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29. IMPACT OF URBANISATION AND ITS EFFECT ON COASTAL COMMUNITIES IN CHENNAI REGION

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ABSTRACT

Impact of Urbanisation in India is the process resulting into increase in the proportion of urban population to the total population in an area. The coastline of India is characterised by several ecosystems and resources. The population in cities is generally increasing because they provide easy access to ocean, rivers beaches and other natural areas and are a good source for raw material and food. In India, Chennai is the fifth-largest city and 36th-largest urban area by population in the world. The Quality of Living Survey rated Chennai as the safest coastal city in India. As a growing metropolitan city in a developing country, Chennai confronts substantial pollution and other logistical and socio-economic problems. The objective of the study is to identify the environmental pollution hotspots and preparing an environment management plan that includes rehabilitation and mitigation measures. The study draws the importance to maintain a balance between the ecology and economy in the region to ensure sustainable development. On the other hand, suggesting the measures to face the problems related to salinity ingress in land and water resources, depletion and degradation of coastal ecosystems and natural resources, pollution of resources like sewage intrusion, garbage disposal, etc, which have impacted on the life and livelihoods of people in multiple ways. Innovative approaches are needed to regulate the processes of salinisation and to manage to live with it since it cannot be eliminated. Keywords: Impact of Urbanisation, Coastal Environment, Sustainable Development.

INTRODUCTION

Urbanisation has become a common feature of Indian society. Growth of Industries has contributed to the growth of cities. As a result of industrialisation people have started moving towards the industrial areas in search of employment. This has resulted in the growth of towns and cities. Urbanisation can also be defined as a process of concentration of population in a particular territory. In India,

the urban population during pre-independence time was 13.9 percent (1941) which rose to 17.3 per cent (1951) after the independence. The rise in urban population during the decades kept growing and by 1991 it reached 40 per cent. This count increased to 28.53% according to 2001 census, and crossing 30% as per 2011 census, standing at 31.16%. Before the independence of the country nearly 15 percent people were living in towns, and now their share has become more than double. The reasons in increase of the urban proportion of the total population may be very many, but mainly the Indian urbanization is the result of movement of rural population to urban areas.

The definition of "urban" apart from size and density specifies that 75 percent of the workforce should be engaged in non-agricultural pursuits. Hence infrastructure has to be planned not only for the population per se but also according to the requirements of the economic sectors in terms of water supply, waste disposal, power, telecommunications, etc. The higher density of urban areas is an advantage because it may provide economies of scale in the provision of these and other urban services.

Table 1

Urban Population of Tamil Nadu			
	2001	2011	Variation
No. of Districts	30	32	2
No. of Sub-Districts	201	215	14
No. of Towns	832	1097	265
No. of Statutory Towns	721	721	0
No. of Census Towns	111	376	265
No. of Villages	16317	15979	-338

Table 2

Percentage of Urban Population	
2001	2011
44.04	48.45

Table 3

Overall Urban Population of Tamil Nadu			
Persons	Rural	Urban	Total
Male	18663701	17495170	36158871
Female	18525528	17454559	35980087
Total	37189229	34949729	72138958

URBAN COASTAL REGION

Indian coastal region is highly heterogeneous and very complex. It possesses variety of resources, habitats and is also very rich in biodiversity, and can be considered as one of the most productive ecosystems on the earth. The Indian coastal region can be divided in three parts namely; the western coastal region, the eastern coastal region and group of Islands. The western coastal region is generally exposed to heavy surf and rocky shores. The eastern coastal region is generally shelving with beaches, lagoons, deltas and marshes.

The coastline of India is characterized by several ecosystems and resources. Such ecosystem is characterized by the several economic resources. In coastal districts, large economic activities are located. Coastal ecosystem protects the region from saline winds, cyclones, tsunami, waves etc. It promotes raw materials for the number of manufacturing activities. The population in cities is generally increasing because they provide easy access to ocean, rivers beaches and other natural areas and are a good source for raw material and food. In addition, they provide good access to jobs, employment, housing and port, access to a wider market etc. The coastal regions where land and water meet are ecologically dynamic and sensitive regions, as marine and coastal ecosystems continuously impact on each other. These regions are rich ecologically as they are home to a large variety of ecosystems, such as mangroves, water bodies, seaweeds coral reefs, fisheries and other marine life, and other coastal and marine vegetation. Coastal ecosystems protect the region from saline winds, cyclones, tsunami waves etc, promote carbon sequestration and promote biodiversity as well as provide raw materials for a number of manufacturing activities. Coastal regions are also attractive for carrying out major economic activities such as construction of ports and jetties, trade, ship building and ship breaking, large export based manufacturing including oil refinery and petroleum based industries, agriculture, tourism, aquaculture and fisheries etc, all of which are likely to put tremendous pressure on the coastal ecology. It is important therefore to maintain a balance between the ecology and economy in the region to ensure

sustainable development. It is a big challenge to policy makers to promote economic growth in the region along with protecting and promoting the ecology of the region.

EFFECTS OF URBANISATION ON COASTAL REGION

URBAN POPULATION DENSITY: The density of population in urban areas not only reveals the concentration of people in urban areas but also highlights the structural condition of the town/city. Although density is essentially the quotient obtained by division of the population of an area by the extent of the area, the resultant figure enables the following trend analyses while expressing the average population density of the area, it also reveals size and class distribution of the population. Difference in the density of population from the central area to the settlement fringes.

GROWTH OF SLUM: Slums are a formidable problem merely because the gap between resources and demand for shelter tends to exist perpetually. The urban poor by themselves can neither afford to build pucca house or spare the hard earned money for stay in rented houses with basic amenities. Such people encroach Government and private lands kept vacant. Many slums are situated in vulnerable locations like river margins, water logged areas, road margins, etc. The slum population prefers to live in unhygienic conditions and in areas prone to floods and accidents. It is estimated that more than 35 percent of the population of Chennai and more than 25 percent of the urban population of the State live in slums. The Tamil Nadu Slum Clearance Board and Public Works Department have jointly identified 33,313 families living on river margins and 8164 slum families squatting on the river beds in Chennai.

URBAN INDUSTRIAL POLLUTION: The high influx of population to urban areas, increase in consumption patterns and unplanned urban and industrial development have led to the problem of air pollution. The larger industries have a very high aggregate pollution potential. Analysis by CSE exposes steady and rapid increase in pollution levels, high local impacts and high traces of toxics making its air dangerous to breathe. Unlike other megacities, Chennai represents a different pollution challenge. Its annual average pollution levels though lower than other megacities still vary between moderate to critical. Without the sea breeze in this coastal city, the peaks could have been worse.

VEHICULAR EMISSIONS AND CONGESTION: Vehicles pose a special challenge. In terms of

actual exposure, people are more vulnerable to vehicular fumes while traveling and in close proximity to roads. Pollution concentration in our breath is 3-4 times higher than the ambient air concentration. In densely-populated cities, more than 50-60 percent of the population lives or works near the roadside where levels are much higher. The Ministry of Environment and Forests show vehicles contribute 14 percent of particulate matter and 68 percent of nitrogen oxides. Some other studies show that 35 percent of PM_{2.5} in Chennai comes from vehicles tinier the particles higher the share of vehicles. A study carried out by scientists of University of Berkeley published in Environmental Science and Technology in 2012 shows that the exposure to vehicular fumes (in terms of population-weighted intake fraction, or the grams of vehicle pollution inhaled per grams of vehicle pollution emitted) in Chennai (72) is one of the highest in cities studied in India – third after Kolkata (150) and Delhi (100).

SEWERAGE: Coastal waters receive a variety of land-based water pollutants, ranging from petroleum wastes to pesticides to excess sediments. Marine waters also receive wastes directly from offshore activities, such as ocean-based dumping (e.g., from ships and offshore oil and gas operations). One pollutant in the ocean is sewage. Human sewage largely consists of excrement from toilet-flushing; wastewater from bathing, laundry, and dishwashing; and animal and vegetable matter from food preparation that is disposed through an in-sink garbage disposal. The waterways of Chennai are not perennial in nature and receive flood discharge only during the monsoon season; the rest of the year these act as carriers of wastewater from sewage treatment plants and others.

SOLID WASTE DISPOSAL: Solid waste is generated in almost all parts of the urban areas and solid waste management becomes complicated in bigger cities. Collection, transportation and disposal of solid waste are the major operations involved in solid waste management. Everyday 4500 MT of garbage is collected and removed from the city. Night conservancy is being carried out in all important roads and commercial areas of the city.

IMPACTS OF URBANISATION ON COASTAL COMMUNITIES

Most coastal states in India have not been able to maintain this balance between economy and ecology, with the result that they are facing serious problems with respect to life and livelihood of coastal population on the one hand and sustainability of the development on the other hand. These areas are facing problems

related to salinity ingress in land and water resources, depletion and degradation of coastal ecosystems and natural resources, pollution of resources etc, which have impacted on the life and livelihoods of people in multiple ways.

It appears that coastal livelihoods are threatened by a number of modern developments taking place on the coast. Some of the important developments are intensive agriculture, aquaculture, mining & quarrying, infrastructure development, industrial development, tourism and increasing urbanization. Intensive agriculture, encouraged under the green revolution has promoted the economic growth in these regions. However, the green revolution, which frequently resulted in excessive use of fertilizers, pesticides, improved seeds and irrigation, has affected ecology of coastal areas adversely. Ingression of salinity and alkalinity in land and water, eutrophication, depletion and degradation of ground water etc. are some of the adverse effects of intensive agriculture that did not take adequate care of land and water resources.

The sustainability of livelihood in agriculture on the one hand and resulted in shortage of potable water supply on the other hand. Aquaculture development is another important development that has contributed to economic development of this region, particularly in Tamil Nadu. Some of the adverse effects are destruction of mangroves; seawater ingression through shrimp farms and overuse of groundwater if shrimp plant is dependent on groundwater. These have resulted in exposing the coast to strong winds, storms and tsunami waves, affecting adversely the safety and security of coastal populations.

Mining and mineral based industries, other industries and infrastructural projects like ports and jetties, highways etc on the coast. However, wrong locations and excessive scale of these activities as well as unsustainable methods of disposal of discharges have frequently led to excessive salinity as well as excessive pollution of land, air and water resources in this region. The higher incidence of urbanization, which is a consequence of these developments, has once again raised pressure on natural resources and impacted adversely on coastal livelihoods of people when it is accompanied by unsustainable use of natural resources.

The impacts on coastal resources, the increased salinity of land and water is an important impact, as (1) it is widespread covering a large number of coastal districts and states, (2) it has impacted significantly on coastal livelihoods in most states and (3) innovative approaches are needed to regulate the processes of salinization and to manage to live with it since it cannot

be eliminated. There is a need therefore to have comprehensive view of coastal salinity to have a proper understanding of this important phenomenon. This understanding will provide useful insights into the problem, and help in formulating policy and programmes to deal with salinity effectively, and to protect and promote livelihood of people in salinity affected areas.

- Chennai's STPs are all situated at the far corners of the city. Wastewater is pumped across the city to these plants located on the outskirts. This would make eminent sense if the treated wastewater was reused in nearby areas, for irrigation or by industries. Instead, the bulk of the treated and clean wastewater is disposed off into rivers and canals, which traverse the entire length of the city (carrying this wastewater) before flowing into the sea.

FINDINGS AND SOLUTIONS

- Chennai's much vaunted sewage treatment infrastructure, its waterways continue to receive sewage from the colonies and industries along their way. In 2000, some 532 MLD of sewage was generated in the basins of Chennai's water bodies.

- Coastal waters receive a variety of land-based water pollutants, ranging from petroleum wastes to pesticides to excess sediments. Marine waters also receive wastes directly from offshore activities, such as ocean-based dumping (e.g., from ships and offshore oil and gas operations). One pollutant in the ocean is sewage. Human sewage largely consists of excrement from toilet-flushing; wastewater from bathing, laundry, and dishwashing; and animal and vegetable matter from food preparation that is disposed through an in-sink garbage disposal

- The waterways of Chennai are not perennial in nature and receive flood discharge only during the monsoon season; the rest of the year these act as carriers of wastewater from sewage treatment plants and others. Everyday 4500 MT of garbage is collected and removed from the city. Night conservancy is being carried out in all important roads and commercial areas of the city.

- Collection of Municipal Solid Waste at source(Door to door collection) has been implemented in all Zones. About 95% of the households were covered under this programme. This has been achieved only on introduction of Tricycles which stands as a wonder tool for better collection of MSW at door steps. Now about 2800 Tricycles are put in use. This has resulted in reduction of dust bins on road side.

- Over the last two decades share of bus, train and bicycle ridership has dropped drastically in the city. The share of personal vehicles trips

have increased. Cycle rickshaws have totally vanished from the city, negatively impacting the last mile connectivity. Significant increase noted in the share of two wheeler trips followed by car trips.

- The Chennai Metropolitan Area (CMA) covers some 1,189 sq km, of which the city limits are a mere 176 sq km. The sewage generated by this gigantic extended area flows into the same waterways, which get heavily polluted before they even enter the city limits.

- Chennai Metro Water has had the advantage of being a public utility which has kept a reasonably good control over its finances. But its increasing dependence on more expensive water projects will jeopardise this position. Its cost of water is increasing and this should be a source of worry for its planners – particularly as it charges high rates from consumers and still needs huge investments in managing sewage.

- Chennai had some past experience in using seawater for drinking. MetroWater built a battery of reverse osmosis plants in the colonies along the sea, mostly inhabited by fisherfolk. The aim was to provide drinking quality water from a source close to where people live. These plants are small, built specifically for drinking water of local communities.

- The reuse of sewage and wastewater for industrial and even domestic water use is another option worth exploring. Chennai has the distinction of having the country's first recycling project – the city's sewage was sold to the Chennai Petroleum Company Limited (CPCL), which in turn used reverse osmosis technology to filter the sewage and turn it into water for its use. This industry found sewage more reliable than water and the costs were low as compared to its use. This approach to turn waste into wealth needs to be promoted in this city of water stress and scarcity.

- Centre for Science and Environment checked out the impact of car centric infrastructure on pollution and carbon emissions in a few locations. This is diagnostic. Car centric infrastructure (signal free roads, flyovers and foot over bridges etc) increases interferes with walking accessibility, increases travel distances, encourage more motorized travel, and lead to more emissions.

- The population exposed newer challenges like ozone, PM2.5 and toxics. It should strengthen its monitoring grid, deploy air quality forecasting modes, must regularly and systematically monitor the health indicators. At the same time implement an air quality index system and health advisory for informing people about ill effects of poor air quality.

- The standards have been made by the

ministry of urban development to provide for compact, high density, mixed land use development near new or existing public transportation infrastructure that includes housing, employment, entertainment and civic functions within walking distance of transit.

- Chennai MetroWater is set to receive Rs 4 crore every year from a United Nations body to implement environment-friendly projects. The financial incentive is for developing renewable energy sources that offset the use of fossil fuels. The water agency would be presented 'carbon credits' for generating electricity from biogas to operate its sewage treatment plants in the city.

- The water supply system of the metropolitan area of Chennai is facing problems due to high groundwater abstraction and progressing salt water intrusion. To increase groundwater recharge, several check dams have been constructed in this area. A supporting analysis and planning tool has been developed for long-term analysis of managed aquifer recharge measures. An increase in groundwater levels was verified, but a reduction of the current abstraction rate is necessary for a sustainable management of the water resources.

- The declining levels of ground water indicates that many of the rain water catchments are in degraded state and their holding capacities have been reduced considerably due to factors like siltation, encroachments, conversion of rain water holding structures for other uses, etc. It is therefore necessary that this dangerous trend of degeneration is halted and immediate remedial measures should be undertaken.

CONCLUSION

The study has brought out the factors that draws the importance to maintain a balance between the ecology and economy in the region to ensure sustainable development and has highlighted the effects and the pressure of population, dependence of coastal communities, sewerage mixing with the river water bodies and how polluted water reaches the sea. This study emphasizes to identify the environmental pollution hotspots and preparing an environment management plan that includes rehabilitation and mitigation measures. Urbanisation has its own merits and demerits. Urbanization can't be avoided. But the negative effect of urbanization can be minimised. The Government proposes to enlist the participation of the Public and Non-Governmental Organisations (NGOs) in propagating and installing rainwater-harvesting structures. The study has suggested the measures to face the problems related to salinity

ingress in land and water resources, depletion and degradation of coastal ecosystems and natural resources, pollution of resources like sewage intrusion, garbage disposal, etc, which have impacted on the life and livelihoods of people in multiple ways.

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