements in most of the cities and towns of the country. In India, slums are found in all the cities, large and small, old or new, unplanned or planned.

Slum demography had been presented on the basis of actual count in census 2011. The slum population was reported from 31 states/union territories in India. Four states/union territories namely, Manipur, Dadra and Nagar Haveli, Daman & Diu and Lakshadweep did not report any slum population in their cities/towns. 2613 towns reported slum population out of 4041 statutory towns. In 2001, 42.6 million populations were lived in slums in India which increased to 65.5 million by 2011. This constituted 17.4% of the urban population of the States/UTs in 2011. The distribution of slum towns across the states and Union Territories was not uniform in India.
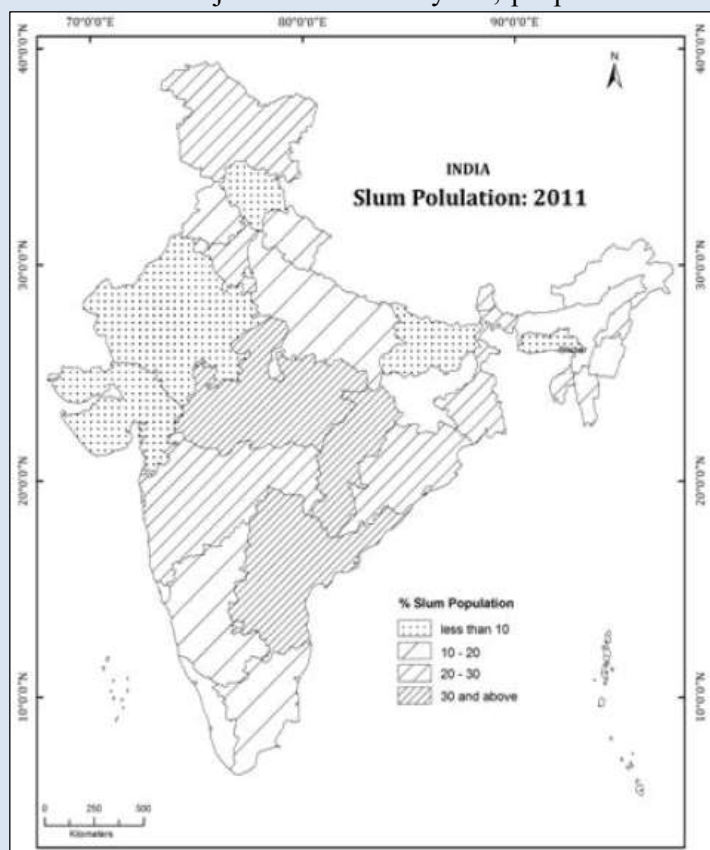

Fig. 9.1.: Slum Population in India, 2011.

Ten larger states enumerated more than 100 slums towns including Tamil Nadu (507), Madhya Pradesh (303), Uttar Pradesh (293), Karnataka (206), Maharashtra (189), Andhra Pradesh (125), West Bengal (122), Rajasthan (107) and Gujarat (103). These larger nine states include 1955 slum towns which accommodate more than 81% of the total slum population. On the other hand 9 small states and union territories include Nagaland, Sikkim, Pondicherry, Meghalaya Arunachal Pradesh, Goa, Mizoram, Chandigarh, Andaman and Nicobar had reported only 47 slum towns which share only 0.6% of the total slum population. In absolute terms, Maharashtra accounted for 11.8 million slum population which is 18.1% of the total slum population of the country. It was followed by Andhra Pradesh (10.2 million), West Bengal (6.4 million) and Uttar Pradesh (6.2 million). Nine states namely; Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha, West Bengal, Sikkim, Jammu & Kashmir and Haryana had shown high percentage of slum population than the national average. Andhra Pradesh, Chhattisgarh, Haryana, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Odisha, Sikkim and West Bengal have recorded high slum concentration than urban concentration high incidence of slums in comparison to level of urbanization where remaining states have reverse situation. A common perception that the larger cities are marked by higher incident of slum than the smaller one is not validated by census data. The proportion of slums was reported 27.2% in the case of small towns in comparison to 24.3% percent in medium towns.

Urbanization, industrialization and higher productivity in the secondary/tertiary sector against primary sector makes cities and towns centres of economic growth and jobs. Cities act as beacons for the rural population as they represent a higher standard of living and offer opportunities to people not available in rural areas. This results in large scale migration from rural to urban areas. Negative consequences of urban pull results in upcoming of slums characterized by housing shortage and critical inadequacies in public utilities, overcrowding, unhygienic conditions, etc.

Location and Administrative Division of the Study Area:

Kolkata, the capital state of west Bengal, is the main business, academic and cultural hub of eastern India and lies on eastern river bank of Hooghly River. The location of this city is 22°28' N to 22°58' N and 88°10' E to 88°27' E. It is surrounded by the districts of Nadia, Hooghly, Howrah, North and South 24Parganas.The total area covered by the city is 185sqkm according to the census of India and total population of the city is 4486679, the density of Kolkata is 24250 Km^2. The city of Kolkata Can be broadly categorized into the following area –

A. **North Kolkata:** Shobhabazar, Shyambazar, Kasipur, Chitpur, Sinthee, Baranagar, Dumdum.
B. **Central Kolkata:** BBD Bagh, Esplanade, Park Street, Chandni Chowk, Dalhausie Square, Burra Bazaar. This area also known as CBD of the city.
C. **South Kolkata:** Alipore, Ballygunge, Tollygunge, Bhowanipur, Lake Gardens, Jodhpur Park, Jadavpur, Golf Garden, Kasba, New Alipore.

Since 1951, the city has been divided into several 'Boroughs'. There were 10 boroughs in 1951, covering an area of 104 sq km. The number of boroughs subsequently increased to 15 in 1984 with the inclusion of Jadavpur, South Suburban and Garden Reach area to Kolkata Municipal Corporation. Present area coverage of the city is 187.33 sq. km. Each of these boroughs is further subdivided into 'Wards'. There existed 100 wards till 1984, after which the number increased to 141 with the merger of the above said municipalities. The ward delimitation has since last changed in 1984. The 'Added Areas' i.e. the areas annexed to Kolkata Municipal Corporation (KMC) area in 1984 experience acute drainage and sewage disposal problems.

The study area considered comprises portion of five Boroughs viz. Borough XI to Borough XV, which were annexed to KMC limit in 1984. Boroughs XI and XII contain seven wards each and Boroughs XIII to XV contain nine wards each, out of which the proposed S&D improvement measures along with allied works are considered to be taken-up in the portions of wards 110 -

Fig. 9.2.: Legislative Structure.

114 in Borough XI; major portions of Wards 108 & 109 in Borough XII; wards 115, 122 & 123 in Borough XIII; wards 124 - 127 in Borough XIV and wards 140, 141 & portion of 139 in Borough XV.

Brief History of the City:

The city of Kolkata was formally established by Job Charnok, a leading English merchant, in August 1690, on the banks of the river Hooghly, primarily to promote the trade and business interests of the East India Company.

Kolkata city, one of the four metropolitan cities in India has a history of no more than 300 years. The city, formerly known by the name of Kolkata has undergone a sea change in a very short span of time. Kolkata as it stands today is the largest metropolitan city of India. The city has the distinction of being the procurer of many important movements encompassing politics, arts, literature, theatre, cinema, science and technology, in India.

The city is a colonial city developed by the British East India Company and then the British Empire. The city was the capital of the British Indian Empire till 1911 when the capital was relocated to Delhi. Kolkata witnessed a fast rise as the second city of the British Empire in the 19th century accompanied by the development of a culture that was a coalescence of European philosophy with Indian tradition. The city is also noted for its revolutionary history, ranging from Indian struggle for independence to the leftist Naxalite and trade union movements. Labelled the "Cultural Capital of India", "The City of Processions", "The City of Palaces", and the "City of Joy", Kolkata has also been home to luminaries such as Rabindranath Tagore, Subhash Chandra Bose, Mother Teresa and Satyajit Ray. Problems related to rapid urbanisation started to plague the city from 1930s and still the city is an example of an urban hotbed of the developing nations.

Slums in Kolkata:

In 2011 census, slum dwellers account for one third of total population of Kolkata. Total slums population of this city is 1409721, that is 2.15% to all India slum population. Presently there are 2011 registered and 3500 unregistered slum in Kolkata. Majority of this population lives below the poverty line and works as domestic workers, daily wage labourers, factory workers, rickshaw pullers, hawkers, and security guards. There are two types of slums in the city

1. Authorised Slum:

The authorised slum can be classified four broad groups. The first kind of slums existed during the British period, when middle man took land from Landowners usually for a long term and built hut type settlements which they let to migrants. As mentioned earlier these migrants needed a place to live and had no alternative but to accept accommodation without basic amenities. There is another type of slum called 'thika tenant slums' where the slum dwellers have taken possession at a fixed rent and have constructed by Zaminders (Landowners) themselves and let out to the slum dwellers.
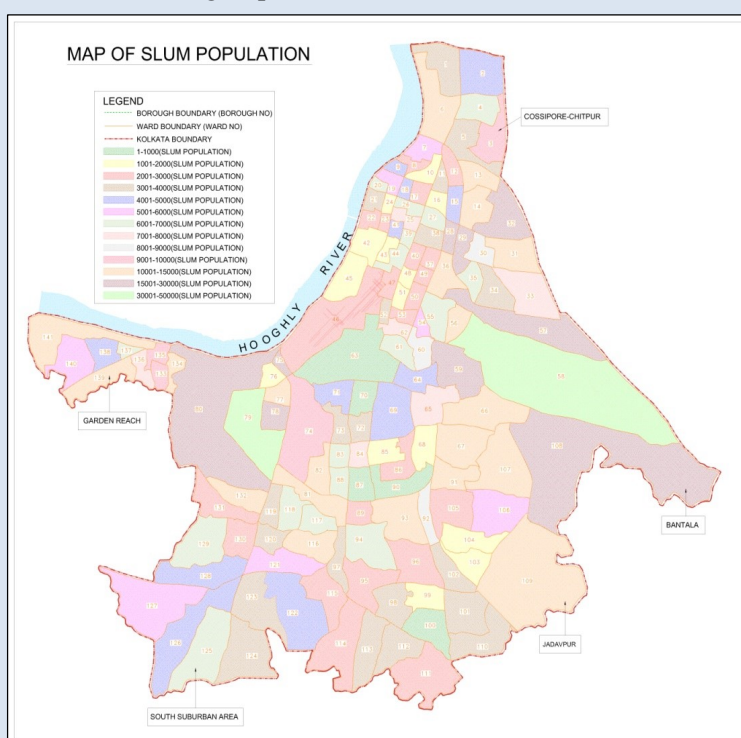

Fig. 9.3.: Slum Population in Kolkata 2011.

2. *Unauthorised Slum:*

Among the unauthorised slums types are those which are simply encroachments of the road side (Locally called jhupri), canals (called khaldhar) or any vacant place (called udbastu) by the poor people either displaced from the city itself or another type of displacement is reported as displacement due to an excessive increase in family size.

Age and Location of Slum in Kolkata:

The slum of Kolkata can be divided into three groups - the older ones, up to 150 years old, in the heart of the city are associated with early urbanization. The second group dates from 1940s-1950s and emerged as an outcome of industrialization based rural-urban migration, locating themselves around industrial sites and near infra-structural arteries. The third group came into being after the independence of India and took vacant urban lands and areas along roads, canals, and on marginal lands .The Calcutta Municipal Act of 1980 defines slums as 'an area of land not less than 700sq meters occupied by, or for the purposes of, any collection of huts or either structures used or intended to be used for human habitation. Under the KMC there are 5000 slums in 98 wards out of 141 wards. Most of the slums are built in place like western part of EM Bypass, Dhapar Math, Ultodanga, Park Circus , Jagarani, Netainagar and Sriharipally. In ward no. 58, Tangra slum located. This area is situated in Tangra roads besides Topsia road.The 150 years old Tangra slum described originated because proximity to chemical and rubber industries but it has expanded largely due to employment opportunities in nearby tanning and shoe making industries as well as Pilkhana or the slaughter house. Bibi Bagan is one of the oldest slum near Pilkhana, situated in ward no. 56, resembles the proximity of plastic making industries and slaughter house. The Christopher slum area located ward no. 58, reveals a different picture where the most residents are involved in small private job. Manual workers as well as in their own small business.

Table 9.2.: Slum Population in Kolkata

Ward No.	Total BPL Households	Total BPL Population	General (%)	SC (%)	ST (%)	OBC (%)
108	4847	21419	26.14	59.98	5.12	3.78
109	2645	11348	24.99	66.45	4.15	1.21
110	821	3542	30.29	52.77	1.04	2.68
111	455	2079	57.96	26.89	3.22	2.79
112	829	3689	78.58	15.80	2.06	0.81
113	884	3943	62.52	30.05	0.28	1.50
114	555	2004	69.21	27.89	0.30	0.00
115	486	2363	80.74	3.68	2.50	1.57
122	951	4060	85.12	3.77	0.05	1.11
123	865	3637	86.14	9.60	2.20	0.00
124	811	3540	57.68	37.80	0.34	0.45
125	1449	6221	55.54	20.09	1.14	5.64
126	981	4394	79.15	11.11	0.20	0.14
127	1328	5358	66.61	28.48	0.60	0.86
139	1560	10304	80.91	0.00	0.00	0.00
140	953	5984	47.81	5.10	0.00	0.37
141	2163	11389	49.60	15.63	0.92	7.82

Source: Kolkata Slum Population 2011, Census of India.

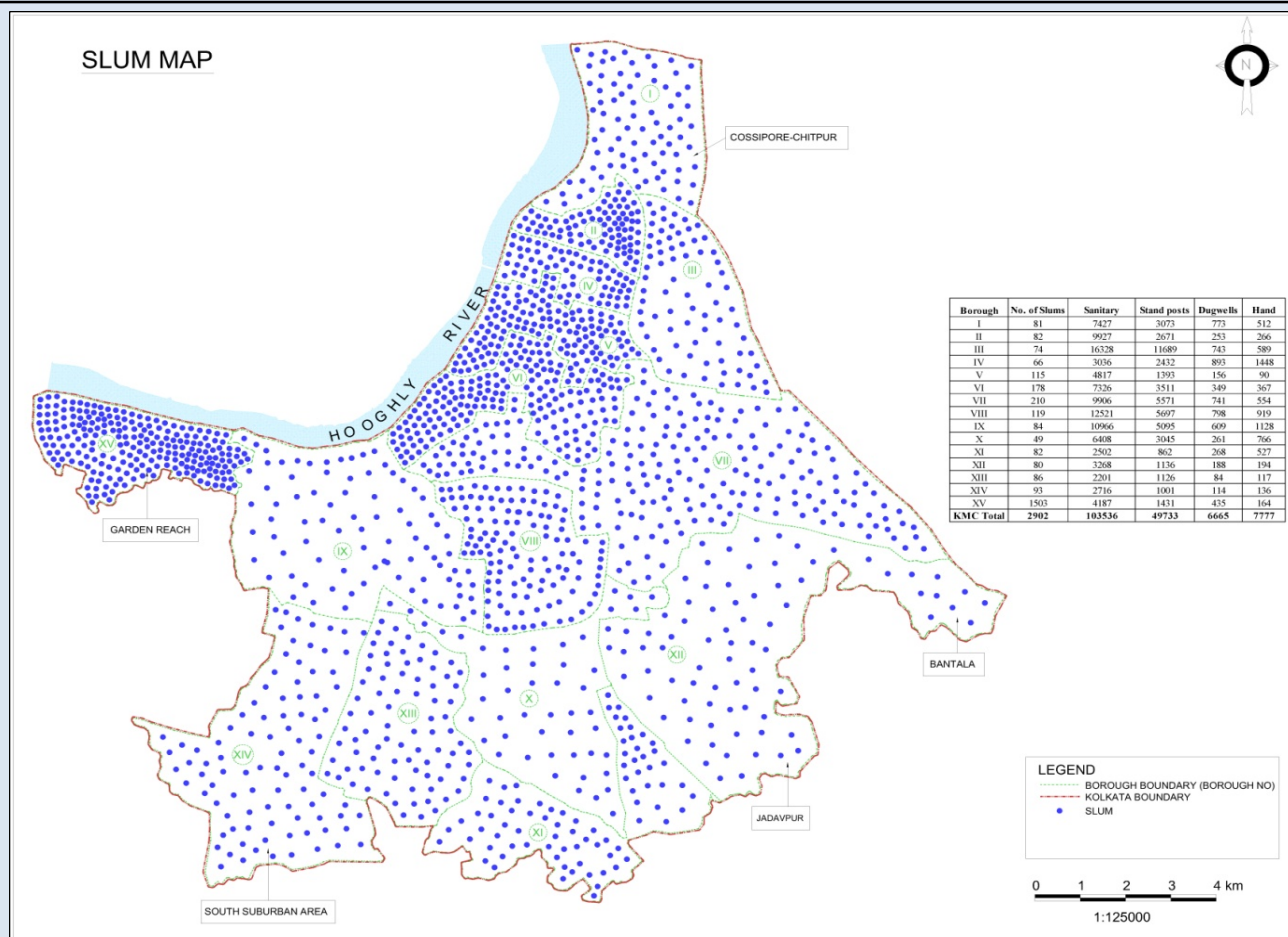| Borough	No. of Slums	Sanitary	Stand posts	Dugwells	Hand
I	81	7427	3073	773	512
II	82	9927	2671	253	266
III	74	16328	11689	743	589
IV	66	3036	2432	893	1448
V	115	4817	1393	156	90
VI	178	7326	3511	349	367
VII	210	9906	5571	741	554
VIII	119	12521	5697	798	919
IX	84	10966	5095	609	1128
X	49	6408	3045	261	766
XI	82	2502	862	268	527
XII	80	3268	1136	188	194
XIII	86	2201	1126	84	117
XIV	93	2716	1001	114	136
XV	1503	4187	1431	435	164
KMC Total	**2902**	**103536**	**49733**	**6665**	**7777**

Fig. 9.4.: Ward wise Slum Map in Kolkata.

Phases of Establishment of Slum in Kolkata:

The slum of Kolkata have been created two stage –

1. Pre-industrialisation Phase:

About 150 years old, during the British rule, slum developed in the heart of the city. Initially the slum dwellers come and settled in the city to serve the British rulers. They originally developed near British quarter, where they were about 19 people or four families living in every katha land.

2. Post Industrialisation Phase:

Phase of slums resulted from the industrialisation process. The large flow of British Capital led to development of jute and engineering industries in an around the city. Railways, Banks, and dock facilities also led to the diffusion of the population over forty miles on the bank of Hooghly River. Another type of squatter settlement (locally called jhopri) developed after independence. These settlements are found near roadsides, and canals. As a result of industrial growth and rapid urbanisation of Kolkata, workers from all over eastern and northern India poured into this city in search of employment and income. The thirties and forties witnessed a significant enhancement of the industrial base in and around Kolkata to support the British war effect. This led to migration of cheap labour from the hinterland. This people found cheap accommodation, mostly in huts made of mud and bamboo constructed by middleman, popularly known as thika tenets, on land leased out to them by landlords. The production of huts without basic infrastructure facilities eventually led to the growth of slums in certain parts of the city. This growth continued unabated not only in KMC but in the KMA as well, and the vacant area were rapidly filled up.

Problems related to Slum in Kolkata:

According to Central Statistical Organization (CSO) a slum is defined as an aerial unit having 25 or more katcha structure mostly of temporary nature with no private latrines and inadequate water facilities. The slums of Kolkata plagued by various problems:

1. **High population density:**

Population density of slums is usually very averaging around 19 persons /katha or 2800 persons/hector. There is an acute storage of space often with one room being rented to one family. The population density of Basanti slum colony is around 15-20 people/katha, while it is 10 people/katha in Tangra Slum.

2. **Cooking Fuel:**

In slum area use of coal, Wood, and kerosene while cooking releases carbon thereby causes environmental pollution. Use of such cooking fuels is mainly due to the poor economic condition of slum dwellers.

3. **Big family size:**

Due to increase birth rate slum households are mainly large. Slum families usually have four types - single, joint, small and mess.

Family Type	Average family members
Single	5
Joint	5-6
Mess	6-7
Small	3-4

4. **Very low income:**

70-80% of slum dwellers are live below the poverty line. The highest monthly income is 500Rs and lowest is 500 Rs. The monthly income of 80% people is between Rs 500-1700.

Income Base Level	Income (Rs)	(%) of people
High	2500 - 5000	10 %
Medium	1500 - 2499	48 %
Low	500 - 1499	42 %

5. **Low Literacy Rate:**

In 2011 it has been found that 67% of slum population is Literate; with 59% of these literate slum population being male and remaining 41% being female. Due to lack of awareness, financial distress, child labour etc, the slum literacy rate is very low.

6. **Poor Drainage System:**

During the rainy season the poor drainage system create an unhealthy environment for water logging. The drainage facilities in the slum of Kolkata are: No drainage - 85.5%, Open drainage - 6.8%, drainage - 7.7 %.

7. **Poor Sanitation System:**

It is said that absence of toilet and bathroom facility within household will stand as barrier to Kolkata slum development. If people use open space as their toilet and bathroom, then it will surely polluted the area, environmental will be unhealthy for people, bad smell will spread everywhere. All the latrines in the slum were sanitary type. There were two types of sanitary latrines according to the mode of use, i.e. personal latrine for single household and community latrine.

Type	(%) of Household
Shared sanitary Latrine	71
Sanitary Latrine without dwelling	17
No Latrine facility	12

8. **Health Problem:**

The slum present worst forms of health conditions. Their deplorable environment and economic conditions result in malnutrition among the children. In fact as well as maternal mortality rate were very high in the slums. Due to poor hygiene conditions people died of hepatitis, encephalitis, typhoid. The incidence of respiratory diseases like fever, viral infection, tuberculosis, skin diseases, urinal diseases were high in the slums.

9. **Unhealthy social Environment:**

Socially slums remain isolated from rest of the urban society and exhibit pathological social symptoms like drug abuse, alcoholism, crime, vandalism, and other deviant behaviour. The lack of integration of slum inhabitants into urban life reflects both, the lack ability and culture barriers.

Rehabilitation and Sustainable Slum Development in Kolkata:

For the proper and actual development of slum areas in order to achieve for slum development both National and State government have to take various developmental plans. Basically due to lack of political will no development plan has yet been implemented properly in slum area. Besides that if the rural push can be stopped by creating employment opportunities in the village, and then automatically slum will be decreased. Some plans/policies which have already been taken for rehabilitation and Sustainable slum development in Kolkata -

1. *National Slum Development Programme (NSDP, 1996):*

    It has been launched in Kolkata for overall development of slum dwellers, which belongs to -

    i. *National Old Age Pension Scheme:*

    In this Scheme cash assistance of R.s 400/- Per month per beneficiary. The beneficiary should be above 65 years of age having annual income less than 4000 per annum.

    ii. *National Maternity Benefit Scheme:*

    NMBS is the scheme launched by Ministry of Women and Child Development of Government of India. In this scheme the pregnant women for poor family who are below poverty line are given financial assistance for pre or post pregnancy care. Every pregnant woman will get Rs 500 per pregnancy and for first two delivery women is eligible for benefits for scheme.

    iii. *Family Benefit Scheme:*

    The National Family Benefit Scheme is an integral part of the National Social Assistance Programme. Families living below the poverty line are entitled to get financial benefits in the event of death of an earning member. This scheme ensures a onetime payable sum of Rs 20,000 to the family. Any kind of death will make the family eligible for assistance.

2. *Environmental Improvement of Urban Slums(1972):*

    Components of water supply, drainage, community latrines and bath, widening and paving of lanes and street lighting are taken up under the scheme to improve the environmental conditions in slums. State govt have not been able to provide adequate funds for this scheme and as such improvement and upgradation works in slums is not taken up widely under this scheme.

3. *Urban Basic Services Scheme (1986):*

    UBS was initiated on a pilot basis in 1986, with involvement of the UNICEF and State Govt, for the provision of basic social services and physical amenities at urban slum. The primary object was to enhance the survival and development of women and children of urban low income families.

4. *Neheru Rozgar Yojana (1989):*

    The population who are living below poverty line in urban area are also considerable. The NRY considered of three schemes namely -

    i. Scheme of Urban Micro Enterprises (Slum).

    ii. Scheme of Urban wage Employment.

    iii. Scheme for Housing and Shelter Upgrading.

5. *Swarna Jayanti Sahari Rojgar Yojana (1997):*

    SJSRY aimed at providing gainful employment to the urban employed and under employed poor, though encouraging the setting up of self employment ventures by the urban poor living below the poverty line.

6. *Rajiv Awas Yojana:*

    It has been launched on 2nd June 2011; the phase 1 is expected to cover about 250 cities across the entire country by the end of 12th Plan (2017). This Scheme aim at Promoting a slum frees India in five years and would focus on according property right to slum dwellers.

7. *Rajiv Rinn Yojana:*

    The Ministry of Housing and Urban Poverty Alleviation (MH & UPA),Govt of India launched the scheme Rajiv Rinn Yojana Or Rajiv Loan Scheme, as an additional instrument for addressing the housing needs at the EWS(Economically Weaker Section) /LIG(Low Income Group) segments in urban area. The scheme envisaged the provision of a fixed interest subsidy of 5% (500 basis points)

on interest charged on the admissible loan amount to EWS and LIG segments to enable them to buy or, construct a new house or for caring out addition (of a room/kitchen/toilet/bathroom) to the existing building.

8. *Jawaharlal Nehru National Urban Renewal Mission:*

The scheme was officially inaugurated by Prime Minister Monmohan Singh on 3rd December 2005, as a programme meant to improve the quality of life and infrastructure of the cities. It was launched in 2005 for a seven year period (up to March 2012) to encourage cities to initiate step for bringing phased improvement in their civic service levels. The govt has extended the tenure of the mission for two years i.e. from April 2012 to 31st March 2014. The main aims at this mission -

     i. Integrated development of slums;

     ii. Slum improvement and rehabilitation;

     iii. Environmental improvement and solid waste management of slums.

9. *Pradhan Mantri Awas Yojana:*

The Pradhan Mantri Awas Yojana (Urban) Programme launched by Ministry of Housing and Urban Poverty Alleviation on 25th June 2015, 'Housing for all by 2022' for LIG, EWS and MIG. The house will be built within the urban areas. It delivers pucca or Permanent houses mostly in crowded slum area to citizens and to other people from EWS (Economically Weaker Section), LIG (Lower Income Group) and MIG (Medium Income Group) categories. This scheme is consist at three phases, Phase 1 is already finished, Phased 2 is the process from April 2017- March 2019 and Phase 3 may start from April 2019 to March 2022.The main purpose of this mission is to assistance in the form of slum development and houses available to eligible slum dwellers in urban areas.

10. *Swachh Bharat Mission (SBM Urban):*

The swachh Bharat Mission or clean India mission launched on 2nd October 2014 aims at making urban India free from open defecation and achieving 100% scientific management of municipal solid waste. The mission has the following components -

     i. Household toilets, including conversion of insanitary latrines into pour-flush latrines.

     ii. Community toilets.

     iii. Solid waste management.

Main object of this mission to fulfil Mahatma Ghandhi's dream of a clean and hygienic India.

Acronyms:

- ➢ *BPL:*   Below Poverty Line.
- ➢ *CMC:*   Calcutta Metropolitan Corporation.
- ➢ *CSIP:*   Calcutta Slum Improvement Programme.
- ➢ *CUDP:*   Calcutta Urban Development Programme.
- ➢ *CBD:*   Central Business District.
- ➢ *CSO:*   Central Statistical Organization.
- ➢ *JNNURM:*   Jawaharlal Nehru Urban Renewal Mission.
- ➢ *KMA:*   Kolkata Metropolitan Area.
- ➢ *KMC:*   Kolkata Municipal Corporation.
- ➢ *KMDA:*   Kolkata Metropolitan Development Authority.
- ➢ *LIG:*   Lower Income Group.
- ➢ *MIG:*   Medium Income Group.
- ➢ *NSSO:*   National Sample Survey Organization.
- ➢ *NOPS:*   National Old Age Pension Scheme.
- ➢ *NMBS:*   National Maternity Benefit Scheme.
- ➢ *NFBS:*   National Family Benefit Scheme.
- ➢ *NRY:*   Nehru Rozgar Yojana.
- ➢ *NSDP:*   National Slum Development Programme.
- ➢ *PMAY:*   Pradhan Mantri Awas Yojana.
- ➢ *RAY:*   Rajiv Awas Yojana.
- ➢ *RRY:*   Rajiv Rinn Yojana.
- ➢ *SJSRY:*   Swarna Jayanti Sahari Rozgar Yojana.

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Human Development Report

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Stockholm (Sweden) Report, 21 March, 2017:

- Its goal was to place people at the centre of the development process in terms of economic debate policy and advocacy, "people are the real wealth of nations".
- This report ranks the countries on the basis of the Human Development Index.
- Released by UNDP (United Nations Development Programme).
- An annual report.
- The report was first launched in 1990 by the Pakistani economist Mehbub-Ul-Haq and Indian Nobel laureate Amarty Sen.
- Includes discussion of major development issues, trends, and policies in the world.
- Provides an annual ranking of countries based on Human Development Index.
- Human Development Index was result of change in thinking.
    - ✓ From monetarily indicators of national progress (like: GDP).
    - ✓ To broader indicators of human progress (like: Health and Education).
- List of Global Report:-
    - ➢ 1990- Concept and Measurement of Human Development.
    - ➢ 1991- Financing Human Development.
    - ➢ 1992- Global Dimension of Human Development.
    - ➢ 1993- People's participation.
    - ➢ 1994- New Dimensions of Human Security.
    - ➢ 1995- Gender and Human Development.
    - ➢ 1996- Economic Growth and Human Development.
    - ➢ 1997- Human Development to Eradicate Poverty.
    - ➢ 1998- Consumption for Human Development.
    - ➢ 1999- Globalization with a Human Face.
    - ➢ 2000- Human Rights and Human Development.
    - ➢ 2001- Making New Technology Work for Human Development.
    - ➢ 2002- Deeping Democracy in Fragmented World.
    - ➢ 2003- Millennium Development Goals: A Compact among Nations to End Human Poverty.
    - ➢ 2004- Cultural Liberty in Today's Diverse World.
    - ➢ 2005- International Cooperation at A Cross Roads.
    - ➢ 2006- Beyond Scarcity: Power, Poverty and the Global Water Crisis.
    - ➢ 2007- Fighting Climate Change: Human Solidarity in a Divided World.
    - ➢ 2008- Fighting Climate Change: Human Solidarity in a Divided World.
    - ➢ 2009- Overcoming Barriers: Human Mobility and Development.
    - ➢ 2010- The Real Wealth of Nations: Pathways to Human Development.

➤ 2011- Sustainability and Equity: A Batten Future for All.
➤ 2013- The Rise of the South: Human Progress in a Diverse World.
➤ 2014- Sustainability Human Progress: Reducing Vulnerabilities and Building Resilience.
➤ 2015- Work for Human Development.
➤ 2016- Human Development for Everyone.

Human Development Index:

✓ A composite index.
✓ To compare the wellbeing of across countries.
✓ 1st introduced by UNDP in 1990.
✓ Developed by Pakistani economist Mhbub-Ul-Haq and Indian Nobel laureate Amarty Sen.
✓ Calculated as a geometry mean of 3 indicators.
  a) **Life expectancy:** A long and healthy life measured through life expectancy at birth of the population.
  b) **Education:**
     i. Access to knowledge measured by mean years of education among the adult population.
     ii. Access to learning and knowledge measured by expected year of schooling for children.
  c) **National income:** Standard of living measured by Gross National Income Per Capita.
✓ An overall score between 0-1.
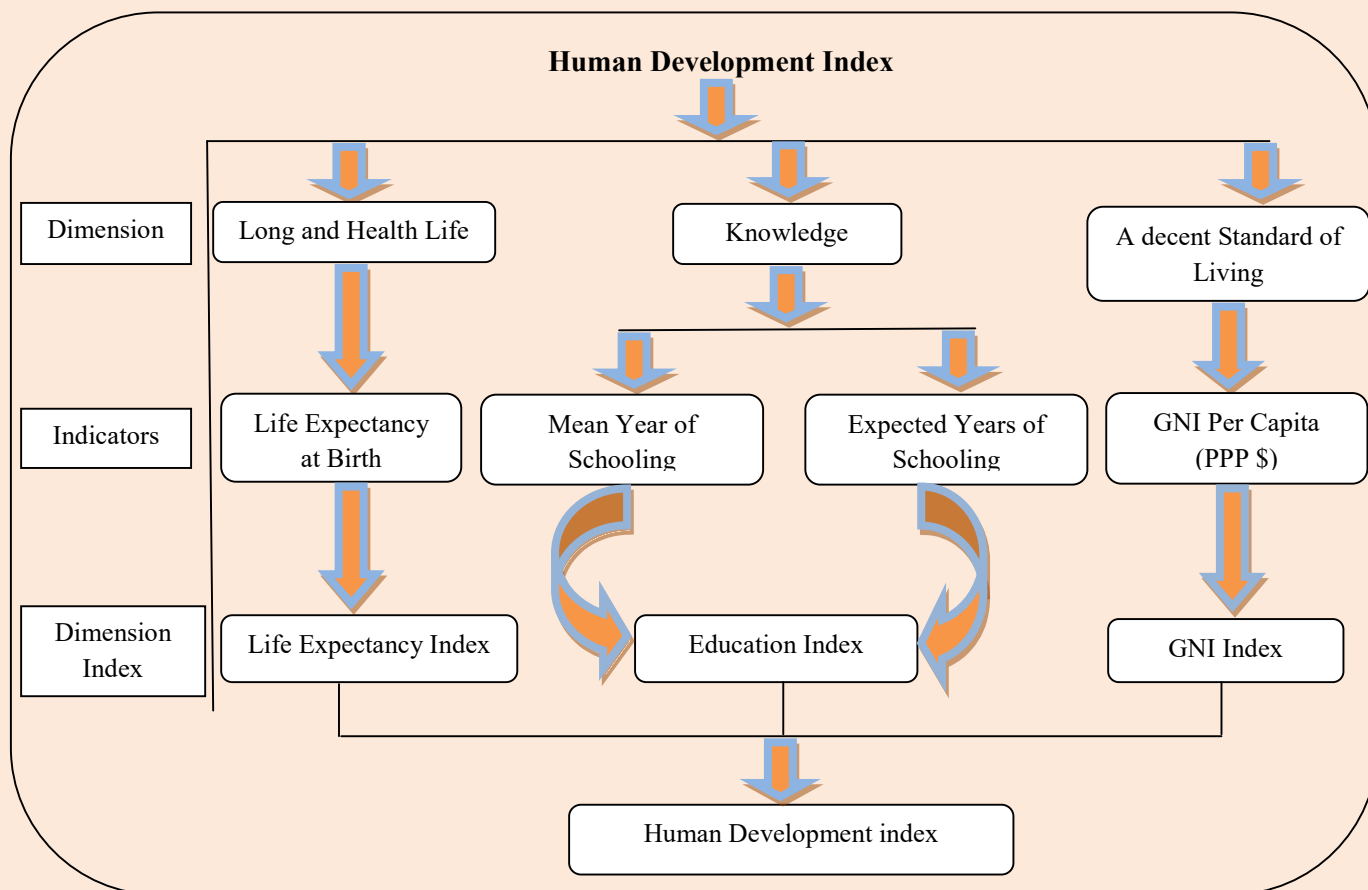
Human Development Index also include for other indices (2010):

• **Inequality-adjusted Human Development Index:**

   Inequality-adjusted Human Developmnet Index takes these inequalities into account and shows the loss to human development due to inequality. The HDI measures inequality using the same elements measured in the HDI for instance countries with a handful of rich citizens and millions in poverty will show a high level of inequality in the income index.
   Inequality-adjusted Human Development Index - 0.454 (India).

Table 10.1.: Inequality-adjusted Human Development Index

India	Human Development Index	Inequality-adjusted Human Development Index	Overall loss (%)
	0.625	0.0454	27.2

Source: National Human Development Report, India.

- *Gender Development Index (GDI):*
  It compares female and male Human Development Index values.
- *Gender Inequality Index (GII):*
  Presents a composite measure of gender inequality using three dimensions -
  - *i.* Reproductive healthy.
  - *ii.* Empowerment.
  - *iii.* Labour market.

Table 10.2.: Gender Inequality Index

Rank	Seats share of Women in Parliament (%)	Participation in the Labour Force	
		Women	Men
India (125)	12.2	26.8	79.1

Source: National Human Development Report, India.

Global Multidimensional Poverty Index (GMPI):

The Global Multidimensional Poverty Index (GMPI) is an international measure of acute poverty covering over 100 developing countries. It complements traditional income-based poverty measures by capturing the severe deprivation that is person faces at the same education, health and living standards .the MPI assesses poverty at the individual level.

Table 10.3.: Indicators of Multidimensional Poverty Index (MPI)

MPI	Health	Child Mortality
		Nutrition
	Education	Years Of Schooling
		School Attendance
	Living Standards	Cocking Fuel
		Toilet
		Water
		Floor
		Electricity
		Assets

Source: Oxford Poverty & Human Development Initiative (OPHI) and United Nations Development Programme (UNDP).

Table 10.4.: Multidimensional Poverty Index (MPI)

India	Population near Multidimensional poverty (%)	Population in severe	Intensity of deprivation
	18.2	27.8	51.1

Source: Oxford Poverty & Human Development Initiative (OPHI) and United Nations Development Programme (UNDP).

Key highlights of Human Development Index (2016):

☻ India's HDI ranking for 2016 put us at 131 among 188 countries with HDI value 0.624- which puts the country in the medium human development category alongside countries such as Congo, Namibia and Pakistan.

☻ Top three country Norway (0.949), Australia (0.939), and Switzerland (0.939).

☻ It is ranked 3rd among the SAARC country but behind Sri Lanka (73) and Maldives (105) in the "High Human Development" category.

➢ **SAARC Countries:**
  ▪ Sri Lanka (73) and Maldives (105) were placed in "High Human Development "category.
  ▪ India (131), Bhutan (132), Bangladesh (139), Nepal (144), Pakistan (147) and Afghanistan (169).
➢ **BRICS Country:**
  ▪ India ranks lowest among BRICS nations Russia (147), Brazil (79), China (90), South Africa (119) and India (131).
➢ *Life expectancy at birth:*
  In India, it has increased from 68 years to an average of 68.3 years-69.9 years for women and 66.9 years for men.
➢ *Access to knowledge:*
  India's expected years of schooling remains at 11.7 years, while mean years of schooling increased from 5.4 to 6.3 years.
➢ *India's Gross National Income (GNI):*
  Based on per capita purchasing power parity (PPP) - it has risen from $5,497 to $5,663.
➢ *Gender Inequality Index (GII):*
  India ranked 125 among 159 countries only 12.2% of parliament seats are held by women.

India was ranked 131 in the 2016 human development index among the 188 countries. India scored 0.624 and was placed in medium human development category.

Calculation of Human Development Index:

There are two steps to calculating the HDI-

  ✓ **Step-1:** Creating the dimension indices.
  ✓ **Step-2:** Aggregation the sub-indices to produce the HDI.

In the first step, the Minimum and Maximum values (Goalposts) are set in order to transform the indicators into indices between 0 and1.

Table 10.5.: Indicators of Human Development Index and its Maximum-Minimum value

Indicators	Minimum	Maximum
Life Expectancy at Birth	20	85
Mean Year of Schooling	0	18
Expected Years of Schooling	0	15
GNI	$100	$75000

Source: United Nations Development Programme (UNDP).

★ *Life expectancy Index:* $\frac{Actual-Minimum}{Maximum-Minimum}$

$$= \frac{68.3-20}{85-20}$$

$$= 0.743$$

★ *Mean Year of Schooling:* $\frac{Actual-Minimum}{Maximum-Minimum}$

$$= \frac{11.7-0}{18-0}$$

$$= 0.65$$

★ *Expected Years of Schooling:* $\frac{Actual-Minimum}{Maximum-Minimum}$

$$= \frac{6.3-0}{15-0}$$

$$= 0.42$$

★ **Education Index:** $\dfrac{(0.65 + 0.42)}{2}$

$$= 0.535$$

★ **GNI Index (PPP):** $\dfrac{log(Actual) - log(Minimum)}{log(Maximum) - log(Minimum)}$

$$= \dfrac{log(5663) - log(100)}{log(75000) - log(100)}$$

$$= \dfrac{3.753 - 2}{4.875 - 2}$$

$$= 0.609$$

HDI = GM of LI, EI and GNI Index:

$$= \sqrt[3]{0.743 \times 0.535 \times 0.609}$$

$$= 0.624$$

Table 10.6.: Very High Human Development Index

RANK 2016 estimates for 2015	Change in rank from previous year[1]	Country/Territory	2016 estimates for 2015	Change from previous year
1		Norway	0.949	0.001
2	1	Australia	0.939	0.002
2		Switzerland	0.939	0.001
4		Germany	0.926	0.002
5	1	Denmark	0.925	0.002
5	1	Singapore	0.925	0.001
7	1	Netherlands	0.924	0.001
8		Ireland	0.923	0.003
9		Iceland	0.921	0.002
10	1	Canada	0.92	0.001
10	1	United States	0.92	0.002
12		Hong Kong	0.917	0.001
13		New Zealand	0.915	0.002
14	1	Sweden	0.913	0.004
15	1	Liechtenstein	0.912	0.001
16		United Kingdom	0.909	0.001
17		Japan	0.903	0.001
18		South Korea	0.901	0.002
19		Israel	0.899	0.003
20		Luxembourg	0.898	0.002
21	1	France	0.897	0.003
22	1	Belgium	0.896	0.001
23		Finland	0.895	0.002
24		Austria	0.893	0.001
25		Slovenia	0.89	0.002
26	1	Italy	0.887	0.006
27	1	Spain	0.884	0.002
28		Czech Republic	0.878	0.003
29		Greece	0.866	0.001
30		Brunei	0.865	0.001
30	1	Estonia	0.865	0.002
32		Andorra	0.858	0.001
33	-1	Cyprus	0.856	0.002
33	2	Malta	0.856	0.003
33		Qatar	0.856	0.001
36		Poland	0.855	0.003
37		Lithuania	0.848	0.002
38		Chile	0.847	0.002
38		Saudi Arabia	0.847	0.002
40		Slovakia	0.845	0.003
41		Portugal	0.843	0.002
42		United Arab Emirates	0.84	0.004

43		Hungary	0.836	0.002
44		Latvia	0.83	0.002
45		Argentina	0.827	0.001
45	1	Croatia	0.827	0.004
47	1	Bahrain	0.824	0.001
48	1	Montenegro	0.807	0.003
49	1	Russia	0.804	0.001
50	1	Romania	0.802	0.004
51	1	Kuwait	0.8	0.001

Source: Human Development Index by United Nations Development Programme (UNDP), 2016.

Table 10.7.: High Human Development Index

RANK 2016 estimates for 2015	Change in rank from previous year[1]	Country/Territory	2016 estimates for 2015	Change from previous year
52	1	Oman	0.796	0.001
54		Barbados	0.795	0.001
54		Uruguay	0.795	0.001
56	1	Bulgaria	0.794	0.002
56		Kazakhstan	0.794	0.001
58		Bahamas	0.792	0.002
59		Malaysia	0.789	0.010
60	2	Palau	0.788	0.005
60		Panama	0.788	0.003
62	1	Antigua and Barbuda	0.786	0.002
63		Seychelles	0.782	0.001
64		Mauritius	0.781	0.002
65	1	Trinidad and Tobago	0.78	0.001
66		Costa Rica	0.776	0.001
66		Serbia	0.776	0.001
68	1	Cuba	0.775	0.003
69	1	Iran	0.774	
70	1	Georgia	0.769	0.001
71	1	Turkey	0.767	0.003
71	1	Venezuela	0.767	0.002
73	1	Sri Lanka	0.766	0.002
74	1	Saint Kitts and Nevis	0.765	0.003
75		Albania	0.764	0.002
76	2	Lebanon	0.763	
77		Mexico	0.762	0.004
78	1	Azerbaijan	0.759	0.001
79		Brazil	0.754	
79	1	Grenada	0.754	0.003
81	1	Bosnia and	0.75	0.003
82		Macedonia	0.748	0.002
83	1	Algeria	0.745	0.002
84	1	Armenia	0.743	0.002
84	3	Ukraine	0.743	0.005
86	1	Jordan	0.741	
87	2	Peru	0.74	0.003
87	1	Thailand	0.74	0.003
89	2	Ecuador	0.739	
90	1	China	0.738	0.004
91		Fiji	0.736	0.002
92	1	Mongolia	0.735	0.002
92	2	Saint Lucia	0.735	
94		Jamaica	0.73	0.001
95		Colombia	0.727	0.003
96	1	Dominica	0.726	0.002
97		Suriname	0.725	0.002
97		Tunisia	0.725	0.002
99	2	Dominican Republic	0.722	0.004
99		Saint Vincent and the Grenadines	0.722	0.002
101		Tonga	0.721	0.003

		World	0.717	
102	2	Libya	0.716	0.003
103		Belize	0.706	
104		Samoa	0.704	0.002
105		Maldives	0.701	
105	3	Uzbekistan	0.701	0.004

Source: Human Development Index by United Nations Development Programme (UNDP), 2016.

Table 10.8.: Medium Human Development Index

RANK 2016 estimates for 2015	Change in rank from previous year[1]	Country/Territory	2016 estimates for 2015	Change from previous year
109		Gabon	0.697	0.003
110		Paraguay	0.693	0.001
111		Egypt	0.691	0.003
111		Turkmenistan	0.691	0.003
113		Indonesia	0.689	0.003
114	1	Palestine	0.684	0.006
115		Vietnam	0.683	0.005
116	2	Philippines	0.682	0.003
117	2	El Salvador	0.68	0.002
118		Bolivia	0.674	0.003
119		South Africa	0.666	0.001
120		Kyrgyzstan	0.664	0.002
121		Iraq	0.649	
122		Cape Verde	0.648	0.002
123		Morocco	0.647	0.002
124		Nicaragua	0.645	0.003
125	1	Guatemala	0.64	0.003
125	1	Namibia	0.64	0.003
127	2	Guyana	0.638	
127	1	Micronesia	0.638	0.001
129		Tajikistan	0.627	0.002
130		Honduras	0.625	0.002
131		India	0.624	0.009
132		Bhutan	0.607	0.003
133		East Timor	0.605	0.002
134		Vanuatu	0.597	0.001
135		Republic of the Congo	0.592	0.003
135	2	Equatorial Guinea	0.592	0.010
137	1	Kiribati	0.588	0.002
138	1	Laos	0.586	0.004
139	1	Bangladesh	0.579	0.004
139	1	Ghana	0.579	0.004
139		Zambia	0.579	0.003
142		São Tomé and	0.574	0.009
143		Cambodia	0.563	0.005
144		Nepal	0.558	0.003
145	1	Myanmar	0.556	0.004
146	1	Kenya	0.555	0.005
147	1	Pakistan	0.55	0.002

Source: Human Development Index by United Nations Development Programme (UNDP), 2016.

Table 10.9.: Low Human Development Index

RANK 2016 estimates for 2015	Change in rank from previous year[1]	Country/Territory	2016 estimates for 2015	Change from previous year
148	1	Swaziland	0.541	
149	4	Syria	0.536	0.017
150		Angola	0.533	0.002
151	1	Tanzania	0.531	0.012
152	1	Nigeria	0.527	0.002
153	1	Cameroon	0.518	0.004
154	1	Papua New Guinea	0.516	0.001
154	4	Zimbabwe	0.516	0.009

156	1	Solomon Islands	0.515	0.002
157	2	Mauritania	0.513	
158	1	Madagascar	0.512	0.001
159	3	Rwanda	0.498	0.005
160		Comoros	0.497	0.001
160	1	Lesotho	0.497	0.002
162	1	Senegal	0.494	0.003
163	1	Haiti	0.493	0.003
163	2	Uganda	0.493	0.005
165		Sudan	0.49	0.002
166	1	Togo	0.487	0.003
167	1	Benin	0.485	0.004
168	9	Yemen	0.482	0.017
169		Afghanistan	0.479	
170		Malawi	0.476	0.003
171	1	Ivory Coast	0.474	0.008
172	1	Djibouti	0.473	0.003
173		Gambia	0.452	0.002
174		Ethiopia	0.448	0.007
175		Mali	0.442	0.004
176	2	Congo, Democratic	0.435	0.010
177		Liberia	0.427	
178	1	Guinea Bissau	0.424	0.003
179	2	Eritrea	0.42	0.002
179	3	Sierra Leone	0.42	0.011
181	1	Mozambique	0.418	0.004
181	2	South Sudan	0.418	0.003
183	1	Guinea	0.414	
184		Burundi	0.404	0.002
185		Burkina Faso	0.402	0.003
186		Chad	0.396	0.002
187		Niger	0.353	0.002
188		Central African	0.352	0.005

Source: Human Development Index by United Nations Development Programme (UNDP), 2016.

Why India falls in Medium Index?

The regional disparities in education, health and living standards within India- or inequality in human development shave of 27% from India's HDI score.

- India's HDI was pegged at 0.624 but its value result falls 27.2% after being adjusted from inequality.
- Life expectancy adjusted with inequalities between 2010 and 2015fell 54% resulting in a value of 0.565.
- The percentage of inequality in education in 2015 was 39.4% or 0.324 and inequality in income 16.1% or 0.512.

What should India do to improve ranking?

➢ India needed to address the three parameters of human development separately and simultaneously.
➢ Address the issues of malnutrition- A long and healthy life.
➢ Knowledge- Ensures access and quality through effective implementation of schemes such as digital India and skill India.
➢ For higher standard of living-
   ▪ Ensure that work is quantitatively and qualitatively enhanced in the country.
   ▪ NREGA
   ▪ Reform the rigid labour market governed by obsolete laws, addresses problems of child labour and forced labour and brings about wage equality.

Table 10.10.: District wise Human Development Indices for West Bengal (2004)

Sl.No.	District	Health Index	Income Index	Education Index	HDI	HDI Rank
1	Darjeeling	0.731	0.356	0.714	0.65	4
2	Jalpaiguri	0.614	0.281	0.581	0.53	10
3	Koch Behar	0.497	0.287	0.628	0.52	11
4	Dinajpur	0.616	0.291	0.527	0.51	13
5	Malda	0.491	0.291	0.465	0.44	17
6	Murshidabad	0.566	0.176	0.527	0.46	15
7	Birbhum	0.533	0.178	0.595	0.47	14
8	Bardhaman	0.74	0.27	0.669	0.64	5
9	Nadia	0.649	0.215	0.653	0.57	9
10	North 24 Parganas	0.721	0.219	0.752	0.66	3
11	Hugli	0.764	0.259	0.72	0.63	6
12	Bankura	0.662	0.215	0.605	0.52	11
13	Purulia	0.606	0.161	0.506	0.45	16
14	Medinipur	0.683	0.323	0.728	0.62	7
15	Haora	0.773	0.194	0.742	0.68	2
16	Kolkata	0.824	0.32	0.783	0.78	1
17	South 24 Parganas	0.705	0.192	0.666	0.6	8
	West Bengal	**0.697**	**0.27**	**0.681**	**0.61**	

Source: West Bengal Human Development Report, 2004.

Table 10.11.: District wise Gender Development Indices for West Bengal (2004)

Sl.No.	District	Health Index	Income Index	Education Index	GDI	Rank
1	Darjeeling	0.731	0.356	0.714	0.6	2
2	Jalpaiguri	0.614	0.281	0.581	0.492	11
3	Koch Behar	0.497	0.287	0.628	0.471	13
4	Dinajpur	0.616	0.291	0.527	0.478	12
5	Malda	0.491	0.291	0.465	0.416	17
6	Murshidabad	0.566	0.176	0.527	0.423	16
7	Birbhum	0.533	0.178	0.595	0.435	14
8	Bardhaman	0.74	0.27	0.669	0.56	7
9	Nadia	0.649	0.215	0.653	0.506	9
10	North 24 Parganas	0.721	0.219	0.752	0.564	6
11	Hugli	0.764	0.259	0.72	0.581	3
12	Bankura	0.662	0.215	0.605	0.494	10
13	Purulia	0.606	0.161	0.506	0.424	15
14	Medinipur	0.683	0.323	0.728	0.578	4
15	Haora	0.773	0.194	0.742	0.57	5
16	Kolkata	0.824	0.32	0.783	0.642	1
17	South 24 Parganas	0.705	0.192	0.666	0.521	8
	West Bengal	**0.697**	**0.27**	**0.681**	**0.549**	

Source: West Bengal Human Development Report, 2004.

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Application of Remote Sensing (RS) and Geographical Information System (GIS) in Geography

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:: Remote Sensing (RS) ::

Remote Sensing (RS) refers to the branch of science which derives information about objects from measurements made from a distance i.e. without actually coming into contact with them. Conventionally Remote Sensing deals with the use of light i.e. electromagnetic radiation as the medium of interaction. RS refers to the identification of earth features by detecting the characteristics electromagnetic radiation that is reflected by the earth surface. Every object reflects a portion of electromagnetic radiation incident on it depending upon its physical properties. In addition, objects also emit electromagnetic radiation depending upon their temperature & emissivity. Reflectance pattern at different wave lengths for each object is different. Such a set of characteristics is known as spectral signature of the object. Visual perception of objects is the best example of Remote Sensing.

Stages in Remote Sensing:

1) Requirement of an energy source (Sun is the main source of energy during day time),
2) Energy interaction with the atmosphere,
3) Interaction with the target,
4) Recording of energy by sensor,
5) Data transmission & processing,
6) Image processing & analysis,
7) Application.

Advantages of the Remote Sensing:

The major advantages of remote sensing over ground based methods are -

a) *Synoptic view:* It facilitates the study of various features of earth surface in their spatial relation to each other & helps to delineate the required features & phenomenon.
b) *Accessibility:* It makes it possible to gather information about inaccessible areas where it is not possible to gather information through ground surveys.
c) *Time:* These techniques save time & efforts as information about large area can be gathered quickly.
d) *Multidisciplinary applications:* Remote sensing data are useful to different disciplines such as geology, fisheries, forestry, land use etc.

Remote Sensing Applications and Uses:

1. *3-D mapping at uranium enrichment site:*
   In various uranium enrichment sites in Iran, multiple satellite acquisitions and 3-D mapping systems are used to differentiate between volumes. This process has proven successful and spreading heavily.

2. *Arial photography for military surveillance:*

Bavarian pigeon corps was used by German military in order to spy on enemy positions to accomplish their dirty work. However, this method was not proven so efficient and left behind some hard lessons for Germans.

3. *Assessment of condition of rural roads:*

Rural road conditions are now possible to be a sessed using various Remote Sensing techniques and GIS technique with inch to inch accuracy. It saves whole a lot time and money of transporters.

4. *Assessment of fuel economy:*

Satellites have now become capable of measuring vehicle emissions including CO, HC, NO, etc. without much interference from the space. Governments are using this technique for putting pressure on vehicle owners to make them follow emission standards.

5. *Assessment of train stability:*

In interferometer technology, landscape deformation is measured with sensors using phase differences. This technique is mostly used in sectors of oil and gas in order to measure train technology.

6. *Building base map for visual reference:*

Many modern mapping technologies are based on Remote Sensing including Google maps, Bing maps, open street maps, NASA's Globe view, etc.

7. *Calculating snow pack:*

To understand snow melt ratio, NASA uses LIDAR along with a spectrometer in order to measure the absorption of sunlight. This can be easily understood by using Remote Sensing technology.

8. *Collecting earth's pictures from space:*

NASA has a 75 page collection containing images of earth. Interesting patters of earth's geometry including oceans, atmosphere, land, etc can be seen in it. EO-1, Terra and Land sat are used to collect this data.

9. *Conserving lakes and rivers:*

Wooded areas along with the waters are the final line of defense constantly protecting lakes and rivers from running off. There riparian zones also require some assistance. High resolution satellites are used to observe them since they are spread on entire globe.

10. *Controlling forest fires:*

Data acquired by satellites using Remote Sensing enables fire-fighters to be dispatched on time and over accurate locations so the damage from such fires can be decreased to minimal.

11. *Counting polar bears:*

Polar bears are on the top in the list of animals that would extinct due to global warming. Ecologists use satellite images as a trusted and primary source for counting them for their survival.

12. *Creating automatic road networks:*

Up to date data regarding to road networks are important for emergency services, urban planning and navigation systems as well. Multispectral image sensing technology and object base classification technology is used to develop automated road networks that serve useful information for groups described above.

13. *Delineating watersheds:*

DEMs (digital elevation model) are prepared using hydrologists' Remote Sensing technology that represents the flow and location of water body.

14. *Detecting land cover and land use:*

Remote Sensing technologies are used to determine various physical properties of soil (land cover) and also how it is being utilized or what it is being used for (land use).

15. *Developing biodiversity in parks:*

Remote Sensing technology is important for maintaining parks since it can map landscape changes. Mapping biodiversity, invasive species and predicting fire risks are some of the main park Remote Sensing applications.

16. *Developing online mapping services:*

It is hard to find a person who has not yet used Google earth, Bing maps or Open street maps. These technologies are too based on Remote Sensing technology. They provide an interface with up to date imaginary without costing us a single penny. It makes it quite efficient to check out locations you are going to visit or find some locations along with the directions to go there. GPS too use this system for providing user interface on the screen.

17. *Elevation and contours derivation:*

Remote Sensing technology named photogrammetry is used in contour mapping, developing surface models, conducting volumetric surveys and developing 3d maps. This same technique is also used in crime scene mapping, archaeology and architecture.

18. *Estimating surface elevation:*

NASA's SRTM (Shuttle Radar Topography Mission) is capable of scanning entire globe in mare 11 days. A Remote Sensing technology named inter-aerometric synthetic aperture radar is used in it.

19. *Exploring and navigating arctic:*

Arctic is possible the last frontier of human development with multiple countries claiming for it. There are performed heavy duty task using Remote Sensing technologies such as ice monitoring, ship tracking, national defense, etc.

20. *Extracting mineral deposits:*

Earth holds more than 4000 natural elements, each with their unique chemical composition and spectral reflectance. Hyperspectral remote sensing technology helps to build potential map of these minerals.

21. *Figuring out habitat suitability for pandas:*

99% of regular panda diet is bamboo. Habitat is really important for these rare animals. Remote sensing technologies such as fragmentation and corridor mapping are used for protecting endangered pandas.

22. *Finding missing bodies (0_o):*

Remote sensing technology is used in operations for finding missing people since they can sense anomalies on the ground and narrow down the search area greatly so that time, money and human power is saved.

23. *Fishing activities:*

Fishermen save a lot of time and fuel by using satellites to monitor sea surface. In this process, remote sensing technology is used to observe surface colour and temperature to derive areas full of fishes.

24. *Forecasting weather:*

GOES12, 13, 14 and 15 are used to forecast and monitor weather. It is important for business, tourism and other important industries. Remote sensing is being used for forecasting weather since 1975.

25. *Geology of Earth's surface:*

Bedrock, lithological and structural mapping are some famous geological remote sensing applications. RADAR and multispectral spectral reflectance have managed to derive valuable information in the field.

26. *Identifying crop conditions:*

Satellite imagery and normalized difference vegetation index technologies are used in order to monitor global fool supplies. Healthy crops are reflected green where other areas are red or blue otherwise.

27. *Improving air traffic control:*

Satellite based GPS system is used to maintain the flow of air traffic. It avoids the use of ground based radar so that money is saved and routes are improved alongside with improved safety.

28. *Inspecting and migrating bird prevalence:*

Light weight GPS telemetry techniques are used to derive migration location of birds. Remote sensing technologies such as LIDAR, multispectral and radar are also useful in such processes.

29. *Lift irrigation system:*

A wide range of data is required to design lift irrigation systems for improving water supplies for agriculture and other industries. Full view of the ground can be acquired with satellite before construction begins.

30. *Locating construction and building alteration:*

Satellite data is used in several countries including Athens, Greece, etc by Tax revenue agencies. They locate signs of wealth using this technology. Back into the year of 2013, there were 15000 swimming pools (unclaimed to steal taxes) in those countries. Remote sensing is being used by these countries in order to increase tax revenue.

31. *Locating ghost cities:*

There are many build apartments, malls, residential areas china with no people. Satellites use remote sensing techniques to find such areas and indicate how legit or dummy the economic growth is.

32. *Managing City assets and safety:*

LIDAR is used by many companies for the purpose of managing their assets and also for ensuring safety. LIDAR data and municipal data are compared to make sure that every construction is permitted and safe.

33. *Mapping out ocean floors:*

ESA's Cryostat-2 and NASA's Jason1 are involved in the activity of mapping out mountains and objects of ocean floor using remote sensing applications revealing seafloor topography as well.

34. *Mapping soil types:*

International soil resource and information centre uses MODIS imagery remote sensing technology to map soil types for agricultural predictions and planning to improve the future results.

35. *Marine life and environmental preservation:*

Oil slicks cause noticeable damage to marine life and surrounding environmental. With remote sensing technology, ocean and weather forecast can be obtained to locate oil spills and determine oil direction and spread ratio.

36. *Measuring Albedo:*

Albedo is considered an important factor for radiation budget of earth. Satellites assign an Albedo value to each land cover. This value is them multiplied by land cover type and then summed up to get final results.

37. *Measuring gravity level:*

GRACE satellites (gravity recovery and climate experiment) are used to keep track on gravity levels around the globe. Gravity pulls over one satellite are tracked with microwave pulses of another satellite to acquire accurate results.

38. *Measuring protest size:*

Remote sensing technology help to estimate the size of the crowd and areas effected with the protest. This technique save quite a lot time of journalists and give them details without physical being in the chaos.

39. *Measuring soil moisture content:*

Active and passive sensors of a satellite in the space are used in order to determine soil moisture content. Many earth sciences such as water cycle, drought, and flood are based on content of soil moisture. There are two ways of determining moisture of the soil from space as following:
- Active sensors,
- Passive sensors.

40. *Measuring sea levels:*

This is one of the most large scale applications of remote sensing technology. Remote sensing data is used by satellites in order to measure sea levels with accuracy of inches. There would be no requirement of going to the sea shore and measuring the sea level with you measure scale.

41. *Measuring wind speed and direction:*

NASA's Quick SCAT scatter meter and wind LIDAR make large scale wind operations for providing accurate wind information to golfers, farmers, pilots, engineers and turbine planners.

42. Monitoring environment:

Copernicus program launched by European Space Agency aims to use various remote sensing technologies in order to obtain a complete autonomous monitoring system that can be used to understand overall health of earth.

43. Monitoring human impact over globe:

Landscape changes are nowadays observed quite easily and efficiently. It is considered longest observations. Records old more than 30 years old are also available. Main observation objects are oil spills, wars, chemical spills, dead zones, etc.

44. Monitoring ocean flow:

Current on the surface of the ocean are controlled by wind however deep in the ocean they are controlled by salinity and temperature. OSCAR a remote sensing technology is used to monitor them with max possible accuracy.

45. Monitoring oil reserves:

High spatial resolution imagery is used for this purpose. In this remote sensing application, satellite imagery is used without even requiring to physically measuring the tank.

46. Monitoring sediment transport:

Major industries like fisheries, tourism and ecology are affected due to sediment transport in rivers and lakes. Repeated coverage and temporal analysis are done using remote sensing technologies to measure nutrients loading in water bodies.

47. Navigating ships:

With the improvement in ship navigation, GPS is not the only tool used. Along with GPS, other remote sensing technologies such as routing analysis, wind, wave information, ship proximity are used to save ships from sinking on iceberg.

48. Observing algae growth:

Hyperspectral sensing technology is used by NASA to observe biochemical properties of algae blooms and make prediction of their locations which may affect lake's health.

49. Observing aurora borealis (from different angles though):

Satellites have made it possible to observe aurora borealis from up above rather than the ground. These different colours are nothing but reflecting gases with sunlight and magnetic force of earth.

50. Observing biodiversity:

Spatial and spectral resolution sensor technologies are used in the field biodiversity. LIDAR are used to make hyperspectral structure and 3d vegetation structures.

51. Observing climate changes:

Remote sensing satellites such as MODIS, CERES, AMSRE, TRMM and MOPITT has made it possible to observe climate changes from up above the skies. It is also possible to compare past climate situation with current one.

52. Observing glacier melts and sea levels:

GRACE satellite of NASA is responsible for monitoring melting level of glacier located on Alaskan and Polar Regions since rapid melting ice is scarily causing increased sea level all around the globe.

53. Observing groundwater activities in well:

Remote sensing technology observers rock types, soil, land use and rainfall, etc. This data is then used to derive well sites on zone maps.

54. Observing live volcanoes:

Remote sensing technologies such as thermal sensing and mid infrared sensing are used to monitor activities of active volcanoes. AVHRR and MODIS are main satellites involved in this activity.

55. Optimizing telecom network capacity:

Remote sensing technologies serve as a cost effective way for telecommunication companies in order to track and optimize network requirements. Appropriate antenna, location and direction are used to augment radio frequency coverage.

56. **Population growth in urban areas:**

Population growth within a city is predicted using remote sensing satellite by observing land use. It is accurate and works for a defined area.

57. **Positioning you on earth (its GPS brush):**

Global positioning satellites were introduced in May, 2000. Since then, it has been constantly evolving and accuracy was increased. It is an important application of remote sensing since it is included in top 50 innovations after wheel.

58. **Predicting famine:**

Early famine signs are important for governments so that they can deliver food in areas affected with shortage. R S satellites SMAP and SMOS are capable of understanding flooding and drought.

59. **Predicting potential landslides:**

Around the globe, landslides cause noticeable death and wealth loss. INSAR uses interferometry remote sensing technique for providing early warning regarding to potential landslides.

60. **Preserving wetland ecosystems:**

Wetlands are resources for pure water; they act as flood controls and are consistently decreasing and being lost. Remote sensing technology is not consistently being evolved to monitor and track their progress in order to get them survive.

61. **Quantifying post-earthquake damage:**

Earthquake damage assessment is important for rescue workers in a quick and accurate manner. Object images of pre and post earthquake are compared using remote sensing satellites for quick assessment of earthquake damage.

62. **Recognizing buildings:**

Remote sensing technology such as irresistible magnetism allow to observe maps (3d) at a 45 degree angle making it easy to identify land figures such as buildings. Google and Bing have already implemented such functionality.

63. **Reducing traffic jams:**

Remote sensing techniques are used to monitor traffic density and changes. This data is useful for manipulating traffic directions and flow within an area to make sure jam level is minimal.

64. **Restricting diseases from spreading in epidemiology:**

Some diseases are strongly related with climate, land use and air. Remote sensing technologies are used to figure out areas where these diseases are much likely to happen. These data are useful for putting a stopover certain diseases.

65. **Restricting illegal forest cutting:**

In tribal areas, tools like Google Earth, smart phones and GPSs are used to keep an eye over illegal activities such as mining and logging in order to restrict them. Remote sensing satellite technologies are heavily implemented for observing illegal wood cutting.

66. **Self-driving mode for vehicles:**

Multiple remote sensing technologies including RIDAR and GPS are used in self driving car along with precocious piece of software. Whole concept of autonomous vehicles is based on these technologies.

67. **Solar panel energy optimization:**

Global horizontal irradiance map is required when determining best position to install solar panels around the globe. This map indicates the amount of solar rays for a particular location. This map is acquired using remote sensing technology such as GOES and Meteosat.

68. **Spotting undeclared nuclear power plants:**

International atomic energy association plants to verify presence of undeclared atomic plants using remote sensing technologies. It is quite easy task for satellites since these plants contain circular structure of cooling tower with releasing thermal emission.

69. **Supplying clean drinking water:**

Simple remote sensing application named base maps are used to keep an eye on where and how much water shortage exist. This information is then used as a base for building further plans.

70. *Tracking air quality in lower atmosphere:*

Carbon monoxide is the most major pollutant in global pollution. It cannot be seen by naked eyes; however, infrared radiation can be measured using a spectrometer that is used by a satellite of NASA named MOPITT.

71. *Tracking and helping refugees:*

Satellite imagery was used by UNHCR in order to track accurate situation of refugees so a proper aid can be delivered to them. Aid and help were greatly optimized to proper location using this technology.

72. *Tracking and monitoring hazards:*

Remote sensing technology is heavily implemented in order to figure possible damage from hazards so a proper dispatch and response can be planned. Main goal is to avoid damage as far as possible.

73. *Tracking urban growth:*

Urbanization is at its peak nowadays and especially in developing countries. Surfaces observed through satellites are useful for tracking the progress of this well-known phenomenon. As Estimation, 50 percent people from most developed country live in urban areas compared to tribal one.

74. *Understanding wildebeest migration:*

NDVI and SLOPE are used to model wildebeest movement patterns. So, their location of migration can be found to study their birth-giving activities.

75. *Using radars for charging higher insurance premiums:*

Remote sensing technologies such as radars and hydrological modelling, geographers can figure out what areas are more prone to flooding. Moreover, they can also determine possible damage and frequency of flooding.

:: *Geographical Information System (GIS)* ::

- GIS may be defined as the integration of computer hard & software with spatially referred digital data so that storage, retrieval, manipulation, analysis and display all forms of geographically referenced information.
- GIS is a computer assisted system that can input, store, retrieve, analyse & display geographically referenced information useful for decision making.

The definition of GIS is not that important but it must encompass -

i. Data & concepts concerned with spatial distribution (Geographical).
ii. Notion of conveying data, ideas or analysis (Information).
iii. Sequence of inputs, processes & outputs (System).

Geographic reference concepts:

Available maps of different thematic layers are used to create GIS. The maps are in two dimension where as the earth's surface is a 3- dimensional ellipsoid. Every map has a projection & scale. Geo-referencing concepts need to be understood to know how maps are created by projecting the 3-dimension earth's surface into a 2-dimensional plane of analogue map. Geo-referencing involves two stages -

i. Specifying the 3-dimensional co-ordinate system that is used for locating points on the earth's surface that is Geographic Co-ordinate system,
ii. Projected co-ordinate system used for projecting into two dimensional analogue maps.

Components of GIS:

GIS runs on the whole spectrum of computer hardware ranging from portable personal computers to a multi-user supercomputer & is programmed in a wide variety of software languages. There are number of elements that are essential for effective GIS operation.

1. The presence of a processor with sufficient power to run the software.
2. Sufficient memory for storage of large volume of data.
3. A good quality high resolution colour screen.
4. Data input & output devices.
5. Liveware.

Functions of GIS:

a. Data pre-processing, manipulation & retrieval,
b. Data analysis,
c. Data display,
d. Database management.

Advantages of GIS:

- It helps the planners in efficient & cost effective decision making based on multiple scenarios available.
- GIS allows integration of all types of data together based on geographical & locational components of data.
- GIS is application oriented.
- Frequent revision of digitized GIS data is possible.
- Changes over time can easily & rapidly monitor through GIS.
- GIS technology enables high quality output.
- Spatial patterns & processes can be effectively described & explained by GIS.

Important GIS Applications and Uses:

1. *Accident Analysis and Hot Spot Analysis:*

    GIS can be used as a key tool to minimize accident hazard on roads, the existing road network has to be optimized and also the road safety measures have to be improved. This can be achieved by proper traffic management. By identifying the accident locations, remedial measures can be planned by the district administrations to minimize the accidents in different parts of the world. Rerouting design is also very convenient using GIS. It also determined and analysis Hot Spot activity over the World.

2. *Agricultural Applications:*

    GIS can be used to create more effective and efficient farming techniques. It can also analyze soil data and to determine: what is the best crop to plant? where they should go? How to maintain nutrition levels to best benefit crop to plant? It is fully integrated and widely accepted for helping government agencies to manage programs that support farmers and protect the environment. This could increase food production in different parts of the world so the world food crisis could be avoided. So, GIS can help major applications in the field of Agriculture. It also calculated Crop Productivity Index and Cropping Pattern.

3. *Coastal Development and Management:*

    The coastal zone represents varied and highly productive ecosystem such as mangrove, coral reefs, see grasses and sand dunes. GIS could be generating data required for macro and micro level planning of coastal zone management. GIS could be used in creating baseline inventory of mapping and monitoring coastal resources, selecting sites for brackish water aquaculture, studying coastal land forms.

4. *Coastal Vegetation Mapping and Conservation:*

    Coastal vegetations like Mangroves are the protectors of coast from natural hazards like tsunami, so that the conservation of this vegetation is highly important. GIS enable us to map which are having higher density of vegetation and which area need more vegetated? Integration of these details to coastal zone mapping helps to identify the area prone to coastal erosion and we can plant more vegetation to reduce coastal erosion.

5. *Collection of Information about Geographic Features:*

GIS is not simply a computer system used for making maps. A map is simply the most common way of reporting information from a GIS database. So these systems are not only for creating maps but also most importantly the collection of information about the geographic features such as building, roads, pipes, streams, ponds and many more that are located in your community.

6. *Crime Analysis:*

GIS is a necessary tool for crime mapping in law enforcement agencies worldwide. Crime mapping is a key component of crime analysis. Satellite images can display important information about criminal activities. The efficiency and the speed of the GIS analysis will increase the capabilities of crime fighting.

7. *Desertification:*

Desertification is the land degradation due to climatic variations or human activities. GIS can provide the information of degraded land which can be managed by governmental agencies or by the communities themselves. GIS plays a vital role to reduce the desertification, the local governments are now widely depends on GIS for reducing desertification. With location based GIS analysis we can find where or which area is suitable for planting new vegetation and which area for the pipeline construction.

8. *Detection of Coal Mine Fires:*

GIS technology is applied in the area of safe production of coal mine. Coal mine have developed an information management system, the administrators can monitor the safe production of coal mine and at the same time improve the abilities to make decisions. Fire happens frequently in coal mines. So it can assessed spontaneous combustion risk using GIS tools.

9. *Determine land use/land cover changes:*

Land cover means the feature that is covering the barren surface .Land use means the area in the surface utilized for particular use. The role of GIS technology in land use and land cover applications is that we can determine land use/land cover changes in the different areas. Also it can detect and estimate the changes in the land use/ land cover pattern within time. It enables to find out sudden changes in land use and land cover either by natural forces or by other activities like deforestation.

10. *Development of Public Infrastructure Facilities:*

GIS is a valuable tool that helps in the Public infrastructure facilities. GIS has many uses and advantages in the field of facility management. GIS can be used by facility managers for space management, visualization and planning, emergency and disaster planning and response. It can be used throughout the life cycle of a facility from deciding where to build to space planning. Also it provides facilitate better planning and analysis.

11. *Disaster and Business Continuity Planning:*

Viewing building and locations assets along with emergency information such as weather patterns, and disaster zones, can provide organizations the required information to make better decision. GIS provide holistic understanding of facility status and performance, and brings together department, business systems, and data source for a comprehensive view into and throughout the organization.

12. *Disaster Management and Mitigation:*

Today well-developed GIS systems are used to protect the environment. It has become an integrated, well developed and successful tool in disaster management and mitigation. GIS can help with risk management and analysis by displaying which areas are likely to be prone to natural or man-made disasters. When such disasters are identified, preventive measures can be developed.

13. *Economic Development:*

GIS technology is a valuable tool used for the economic development. It helps in site selection, suitability analysis, and for finding the right sites to locate new business and grow existing ones. Within economic development, GIS is used to support the emerging trend of economic gardening, a new way to foster local, regional and national economic growth by existing small business in the community.

14. *Energy Use Tracking and Planning:*

GIS is a valuable tool that helps in the planning organizing and subsequent growth in the energy and utilities industries. The effective management of energy systems is a complex challenge. GIS has enormous potential for planning, design and maintenance of facility. Also it provide improved services and that too cost effectively.

15. *Environment:*

The GIS is used every day to help protect the environment. The environmental professional uses GIS to produce maps, inventory species, measure environmental impact, or trace pollutants. The environmental applications for GIS are almost endless. It can be used to monitor the environment and analyze changes.

16. *Environmental Impact Analysis:*

EIA is an important policy initiative to conserve natural resources and environment. Many human activities produce potential adverse environmental effects which include the construction and operation of highways, rails, roads, pipelines, airports, radioactive waste disposal and more. Environmental impact statements are usually required to contain specific information on the magnitude and characteristics of environmental impact.

17. *Fire equipment response distance analysis:*

GIS can be used to evaluate how far (as measured as via the street network) each portion of the street network is from a firehouse. This can be useful in evaluating the best location for a new firehouse or in determining how well the fire services cover particular areas for insurance ratings.

18. *Flood damage estimation:*

GIS helps to document the need for federal disaster relief funds, when appropriate and can be utilized by insurance agencies to assist in assessing monetary value of property loss. A local government need to map flooding risk areas for evaluate the flood potential level in the surrounding area. The damage can be well estimate and can be shown using digital maps.

19. *Forest Fire Hazard Zone Mapping:*

Forest is one of the important elements of the nature. It plays an important role in the local climate. Forest fires caused extensive damage to our communities and environmental resource base. GIS can effectively use for the forest fire hazard zone mapping and also for the loss estimation. GIS also help to capture real time monitoring of fire prone areas. This is achieved by the help of GNSS and satellite Remote Sensing.

20. *Geologic Mapping:*

GIS is an effective tool in geological mapping. It becomes easy for surveyors to create 3D maps of any area with precise and desired scaling. The results provide accurate measurements, which helps in several fields where geological map is required. This is cost effective and offers more accurate data, there by easing the scaling process when studying geologic mapping.

21. *GIS Applications in Geology:*

Geologists use GIS in a various applications. The GIS is used to study geologic features, analyze soils and strata, assess seismic information, and or create three dimensional (3-D) displays of geographic features. GIS can be also used to analyze rock information characteristics and identifying the best dam site location.

22. *GIS based Digital Taxation:*

In Local Governments, GIS is used to solve taxation problems. It is used to maximize the government income. For example, for engineering, building permits, city development and other municipal needs, GIS is used. Often the data collected and used by one agency or department can be used by another.

23. *GIS for Business:*

GIS is also used for managing business information based on its location. GIS can keep a track of where the customers are located, site business, target marketing campaigns, and optimize sales territories and model retail spending patterns. Such an added advantage is provided by the GIS to enhance in making companies more competitive and successful.

24. *GIS for Drainage Problems in Tea Plantation Areas:*

Drainage problem in tea plantation differ widely because of its varied nature of physical conditions. Tea crop requires moisture at adequate levels all times of its growth. Any variation either excess or lack has a direct impact on the tea yield. This become greatly influenced the productivity of tea. Required some hydraulic design to solve this problem such as design of drains, checking the adequacy of the river and classification of water logged areas etc.

25. *GIS for Fisheries and Ocean Industries:*

GIS tools add value and the capability to ocean data. ArcGIS is used to determine the spatial data for a fisheries assessment and management system. It is extensively used in the ocean industry area and we get accurate information regarding various commercial activities. To enhance minimizing cost for the fishing industry. Also it can determine the location of illegal fishing operations.

26. *GIS for Land Administration:*

In a number of countries, the separate functions of land administration are being drawn together through the creation of digital cadastral databases, with these database they can reuse land for suitable needs ,digital taxation and even utilities are also easily handle using these database.

27. *GIS for Planning and Community Development:*

GIS helps us to better understand our world so we can meet global challenges. Today GIS technology is advancing rapidly, providing many new capabilities and innovations in planning. By applying known part of science and GIS to solve unknown part, that helps to enhance the quality of life and achieve a better future. Creating and applying GIS tools and knowledge allow us integrating geographic intelligence into how we think and behave.

28. *GIS for Public Health:*

GIS provides the cost effective tool for evaluating interventions and policies potentially affecting health outcomes. GIS analysis, environmental health data is also helpful in explaining disease patterns of relationships with social, institutional, technological and natural environment. It can be understand the complex spatial temporal relationship between environmental pollution and disease, and identifying exposures to environmental hazards.

29. *GIS for Wildlife Management:*

Man-made destruction such as habitat loss, pollution, invasive species introduction, and climate change, are all threats to wildlife health and biodiversity. GIS technology is an effective tool for managing, analyzing, and visualizing wildlife data to target areas where international management practices are needed and to monitor their effectiveness. GIS helps wildlife management professionals examine and envision.

30. *GIS in Dairy Industry:*

Geographic Information System is used in a various application in the dairy industry, such as distribution of products, production rate, location of shops and their selling rate. These can be monitored by using GIS system. It can be also possible to understand the demand of milk and milk products in different region. GIS can prove to be effective tool for planning and decision making for any dairy industry. These advantages have added new vistas in the field of dairy farm and management.

31. *GIS in Mapping:*

Mapping is a central function of Geographic Information System, which provides a visual interpretation of data. GIS store data in database and then represent it visually in a mapped format. People from different professions use map to communicate. It is not necessary to be a skilled cartographer to create maps. Google map, Bing map, Yahoo map are the best example for web based GIS mapping solution.

32. *GIS Solutions in Banking Sector:*

Today rapid development occurs in the banking sector. So it has become more market driven and market responsive. The success of this sector largely depends on the ability of a bank to provide customer and market driven services. GIS plays an important role providing planning, organizing and decision making.

33. Infrastructure Development:

Advancement and availability of technology has set a new mark for professionals in the infrastructure development area. Now more and more professionals are seeking help of these technologically smart and improved information systems like GIS for infrastructure development. Each and every phase of infrastructure life cycle is greatly affected and enhanced by the enrolment of GIS.

34. Irrigation water management:

Water availability for irrigation purposes for any area is vital for crop production in that region. It needs to be properly and efficiently managed for the proper utilization of water. To evaluate the irrigation performance, integrated use of satellite remote sensing and GIS assisted by ground information has been found to be efficient technique in spatial and time domain for identification of major crops and their conditions, and determination of their areal extent and yield. Irrigation requirements of crop were determined by considering the factors such as evapo-transpiration, Net Irrigation Requirement, Field irrigation Requirement, Gross Irrigation Requirement, and month total volume of water required, by organizing them in GIS environment.

35. Knowledge Based System for Defense Purpose:

Regular analysis of terrain is essential for today's fast paced battlefield. Conventional method of studying paper topographical maps is being replaced by use of maps in digital form to get terrain information. It is increasingly being used to derive terrain information from digital images. Which help to the selection of suitable sites for various military uses more accurate and faster? The uses of GIS provide information regarding the terrain features which can be useful for planning today's war strategies.

36. Land Information System:

GIS based land acquisition management system will provide complete information about the land. Land acquisition managements is being used for the past 3 or 4 years only. It would help in assessment, payments for private land with owner details, tracking of land allotments and possessions identification and timely resolution of land acquisition related issues.

37. Landslide Hazard Zonation using GIS:

Landslide hazard zonation is the process of ranking different parts of an area according to the degrees of actual or potential hazard from landslides. The evaluation of landslide hazard is a complex task. It has become possible to efficiently collect, manipulate and integrate a variety of spatial data such as geological, structural, surface cover and slope characteristics of an area, which can be used for hazard zonation. The entire above said layer can well integrate using GIS and weighted analysis is also helpful to find Landslide prone area. By the help of GIS we can do risk assessment and can reduce the losses of life and property.

38. Lease Property and Management:

Revenue can be increased, operations and maintenance cost can be reduced when GIS is used to help manage space. Real estate and property managers can see and make queries about space including its availability, size and special constraints for the most cost effective use.

39. Locating Underground Pipes and Cables:

Pipe line and cable location is essential for leak detection. It can be used to understand your water network, conducting repairs and adjustments, locating leaks known distance for correlating etc. Pipelines are continually monitored, check for leak detection and avoid the problem of geo hazards.

40. Location Identification:

This technique is used to find a location for a new retail outlet. It helps to find out what exists at a particular location. A location can be described in many ways, using, for instance, name of place, post code, or geographic reference such as longitude or latitude or X/Y.

41. Monitor Deforestation:

Nowadays forest area is decreasing every year, due to different activities. GIS is used to indicate the degree of deforestation and vital causes for the deforestation process. GIS is used to monitor deforestation.

42. *Natural Resources Management:*

By the help of GIS technology the agricultural, water and forest resources can be well maintain and manage. Foresters can easily monitor forest condition. Agricultural land includes managing crop yield, monitoring crop rotation, and more. Water is one of the most essential constituents of the environment. GIS is used to analyze geographic distribution of water resources. They are interrelated, i.e. forest cover reduces the storm water runoff and tree canopy stores approximately 215,000 tons carbon. GIS is also used in afforestation.

43. *Navigation (routing and scheduling):*

Web-based navigation maps encourage safe navigation in waterway. Ferry paths and shipping routes are identified for the better routing. ArcGIS supports safe navigation system and provides accurate topographic and hydrographical data. Recently DNRs Coastal Resources Division began the task of locating, documenting, and cataloguing these no historic wrecks with GIS. This division is providing public information that makes awareness of these vessel locations through web map.

44. *Pipeline Route Selection:*

Pipeline route planning and selection is usually a complex task. GIS technology is faster, better and more efficient in this complex task. Accurate pipeline route selection brings about risk and cost reduction as well as better decision making process. GIS least cost path analysis have been effectively used to determine suitable oil and gas pipeline routes. An optimal route will minimize reduce economic loss and negative socio-environmental impacts.

45. *Regional Planning:*

Every day, planners use Geographic Information System (GIS) technology to research, develop, implement, and monitor the progress of their plans. GIS provides planners, surveyors, and engineers with the tools they need to design and map their neighbourhoods and cities. Planners have the technical expertise, political savvy, and fiscal understanding to transform a vision of tomorrow into a strategic action plan for today, and they use GIS to facilitate the decision-making process.

46. *Reservoir Site Selection:*

GIS is used to find a suitable site for the dam. GIS tries to find best location that respect to natural hazards like earthquake and volcanic eruption. For the finding of dam site selection the factors include economic factors, social considerations, engineering factors and environmental problems. These informations are layered in the GIS.

47. *River Crossing Site Selection for Bridges:*

The important geotechnical consideration is the stability of slope leading down to and up from the water crossing. It is advisable to collect historical data on erosion and sedimentation. On the basis of these information asses the amount of river channel contraction, degree of curvature of river bend, nature of bed and bank materials including the flood flow and the flow depth, all these can be done in GIS within estimated time and accurately. This information has been often used for river crossing site selection for bridges.

48. *Site Suitability for Waste Treatment Plant:*

There is an increasing amount of waste due to the over population growth. This has negative impact on the environment. With the help of GIS we can integrate various aspect layers in GIS and can identify which place is suitable for waste treatment plant. This process will reduce the time and it is cost effective. Also it enhances the accuracy. It provides a GIS analyst to identify a list of suitable dumping sites for further investigations. It also provides a digital bank for future monitoring program of the site.

49. *Snow Cover Mapping and Runoff Prediction:*

Systematic, periodical and precise snow cover mapping supported by GIS technology, and the organization of the results in a snow cover information system forms the basis for a wide range of applications. On the practical side, these applications are related to the monitoring of seasonal and yearly alterations of the snow cover under the presently existing climatic conditions, to simulate and forecast runoff, to map the regional distribution of the water equivalent, and to document the recession process of the snow cover during the melting period in its relation to geological features.

50. *Soil Mapping:*

Soil mapping provides resource information about an area. It helps in understanding soil suitability for various land use activities. It is essential for preventing environmental deterioration associated with misuse of land. GIS Helps to identify soil types in an area and to delineate soil boundaries. It is used for the identification and classification of soil. Soil map is widely used by the farmers in developed countries to retain soil nutrients and earn maximum yield.

51. *Space Utilization:*

GIS helps managers to organize and spatially visualize space and how it can best be used. Operational costs can be decreased by more efficiently using space including managing the moves of personal and assets as well as the storage materials. The 3-D visualization in GIS platforms helps planers to create a feeling of experience like virtual walk inside the building and rooms before construction.

52. *Surveying:*

Surveying is the measurement of location of objects on the earth's surfaces. Land survey is measuring the distance and angles between different points on the earth surface. An increasing number of national governments and regional organizations are using GNSS measurements. GNSS is used for topographic surveys where a centimetre level accuracy is provided. These data can be incorporated in the GIS system. GIS tools can be used to estimate area and also, digital maps can prepare.

53. *Telecom and Network services:*

GIS can be a great planning and decision making tool for telecom industries. GDi GISDATA enables wireless telecommunication organizations to incorporate geographic data in to the complex network design, planning, optimization, maintenance and activities. This technology allows telecom to enhance a variety of application like engineering application, customer relationship management and location based services.

54. *Tourism Information System:*

GIS provides a valuable toolbox of techniques and technologies of wide applicability to the achievement of sustainable tourism development. This provides an ideal platform tools required to generate a better understanding, and can serve the needs of tourists. They will get all the information on click, measure distance, find hotels, restaurant and even navigate to their respective links. Information plays a vital role to tourists in planning their travel from one place to another, and success of tourism industry. This can bring many advantages for both tourist and tourism department and improve information system.

55. *Traffic Density Studies:*

GIS can effectively use for the management of traffic problems. Today's population along with the road traffic is increasing exponentially. The advantage of GIS makes it an attractive option to be used to face the emerging traffic problems. By creating an extensive database that has all the traffic information such as speed data, road geometry, traffic flow and other spatial data and processing this information will provide us the graphical bigger picture for the traffic management.

56. *Transportation Planning:*

GIS can be used in managing transportation and logistical problems. If transport department is planning for a new railway or a road route then this can be performed by adding environmental and topographical data into the GIS platform. This will easily output the best route for the transportation based on the criteria like flattest route, least damage to habitats and least disturbance from local people. GIS can also help in monitoring rail systems and road conditions.

57. *Urban Planning:*

GIS technology is used to analyze the urban growth and its direction of expansion, and to find suitable sites for further urban development. In order to identify the sites suitable for the urban growth, certain factors have to consider which is: land should have proper accessibility, land should be more or less flat, land should be vacant or having low usage value presently and it should have good supply of water.

58. *Volcanic Hazard Identification:*

Volcanic hazard to human life and environment include hot avalanches, hot particles gas clouds, lava flows and flooding. Potential volcanic hazard zone can be recognized by the characteristic historical records of volcanic activities, it can incorporate with GIS. Thus an impact assessment study on volcanic hazards deals with economic loss and loss of lives and property in densely populated areas. The GIS based platforms enables us to find out the damage and rapid response against volcanic activities may helps to reduce the effect in terms of wealth and health of people.

59. *Wetland Mapping:*

Wetlands contribute to a healthy environment and retain water during dry periods, thus keeping the water table high and relatively stable. During the flooding they act to reduce flood levels and to trap suspended solids and attached nutrients. GIS provide options for wetland mapping and design projects for wetland conservation quickly with the help of GIS. Integration with Remote Sensing data helps to complete wetland mapping on various scale. We can create a wetland digital data bank with spices information using GIS.

60. *Worldwide Earthquake Information System:*

One of the most frightening and destructive phenomena of nature is the occurrence of an earthquake. There is a need to have knowledge regarding the trends in earthquake occurrence worldwide. A GIS based user interface system for querying on earthquake catalogue will be of great help to the earthquake engineers and seismologists in understanding the behaviour pattern of earthquake in spatial and temporal domain.

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ভূগোলে দূর সংবেদনের (RS) গুরুত্ব

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ভূগোল বলতে বুঝি, The description of the Earth. ভূগোলই আমাদের ধারনা দেয় গোটা বিশ্বের। এই বিষয় সংক্ষিপ্ত গন্ডির মধ্যে সীমাবদ্ধ নেয়। এই শাখাকে বিশ্বের দরবারে উন্নত করার জন্য Remote Sensing এবং GIS এর আবিষ্কার হয়েছে। এই ধরনের বিষয়, ভূগোলের অগ্রগতিতে এক নতুন পালক যুক্ত করেছে। এই বিষয় চার পাতার মধ্যে সীমাবদ্ধ বিষয় নয়, এই বিষয় হল মানুষের মনে যে সুপ্ত বাসনা থাকে, অজানা কে জানার অদেখা কে দেখার, সেই আগ্রহ বাড়িয়ে তুলবে।

Remote Sensing হল, যখন আমরা কোনো বস্তু কে কোনো রকম ভাবে না স্পর্শ করে উক্ত বস্তু সম্পর্কে জ্ঞান আহরণ করি। চিত্রের মাধ্যমে ভূগোল ব্যাখ্যা 1952 সাল থেকেই শুরু। USA র Officer of the Naval Research, 1960 সালে Remote Sensing নামটি পরিপূর্ণ ভাবে গ্রহণ করে। যে পদ্ধতির সাহায্যে দূর সংবেদনের ব্যাখ্যা করা হয় তার পদ্ধতি গত উপাদান গুলো হল –

ক) বিমান চিত্র ব্যবহার।

খ) মৃত্তিকাগত ব্যাখ্যা ও অন্যান্য বিজ্ঞানভিত্তিক ব্যাখ্যার মত ব্যবহার করা।

গ) বিভিন্ন বিজ্ঞানভিত্তিক বিষয়ের ব্যাখ্যা করার জন্য বিমান চিত্রের পূর্ণ ব্যবহার।

According to Geographers, "Remote Sensing is the technique used to obtain information about Earth's Surface and Atmosphere without having physical contact with the object of the studies, usually by means of radiation from electro spectrum".

Application of Remote Sensing:

Remote Sensing Application হল একটি software application যা Remote Sensing এর data পরিচালনা করে। Remote Sensing এর দ্বারা উপগ্রহ এবং বায়ুবাহিত সেন্সর তথ্য থেকে ভৌগোলিক তথ্য তৈরী করতে সক্ষম।

Remote Sensing Application এর মাধ্যমে একই এলাকার বিভিন্ন সময়ে নেওয়া ছবি থেকে সেই ছবি বিশ্লেষণ করা হয়। এছাড়াও ছবি এর pixel শ্রেণীবদ্ধকরন করা হয়।

　　i. *Weather forecasting:*
　　　　ভারতে আবহাওয়ার পূর্বাভাস দেওয়ার জন্য Remote Sensing খুবই জনপ্রিয়। মানুষের সচেতনতার কাজ করে Remote Sensing.

　　ii. *Environmental study:*
　　　　বনচ্ছেদন, অনুর্বর জমি, বায়ুমণ্ডলের দূষণের ওপর ব্যবহার করা যেতে পারে।

　　iii. *Resource exploration:*
　　　　ভূ-তাত্ত্বিক মানচিত্রগুলি যুগোপযোগী করতে বা খনিজ খননের জন্য জায়গা চিহ্নিত করতেও সাহায্য করে Remote Sensing. এছাড়াও জীবাশ্ম জ্বালানী আমদানির খোঁজেও সহায়ক।

iv. ***Land use Land cover mapping:***

Remote Sensing কোনো একটি অঞ্চলের Land use Land cover Map প্রস্তুত করতে সহায়ক। অঞ্চলের সার্বভৌম বিকাশের জন্য Remote Sensing ব্যবহার করা হয়।

v. ***Crop area estimation and land degradation monitoring.***

vi. ***Drought monitoring from space.***

vii. ***Ground water prospects.***

viii. ***Cyclone tracking.***

ix. ***Flood inundation study.***

x. ***Engineering application (Dam site selection, River crossing site selection for bridge).***

xi. ***Geologic hazard zone monitoring / mapping.***

xii. ***Forest fire hazard zone mapping.***

xiii. ***Assessment of land surface water.***

Remote Sensing Platforms:

Remote Sensing Platform হল, যে জায়গার ওপর ভিত্তি করে তথ্য সংগ্রহ করা হয়। Remote Sensing platform কে তিন ভাগে ভাগ করা যায়।

i. Ground level Remote Sensing: মাটির কাছাকাছি থাকে এই platform. যেমন – Hand held camera.

ii. Aerial Remote Sensing: এটি দুই ভাগে বিভক্ত –

    a) Low altitude aerial sensing.

    b) High altitude aerial sensing.

iii. Space borne Remote Sensing: দুই ভাগে বিভক্ত –

    a) Polar Orbiting Satellite.

    b) Geo-Stationary Satellite.

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Urban Poverty

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Poverty is defined as the deprivation of people from Health, Education, and Income etc. Urban Poverty is a multidimensional phenomenon. The Urban poor people live with many deprivations.

Urban poverty exists everywhere, although on different level, from poor to reach countries. Urban Poverty isn't just a collection of characteristics; it is also a dynamic condition of vulnerability of susceptibility to risks.

Urban poverty in India is over 25 percent; some 81 million people live in urban areas on incomes that are below the poverty level. At the national level, rural poverty remains higher than urban poverty, however the gap is closing. By 2030, urbanisation in India is projected to achieve 50 percent.

Source: India: Urban Poverty Report, 2009.

According to a 2001 census: India's cities have a slum population of 42.6 million (23.7 percent of the urban population).The majority (11.2 million) are in Maharashtra, whose capital city Mumbai is home to the Dharavi slum. Whereas the slum population has increased, the number of slums has decreased – resulting in greater density.

Urban poverty can be accurately measured in Multidimensional Poverty Index. This index was first published by Sabina Alkire and James foster.

Dimensions of Estimating Urban Poverty:

In the article "In search of a Multidimensional poverty index for Latin America" (J. M. Roche and M.E. Santos) – used three dimension of Health, Education and Standard of living and used ten indicators to find out the Urban poverty. This are-

1. **Health (each indicator weighted equally at 1/6):**
   a) **Child Mortality:** If any child has died in the family.
   b) **Nutrition:** If any adult or child in the family is malnourished.
2. **Education (each indicator weighted equally at 1/6):**
   a) **Years of Schooling:** If no household member has completed 5 years of schooling.
   b) **Child School:** Attendance if any school-aged child is out of school in years 1 to 8.
3. **Standard of Living (each of the six indicators weighted equally at 1/18):**
   a) **Electricity:** If household does not have electricity.
   b) **Drinking water:** If doesn't meet MDG definitions, or is more than 30 minutes walk.
   c) **Sanitation:** If does not meet MDG definitions, or the toilet is shared.
   d) **Flooring:** If the floor is dirt, sand, or dung.
   e) **Cooking:** Fuel if they cook with wood, charcoal, or dung.
   f) **Assets:** If don't own more than one of radio, TV, telephone, bike, motorbike or refrigerator and do not own a car or truck.

Form above these indicators we can find out head count ratio **(H)** and the average intensity of their poverty **(I)** and finally the Multi-dimensional Poverty index form as multiplying of **H** and **I** value.

A person or family is known as 'poor' if she/he or they deprived minimum of one third of the weighted indicators.

The measurement of *MPI* is identifying the most vulnerable people. *MPI* is very important rather than income poverty and it explains deprivation directly.

In "Multidimensional Poverty Index: an Application to the United States" (S. Dhongde and R. Haveman) – used 4 dimension of health, education, income and housing to find out the *MPI* value.

Characteristics of Poverty:

1. Urban poverty isn't essentially an indication of economic failures.
2. Internal migration isn't a significant variable explaining urban poverty.
3. Poor urban governance and inappropriate policy frameworks contribute to vulnerability of urban poor.
4. Urban conditions cannot be generalized across types of urban areas.
5. The concept of "city" itself is heterogeneous.
6. Urban poor is a very diverse group with different needs and levels/types of vulnerability.
7. Urban poverty is often characterized by cumulative deprivations.

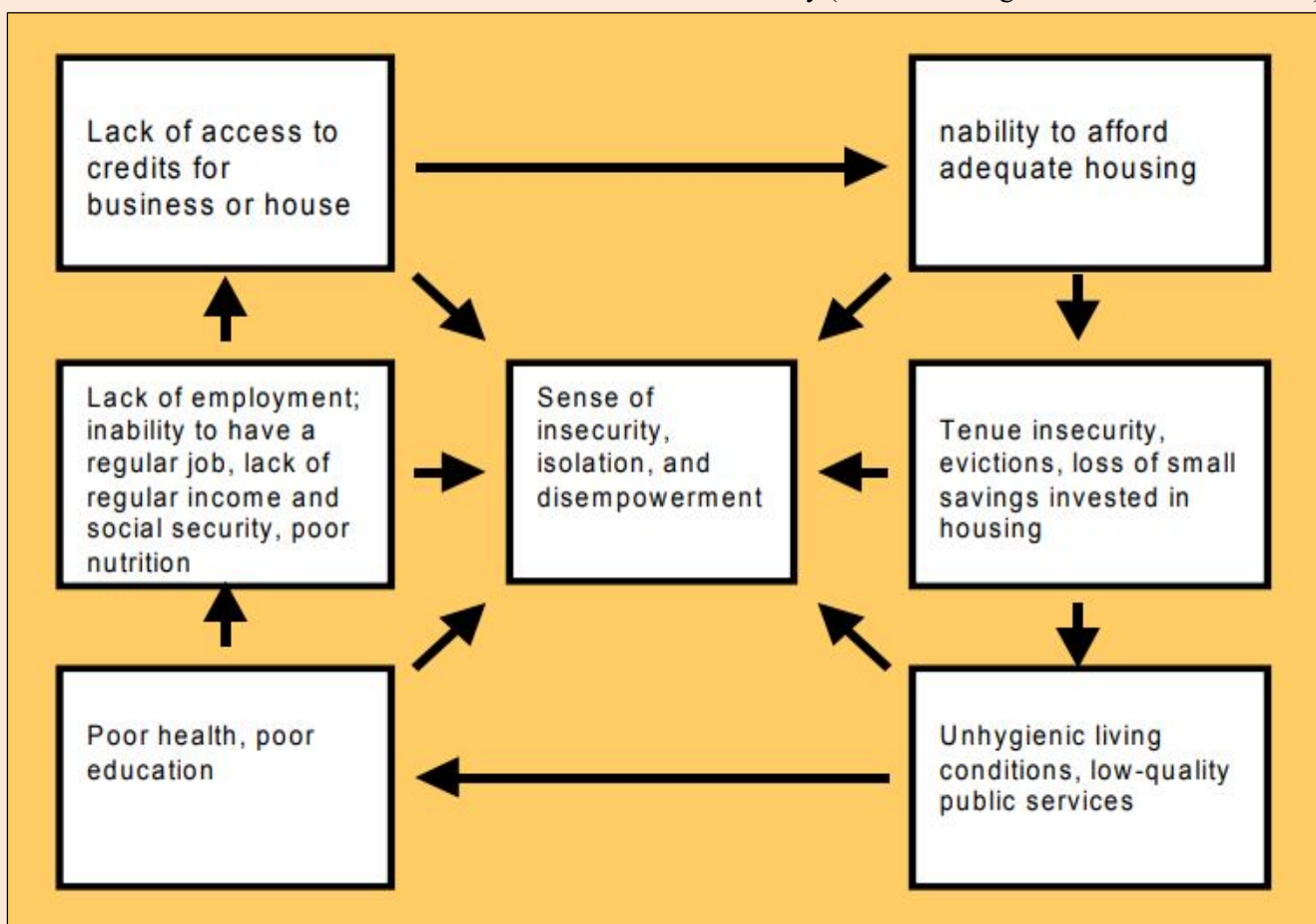*Source:* Urban Poverty (Deniz Baharoglu and Christine Kessides).

Fig. 13.1.: Impact of urban poverty.

Major Policies to Controls Urban Poverty:

1. Supporting tiny and micro-enterprises (SMEs).
2. Facilitating access to job opportunities and trainings.
3. Supporting urban agriculture.
4. Supporting home-based financial gain generating activities.
5. Safety nets.

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দৃশ্য দূষন: এক সামাজিক ব্যাধি

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ক্রমশ বেড়ে চলা নানারকম ঘটনাপ্রবাহ সমাজের অভ্যন্তরে প্রবেশ করে যখন সমাজের মূল স্তরটিকে নাড়িয়ে দিয়ে তাকে ক্ষতিগ্রস্ত করে এবং ব্যাপক অঞ্চল জুড়ে সমাজের অবক্ষয় হয় এবং সমাজ কে অসহিষ্ণু ও অসহনশীল করে তুলে তাই হল সামাজিক দূষন, যা ক্রমশ সামাজিক ব্যাধিতে পরিনত হচ্ছে এবং আমাদের সমাজ কে ক্রমশ ক্ষয়িষ্ণু করে দিচ্ছে।

এইরকম এক সামাজিক ব্যাধি, আমাদের প্রতিদিনের ঘটে চলা বিভিন্ন দৃশ্য, পোস্টার, বিদেশী কুরুচিকর অশ্লীল ছবি যখন টিভির পর্দায়, পোস্টার আকারে দেওয়ালে বা বিভিন্ন স্থানে দৃষ্টিগোচর হয় এবং এগুলি শিশু, কিশোর-কিশোরী এমনকি প্রাপ্তবয়স্ক ও প্রবীণদের মনেও অস্বস্তিকর ও খারাপ প্রভাববিস্তার করে তখন তা হয় দৃশ্য দূষন।

দৃশ্যদূষনের কারন খুঁজতে হলে কতকগুলি ক্ষেত্র কে আমাদের ধরতেই হয়, যেমন -

১. আজকাল টেলিভিশন, সিনেমা, ইন্টারনেট, কম্পিউটার প্রভৃতি অত্যাধুনিক বিনোদনের মাধ্যমে আমরা যে সকল বিজ্ঞাপন, কুরুচিকর ছবি, বিভিন্ন উত্তেজক দৃশ্য দেখতে পাই, যা দৃশ্য দূষন ঘটায়।

২. পথের ধারের গাছে বা খুঁটিতে ও রেলিং -এ যে বড়ো বড়ো বিভিন্ন হোর্ডিং, ব্যানার ও লিখন টাংগানো থাকে তা আমাদের রুচিশীল দৃশ্য কে ক্রমাগত আঘাত করে। কোলকাতার ব্যানারের জেরে আজকাল আকাশও সবুজ দেখনে পাওয়া যায় না বললেই চলে।

৩. বিভিন্ন বহুজাতিক কোম্পানি গুলি তাদের পন্যের বিক্রি বাড়ানোর উদ্দেশ্যে যে ভাবে স্বল্প-বাসনা, অর্ধনগ্ন নারীদের শরীরের প্রতিযোগিতা দেখায় তাতে পন্যটি গৌণ্য হয় এবং শরীর প্রদর্শিত ছবি গুলি মুখ্য হয়ে ওঠে। এগুলি যখন টিভির পর্দায় বা ব্যানারে আমরা দেখি তখন তা আমাদের রুচিশীল সংস্কৃতি কে আঘাত করে। যেমন বডি স্প্রে বিক্রেতা কোম্পানিগুলি।

৪. এ ছাড়াও বিভিন্ন টিভি সিরিয়ালে, সিনেমায় যে ক্রাইম দৃশ্যগুলি বারবার প্রদর্শিত হয় সেগুলি আমাদের দৃশ্য দূষনের কারন হয়।

বর্তমানে দৃষ্টি দূষন একটি মারাত্মক ব্যাধির আকার ধারন করেছে, বিভিন্ন উত্তেজক ছবি, কুরুচিকর পোষাক প্রভৃতির ব্যবহার বৃদ্ধির ফলে ভারতীয় সংস্কৃতি ক্রমশ খর্ব হচ্ছে। দৃশ্যদূষনের প্রভাব আজ অর্থাৎ বর্তমান শতাব্দীতে সর্বত্র ছড়িয়ে আছে। এর ফলে মানুষের সহনশীল, সহানুভূতিশীল অনুভূতিগুলি ক্রমশ কমে গিয়ে অসহিষ্ণু, দানব মনস্ক হয়ে উঠেছে। যেমন -

১. টেলিভিশন, সিনেমা, পোস্টারে ক্রমশ এই সব দৃশ্য দেখার পর শিশুমনে কুপ্রভাব পড়ে এবং তারা অস্বাভাবিক আচরন করতে শুরু করে, অনেক সময় এই প্রভাব এত বেশী হয় যে, শিশুটির কাউন্সিলিং এর প্রয়োজন হয়।

২. কিশোর-কিশোরীরা তাদের নিজস্ব সংস্কৃতির সঙ্গে পরিচিত না হয়ে তারা এক মিশ্র সংস্কৃতির জন্ম দেয়, যা তাদের পরবর্তী জীবনের জন্য সমস্যাদায়ক হয়। তারা এই সব কুরুচিকর পোষাক, সংলাপ, বিভিন্ন আদব কায়দা অবলম্বন করে ভারতীয় সংস্কৃতির বিলোপ ঘটায়।

৩. ক্রমশ দৃশ্যমান ক্রাইম দৃশ্যগুলি শিশুদের মনকে খুব প্রভাবিত করে এবং এগুলি অনেক সময় মানসিক অবসাদের কারন হয়ে দাঁড়ায়।

৪. মানুষের প্রতি শ্রদ্ধা কমে যাওয়া, নারীর প্রতি অসম্মান প্রদর্শন এসবই হল দৃশ্যদূষনের প্রভাব।

৫. মানুষের আদিম সত্তা হিংস্রতার স্বরূপটি ক্রমশ বেরিয়ে পড়ছে।

বিভিন্নভাবে দৃশ্যদূষন প্রতিরোধ করা যেতে পারে। যেমন -

১. আইনগত ভাবে বিভিন্ন ব্যবস্থা গ্রহন করে বেআইনি হোর্ডিং, ব্যানার, বিভিন্ন কুরুচিকর পোস্টারগুলি খুলে ফেলে সমাজ কে নির্মল করে তুলতে হবে।

২. বিভিন্ন অশ্লীল ও কুরুচিকর দৃশ্যগুলি যাতে যেতেচ্ছ পরিমানে টিভি বা সিনেমাতে ব্যবহৃত না হয় তার জন্য 'সেন্সর বোর্ড' কে আরো সক্রিয় হতে হবে।

৩. বিভিন্ন ক্রাইম দৃশ্যগুলিকে একনাগাড়ে দেখা বন্ধ করতে হবে, পরিবর্তে সুস্থসবল সমাজের ছবি বেশী করে দেখাতে হবে।

৪. মানুষের মধ্যে ব্যাপকভাবে জনসচেতনতা গড়ে তুলতে হবে, যাতে জনগন এগুলির কুফল সম্পর্কে অবগত হয়। এব্যাপারে প্রচার, কনভেনশন, সেমিনার প্রভৃতির মাধ্যমে এর কুফল মানুষের কাছে তুলে ধরতে হবে।

৫. ভারতীয় সংস্কৃতিকে আরও বেশী করে সচেতনভাবে তুলে ধরার দরকার আছে।

ভূগোল শিক্ষা @bhugolsiksha

World Capitals Puzzle

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World Capitals

Across

1. Capital of Iraq
4. Capital of Greece
5. Capital of Taiwan
6. Capital of Estonia
8. Capital of New Guinea
11. Capital of Bermuda
12. Capital of Kosovo
13. Capital of Guyana
15. Malé is Capital of....
17. Capital of Suriname
20. Capital of Eritrea

Down

2. Capital of the Netherlands
3. Capital of Israel
7. Lima is Capital of Peru found in which continent?
9. Capital of Bulgaria
10. Capital of Albania
14. Capital of Senegal
16. Capital of Belgium
17. Capital of France
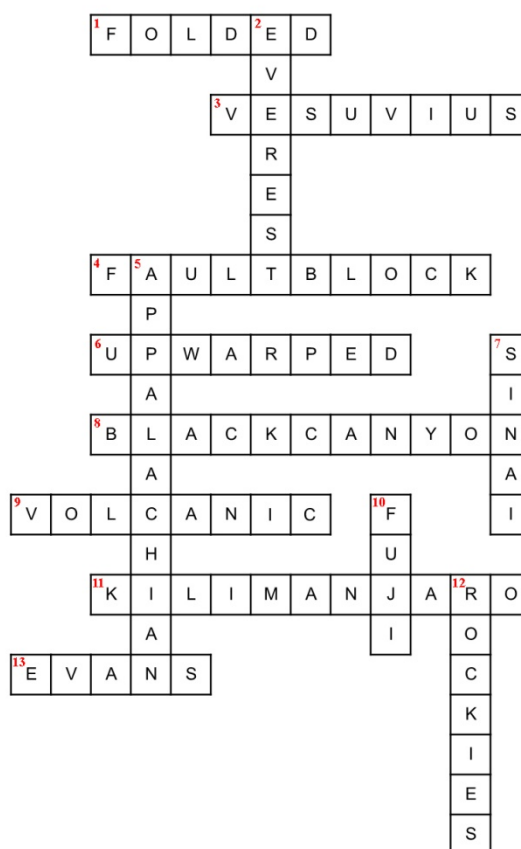18. Capital of Myanmar (Former)
19. Capital of Serbia

☻ Send the Answer of Puzzle to *bhugolsiksha@gmail.com* on and before 19/08/2018. Name of person/s who gives Correct Answer, will be informed in Vol. 1, Issue 3 and same time Puzzle Answer Key will be given.

☻ Puzzle -এর উত্তর ১৯/০৮/২০১৮ -র মধ্যে *bhugolsiksha@gmail.com* তে পাঠিয়ে দিন। সঠিক উত্তরদাতার/দের নাম Vol. 1, Issue 3 তে জানিয়ে দেওয়া হবে এবং Puzzle -এর উত্তর ও দিয়ে দেওয়া হবে।

Vol. 1, Issue 1   No. - 2018/01

Mountains and Their Origins
Answer Key

The crossword answer grid:

- 1 Across: FOLDED
- 2 Down: EVEREST
- 3 Across: VESUVIUS
- 4 Across: FAULTBLOCK
- 5 Down: APPALACHIA
- 6 Across: UPWARPED
- 7 Down: SINAI
- 8 Across: BLACKCANYON
- 9 Across: VOLCANIC
- 10 Down: FUJI
- 11 Across: KILIMANJARO
- 12 Down: ROCKIES
- 13 Across: EVANS

Across

1. Mountains that are made by intense compressional forces
3. The only volcano in Europe to erupt in the last century. It also destroyed Pompeii.
4. Mountains that resulted from geological tensional stress.
6. Mountains that resulted from broad arching of the Earth's crust.
8. A big, deep canyon in Gunnison
9. A mountain with molten stuff, or magma, inside of it.
11. A fun-sounding name for a deadly mountain located in Tanzania, Africa.
13. The closest Rocky Mountain to Denver, Colorado.

Down

2. The tallest mountain in the world which is located in the Himalayas.
5. A mountain chain located in the eastern part of the US.
7. Jews and others believe that Moses got the 10 Commandments on this mountain.
10. A beautifully symmetrically shaped mountain in Japan.
12. A mountain chain located in the northwestern part of the US.

Correct Answer of Puzzle (No. - 2018/01) given by:

◆ ***PRASHANTA BAG***
B.A. (Honours), B.Ed., M.A., Department of Geography, The University of Burdwan.

Sub-Theme:

1. Environmental Issues.
2. Geo-Political Aspects.
3. Geographical Thought.
4. Cartographic Techniques in Geography.

Rules:

1. Send your text to *bhugolsiksha@gmail.com* with your Name, Title of Topics, Designation and your E-mail ID.
2. Type it in MS Word having with extension .doc / .docx. Do not accept any other format.
3. There have no limits of page/s for your text.
4. You will receive a confirmation E-mail for acceptance.

☻ Deadline of submission is 19/08/2018.

☻ Vol.1, Issue 3 will be published on 01/09/2018 (only e-Book). That day e-Book will be uploaded to Facebook Page (*www.facebook.com/bhugolsiksha/*) and Group (*www.facebook.com/groups/bhugolsiksha/*).

বিষয়:

১. পরিবেশগত বিষয়াবলী।

২. ভূ-রাজনৈতিক দৃষ্টিভঙ্গি।

৩. ভৌগোলিক চিন্তন।

৪. ভূগোলে মানচিত্রাঙ্কনবিদ্যার কৌশল।

নিয়মাবলী:

১. আপনার লেখা নিজের নাম, শিরোনাম, আপনার বিবরণ এবং নিজের E-mail ID সহ *bhugolsiksha@gmail.com* তে পাঠিয়ে দিন।

২. আপনার লেখা MS Word –এ টাইপ করুন .doc / .docx -এ । অন্য কোনো Format গ্রহণ করা হবে না।

৩. আপনার লেখার জন্য কোনো পৃষ্ঠার সীমা নেই।

৪. আপনার লেখা স্বীকৃতির জন্য একটি নিশ্চিতকরণ E-mail গ্রহণ করবেন।

☻ লেখা পাঠানোর শেষ তারিখ ১৯/০৮/২০১৮।

☻ Vol.1, Issue 3 প্রকাশিত হবে ০১/০৯/২০১৮ (কেবলমাত্র e-Book)। ঐ দিন ফেসবুক পেজ (*www.facebook.com/bhugolsiksha/*) এবং গ্রুপ (*www.facebook.com/groups/bhugolsiksha/*) এ দিয়ে দেওয়া হবে।