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Allied Strategies to Focus on Sustainable Development in Fringe Areas of Chennai

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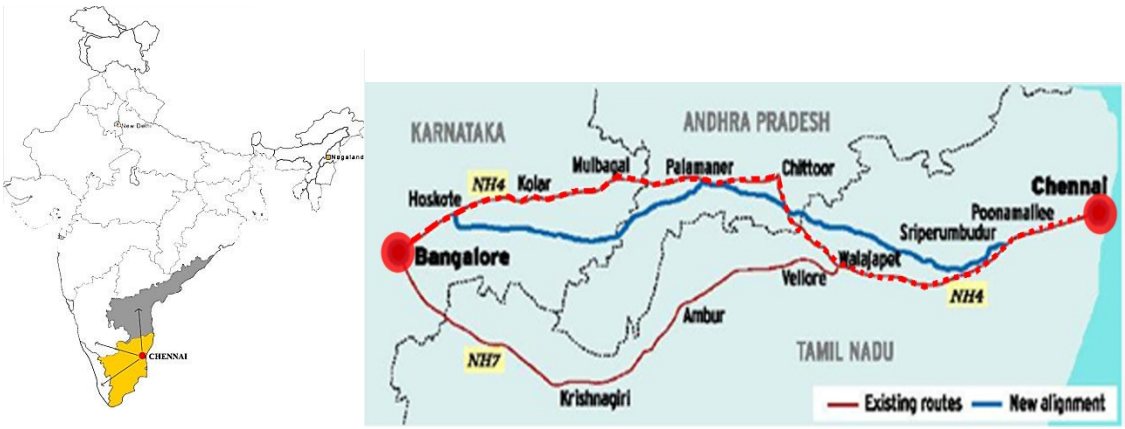
ABSTRACT: Cultivating the contemplation of growing cities has driven the urban environment towards the idea of rapid urbanization, but this quintessential idea of cities has consciously made rear to its urban, as well as, socio-economic anatomy. On account of discrete factors such as escalating population leads to out migration from Central Business Districts (CBD) to suburban areas; where, economic and livability options pledge to the expansion of cities. Under the critical review of urban development part of cities this paper will bring out an issue which is in concern to urban transformation in Chennai city, which lead to recent flooding condition due to deteriorated water bodies. With passing years of Chennai's growth, numerous urban issues are detected where urban expansion has amicably consumed large part of available natural resources in fringe land. This entire analysis points towards the argument reflected best in the boundaries of fringe urban development, especially having water bodies. After the methodical dissection of the entire assortment, at the end, the paper addresses the resolution to these urban issues through suggestive sustainably linguistic urban planning guidelines. This might will be useful to heal fringe-urban and social environment, in an attempt to bear future physical and non-physical stresses.

Keywords: Fringe areas, expansion, Urbanization, Transformation, water bodies, planning strategies.

I. INTRODUCTION

The city that is surrounded by the sea in the east side and with the neighboring state of Andhra Pradesh in the northern side, made this city to expand and grow towards south and west. New international companies and foreign investors have come up with new economic establishments, which made this city to grow more towards west since it has growth opportunities at western part of city and more regional connectivity with other important cities such as Bangalore and Hyderabad.



A. Expansion of city

In year 2000, Chennai became important hub for Information technology and let this city to expand its municipal jurisdiction boundary towards south. According to the one of the report of 2014 by IIHS Bangalore.

It is said that in 2011, the city has increased its municipal boundaries four times its original size, which made city to be pledged more economic opportunities in western part of city. The Chennai Metropolitan Area (CMS) has a size of 1,189 sq km and comprises of eight districts, including the Chennai city district. The population has increased from 5.8 million in 2001 to 8.9 million in 2011 in CMA. Industrial developments and establishments at Sholinganallur and Perugudi, Special Economic Zone (SEZ) at Ennore and Nadambakkam attracted many investors to Chennai [1].

Impact of city expansion: Chennai falls under hot and humid climate zone. But in recent yearsthe city has urbanized towards its fringe area, almost changed to a concrete jungle. The grey areas has been amicably consumed an ecological green cover to great extent. In this process of expansion, the city has eaten up fishing, weaving and agricultural villages and few hamlets, thus very little importance has been given to ecology and livelihood pattern of villagers during this rapid urbanization and development, now there are very fewer areas remained to be conserve. **Impact on climate:** And the result of all this Chennai had faced one of the hazardous man-made disasters during December 2015. Chennai in particular was one of the worst hit districts in the state which received almost 1,200 mm of rain in November, which is nearly 300 per cent above the normal observation of 40 7.4 mm. While rainfall in the city broke the nearly century-old record for November, the record for the highest rainfall received in a single day in December was also rewritten. On December 1 –2, 2015, the Indian city of Chennai received more rainfall in 24 hours than it had seen on any day since 1901. The previous record for rainfall in a single day in December dates back to 1901 when the city received 261.6 mm of rainfall in a span of 24 with environmental management and sustainable planning strategies. hours. On December 1, 2015, the city received around 290 mm of rain in a single day causing catastrophic flood disaster[1].

Physiographic study, Chennai: The city is dotted with wetlands and natural channels, and it has essential water bodies in outskirts of a city. Chennai is a low-lying area and the land surface is almost flat like a pancake. The elevation variation within Chennai district varies between 0 to 11m, with mean elevation being about 6m. The even topography of the land throughout the district renders sub-divisions into natural regions rather difficult. Most of the localities
are just at sea-level and drainage in such areas remains a serious problem[1].

Chennai City has experienced major flooding during 1943, 1976, 1985, 1996 and 2005.This entire hazard had been taken place due to loss of water bodies and unorganized planning. Therefore, the paper represents the study the of water bodies in a transforming landscape like that of Chennai's fringe area, in the hope that there might still be scope to change ways of planning so as to let the edges of water bodies breathe and expand when necessary.

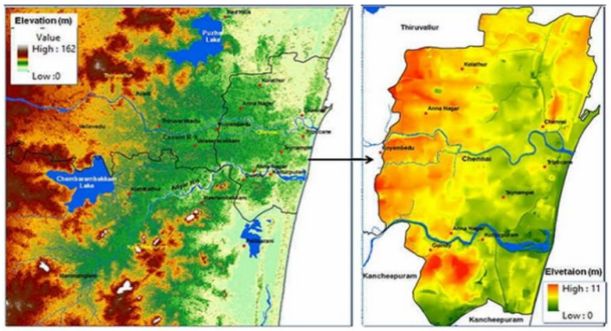
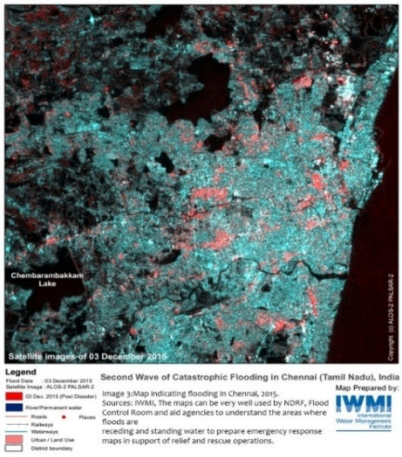


Fig2: Elevation variation within suburbs of Chennai (SRTM DEM) and within Chennai District (Carto DEM)
Source: Chennai Floods, 2015Based Assessment Study, Disaster Management Support (DMS) Division, National Remote Sensing Centre ,(NRSC / ISRO), Hyderabad, India



II. STUDY OF WATER BODIES IN FRINGE AREAS

Whereas water bodies are not remained same, they are the constantly changing their shape. [1]Monsoon and summer seasons, encroachments on edges and contaminated land, silting and de-silting, all causes water bodies to contract and expand throughout the year.

This paper began as an attempt to study what is the impact of industrial development along the water body and how it changes its edge condition, to understand this closely analysis has been taken to understand what happens in wet region, when it has a water body.

Image: Chembarambakkam Lake, Chennai

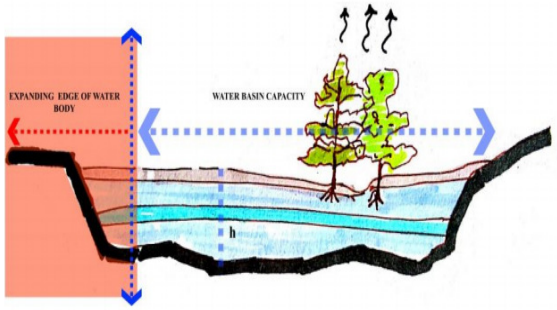


Image: Phenonmenon of expansion and contraction of water bodies

Fig4: Expansion and contraction of water bodies

A. Chronological Analysis

The analysis has taken for the last five years to understand the chronology of expanding and contracting water bodies. After this analysis it comes up with the phenomenon of changing water bodies and their water table.

Transformation due to urbanization, increasing growth in fringe area and transformation in edge condition of lake

2010 Chembarambakkam Lake and Development along lake area.

2016 Chembarambakkam Lake and Development along lake area.

Water bodies whose edges have been changed due to human inducing activities are likely to be remained relatively same and stabile throughout the last five decades whereas water bodies without any humanizing activities are constantly changing their edges and found to be more organic in nature.

III. CASE STUDY

Chembarambakkam Lake is one of the lakes that have taken on account to study the transformation in fringe area and water bodies. Chembarambakkam Lake is a lake located in west Chennai of its fringe area, about 40 km away from main city center. It is one of the biggest lake in Chennai and it has a two reservoirs which stores rain water. It is one of the reservoir which supplies water through pipelines to the metropolitan city Chennai. Chembarambakkam was known as Puliyar Kottam in past. It serves its water to 24 villages and it came into picture during the Chola period in Thondai Mandalam which had Kanchipuram as its headquarters. Adayar is the major river that carries water from Chembarambakkam to South Chennai and innumerable canals originating from Adayar brought water to paddy fields. During the unpredictable heavy rainfall, whenever the water level is close to full its capacity, water is released into the Adayar River. The released water is more in capacity that it overflowed the river banks, and it causes flooding in residential areas along the river and eventually along the edge of the lake.

A. Analysis of edge condition of water bodies

Most of the edges of lakes, and river are encroached by slums due to availability of natural resources. During the heavy rain the river become flooded and people along the river

have to move to other areas. But when the flood gets over, people again return and start living along the river or lakes. Since there is no such policy level mechanism has been yet established which will rehabilitate the slums along natural resources. Also according to the development control rules it has been restricted new development to begin construction along the natural resources or on natural resources. If any building is about to be constructed on lakes or water bodies it is considered to be the vulnerable.

Current Condition: But in recent years as the areas have started expanding, neglecting the development control rules the rural areas have transformed without any control and its major incentives are change in rural to urban transitions. Also this transformation was not just limit to physical transitions but major transitions have been made with natural water bodies such as in recent years many new buildings were constructed over water bodies. New apartments and townships were began to replace the natural topography and land cover, and the major incentives for this transition was change in land use from agriculture to residential and industrial which allowed such new constructions. But during this transformation process natural cover has been reduced to great extend which repels the land to hold water, which slowly leads to climatic condition.

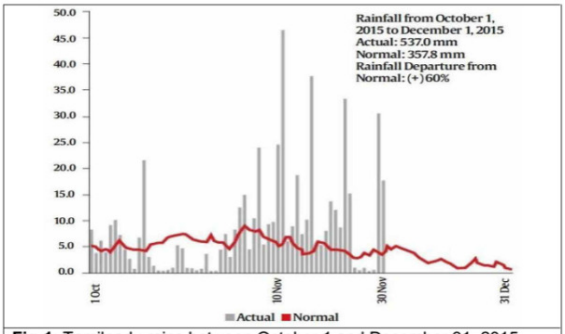


Fig-1: Tamilnadu rains between October 1 and December 31, 2015. (Source:IMD, Indian Express)

From this entire analysis of water bodies in fringe areas considered to be the total disconnect between hydrology and urban planning in the city, which made drop in water table. Unplanned growth and city expansion has made extraction of groundwater, moreover as mentioned earlier highly polluted water due to industrial effluents made hazards to marine ecology. Natural course of water has been fragmented into pieces and many water bodies had been lost. This is one of the reasons for urban flooding in the urban fringe areas. Therefore, in order to overcome through problem of urban flooding in fringe area sustainable allied strategies are one of the solutions, which will help to control flooding.

III. ALLIED STRATEGIES TOWARDS SUSTAINABLE DEVELOPMENT IN FRINGE AREA, CHENNAI

A successful urban solution relies heavily on the way they are distributed to the smaller of units- both functionally and financially. Simultaneously, we have to abide by the standard procedure in case of smart planning principles, i.e.:

- To create a vision for the city with citizen engagement;
- To develop baselines, set targets and choose indicators;
- To embrace lean start-up principles;
- To start with a pilot project, and
- To make the region be the major investor in the technologies being built.

Thus, allied yet fragmented strategies can only bring a successful implementation of strategies. The sustainable allied strategies that are being discussed upon are to be started by formulating the following two pivotal mechanisms, i.e. DPSIR framework and PPP mechanism.

The DPSIR framework shall comprise of the following steps:

1	*1. Driver*	It signifies the role of important players involved in the development mechanism	• Local Municipality • Self Help groups • NGOs
P	*2. Pressure*	It implies the pressure augmented at source and multiplied by externalities	• Environmental • Temporal • Political
S	*3. State*	It explains the present state of infrastructural environment and the predicted scenario after gap analysis in previous stage	• Economic mechanism • Developmental guidelines
I	*4. Impact*	It directs towards the impact of the proposals in the tangible and intangible forms onto the urban fabric	• Urban form • Immediate planning paradigm
R	*5. Response*	It assumes the response of each stakeholder involved in the proposal to produce fruitful results	• Transparency • Accountability • Segregated functionalities

The PPP mechanism shall seek the following segmentation in roles.

P	*Public*	The government is supposed to operate the stakeholder management and initiate the functioning of e-services.
P	*Private*	The private bodies shall seek intervention through training programs for capacity building of various stakeholders and introducing network planning where all the parameters of urban growth shall be directly linked to the issues of the Chembarambakkam lake.
P	*People*	Finally, the people should have the urge to incorporate the principles of judicious usage of the resources available.

An example of the above can be better understood by this example:

A local businessman (say) Mr. Paneerselvam has to buy a flat in a range of 20-25 lakh. He goes to builder (say) Tirupati Builders and is offered a number of options. Some of them are approved and proposed near the Chembarabakkam Lake; further, it suits his budget. He will come back and open a portal of local authority and check whether this property is infringing with environmental guidelines and other norms which would create an imbalance in storm water drainage and natural course of river. If he finds anomaly, he can file an online complain. If a considerable complains are found, the property can be identified and stopped from being constructed. But before that, the concerned authority has to prepare an entire database of the catchment basin, hydrological route mapping and elaborate land use map. Moreover, the whole thing has to be at the behest of public domain in regional language as well. Then a final report has to be prepared by a SPV (Special Purpose Vehicle) or Central appointed body under the following broad framework.

Access the growth impact on infrastructure: The aim is understanding the population growth, supply and demand management, Infrastructure system monitoring.

Access the cost and value: The focus is on costing and paying for - projected population and design reliable infrastructures.

Integrate infrastructure planning: The natural environment will be given priority besides storm water management planning, quantifying groundwater resources, ecological footprint, growth planning for existing infrastructure and optimizing the role of communication in infrastructure planning.

Managing Capacity to Support intensification: We need to address capacity management challenges and opportunities, encourage PPP capacity improvement projects, intensification of benefits in partially-separated sewer areas, funding capacity works and monitoring capacity management initiatives.

Re-evaluating existing systems: Rejuvenating traditional resource management practices to provide ecosystem services. This will include focus on provisioning, regulating, cultural and supporting services.

A successful urban solution in this case will range from urban renewal to urban conservation in an integrated way. However, practically- land reforms, economic assistance and political will are the key factor towards the successful implementation. In the stage where SMART city is set to perform and MAKE INDIA is being promoted, the hopes for a better Chennai might be a true dream to achieve.

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