CHAPTER - 16
SUSTAINABLE URBANIZATION IN KARNATAKA

Summary

Karnataka’s urban growth is in inflection point as the number of towns with less than 1 lakhs is emerging as the generators of wealth. The very definition of “Urban” need to be re-visited, especially from the point of percentage of people engaged in agriculture and allied-agriculture activity and density of population. Both Urban and Rural areas are looking at having equal level of basic services. The coming decade between 2021-31 will witness the emergence of an additional 18 new Class I cities and 24 Class II cities. New towns having both Urban and Rural Characteristics are emerging giving rise to “RURBAN” towns. Many emerging urban areas in coastal, hilly and eco-sensitive regions have been neglected due to low population density and these significant areas need to be identified and given urban status. A new “TOWN COMMISSIONERATE” for towns having less than 50,000 population need to be formed for better governance to achieve Sustainable Development. A “NEW TOWNSHIP ACT” should be promulgated to facilitate large developments and Satellite towns.

The Master Plan of Bengaluru has expired in 2015 and the new Master Plan for 2031 need to be prepared at the earliest. Bengaluru is witnessing a urban sprawl by leaps and bounds. The Ministry of Urban Development need to explore to extend the Master plan limits till Satellite Town Ring Road (STRR) jurisdiction, for better governance.

Regarding the entire state, out of 312 Urban Local Bodies, the Master plans exists for only 114 Urban areas, City Mobility Plans (CMP) are there for only 14 cities, whereas, there is not even one Regional plan- except the Bangalore Structure plan! In addition to the preparation of Master Plans of the small towns-which, it is essential to go a step further and prepare a “Multi-sectoral Rejuvenation plan” for these towns and use “Town Planning Scheme” to restructure smaller towns, on “Conservative Surgery” principle. Study has to be carried on to identify the existing towns that are already acting as Satellite towns and Counter-magnets to the major cities and reinforce further with good infrastructure and ensure that no ribbon development happens between the city and these towns. Identify new areas as satellite towns, especially in coastal areas where ports are developing and identify Counter magnets around Bengaluru. The general tendency of layout formation in Karnataka is “Cut and fill and make the layout flat”! Even the Subdivision rules and regulations of town planning department don’t have regulations regarding the preservation of natural slopes.

For a sustainable Urbanization provision of WASH (Water Supply, Sanitation and Hygiene) plays a very important role. For to understand the other activities that impact urbanization, the state Government should immediately moot the preparation of regional plans and Eco-Regional plans at eco-sensitive regions. The surge of farm processing and FPO’s that needs farm infrastructure in urban areas, tourism development, industrial development, ports developments, mining activity, etc., calls for a deeper insight into the way we plan the Urban area for a sustainable development.

The Ministry need to carry out “Water Resource Audit” at every village / town / settlement considering all the water resources available in that settlement (whether Urban or
Rural) and rationalize the use of water resource. The NGT order dated 4th December 2021 stated that, “The MoEF may issue appropriate notification prohibiting use of RO where TDS in water is less than 500 mg/l and wherever RO is permitted, a requirement is laid down for recovery of water be more than 60 per cent”. RO plants should be based on the quality of water.

It is found that around 19,291 Acres of unauthorized developments have cropped up in various urban areas within Karnataka. The tax-avoidance of these unauthorized developments is to a tune of Rs. 19,622 Crores. Due to this, the state has lost almost 1929 Acres of parks and 964 Acres of roads. Heavy penalties should be initiated to recoup the real loss of parks and road space- apart from betterment levy and other taxes. The ULB’s need to coordinate with the Sub-registrars to assess the exact extent of unauthorized colonies.

The Green Belt Concept need to be re-introduced in Karnataka Land Revenue Act. In Karnataka, 63 Urban local bodies don’t have play grounds at all (very miniscule area in some ULB’s). Bengaluru ranks first in terms of area of play grounds 1331 Acres, but has only 1.87% of play ground area. It’s high time that Bengaluru builds a State of art stadium in the peripheral area. The tree clad areas need to be developed. “PARKS AND PLAY GROUNDS PLANNING AND DEVELOPMENT AUTHORITY” need to be formed for conserving, planning and designing the Parks and Play grounds in ULB’s. Gender based parks need to be promoted to encourage the females in sports activity.

The proposed Karnataka Active Mobility Bill need to be passed. Efforts should be made to rationalize the bus routes and operations, studies like “Comprehensive services and operational analysis” that was done for Mysore, need to be carried out for Bengaluru and other cities of Karnataka.

It is essential to discuss the provisions of THE BENGALURU METROPOLITAN LAND TRANSPORT AUTHORITY(BMLTA)BILL, 2021, and implement the same immediately after ratifying certain clauses that overlaps in other acts. its rather pragmatic to constitute Metropolitan planning Committee (MPC) with Bangalore Metropolitan Region Development Authority (BMRDA) as its secretariat and the BMLTA could work under the Metropolitan Planning Committee (MPC) as transportation unit- as an ADVISORY & REGULATORY body.

Effective parking infrastructure with affordable tariffs located near Bus/ BMRCL/ KSRTC terminals could increase the share of Public transport, through efficient automated parking lots (through Multi-storey parking system), thus opening up of vacant land for commercial or Institutional development on PPP model. There is a need to construct integrated transport hub along with/adjacent to Metro stations, where land is available. Example Baiyappanahalli.

The Urban local bodies should come up with an impact study on various commercial buildings (Ward-wise) in ULB’s that generates huge traffic. On that basis, the identified buildings that generates huge traffic (like Malls/Multiplexes/ Office buildings, etc.,) should be levied “IMPACT FEE”.

Atleast one Construction Debris Wastes (CDW) aggregation dumping yard and a used battery/old EEE equipment collection units are needed per every 4 wards. Remediation and reclamation of existing SWM dump site (legacy waste) through Bio-mining need to be prioritized and the lands need to be restored in all ULB’s.
The recent landslides and other disasters are due to excessive mining and deforestation, as well as due to unscientific way of construction of layouts and too-many borewells installation in the hinterland of Urban centers. Hence it is necessary for the Department of Mines and Geology to strictly implement the Karnataka Minor Mineral Concession Rules, 1964, by adhering to its various clauses [8(c) to 8(y)] under the Chapter II “A” viz., “Systematic & Scientific Mining and Protection of Environment”. The Government should come out with the “Impact of Mining activity” around the towns affected. It is advisable to install observatory wells and Dust measuring equipments near the mining activity, to micro-manage the impact. The department should effectively use the funds accrued in the “Karnataka Mining Environment Restoration Corporation (KMERC)”,for various projects identified under the “Impact of Mining activity”. Defunct mines need “Closure Plans” -to be protected by wall and/or redeveloped as Theme park or Amphitheater or water storing structures, rather than using it as solid waste dumping.

The coastal urbanization impacts environment on water and soil, though maritime shipping is the most carbon efficient transport in-terms of grams of carbon di-oxide emitted per tons compared with that of rail, road and air cargo. The “WATER QUALITY” could be impacted due to oil spills, port runoffs, and illegal dumping practices and during loading and unloading of tankers. The oil, fuel deposits, chemical spills from the vehicles traversing to and fro to port and the ship demolition and repair works impacts the “SOIL”. The fuel deposits, the dry dock operation discharges oily and toxic sludge as well as, produce various “WASTES”. It’s a well know fact that though cruise ships represents just 1% of the global fleet, it is responsible for 25% of all the wastes. The noise due to ships/ cranes and industrial activity around the port wastes, the air emissions, ballast water impacts on the entire “ECOSYSTEM & BIODIVERSITY”, especially on the marine life. Bulk cargo piles and stacks creates DUST and that emphasizes high voltage lights within the ports that bears VISUAL IMPACT to citizens living around port. The COST OF TRAFFIC CONGESTION rises with the rise of freight and that has to be determined and the Planning department need to plan based on ports development.

The economic consequences of Port Cluster developments can bring in greater opportunity cost as well as lead to urban agglomeration and high job intensity. The land use impact of the port on spatial intensity need to be analyzed and relative development controls need to be derived. Hence, it is essential to keep preparing the Environmental impact assessment periodically -whenever a port cluster is upgraded or whenever a new tourism related infrastructure is established. Since land is a scarce commodity in the Eco-sensitive region, vertical development and high density satellite towns (away from ports) is recommended with the Transfer of Development Rights (TDR) that could be used across the state.

Karnataka is down to 5th rank (lower than Tamil Nadu & Odisha) in the country in its logistic infrastructure. The state need an effective “Road Core Map” and identifies Spatial Priority Urban Regions (SPURS) and focus on to create powerful/significant urban areas. The Karnataka State should prepare a State Level Infrastructure Pipeline (SLIP) project and integrate with the National Infrastructure Pipeline (NIP) and create a platform in coherence to the center’s GATI SHAKTHI. The “COASTAL AREA DEVELOPMENT PERSPECTIVE PLAN” need to be prepared and important towns around the port need to be rejuvenated to bear the impact of port development. There is also need to prepare a COMPREHENSIVE PERSPECTIVE PLAN FOR KALYANA KARNATAKA REGION”. At the city level, “INNER AREA URBAN REJUVENATION AND REGENERATION PLANS” need to
be prepared and implemented immediately, before the historic aura of such area gets decayed. It is essential to prepare “3D Visualization Plans” for historical inner areas of historical cities. Ex: Mysore, Hampi, etc.,

The present Government having recognized the growth of smaller towns and municipalities and their need for the upgradation of basic services in the City Corporation (CC), Town Municipality, Pattana Panchayath, has sanctioned Rs. 3885 Crores under the Chief Minister’s Amruth Nagarothana (Municipality) Plan (Stage 4) for the financial year covering 2022-2024. The said sanctioned amount shall be used for the upgradation of basic services in 23 number of Grade 1-Corporation (CC) [Rs. 920 Crores @ Rs. 40 Crores/Grade 1 City Corporation], 38 number of other Corporation (CC) [Rs. 1140 Crores @ Rs. 30 Crores/ City Corporation], 124 number of Town Municipality [Rs. 1240 Crores @ Rs. 10 Crores/Town Municipality] and 117 number of Pattana Panchayath [Rs. 585 Crores @ Rs. 5 Crores/Town Panchayath].

Chief Minister’s Amruth Nagarothana (Municipality) Plan (Stage 4) has given the first priority towards the provision of 100% Water Supply (@ 135 LPCD- 24/7 Supply) and Under Ground Drainage (UGD) System to all the identified Urban Local Bodies. The GoK states the remaining fund could be used for pending works of Amrut-2 mission and Swatch Bharath Mission-2, foot paths, arboriculture, traffic signage’s, utility corridor, Community Business Districts (CBD)/Market complex, Street lights, library, Anganawadis, Parks and play grounds.

While the entire country needs around 17,000 spatial planners, Karnataka alone needs another 300 town planners to prepare Master plans its remaining 190 towns and cities. Based on the NITI Aayog’s report titled “Reforms in Urban Planning Capacity in India” the Union Ministry of Housing & Urban Affairs (MoHUA) is now working on “National Council of Town and Country Planners” to set relevant standards on spatial planning and governance of towns & cities.

Urbanization, tourism and road infrastructure has always impacted the forest, in terms of human-animal conflict, reduction in the density of the forest cover, destruction of tree clad areas (188 ULB’s have tree clad areas) and degradation of mangrove areas (7 ULB’s) in coastal areas results in the loss of flora & fauna. Surprisingly, there are 77 ULB’s that has forest land within its jurisdiction and in that around 18 ULB’s has forest land extent between 500 Acres to 15000 Acres. By analyzing the land use maps of Coorg District, obtained from the Karnataka State Remote Sensing Application Centre (KSRSA), from the past two decades - between the year 2000 and year 2020- it is observed that the forest area has decreased by 5459 Hac (1.27%), the grazing land has decreased by 1,12,998 Hac (27.51%) whereas the Built up area (Settlements and Urban/rural Sprawl) and Waste lands have increased by 12,676 Hacs (3.11%) and 8050 Hacs (1.97%) respectfully. As per the study conducted by Center for Ecological Studies, IISC, in the past 45 years, the Coorg district has lost 13% of its intact forest,16 species Critically Endangered, 18 species are Endangered, 37 are Vulnerable, 13 are near threatened, 66 are least Concern, 13 are data deficient and 762 shows not Evaluated status.

The idea of funding the districts based on population should be taken over by funding the districts on the basis of “forest cover and flora and fauna”- CANOPY DENSITY. It is observed that, from the 12th Finance commission (2005-10) onwards, the Center considered the forest cover as a determining factor in a state’s share and its obligation.
to invest on resources in such regions. The 13th and 14th Finance commission allocated Rs. 5000 Crores and Rs. 39,300 Crores respectively to states on the basis of Canopy Density and attached a 7.5 per cent weight to forest cover with an added parameter of Canopy density. There is a need for the Karnataka state to adopt its fund allocation to Districts based on “CANOPY Density”- in order to ensure self containment of its urban and rural areas. The planners should explore to “freeze the Urbanizable limits” of Urban Areas attached to Western-ghats/ in eco-sensitive regions/ dense forest areas and opt for re-densification of the core ULB’s, based on Eco-Regional plans. Unfortunately, the Eco-regional plans don’t exist!

16.1 DYNAMICS OF SUSTAINABLE URBANIZATION

16.1.1 Introduction

As per the UN World Urbanization prospects-2018 (Revision), the rural population throughout the world is expected to decline by 500 Million after 2020 and urban population will rise by 2 billion- and 90% will be in Asia and Africa. In that, India’s global urban growth of 17% and is estimated to add 416 Million people between 2018-2050, whereas China’s global urban growth of 10% and is estimated to add 255 Million only.

The Sustainable Development Goals (SDG’S) are formulated to mitigate Poverty, hunger, disease, illiteracy, inequalities, lack of infrastructure and basic services, etc. SDG 11 focuses directly to make cities and habitats inclusive, safe, resilient and sustainable with the target to achieve ensuring access for all to adequate, safe, and affordable housing, basic services, mobility, etc.,. To reinforce SDG 11, there is a need to achieve of Goals and targets under SDG’s 1,2,3,4,6,10. It is to be noted that SDG’s 5, 7, 8, 9 may indirectly provide support in achieving the other goals. Achieving SDG’s 16 and 17 will provide necessary framework, guidelines for strengthening the institutions and budgetary & financing mechanism for effective implementation and achievement of policies and programs aligned with the Sustainable Development Goals through effective Governance.

It is estimated that out of 7934 towns, 94% of India’s Urban growth happens in small towns, i.e., in 7466 towns of less than 1 lakh population. Hence, the sustainability of large cities depends on the sustainability of smaller urban areas and the sustainability of smaller town depends upon the sustainability of rural areas.

The SDG’s targets need to be achieved in the backdrop of the three tiers administrative structure vide., various departmental subjects under different account heads listed under the state list, the central list and concurrent list! Under these circumstances, “Localizing Sustainable Development Goals”, is the only solution to expedite the SDG’s across the country! However, localizing certain SDG’s is happening inorganically because of various schemes, but an organized approach will identify the gaps and expedite the progress at the grass root level itself.

16.1.2 Urbanization in Karnataka

The urbanization in the country between 1901 till now proves that the level of urbanization in Karnataka has always been higher than the country level, except for slight decline in Karnataka during 1951-1961 (22.95% to 22.3%). Karnataka is the seventh largest state in
India with 38.67% of urban population as of 2011. Bengaluru continues to have the primacy over other large cities of Karnataka with the urbanization rate of 90.94%. Bengaluru has established itself as a large primate city engulfing many Urban villages, its erstwhile satellite towns and has its influence beyond the state’s jurisdiction! The data released by the directorate of economics and statistics for 2018-19 stated that 84 villages have been erased from the map and got merged with due to rapid urbanization.

### Table 16.1: Growth of Various Classes of Towns- 2001-2031

<table>
<thead>
<tr>
<th>Status</th>
<th>Population Size</th>
<th>2001</th>
<th>2011</th>
<th>% Age</th>
<th>2021</th>
<th>% Age</th>
<th>2031</th>
<th>% Age</th>
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<tbody>
<tr>
<td></td>
<td>Towns</td>
<td>Towns</td>
<td></td>
<td></td>
<td>Towns</td>
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<td>67.28</td>
<td>30</td>
<td>52.66</td>
<td>48</td>
<td>61.17</td>
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<tr>
<td>CLASS II</td>
<td>&gt;50000 UPTO 99999</td>
<td>37</td>
<td>39</td>
<td>10.43</td>
<td>53</td>
<td>18.29</td>
<td>77</td>
<td>19.21</td>
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<tr>
<td>CLASS III</td>
<td>&gt;20000 UPTO 49999</td>
<td>101</td>
<td>114</td>
<td>14.62</td>
<td>155</td>
<td>24.00</td>
<td>147</td>
<td>17.61</td>
</tr>
<tr>
<td>CLASS IV</td>
<td>&gt;10000 UPTO 19999</td>
<td>53</td>
<td>104</td>
<td>6.86</td>
<td>59</td>
<td>4.59</td>
<td>30</td>
<td>1.78</td>
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<tr>
<td>CLASS V</td>
<td>&gt;5000 UPTO 9999</td>
<td>27</td>
<td>20</td>
<td>0.70</td>
<td>11</td>
<td>0.41</td>
<td>7</td>
<td>0.20</td>
</tr>
<tr>
<td>CLASS VI</td>
<td>&lt; 5000</td>
<td>5</td>
<td>7</td>
<td>0.11</td>
<td>6</td>
<td>0.05</td>
<td>5</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>247</td>
<td>310</td>
<td>100</td>
<td>314</td>
<td>100</td>
<td>314</td>
<td>100</td>
</tr>
</tbody>
</table>

During the decade starting from 2011 onwards, there have been efforts by the Government of Karnataka to mitigate the regional imbalances on the basis of Dr. Nanjundappa Report. The Central and the State Government’s various initiatives, especially the Aatmanirbhar Bharath program, the digital India initiatives, the development of core road network across all regions, emphasis on Port development, the rejuvenation of 26 amrith cities, Karnataka Land Reforms, the Ayushman Bharath health schemes, and most importantly the initiatives by the Ministry of Jalshakthi has made the regions of Karnataka more vibrant than before.

However, Karnataka is below the national average on the provision of affordable housing, and waste management (SDG-11), Drinking water and sanitation (SDG-6), Broad band ecosystem (SDG-9), higher percentage of ground water withdrawal (SDG-12), climate action initiatives (SDG-13), coastal water quality and increase of area under mangroves (SDG-14) and tree cover as a proportion to geographic area (SDG-15). However, Karnataka stands 4th place in overall index, as per SDG 2030-Strategies & action plan for Karnataka, GoK, prepared during 2020.

**16.1.3 Planning initiatives for sustainable urbanization in Karnataka**

Planning and Development control forms the core of Sustainable urbanization. Inclusion of ‘Planning’ as a discipline in the National Institutional Ranking Framework (NIRF) was approved by MoE (then MHRD) and was launched in 2015. It is found that about 52% of the statutory towns and 76% of the census towns do not have any Master Plans to guide their spatial growth and infrastructural investments.
Karnataka has 32 Urban Development Authorities and 52 Planning Authorities

No. of Urban Local Bodies (ULB): 302 plus 10 Maha Nagara Palike

PLANNING INITIATIVES

Declared Local Planning Areas (LPA): 157 (within 190 towns)
Master plans prepared: 114
City Mobility Plans prepared: 14
Master plans to be prepared for the declared LPA’s: 120
Regional plans: none prepared - except Bangalore- Structure plan in 2015
Agriculture master plans: None prepared

NON-IMPLEMENTATION OF 73rd & 74th AMENDMENT TO CONSTITUTION

Metropolitan Planning Committees not formed in Mysore, Hubli-Dharwad
Ward committees formed only in BBMP
District Planning Committees formed in 29 districts but were not functional because “Comprehensive District Development Plans” were not prepared.

RECENT BILLS THAT IMPACT DEVELOPMENT

The Karnataka Land Reforms Act

However, many Master Plans got prepared in Karnataka after the launch of AMRUT mission in 2016 (a sub-scheme on the formulation of GIS-based master plans was launched by MoHUA at a cost of Rs 515 crore) as a 100% centrally funded sub-scheme. The Credit Link Subsidy (CLSS) Scheme by the Central Government was also responsible for the immediate surge of Master Plans across various cities in Karnataka, especially after 2017, because one of the initial conditions of CLSS scheme was that the scheme was applicable only within the notified area (later it was relaxed)- and the land cost was too high within the notified area (for affordable housing), and hence Master Plans were prepared to extend the conurbation limits based on various parameters.

As on today, Local Planning Area has been declared in 157 Planning Areas covering 190 towns in Karnataka, and Master plans has been prepared for only 114 towns. Master plans are yet to be prepared for 198 towns. The Master Plan for Bengaluru for 2031 is yet to be finalized, since the 2015 Master plan got expired 6 years back. There is not even a single Regional Plans prepared for the entire state- except the Bengaluru Metropolitan Region Structure Plan-2031.

Furthermore, a study conducted by TCPO and NIUA for NITI Aayog indicates that over 12,000 posts of town planners are required in the country. Karnataka needs an additional 300 Town Planners apart from the existing 120 Town planners (approximately).

16.1.3.1 Need for a urbanization policy for Karnataka

Urbanization policy is not just about Urbanizing a city or a region, but is also about conserving some regions away from urbanization, based on the 10 Agro-Climatic Zone, Western Ghats and Eastern Ghats. It should list the towns that need to be self contained and that need to be expanded based on detailed study! The proposed policy should act
as a guide to Industrial and Tourism policy, which generally ushers urbanization/sprawl and floating population. Added to this, the Kalyana Karnataka Region doesn’t have a Perspective plans since decades and huge amount of funds allocation hasn’t resulted in visible development. Without Urbanization Policy, the state is regionally imbalanced! There is a need to revise the Town and Country Planning Acts and evolve a “NEW TOWNSHIP ACT” to facilitate large scale developments and Satellite Towns.

16.1.3.2 Planning technique to be adopted in the preparation of master plans

Karnataka has been preparing the “Comprehensive Development Plans(CDP)” and now reinforced with GIS-based master plans. The reach of CDP is till the Planning District (PD) level and each PD constitutes 15 to 20 wards. The development control happens through Bylaws and Sub-division rules and regulations. There is no detailed intervention of CDP at the ward level, when it comes to infrastructure. Hence a new planning methodology need to be evolved that could prepare/ revise action plans at the Ward level. The action plan should be based on improvement/development/conservation/preservation of the various components of the ward. Hence, mapping of all the relevant sub-sectors of a city—blue-green-grey infrastructure (including rivers, waterbodies, forests, parks, sanitation, water supply, solid waste management, etc.), mobility (including detailed road cross-sections, digital connectivity, EV infrastructure, motorized and non-motorized transit facilities), industrial infrastructure, heritage, and so on. The CDP need to be revised 10 years once and ward level plans need to be revised at every 5 years once. The NITI Aayog suggests review of bylaws and advices for programmatic interventions for advancement in development control regulations.

Covid-19 has revealed the dire need for planning and management of our cities, with a thrust on health aspects. In this context, every city must aspire to become a ‘Healthy city for all’ by 2030. This would need a convergence of multi-sectoral efforts at the intersections of spatial planning, public health, and socio-economic development. The synergy between the Urban and Rural Planning need to be explored.

16.1.3.3 Are our urban areas truly urban?

There are 77 ULB’s that has forest land within its jurisdiction. Are our Urban Areas truly Urban? Around 18 ULB’s has forest land extent between 500 Acres to 15000 Acres, 21 ULB’s has forest land extent between 100 Acres to 500 Acres. Almost 42% of the ULB’s have 50%-93% (120 ULB’s) of agriculture land, 42% (122 ULB’s) of the ULB’s have 25%-50% of agriculture land and only 16% (46 ULB’s) of the ULB’s have less than 25% of agriculture land within its local planning area. Mangrove lands are there within the LPA’s of 7 ULB’s of Karnataka. Some Local Planning Areas are 15 times more than the Built up area of the town. It’s like designating our planet as earth though, 3/4th is covered with ocean!

Karnataka’s Urban growth is in inflection point as the number of towns with less than 1 lakhs are emerging as the generators of wealth. The very definition of “Urban” need to be re-visited, especially from the point of percentage of people engaged in agriculture and allied-agriculture activity and density of population. Both Urban and Rural areas are looking at having equal level of basic services. New towns having both Urban and Rural Characteristics are emerging giving rise to “RURBAN” towns. Many emerging urban areas in coastal, hilly and eco-sensitive regions have been neglected due to low population density and these significant areas need to be identified and given urban status.
16.1.3.4 Achieving localized sustainable development and town commissionerate

Localizing Sustainable Development Goals (LSDG) calls for implementation of SDG’s that touches every citizen. To realize SDG 11- Sustainable Cities and Communities, the 73rd and 74th Amendment to the constitution needs to be fully adhered! The ward level action plans should be based on the participation and interaction between the Citizens, Corporators and the Experts.

A new “TOWN COMMISSIONERATE” for towns having less than 50,000 population need to be formed for better governance to achieve Localized Sustainable Development Goals. Private sector would need to be evolved to play a major role in this and support the public sector in a very big way. Specialized professionals like Transport Planners, Urban Designers, Conservation experts, Infrastructure Planners need to be inducted into MahanagaraPalike as lateral entrants and that would help in multiple ways.

16.1.3.5 Impact of karnataka state land reforms (amended) act on urbanization

The Karnataka State Land Reforms (Amended) Act will certainly impact the landuses across various districts. The Government should quickly come out District Landuse Plans designating various landuses and conserve the fertile Land and the pasture Land (Goomaala) and identify the developable/ barren land, with an aim to protect the biodiversity of the region. Alienation of the land to non-industrial use shouldn’t be on adhoc basis and the new industrial developments should be based on either a designated master plan of the City or Sub-Regional plan of the particular taluk / District.

16.1.3.6 Planning of smaller towns (town municipalities & town panchayaths)

It is observed that the Household income in towns and rural areas are raising. The Central Government’s initiative to increase the agriculture product processing from the existing 5% to 40% with slew of incentives will surely change the landscape of our agriculture areas around the smaller towns/ rural areas. Good road connectivity to markets and cities is bringing down the logistic costs. With mechanization in Agriculture sector, people are purchasing tractors, farm equipments and cars- even in smaller towns, but the road widths are too narrow to accommodate their parking. This is the time to reinvent our small towns and rejuvenate appropriately by creating wider roads.

In addition to the preparation of Master Plans of these towns-which concentrates on the Land use Plans, it is essential to go a step further and prepare a “Multi-sectoral Rejuvenation plan” for these towns. The only solution is to unleash “Town Planning Scheme” to restructure smaller towns, on “Conservative Surgery” model. The other alternative to that is to shift the old villages to newly built townships adjacent to it. Many smaller towns were erstwhile big villages and concrete roads were prioritized more than the drains. Making drains contiguous and laying water supply and sewerage system should be the first priority.

16.1.3.7 Kalyana Karnataka region's planning

The Hyderabad Karnataka Region is one of the most backward regions in Karnataka. It constitutes six districts viz., Gulbarga, Yadgir, Bellary, Bidar, Raichur and Koppal, with a population of approximately 1.5 Crores within its 43,682 SqKms and is the second largest Arid Region after Rajasthan in the Country.
Ministry of Municipal Administration should expedite the preparation of Master plans for all Urban Local Bodies in Kalyana Karnataka region. Regional Plans and Perspective Development plans should guide the Master Plans of the ULB’s in Kalyana Karnataka region. Comprehensive Composite Development Index (CCDI) should be separately derived for Urban and Rural areas, so that funding can happen accordingly.

16.1.3.8 Planning for eco-sensitive regions

An Ecology plan should be the basis for Regional Plan for Kodagu Region due to its rich biodiversity of varied terrestrial Eco-regions, marine eco-regions, distinct freshwater eco-regions, network sacred forests. Avoid extending the conurbation limit as far as possible and to go in for high raised building or regeneration of town.

There are conflicts between the people engaged in tourism Development, urban development- with the Environment activists. Especially, in Kodagu, there is reduction in paddy cultivation, human-animal conflict. There are incessant rains in varied seasons, floods and land sliding. Overall, the climate change is significantly visible. This call for clear cut guidelines for development with strong development control to suit the hilly area and that could emerge only out of Eco-Regional Plan.

In an ecologically sensitive area, the strengthening of existing roads is preferred when compared with constructing new roads. It is essential to carry out a detailed Road Inventory Survey and that forms the basis for any asset management of the road network and Road Maintenance Management System (RMMS).

The Government needs to immediately carry out appropriate Revenue Survey for the entire Kodagu region and depict the existence of various trees in each RTC’s of the land holder. The Land revenue act needs to be amended atleast for the Western Ghats (Kodagu in particular) where the land tenures are complicated. Land Revenue Act need to be amended in-order to give “Special RTC (with a pre-condition that alienation/conversion of land is banned) for “BANE/ WASTE LANDS” to the farmers- with a strict precondition to grow only “forests” that could be integrated with shaded coffee plantations, horticulture/ jack fruits/ organic vegetables/ cardamom, etc.,.

16.1.3.9 Sustainable urbanization in Coastal Karnataka

The 320 kms coastline of Karnataka with its beaches and islands aided by rivers, Western Ghats and forests creates a potential for tourism development, whereas its ports and urban areas have great potential and role in the global economic chain as well as, for the trade and economic development of its region and state. Many cities have grown engulfing the villages and still retains rural aura. Unfortunately, on a larger foot print the impact on unplanned urban and rural sprawl has unleashed loss of its forest cover in the Western Ghats- which is considered as one of the global biodiversity hotspots (accounts to 64.9% of India’s total bio-diversity)](Western Ghats is also called as the conglomeration of water bodies of India). It is sad to know that Karnataka has lost 27.1% of Western Ghats forests. The developments in the ecological sensitive Area across coastal and adjoining regions of Shivamogga, Uttara Kannada, Mangaluru, Mysore, Belgaum, Dharwad, Kodagu, Chikkamagaluru, Udupi etc., needs to prepare Eco-Regional Plans and spatial developments should be based on the Environmental management zones/ guidelines derived from the Eco-Regional plans.
There is a need to improve existing water supply, sanitation and logistic infrastructure in its urban areas and its hinterland. On the other hand, there is a need to conserve and develop the mangrove plantations, conservation of coastal resources by strictly adhering to the Coastal Regulation Zone maps and strengthening the environmental monitoring capacity at the level.

It is to be understood that though CRZ regulations were there before 1990’s, it couldn’t control the unauthorized developments along the shore line, because the High Tidal Lines were not fixed. The districts in the eco-sensitive zones are losing its flora and fauna’s.

For a sustainable urbanization in the Coastal areas, apart from mitigating the environmental stress due to tourism, the coastal ports efficiency and its connected green infrastructure also plays a bigger role. It’s found that by doubling the existing ports efficiency, there will be atleast 32% increase in trade value. The higher the throughput of goods and passenger’s year-on-year, the more infrastructure, provisions and associated services are required. These will bring varying degrees of benefits to the economy and to the state. However, Haldia has become the ‘first green port’ in the country after a biodiesel dispensing unit was inaugurated in it. Haldia Port Complex, part of Kolkata Port Trust, will start using biodiesel to run its railway engines, trucks and other vehicles.

16.1.4 Satellite towns and its impact on sustainable urbanization

It was in 1902 that Ebenezer Howard propounded the idea of “Satellite Towns” through his book, the “Garden Cities of Tomorrow”. He defined Satellite towns are those habitats with almost 58,000 population connected by fast roads/ railways (now access controlled road) near to the parent city that is separated by a Green zone or Green Belt! But the Green Belt is no more in Karnataka due the amendment of Land Revenue Act, 2005.

All the Ring Towns and Satellite towns proposed from 1950’s remains on paper and there is no serious intervention by all the Government in the past to create satellite towns and Counter magnets to Bengaluru. “Develop Satellite towns” in the “outskirts of the city”, was a clarion call given by the ex-mayors during their recent meeting with BBMP administrators and similar message was put-forth by leading architects/planners in various forums. But, can the outskirts of Bengaluru be determined? How can one conceive Satellite towns in the “outskirts of Bengaluru”, especially when subsequent Master plans of have erased almost 830 Sq. Kms of Green Belt/ Agriculture zone due to unabated urbanization and the so called “outskirts” are filled with Urban Sprawl?

Figure 16.1: “Garden Cities of Tomorrow” by Ebenezer Howard
The Lakshman Rao committee in 1950’s proposed five Satellite towns for Bengaluru, viz., Kengeri, Yelahanka, Dobaspete, Chandapura and Hosakote, and they are now an integral part of the city, as the designated Green belt disappeared. Kengeri Satellite town remained less developed till the year 2000 due to nauseating Vrishabhavathi river mosquito menace, and the residents there still feel that they are in satellite town, due to the vast vacant lands of Bengaluru University that acts as a buffer to Bengaluru.

The earlier proposed “Ring towns” that were termed as “Counter magnets” around Bengaluru, viz., Magadi, Ramanagara, Kanakapura, Doddballapura are now labeled as Satellite towns. The Satellite Town Ring Road Planning Authority (STRRPA) connects these proposed Satellite towns/ Ring towns along its entire 204 Km stretch comprising of 331 villages. The Draft Master Plan-2031 (that was cancelled) had proposed seven (7) Special Economic Zones along the Intermediate Ring Road, which may evolve as Satellite towns, upon its development.

Even the proposed Bengaluru-Mysore Infrastructure Corridor Project (BMIC) that envisaged to construct Expressway integrated with five Self-sustained townships, could have decentralized Bengaluru to some extent, if it had got implemented! But the delay in project approval has caused distortion to Bengaluru-Mysore Corridor itself, as both the authorized and un-authorized urban sprawl has emerged all along the corridor in anticipation of the Expressway. This may lead to the creation of “Unstructured Megalopolis”, merging Bengaluru and Mysuru in the near future.

In the spatial urban pattern of Karnataka, some towns are acting as satellite towns (without designation) and some as counter-magnets to the large cities. Identifying such towns and upgrading them to remain as Satellite towns by not allowing ribbon developments should be the objective of the Government. Study has to be carried out to identify new Satellite towns with high raised buildings and adequate coverage, especially around the Coastal cities, eco-sensitive regions and Industrial towns- where land is a scarce commodity. This process should be reinforced by evolving “New Township Act” and to allow the transfer of Transfer of Development Rights from one Region to the other region.

In order to boost planned urbanization, the 15th Finance Commission has recently announced a grant of Rs. 8000 Crores to incubate eight new cities in India, wherein one city each per state will be grated Rs. 1000 Crores out of Eight shortlisted states. Karnataka could showcase its development perspective and bids to win for one Satellite town.

WAY FORWARD

1. The Urbanization policy for Karnataka needs to be evolved. There is a need to revise the Town and Country Planning Act and evolve a “NEW TOWNSHIP ACT” to facilitate large scale developments and Satellite Towns.

2. Master plans need to be prepared for 198 towns. The Master Plan for Bengaluru for 2031 need to be expedited, since the 2015 Master plan got expired 6 years back. Regional plans need to be prepared for all Planning Authority Area and the City/ Town Master Plan should be based on Regional Plans Karnataka needs an additional 300 Town Planners apart from the existing 120 Town planners (approximately).

3. The very definition of “Urban” need to be re-visited, especially from the point of percentage of people engaged in agriculture and allied-agriculture activity and density of population.
4. A new “TOWN COMMISSIONERATE” for towns having less than 50,000 population need to be formed for better governance to achieve Localized Sustainable Development Goals.

5. The Karnataka State Land Reforms (Amended) Act will certainly impact the landuses across various districts. The Government should quickly come out District Landuse Plans designating various landuses and conserve the fertile Land and the pasture Land (Goomaala) and identify the developable/ barren land, with an aim to protect the bio-diversity of the region.

6. There is a need to restrict the installation of Bore wells. Decentralized water harvesting structures should be constructed at every ward for ground water recharging and storage. Rain water harvesting at public spaces should be made mandatory for the Town Municipalities.

7. Comprehensive Composite Development Index (CCDI) should be separately derived for Urban and Rural areas, so that funding can happen accordingly in Kalyana Karnataka Region.

8. Prepare Eco-Regional plans and separate bylaws for various urban areas in the hinterland of Western Ghats. Avoid extending the conurbation limit as far as possible and to go in for high raised building or regeneration of town. Carry out revenue survey and let the trees of every land holder is designated in their RTC.

9. There is a need to improve existing water supply, sanitation and logistic infrastructure in its urban areas and its hinterland. On the other hand, there is a need to conserve and develop the mangrove plantations, conservation of coastal resources by strictly adhering to the Coastal Regulation Zone maps and strengthening the environmental monitoring capacity at the level.

10. Study has to be carried on to identify the existing towns that are already acting as Satellite towns and Counter-magnets and reinforce further with good infrastructure and ensure that no ribbon development happens between the city and these towns. Identify new areas as satellite towns, especially in coastal areas where ports are developing.

16.2 SUSTAINABLE TRANSPORTATION

16.2.1 Introduction

A city can transcend to the regime of Sustainable Transportation by encouraging active mobility (Non-Motorized transport) such as walking, cycling and Mass transit system/ Public transport. Ward level area planning and landuse structuring integrating with the city level road hierarchy plays a very important role in achieving success in Sustainable Transportation. A well integrated transport system can achieve sustainability.

16.2.1.1 Walkability

The first very important priority of any sustainable transportation for any city or the urban area is the WALKABILITY! Walkability is a measure of the extent to which the built environment of an area is friendly for pedestrians.

Bengaluru, stands second among 15 Asian cities on the Walkability Index, scoring a poor 46 out of 100. Hence, to improve this scenario, every urban local body/ city should come
up with Ward level detailed Pedestrianization plan and integrate it with other wards around it to achieve an efficient city level walkability.

16.2.1.2 Cycleability

The second priority for a sustainable transport is the Cycleability. With 11,000 new inhabitants every year, Amsterdam is creating new “royal routes” to accommodate more bicycles. To reduce stress during rush hour, they’re widening existing cycle tracks to more than eight feet, building more low-speed cycle streets, and redesigning major intersections to allow for more protected cycling space.

Though Bicycling sharing system is introduced in Bengaluru & Mysuru by the Directorate of Land Transport (DULT), its impact is not felt to the required level. The reason is many, and that includes inadequate road widths, discontinuity of Cycle tracks, non-coordination of various infrastructure provision organizations and irrational cycle routes. A study on the “Rationalization of Cycle routes” based on various parameters need to be taken up by DULT to propagate non-motorized transportation in various cities and Urban Local Bodies (ULB’s).

No doubt the share of “Active mobility” / “non-motorized transportation” need to increase drastically. In 1990’s Madurai had almost 79% share in non-motorized transportation (Cycles), but now has just 2% share. Hence, in towns where the Cycles are predominantly used now (Ex: Tumkur - 15% share- and many other ULB’s), efforts should be made to retain that share by comprehensive initiatives that includes creating user friendly cycle tracks, accessibility to amenities, etc. The share of Cycleability in various cities and ULB’s at present need to be conserved and efforts should be made to enhance it by providing obstacle-less cycle paths/ tracks. Cycle tracks/ cycle paths need to be indicated under the Roads Classification in every Comprehensive Development Plans/ Master plans.

The proposed Karnataka Active Mobility Bill published by the Directorate of Urban Land Transport (DULT) that recognizes the rights of all road users (pedestrians & cycles) should be immediately passed and integrated with the ULB/ City plans.

16.2.1.3 Urban mass transport system-public transportation system

Public transport should be based on “Mobility/ Transportation for all”, not just addressing one section of people. The success of public transport depends on, as to how much connectivity is there? How easy it is to transcend from one mode of transport to the Public transport- from origin to destination? How congestion free it is! How time could be saved and how affordable the system is? Only if big investment is pushed to improve the Public transport mode like, Buses, Elevated Bus Rapid System (BRT), Monorail, etc., the public traffic mode share will increase.

The share of public transport by BMTC Bus is around 50% in Bengaluru. In Bengaluru alone there are 6484 Buses with 5189 Schedules with a daily service of 8.56 Lakh Kms in 46000 kms trips and servicing 5.02 Million people. Bengaluru launched 90 Electric buses along with 150 Bharat Stage-VI diesel buses. The 90 electric buses will be operated as Metro Feeder services to provide first and last mile connectivity.

The Namma Metro still carries around 25,000 passengers per day. There are more than 50 Lakhs private vehicles in Bengaluru (of which, 60% are Two wheelers, 20% are cars).
During the past 3 years, Bengaluru registered 20 Lakhs Vehicles. METRO/ MONO/ BRT solutions need to be first implemented on the Ring road/ Peripheral road rather than extending beyond city limits (like the one towards Bidadi) in isolation to the City Master plan. Time has come that Bankable report should be integrated with an important parameter called as “Sustainable transport”.

At present, there are 10 Million trips per day and it will reach 23 Million trips per day by 2031. Even if the Metro Rail Phase I, II & III gets fully completed and operational, even if the BMTC Buses fleet are doubled to 15000 buses, the public transport mode share will drop from the present 50% to 30% by 2031. This means that the number of vehicular trips will increase by 3 folds. Hence, the solution is to initiate a major over-haul of BMTC Buses- especially e-Buses.

What’s the way forward to enhance the share of public transport in Urban Local bodies and cities of Karnataka? Encourage and facilitate to enhance the Public Transport ride share. Increase the number of Buses exponentially, especially in Bengaluru.

To rationalize the bus routes and its operations, studies like “Comprehensive services and operational analysis” that was done for Mysore, need to be carried out for Bengaluru and other cities of Karnataka. With regards to Bengaluru, there is a need to bifurcate it into manageable few zones/ quadrants associated with more bus terminals -that will be easier to operate on the basis of Hub-Spoke concept.

Buses are increased, the congestion on existing roads increase. To mitigate that, there is an immediate need for infusing Bus Rapid Transit (BRT) System - it could be an Elevated BRT or BRT corridors, if the road width is available. It is advisable to build the Elevated BRT for at least 200 Kms in Bengaluru to immediately ease the traffic and this will increase the public confidence in using public transport, thus improving the share of public transport mode.

It is essential to create more Bus terminals/ nodes and decentralize the Bus service. It’s time to re-look at the Bankable solutions, wherein profitability alone shouldn’t be the priority. It is essential to make SERVICE as a profitable entity- not just the BUSES alone! The BMLTA need to explore an algorithm to share the earnings derived from the Parking within the city with BMTC.

16.2.1.3.1 Transition to green mobility

Recently, the State-run Convergence Energy Services Ltd (CESL) floated its biggest ever request for proposals for the rising demand for electric buses, under the ‘Grand Challenge’ – a set of homogenised demand for electric buses aggregated across five major cities, viz., Bengaluru, Delhi, Surat, Hyderabad, and Kolkata. The CESL aims to deploy 5450 Standard buses and 130 double decker buses, as a part of the government’s Atmanirbhar Bharat initiative and Azadi Ka Amrit Mahotsav.

16.2.2 Unified metropolitan transport authority

The DULT need to become more pro-active and visible in Karnataka. Unified Metropolitan Transport Authority (UMTA) is a simple concept, viz., take care of all transportation systems/ roads of the City- from coordinating/ planning/ design to regulation, with an objective to promote sustainable, affordable and seamless mobility. The first step towards it has been
envisaged through the Draft “THE BENGALURU METROPOLITAN LAND TRANSPORT AUTHORITY BILL, 2021”(BMLTA).

However, many metros including Delhi, Mumbai, Pune, etc., couldn’t pass the UMTA bill due to practical difficulties. The proposed BMLTA bill-2021 envisages to implement projects, and enforce certain duties that overlaps with certain provisions of various other legislations of Municipalities, Railways, RTO, Police, BBMP, BDA/BMRDA, etc.,. Under such circumstances, it’s rather pragmatic to constitute Metropolitan Planning Committee(MPC) with Bengaluru Metropolitan Region Development Authority (BMRDA) as its secretariat. The BMLTA could work under the Metropolitan Planning Committee (MPC) as transportation unit- an ADVISORY & REGULATORY body, so as to integrate landuses with transportation, initiate and implement Intelligent transport system, city mobility investment programs, regulate tariff to prepare the Street design guidelines/policies, parking policy, establish strong parking grid, initiate active mobility (Non-Motorised Transport solutions) at the ward levels, Junction designs, integrate and regulate public transport system etc.,.

No doubt Unified Metropolitan Transport Authority (UMTA) is very much needed to harmonize the various modes of transport, especially the BMTC, BMRCL, PRIVATE TAXIS, ROADS UNDER ALL LOCAL BODIES, etc., for an efficient city governance. In simple terms, BMLTA is a platform wherein it will coordinate with all the organizations involved with the Public transport (and associated infrastructure) and ensure success of the Master plan. DULT/ BMLTA should ensure that comprehensive mobility plans are implemented in totality. Example: it should be the BMMLTA/ DULT’s City Mobility Plans (CMP) that should determine the CORRIDOR/ routes for BMRCL based on the City level Master Plans/structure plan rather than BMRCL deciding the routes. Hence it is essential to discuss the provisions of BMLTA threadbare before its implementation.

16.2.3 Parking

Parking demand in most metropolitan cities has far ahead of the supply. Effective parking infrastructure with affordable tariffs located near Bus/ BMRCL/ KSRTC terminals could increase the share of Public transport. A better use of space can be achieved through mechanized parking lots. There are many automated parking systems implemented in Kerala that can park 100 Cars in just 300 Sq Km.

The Urban local bodies should come up with an impact study on various commercial buildings (Ward-wise) that generates huge traffic. On that basis, the identified buildings that generates huge traffic (like Malls/Multiplexes/ Office buildings, etc.,) should be levied “Impact Fee”. [Note: “Impact fee” is levied in Hyderabad @ Rs. 400/ Sft (for Ground +2) and @ Rs. 200 (beyond 2nd floor)].

16.2.4 Implement circular roads connecting various corridors

Infact, the implementation of Northern Peripheral Road was taken up for 11 times by various Governments from 1995 onwards, but in vain and the land acquisition for the said road is still not completed. Whereas, NICE Peripheral Road (a BOOT project) of 50.9 Kms was completed in 2008 and this road contributed immensely in mitigating traffic jams and pollution in Bengaluru, by easing the movement of Heavy and Medium Transport...
vehicles and saving the travel time & fuel. Hence, by constructing the Northern Peripheral Road at the earliest can mitigate double the pollution levels that exist within the city presently.

The Sub-Urban Railways that traverses 148 Kms across the peripheral area of Bengaluru connecting all corridors need to be implemented at the earliest.

16.2.5 Urban Design- Aesthetics & Transport Planning

There is a need to implement Urban Design plans for very important roads of Cities and tourist potential Urban local bodies, The urban design plans ensures the city looks beautiful and enhances its aesthetic and cultural value.

16.2.6 Electric vehicle charging infrastructure

The study by Center for Study of Science, Technology and Policy (CSTEP) in BBMP limits assumes 30 per cent EV penetration by 2031. Assuming 30 per cent EV penetration, 22,000 chargers of different types and capacities would be required in the city. Setting up charging infrastructure at a city level is expensive at the moment. The cost of one charger ranges from Rs 1 lakh to Rs 5 lakh.

It is essential for the Government to plan to set-up more EV charging stations across Bengaluru and in all the ULB’s, as there is a rise in the number of electric vehicles in the city.

16.2.7 Railways - Moving Towards Net-Zero emmission

The railways have come out with a road map to become Net-Zero Emitter by 2030. The extent of railways vacant land proposed to use for solar to Rail Project is around 349.69 Acres of land parcels in the state of Karnataka, Tamil Nadu, Goa and Andhra Pradesh with a combined capacity of 118MWp. The total Roof Top Solar has 13989 capacity (KWp) and has already installed capacity (KWp) 4535 (Balance available capacity (KWp) 9454). For 2021-22, the railways have planned in 359 (KWp) and for 2022-23 it has planned to install 1997.12 KWp. Provision of Solar Panels has been made at 108 Railway stations of SWR, with a combined capacity of 972.38 kWp. Out of in all 761 LC Gates, Solar Panels have been provided at 298 LC Gates. Works has been proposed to install solar plants at 31 stations with a total capacity of 359 kWp in FY 2021-22.

A total of 26 Stations with a combined capacity of 465 kWp has been proposed. In the Bengaluru division, Solar streets lights at 101 LC gates with a combined capacity of 12.12kWp. An additional capacity of 1520 kWp has been planned at Various Service buildings over SWR. Apart from solar panels, 50,700 LPD of solar water heaters are provided to reduce energy consumption and carbon emissions.

WAY FORWARD

1. The proposed Karnataka Active Mobility Bill published by the Directorate of Urban Land Transport (DULT) that recognizes the rights of all road users (pedestrians & cycles) should be immediately passed and integrated with the ULB/ City plans.
2. Initiate a major over-haul of BMTC Buses- especially e-Buses. Plan for atleast 200 Kms of BRT corridors in Bengaluru to increase the Mass transportation share.
3. To rationalize the bus routes and its operations, studies like “Comprehensive services

Karnataka Economic Survey 2021-22
and operational analysis” that was done for Mysore, need to be carried out for Bengaluru and other cities of Karnataka. With regards to Bengaluru, there is a need to bifurcate it into manageable few zones/ quadrants associated with more bus terminals -that will be easier to operate on the basis of Hub-Spoke concept.

4. The Government needs to constitute Metropolitan Planning Committee(MPC) with Bengaluru Metropolitan Region Development Authority (BMRDA) as its secretariat. The BMLTA could work under the Metropolitan Planning Committee (MPC) as transportation unit- an ADVISORY & REGULATORY body, so as to integrate landuses with transportation, initiate and implement Intelligent transport system, city mobility investment programs, regulate tariff to prepare the Street design guidelines/policies, parking policy, establish strong parking grid, initiate active mobility (Non-Motorised Transport solutions) at the ward levels, Junction designs, integrate and regulate public transport system etc.,

5. Effective parking infrastructure with affordable tariffs located near Bus/ BMRC/ KSRTC terminals could increase the share of Public transport. Multi-Storey Parking lots need a larger space to accommodate the up/down ramps, circulation areas and walk ways/lifts for people movement. A better use of space can be achieved through mechanized parking lots.

6. Expedite the construction of the Northern Peripheral Road at the earliest to ease the traffic from the city and to mitigate the pollution levels that exist within the city.

7. Implement the Sub-Urban railways at the earliest. Increase the frequency of inter-urban trains that could facilitate passengers and goods.

8. There is a need to implement Urban Design plans for very important roads of Cities and tourist potential Urban Local Bodies, The urban design plans ensures the city looks beautiful and enhances its aesthetic and cultural value.

9. Replacing LED lamps in all ULB’s is a green initiative and that can bring in some Carbon credits that could be used for the maintenance.

10. Government to plan to set-up more EV charging stations across Bengaluru and in all the ULB’s, as there is a rise in the number of electric vehicles in the city.

11. The cities and ULB’s need to monitor the CDS waste and ensure that they are re-used for the construction of roads.

16.3 UNAUTHORIZED DEVELOPMENTS, SLUMS AND AFFORDABLE HOUSING

16.3.1 Introduction

Some ULB’s are marred with costly concrete roads that are built before a robust drainage is constructed leading to floods, whereas, the water supply, sewerage systems and water harvesting structures are still yet to be fully laid. The Unauthorized layouts and slums have cropped up, brow-beating urban local bodies/corporations, due to which our road pattern are non-hierarchical and disconnecting, as well as, the road widths are below the specified standards and the parks never exist. Industrial development boards have developed some Industrial Estates in isolation that was never earmarked in the Master plans and most of our Industrial areas don’t have Common Effluent Treatment Plants (CEPT).
16.3.2 Unauthorized developments

Unauthorized developments are rampant in many emerging cities/Urban Local Bodies of Karnataka and constitute almost 30% to 40% of the total urban area. The quantum of unauthorized developments has to be collated from various sub-register offices, since some of the unauthorized developments exist beyond the jurisdiction of Planning Authority (PA)/Urban Development Authority (UDA)/City Municipal Corporation (CMC)/Town Panchayath (TP). However, due to continuous efforts made by the Vice-Chairman of Karnataka State Policy & Planning Commission (KSPPC) to secure the data on unauthorized developments in various urban areas of Karnataka, the details of unauthorized colonies were procured from various ULB’s. Accordingly, it is found that around 19,291 Acres of unauthorized developments have cropped up in various urban areas. The tax-avoidance of these unauthorized developments is to a tune of Rs. 19,622 Crores. More than that, the state has lost almost 1929 Acres of parks (that area too has been formed into sites) and 964 Acres of roads.

16.3.2.1 Impact of unauthorized development

For decades Karnataka has witnessed huge unauthorized developments that have encroached upon the natural drains, lakes, catchment areas, parks and open spaces. The impact of unauthorized colonies and revenue colonies are multifold.

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<th>Un-Authorized Developments (Acres)</th>
<th>Extent of Parks &amp; Open Spaces lost **(Acres)</th>
<th>Extent of Road area lost (Acres)**</th>
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<td><strong>1929.13</strong></td>
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Source: Collated from the documents procured by KSPPC from various authorities

*computed based on primary survey  **Computed

There are more than 106 cities in the entire country wherein, the rivers entering those cities carry sewage. Despite the Supreme Court order banning developments in Thippagondanahalli Catchment area, one witness huge unauthorized developments sprawling the entire catchment area. Many unauthorized developments encroaching the natural drains thus blocking the natural drain, as well as discharging sewage and sullage into the catchment areas of Arkavathi/Vrishabhavathi rivers, has made those
rivers carrying sewage water that flows within Bengaluru emitting nauseating smell. Untreated sewage and industrial effluents are also being dumped even in Cauvery, Pennaiyar and other rivers! This is a general phenomenon in all through the state.

The algorithm for the overall development for any city gets totally disturbed due to unauthorized colonies and the coherence for the sustainable development of a city is lost. The road network of unauthorized colonies doesn’t efficiently merge with the city level roads and infrastructure.

16.3.3 Slums In urban local bodies of Karnataka

Slums crop up as a byproduct of industrialization and urbanization. The Slums diminishes the ranking of majority of the Sustainable Development Goals of a city, because slums depicts Poverty, hunger, disease, illiteracy, Gender inequality, lack of infrastructure and basic services, etc., and almost 22.56% of Urban population lives in Slums. But slums contribute a high percentage of informal sector labour. The SDG 11 which focuses directly to make cities and human settlements inclusive, safe, resilient and sustainable with the target to achieve ensuring access for all to adequate, safe, and affordable housing and basic services and upgrade slums. To reinforce SDG 11, there is a need to achieve of Goals and targets under SDG’s 1,2,3,4,6,10. It is to be noted that SDG’s 5, 7, 8, 9 may indirectly provide support in achieving the other goals. Achieving SDG’s 16 and 17 will provide necessary framework, guidelines for strengthening the institutions and Budgetary & financing mechanism for effective implementation and achievement of policies and programs aligned with the Sustainable Development Goals through effective Governance.

As per the survey conducted by the Karnataka Slum Development Board there are 2804 slum areas in state. Out of which 597 slum areas are in Bangalore City. It is estimated that the population of the slums in the State is about 40.50 lakhs (25.04 lakhs), which works out to 22.56% of the State's urban population. Totally 2734 slums are notified in the State and out of which 444 slums are notified in Bangalore City alone under the Karnataka Slum Areas (Improvement and Clearance) Act 1973. The total number of non-notified slums in all ULB’s is 407. Annexure: Slums in Karnataka-Zone-Wise

16.3.4 Affordable housing demand in ULB’s of Karnataka

The 2011 Socio-Economic Caste Survey estimates that around 5.09 Million Households don’t have access to housing. In that 13.7% (0.8 Million HH) lives in kattcha houses and 8.6% (0.43 Million) lives in congested houses. Due to various housing schemes by the GoK and GoI, the present Urban housing demand has gone down to just 1.32 Million (including siteless).

Based on the housing demand survey by the Rajiv Gandhi Housing Corporation, the total Urban housing demand (houseless and siteless) has gone down to 1.32 million. It is surprising to note that only 22.72% (0.32 Million) of the total demand is for housing, whereas 77.28% (1.27 Million) is the demand for sites. Of that the demand for SC/ST, General & OBC for houses and sites are 32.46%, 38.07% and 30.47% respectively.

The Karnataka Affordable Housing Policy (KAHP)- 2016 focuses equally on improving
existing housing and building new housing. The Government of Karnataka housing schemes is in alignment with the Pradhan Mantri Awas Yojana (PMAY) launched by the Government of India in 2015.

16.3.4.1 Role of Building Material & Technology Promotion Council (BMTPC)

BMTPC is engaged in identification, evaluation & certification of new technologies and has published various documents. Recently, the Ministry of Housing & Urban Affairs (MoHUA) organized Global Housing Technology Challenge-India, under which 54 new technologies in 6 broad categories were shortlisted. Using one new technology from each of broad categories, 6 light house projects are being constructed presently at 6 locations in the Country. All the details related to various aspects of GHTC-India including Light House Projects are available at https://ghtc-india.gov.in
WAY FORWARD

Unauthorized colonies in urban areas
1. It is found that around 19,291 Acres of unauthorized developments have cropped up in various urban areas. The tax-avoidance of these unauthorized developments is to a tune of Rs. 19,622 Crores. More than that, the state has lost almost 1929 Acres of parks (that area too has been formed into sites) and 964 Acres of roads. Heavy penalties should be initiated to recoup the real loss of parks and road space- apart from betterment levy and other taxes. The ULB’s need to coordinate with the Sub-registrars to assess the exact extent of unauthorized colonies.

Slum rehabilitation and redevelopment in urban area
1. Creating Regional Balance will certainly dampen the migration of poor people
2. If a slum has cropped up due to a particular economic activity, ensure that the large employer of such economic activity becomes the stake holder for the slum rehabilitation or for creating rental housing schemes.
3. To allocate housing to the slum dwellers under PMAY-HFA. Redevelopment of slums on PPP model may ease the strain on the Government. The existing slum’s social and physical infrastructure needs to be upgraded.
4. A detail action plan covering based on Socio-Economic survey need to be prepared for every slum in terms of fulfilling majority of the SDG goals.

Affordable housing in urban areas
1. Similar to Building Material & Technology Promotion Council (BMTPC) which is s engaged in identification, evaluation & certification of new technologies (and that has been published), Karnataka too should come out with various low cost technologies that are suited to various regions/district, that emphasizes the use of local material/ industrial waste, etc., and the same need to be manufactured and marketed to handle the beneficiaries of various housing schemes. The Karnataka’s NIRMITI KENDRA is an appropriate organization to carry out this task.
2. Efforts should be made to create the Vulnerability Atlas of Karnataka, similar to the vulnerable atlas of India to mitigate natural disasters like floods, heavy rains, erosion and earthquakes.

Environment impact of using localized building materials
1. Our construction technology should aim in to reduce water, steel, cement and sand consumption under Paris agreement on climate change India has committed to creating cumulative carbon sink of 2.5-3 billion tons or equivalent by 2030.
2. There are around 1,905 steel production companies in Karnataka. Infact, steel flux/ slag can be used as an alternative to cement , concrete and for flooring
3. Excellent thermal insulation to the structure can be achieved by using clay hollow blocks and it gives 4-5 degree reduction in internal temp in summer.
4. sludge from coal based power plants and silt from the dams can be reused to manufacture bricks.
16.4 URBAN FLOODS AND WATER BODIES

16.4.1 General

Urban floods are common phenomenon seen in Indian cities and ULB’s. The reasons are two-folds, viz., Very heavy rainfall and unplanned development! The Indian cities have grown without respect for natural slopes, encroachment on drains, solid waste clogging in natural drains and unauthorized wastewater entering into the natural drains that is meant for carrying only rainwater.

Encroachment of flood plain areas/ Kharab lands and blocking the natural drains reaching its destination lakes is another serious issue is a general phenomenon through-out the state. Identifying such unauthorized developments (Approx. more than 19291 Acres in Karnataka) that blocks the natural drains and the developments that discharge raw sewage into the existing natural drains should be penalized.

Bengaluru was once called as the City of Lakes. Today there are only 210 lakes out of 400 plus lakes. In that many of the lakes are yet to be rejuvenated. In the past, some of the past lakes were either converted into Bus stands, ware houses, Hospital, play ground, etc.,. Many lakes ceased to exist due to dumping of solid waste, infl ow of sewage, formation of roads, parks, religious structures, graveyards, residential layouts and agriculture activity.

The BWSSB (Amendment bill)-2021 makes Rain Water Harvesting (RWH) mandatory for all the buildings on sites measuring 30’*40’ (new buildings), 40’*60’ and above. The recent bill mandates the buildings that come up on sital area beyond 10,763 Sq. feet too shall provide dual piping system and rain water harvesting structures”. Out of around 35 lakhs buildings in Bengaluru, only around 2 lakhs buildings have provided RWH till now. Similar bill need to be passed for all ULB’s.

The ULB’s need to harvest the rainwater at the ward level by collecting atleast 30% of rain water based on topography- from Roads, Public buildings and parks. This will have a dual purpose, viz., mitigating flood water and water source for drinking (after treatment) and using the same for maintenance of parks and open spaces.

The general tendency of layout formation in Karnataka is “Cut and fill and make the layout flat”

Even the Subdivision rules and regulations of town planning department doesn’t have regulations regarding the preservation of natural slopes.
The total area covered by the canals and storm water drains within all the ULB’s of Karnataka sums up to 16062 Acres (0.85% of the total area of ULB’s in Karnataka)

Delineation of floodplains for a stream or major drains is very important prior to development because a well planned logical development on floodplains is very important for the overall sustainable development of an area. Frequent assessment of the surface runoff and accordingly enhancing the drainage capacity is another means of avoiding the possibility of drainage overflow.

Annexure: CANALS & STORM WATER DRAINS WITHIN ULB’s of KARNATAKA

WAY FORWARD

1. Respect the natural drains! Prepare the drainage master plan for every urban local body based on region beyond its limits!

2. The ULB’s need to harvest the rainwater at the ward level by collecting atleast 30% of rain water based on topography- from Roads, Public buildings and parks. This will have a dual purpose, viz., mitigating flood water and water source for drinking (after treatment) and using the same for maintenance of parks and open spaces.

The Tank development should be based on the drainage pattern and not on the basis of size of the water body.

16.5 OLIVE GREEN TO PALE GREEN

16.5.1 Introduction

Urban greening is all about bringing in green spaces within proposed developments-atleast to a tune of 15%, conserving and protecting existing trees, gardens/ parks/ play grounds. It is also about conserving/ re-densifying and preserving the forests/ mangroves/ marshy lands while expanding the Urban areas/ cities. Out of this, the fruits, timber and fuel can bring in immediate marketable benefits to the ULB’s. Even intangible benefits like the carbon dioxide sequestration, oxygen emission, rainfall interception, dust retention, biodiversity conservation, removal of particulate pollutants, microclimate amelioration, etc., can add up to the Intended Nationally Determined Contributions (INDC) highlighting climate actions, including climate related targets for greenhouse gas emission reductions, policies and measures governments aim to implement in response to climate change. Nevertheless, the ULB’s can derive carbon credits and earn for its area maintenance.

16.5.2 Impact of unauthorised developments on parks and open spaces

In Karnataka, though there are building byelaws that prescribes setbacks around the building and sub-division rules and regulations that stipulateat least 10% of the total area of development to be reserved for Parks and open spaces. Despite these regulations and basically due to many unauthorized and revenue developments, the parks and open spaces of the cities are less than 10%. There is lack of focus on preservation and
improvement of parks in the state. Our ULB’s should become Park and Tree centric urban areas. It’s time that the Development Authorities/ Corporations/ ULB’s should come out with a designated algorithm for the development, protection, preservation and conservation of trees and parks. An approachable, well designed, well structured, well maintained and conserved parks (Avenue trees) brings in more investment in various sector, improves tourism sector as well as attracts better real estate price for its residential, commercial, institutional and industrial landuses. The responsibility of conserving trees and parks can be achieved by ensuring strict development control by the concerned authorities as well as by active participation by the Citizen groups.

On the basis of per capita green space, green space to land ratio, green space canopy coverage, around over 3000 cities, towns and communities were awarded as “Tree City” in USA and over 100 cities were awarded as “National Garden City” in China. Some of the cities like Gandhinagar, Chandigarh, Delhi, Bangalore and Jaipur has per capita green space of 162.80 Sq.mt/ inhabitant, 54.45 Sq.mt/ inhabitant, 21.52 Sq.mt/ inhabitant, 17.32 Sq.mt/ inhabitant and 2.30 Sq.mt/ inhabitant, respectively.

16.5.2.1 Green belt in urban local bodies

The Master Plan- 2015 of Bangalore that was prepared in year 2007 re-designated the year-2005 Master Plan's Green Belt as the Agriculture Zone. This obviously facilitated land alienation and the same was followed in other cities Master plans too. The Bengaluru's Green Belt has been reduced from 830 Sq. km (65%) to almost zero in four decades and the corresponding conurbation (urbanized) limit has been expanded by 5 times from 220 Sq. Kms to 906 Sq. Kms. There are more than 5000 hurdles in the form of un-authorized developments on the proposed roads (alone) of Bengaluru Master plan-2015.

Earlier, the Karnataka Government had ushered the implementation of Town and Country planning concepts like the Green Belt on their cities in letter and spirit. Infact, Section 95 (3B) of the Karnataka Land Revenue Act-1964 specifically prohibited the Deputy Commissioner from granting permission for conversion of land in the green belt for any other purpose. Hence, no land in the green belt could be alienated or converted, till 2005. Unfortunately, green belt concept failed across the state, due to the urban sprawl and witnessed huge extent of Unauthorized and revenue layouts. Hence, Sec 95 (3B) of Karnataka Land Revenue Act-1964 was omitted by Act 1 of 2005 w.e.f. 14.02.2005.

It is observed that many of the lands in the Agriculture Zone has already been alienated to Non-Agriculture purpose, but in the process Bengaluru will experience a complete urban sprawl in the next decade, in the absence of the Master Plan-2031, though the Master Plan-2015 got expired 6 years back.

In the above context, in-order to increase the Green Zone and to permanently conserve the Agriculture Zone, the BDA/ Government (through Master plan-2031) can acquire suitable land in the periphery and convert it into Botanical Garden cum Herbal Park or theme park on PPP mode. These Botanical Gardens could also spurt the recreational tourism in line with the Sentosa of Singapore. The same model could be tried in all major urban centers in Karnataka.
### Table 16.3: Bangalore Development Since 1972

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Master Plans</th>
<th>Connurbation Limit Extent (Sq. Kms)</th>
<th>% Age of Lpa</th>
<th>Agriculture Zone Extent (Sq. Kms)</th>
<th>% Age of Lpa</th>
<th>Local Planning Area Extent (Sq. Kms)</th>
<th>Change in Lpa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outline Development Plan-ODP 1972</td>
<td>220</td>
<td>44.00%</td>
<td>280</td>
<td>56.00%</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Comprehensive Development Plan-CDP 1984</td>
<td>449</td>
<td>35.11%</td>
<td>830</td>
<td>64.89%</td>
<td>1279</td>
<td>Area increased by 2.56 times</td>
</tr>
<tr>
<td>3</td>
<td>Revised Comprehensive Development Plan-CDP 1995</td>
<td>597</td>
<td>46.68%</td>
<td>682</td>
<td>53.32%</td>
<td>1279</td>
<td>No change in LPA</td>
</tr>
<tr>
<td>4</td>
<td>Revised Master Plan-RMP- 2015 (Approved in June 2007)</td>
<td>800</td>
<td>65.63%</td>
<td>419</td>
<td>34.37%</td>
<td>1219</td>
<td>No change in LPA</td>
</tr>
<tr>
<td>5</td>
<td>Comprehensive Development Plan-CDP 2031 (Draft)- &amp; later cancelled</td>
<td>906.02</td>
<td>75.07%</td>
<td>300.95</td>
<td>24.93%</td>
<td>1206.97</td>
<td>Miniscule change in LPA</td>
</tr>
</tbody>
</table>

The Agriculture zone is just 24.93% (300.95 Sq. Km) of LPA- Even that is under transition, since; many land parcels are getting converted. It is time to act, before there is no lungscape.

### 16.5.2.2 PARKS AND OPEN SPACES IN URBAN LOCAL BODIES

A survey by an NGO Janagraha few years back found that, Bengaluru alone- out of 1115 Parks and 192 playgrounds within BBMP limits, 21% are inaccessible to public and aren’t developed. It is also observed that the Children play in open spaces that are reserved for Community Amenities that are not yet developed.

In Karnataka, 63 Urban local bodies don’t have play grounds at all (very miniscule area in some ULB’s). Bengaluru ranks first in terms of area of play grounds 1331 Acres, but has only 1.87% of play ground area. It’s high time that Bengaluru builds a State of art stadium in the peripheral area.

The Central Government has come out with the “Fit India Movement” and the sports ministry wants to promote “Sports for all”. There is a need to create space and install requisite infrastructure for that! The urban areas lack space and the RURBANTowns lack both space and infrastructure. It is observed that atleast 25% of the Urban areas in Karnataka is encroached by Unauthorized colonies that don’t have Parks and open spaces. While we speak a lot on Gender equality, it is found that none of the open spaces or parks are reserved for females! Many cognitive outdoor sports that existed few decades back like the Ball Badminton (that was played by both boys and girls), etc., are extinct now! The Urbanization policy needs to fix it.

### 16.5.2.3 The tree clad areas

In terms of Tree Clad area, almost 188 Urban Local bodies doesn’t have any Tree Clad Zone. Mangalore of Dakshina Kannada District that has 2389.21 Acres ranks first, Where
as Mysore and Bengaluru ranks 12th and 21st with tree clad area of 221 Acres and 62.42 Acres respectively. Interestingly, the Kodagu District’s ULB’s Somawarapet and Kushalnagar ranks 57th and 93rd with just 4.11 Acres and 0.55 Acres of tree Clad area within its Conurbation limit/Built up area limits, respectively.

16.5.3 Forest areas within urban local body limits

There are 77 ULB’s that has forest land within its jurisdiction. 207 ULB’s don’t have forest land within its jurisdiction. Around 18 ULB’s has forest land extent between 500 Acres to 15000 Acres, 21 ULB’s has forest land extent between 100 Acres to 500 Acres, 17 ULB’s has forest land extent between 10 Acres to 100 Acres, 8 ULB’s has forest land extent between 1 Acres to 10 Acres and 11 ULB’s has forest land extent that is less than 1 Acres.

16.5.4 Agriculture land within urban local body limits

Agricultural activity between 500 Acres to 30000 Acres are still been carried out within 231 ULB’s limits (72.75 % of ULB’s). Almost 42% of the ULB’s have 50%- 93% (120 ULB’s) of agriculture land, 42% (122 ULB’s) of the ULB’s have 25%- 50% of agriculture land and only 16% (46 ULB’s) of the ULB’s have less than 25% of agriculture land within its local planning area. This explains the characteristics of our urban area.

16.5.5 Mangroves within ulb limits- Karnataka

In Karnataka, seven towns viz., Someshwera, Ullal, Shikaripura, Baindoor, Kundapur, Saligrama and Karwar has mangrove lands within the ULB Limits. It is essential to conserve these mangrove lands and the ULB’s Master plans should envisage the ways and means to protect these lands.

16.5.6 Tree counting to be made mandatory

The Tree counting survey for Bengaluru that started in 2017 is still not completed. There is a need for carrying out Aerial Survey that can provide the tree count, estimates of canopy dimensions & Bio mass estimation using locally-appropriate 'leap-frogging' technologies to complement the forest department and BBMP efforts in managing urban trees and forests. All Urban Local Bodies should be in the forefront of urban tree conservation efforts in the State. Through this exercise the high resolution baseline map that is created could assist in road Survey, Storm water Drain survey and other infrastructural issues faced by the BBMP, as well as for all ULB’s.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>District Name</th>
<th>Town Name / Land use</th>
<th>Mangroves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dakshina Kannada</td>
<td>Someshwara</td>
<td>0.05</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Ullal</td>
<td>34.88</td>
</tr>
<tr>
<td>3</td>
<td>Shivamogga</td>
<td>Shikaripura</td>
<td>3.14</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Bynduru</td>
<td>6.57</td>
</tr>
<tr>
<td>5</td>
<td>Udupi</td>
<td>Kundapur</td>
<td>40.85</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Saligrama</td>
<td>28.98</td>
</tr>
<tr>
<td>7</td>
<td>Uttara Kannada</td>
<td>Karwar</td>
<td>181.90</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td></td>
<td><strong>296.36</strong></td>
</tr>
</tbody>
</table>
WAY FORWARD

1. In-order to increase the Green Zone and to permanently conserve the Agriculture Zone, the BDA/ Government (through Master plan-2031) can acquire suitable land in the periphery and convert it into Botanical Garden cum Herbal Park or theme park on PPP mode. These Botanical Gardens could also spurt the recreational tourism in line with the Sentosa of Singapore. The same model could be tried in all major Urban centers in Karnataka!

2. The Green Belt Concept need to be re-introduced in Karnataka Land Revenue Act

3. In Karnataka, 63 Urban local bodies don't have play grounds at all (very miniscule area in some ULB's). Bengalure ranks first in terms of area of play grounds 1331 Acres, but has only 1.87% of play ground area. It's high time that Bengaluru builds a State of art stadium in the peripheral area. The tree clad areas need to be developed.

4. “PARKS AND PLAY GROUNDS PLANNING AND DEVELOPMENT AUTHORITY” need to be formed for conserving, planning and designing the Parks and Play grounds in ULB’s. Gender based parks need to be promoted to encourage the females in sports activity.

5. The Tree counting survey for Bengaluru that started in 2017 is still not completed. There is a need for carrying out Aerial Survey that can provide the tree count, estimates of canopy dimensions & Bio mass estimation using locally-appropriate ‘leap-frogging’ technologies to complement the forest department and BBMP efforts in managing urban trees and forests. All Urban Local Bodies should be in the forefront of urban tree conservation efforts in the State. Through this exercise the high resolution baseline map that is created could assist in road Survey, Storm water Drain survey and other infrastructural issues faced by the BBMP, as well as for all ULB’s.

16.6 MANAGEMENT OF THE GREY, BLACK AND DARK WATER

16.6.1 How Fragile Is Karnataka State Perinneal Rivers?

The total area covered by the canals and storm water drains within all the ULB’s of Karnataka ULB’s of Karnataka sums up to 16062 Acres (0.85% of the total area of ULB’s in Karnataka). Also, the total area comprising of farm ponds, natural-Ox-bowlake, cut off meander, water logged and tanks/lakes within all the ULB’s of Karnataka sums up to 33757 Acres (1.38% of the total area of ULB’s in Karnataka). Seventeen of the rivers of Karnataka provides drinking water to 232 Urban Local Bodies.

It is found that Karnataka’s 17 perennial rivers are susceptible to pollution from the sewage and sullage effluents, the solid wastes, plastic, bio-medical and hazardous wastes that are directly discharged from many ULB’s. Hence, the intervention for a sustainable and clean river should be comprehensive and combined effort, rather than selective effort.

16.6.2 Recycle and reuse of wastewater

The “COMPENDIUM OF RECYCLE AND REUSE OF WASTEWATER In 54 Million Plus Cities” by Ministry of Housing and Urban affairs, Government of India, during September 2021, emphasizes and encourages the wastewater reuse to conserve fresh water sources and generate revenue from the sale of treated wastewater for industries and derive revenue
from sale of secondary treated wastewater can cover operation and maintenance costs of STPs.

16.6.3 Status report on sewerage system in urban local bodies of Karnataka

The most important parameter for a sustainable Urbanization is to treat, re-use and re-cycle the sewage water that is generated. There are various challenges in the provision of water supply to individual houses as well as to provide the sewerage system. We have already observed that many urban areas have grown organically with high density landuses adjacent to smaller width roads that are laid by concrete. Provision of water supply lines to individual houses and the sewerage system has to happen after breaking the Concrete pavement (unless and until the trenchless technique is adopted). Added to this drain are filled with sullage which are grey/ waste water from the kitchen and bathrooms, of which many drains or either clogged (as the solid waste get mixed) or leads to the existing natural drain. The sullage flows unabated in the road side drains many ULB’s the soak pits/ septic tanks are existing at the individual Household level/ street level and has great potential to pollute the Ground water. The ULB’s have to address all the above issues before laying water supply and sewerage lines.

The treated sewage effluent is discharged into either to the streams or lakes/ ponds or river. No data is available to ensure that whether the treated water has a Biological Oxygen Demand (BOD) less than 10- as prescribed by the Karnataka State Pollution Control Board (KSPCB).

<table>
<thead>
<tr>
<th>Status of sewage treatment</th>
<th>Number of ULB’s</th>
<th>No. of treatment plants</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Installed capacity (MLD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational</td>
<td>54</td>
<td>62</td>
<td>29</td>
<td>31</td>
<td>2</td>
<td>547.84</td>
</tr>
<tr>
<td>Total Treated Sewage (MLD)</td>
<td></td>
<td></td>
<td>248.72</td>
<td>246.87</td>
<td>52.25</td>
<td></td>
</tr>
<tr>
<td>Under Construction</td>
<td>15</td>
<td>22</td>
<td>5</td>
<td>18</td>
<td>0</td>
<td>186.86</td>
</tr>
<tr>
<td>Total Sewage (MLD)</td>
<td></td>
<td></td>
<td>25.23</td>
<td>161.63</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Proposed</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>23.7</td>
</tr>
<tr>
<td>Total Sewage (MLD)</td>
<td></td>
<td></td>
<td>11</td>
<td>12.7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Non-Operational</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>15.95</td>
</tr>
<tr>
<td>Total Sewage (MLD)</td>
<td></td>
<td></td>
<td>1.95</td>
<td>14</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>76</td>
<td>92</td>
<td>286.9</td>
<td>435.2</td>
<td>52.25</td>
<td>774.35</td>
</tr>
</tbody>
</table>

It is observed that 171 ULB’s doesn’t have sewerage system and the sewage is disposed in the Soak pit or the Septic tank. The Government of Karnataka has progressed in 85 ULB’s by providing sewerage system to 59% of the households vide., House Service Connection.
(HSC). Now the same is needed to connect to the Sewage Treatment Plants. However, the challenge is to provide both the UGD and connect it to the Sewage treatment plant for 171 ULB’s.

<table>
<thead>
<tr>
<th>Status of Sewerage System in other ULB’s</th>
<th>No. of ULB’s</th>
<th>Quantum of Sewage Generated</th>
<th>System of Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULB’s without Underground Drainage system</td>
<td>171</td>
<td>496.63 MLD</td>
<td>Septic tanks with soak pits</td>
</tr>
<tr>
<td>Ongoing Sewerage work in giving House Service Connection (HSC)</td>
<td>85</td>
<td>1158 MLD</td>
<td>To connect to proposed STP’s</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>256</strong></td>
<td><strong>1654.63</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Collated from data given by DMA

It is observed that only Twenty Six (26) treatment plants have come up in the past 5 years (from 2016 onwards) treating 260.11 MLD. These plants could claim carbon credits.

16.6.4 The dark water - Industrial effluents

As per the Comprehensive Pollution Index (CPI), Out of identified 88 prominent industrial clusters, 43 industrial clusters in 16 States having CEPI score of 70 and above are identified as Critically Polluted Industrial Clusters. Further, thirty two industrial clusters with CEPI scores between 60 & 70 are categorized as severely polluted areas. The Government of Karnataka has prepared action plan to rectify the same.

Many old industrial estates and Industrial clusters under Green category, doesn’t have Common Effluent Treatment Plants (CEPT). Strict Development Control in-terms of Specific Industrial landuse maps need to be prepared by the town-planning department and any change in the type of industries should be immediately recorded and its impact needs to be assessed. The KIADB should plan for CEPT for all industrial areas, whether it comes under Green, Orange or Red Category.

Pharmaceutical industry, as it is very dynamic industry, especially in the present situation which evolves with various clinical trials. Getting EC is time consuming and hence, many small industries are coming out with products with technical grade production, without a valid Environmental Clearance (EC). Also, it’s complex to assess the type of Sewage that is based on innumerable process for every product. In some cases the process being patented, cannot be revealed for EIA purpose! They emit different types of effluents like the normal sewage, the Low Total Dissolved Solid (TDS)/ Chemical Oxygen Demand (COD), high TDS/COD, For-Ever- Chemical (FEC) gases & effluents, toxic effluents that needs special treatment,- and again classified based out of various catalysts used, and hence need robust monitoring and evaluation. Though a Pharma company can take EC for many products at a time, however, by the time they obtain the EC, the product may get outdated. There should be a mechanism of continuity for obtaining EC for a new product, after the first product EC is obtained. Most of the EC conditions are impracticable, subjective and hypothetical.
WAY FORWARD

1. KSPCB should ensure that irrespective of developers within 10 Acres of land and/or developments that generate more than 100 KLD (irrespective of the extent of development) should contribute to develop a decentralized tertiary treatment plant on a collective basis.

2. Waste water flows contiguously irrespective of administrative jurisdiction. The Government should give very high priority for sullage and sewage going into natural drains - from Gram Panchayath level to the City level.

3. All Urban Development Authorities/ ULB’s around any industrial area should insist KIADB/ KSPCB to come out with the overall impact assessment of Industries on Air, Water and Soil - periodically upon its full operation.

4. There is a need to further simplification of obtaining EC, followed by robust monitoring, post EC. The draft EIA NOTIFICATION- 2020 tries to integrate various enforcement clauses to achieve the Ease of doing Business, by envisaging joint inspection of all departments doing inspection together, though the time protocol is different for different department. This need to be properly structured. The pollution of Sterlite Copper Plants, Bhopal Gas leakages, etc., calls for periodic monitoring as well as, Risk Mitigation Master Plans in the regions where such industries exists.

16.7 THE SOLID WASTE MANAGEMENT

16.7.1 Introduction

Examples around the globe, on environmental conservation inspire a lot! The example of a small pacific island Palau, whose geographical regime constitute around 5 Lakhs Sq. Kms, has protected waters to an extent of 80% of the marine rights of the country by imposing total ban on domestic fishing and this serves as a valuable carbon sink. Lithuania has already achieved treatment rate of 97% for all its household and Industrial waste water!

16.7.2 Solid waste generation in Karnataka

For a sustainable urbanization, 100% of solid wastes that includes the fresh waste, the industrial wastes and the Bio-medical wastes need to be processed and recycled and Karnataka plans to achieve ZERO WASTE using technology enabled solutions by 2030. That could be done by focusing on ensuring segregation (to standards) at source for efficient waste management and resource recovery.

Effective segregation of waste is very important since the Energy-from-waste can be derived from it. This results in the reduction of the volume of waste from disposal also helps in converting the waste into renewable energy and organic manure. Installation of waste-to-compost and bio-methanation plants would reduce the load of landfill sites. The biodegradable component of Karnataka is currently more than 60%. Bio-methanation is a solution for processing biodegradable waste which is also remains underexploited. It is believed that if biodegradable waste is segregated from the rest, it could reduce the challenges by half. Even carbon credits could be derived from that.
Remediation and reclamation of existing SWM dump site (legacy waste) through Bio-mining need to be prioritized. The ULB’s need to calibrate and arrive at an effective solid waste management system in various locations based on certain parameters like wind direction, hinterland habitation, water body, flora & fauna, wind direction, appropriate land availability, etc. The ULB’s need to also explore whether to set up a decentralized Solid Waste processing / Management (SWM) or to set up SWM for selected clusters of habitations, based on cost and location parameters.

Electronic monitoring system for garbage management is essential to Map / Track / Report / Alert staff compliance with timings and locations assigned and to publish management dashboard. The GoK plans to create public awareness on segregation of waste through various social media, pamphlets, Dashboard (using IED), announcements, transgender, women self help groups and interaction through citizen associations - as this program is funded by the "Swatch Bharath Mission" An action plan on controlling Plastic waste has been prepared by State Level Special Task Force Committee and the same has been sent to Central Government for approval. As per National Green Tribunal (NGT) orders, the State Government has already prepared “Environment Management Plans” for 14 districts and the remaining District EMP is getting prepared.

It was seen that the many animals, birds and insects gets attracted to this debris, get poisoned with litter, as well as, intercept the traffic and gets killed. The wet garbage has induced toxicity into the Ground water. This heterogeneous hazardous Garbage was being burnt mindlessly and the same has affected the residents in the hinterland of villages. The massive burning of the Garbage induces more smog on the Arterial and Peripheral roads in the Dawn, Dusk and in the night, thus diminishing the visibility for the Vehicles resulting in many traffic snarls and accidents.

16.7.3 E-Wastes in Karnataka

E-waste components contain toxic materials and are non-biodegradable which present both occupational and environmental health threats including toxic smoke from recycling processes and leaching from e-waste in landfill into local water tables. E-waste is a cyber security problem too. Toxic chemicals can leach out of old devices, and so the sensitive data could be also lost.

Many online monitors are imported from either China or Europe and not legally authenticated and readings are very subjective and hence the production cost will certainly go up. This has to be fixed. Regarding the Hazardous output of Electronic industry, the “Extended producer responsibility” - should finally eliminate the un-scientific scrap dealers who further pollute the environment.

According to a 2020 report by the Central Pollution Control Board, India generated 3.2 Million tonnes of e-waste in FY 2019-2020 – up 32% from FY 2018-2019. Of this, the report found that only 3.6% and 10% were actually collected in the country in 2018 and 2019, respectively. However there is no actual data on how much of Electrical and Electronic Equipment (EEE) wastes are put into market. This needs to be addressed on top priority by the concerned regulatory authorities. A proper digital tracking and monitoring system on a national level has to be established to track all EEE during its complete life cycle VIZ,
during BOL (Beginning of Life), MOL (Middle of Life) & EOL (End of Life)

Karnataka has 158 e-waste (dismantlers/ recyclers/refurbisher) units, of which 30 are closed and 8 are not functioning.

It is advisable that the KSPCB to look at the two popular European Union regulations affecting the electronics manufacturing industry, viz., Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Registration, Evaluation, Authorization and Restriction of CHemicals (REACH)

Taiwan RoHS - currently restricts the same 6 hazardous substances as EU RoHS 2 (except phthalates)
Korea RoHS - currently restricts 6 hazardous substances in electronic and electrical products and 4 hazardous substances in vehicles.
UAE RoHS - Modeled after European Union (EU) RoHS, the Regulation came into force with preliminary requirements on January 1, 2018.

RoHS & REACH aims to limit the use of six hazardous substances in Electrical and Electronic Equipment (EEE)

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<th>Restricted Substance</th>
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16.7.4 Battery waste

Globally, over 15 billion batteries — containing toxic chemicals — are carelessly dumped in the garbage each year. This improper disposal causes fires and pollution, putting the lives of millions of people and animals at risk and many end up in landfills. There is a need for certified battery bins located at appropriate locations in the city to be managed by NGO’s who could handle this and place it for recycling.

16.7.5 Plastic wastes

There are 111 registered plastic waste recycles in Karnataka. Preparation of road map for awareness generation activities at State, District and ULB/GP level for citizens, institutional waste generators, Resident Welfare Associations (RWAs)/ Market associations. UDD/ DMA/RDPR may prepare a road map for awareness generation. To implement this road map, the district level committees may take support from Producers, Importers & Brand Owners (PIBOs) as per section 17 of SWM 2016 Rules.
Bulk waste Generators may contribute to capacity building of all stake holders on a regular basis and organise and review atleast once in a quarter. This information need to be reported to the district level committees.

The concerned authorities may engage youth organizations such as NCC, NSS, NYK and school students, women Self Help Groups (SHG’s), Transgenders and conduct public movement on cleanliness and awareness drives.

WAY FORWARD

1. Remediation and reclamation of existing SWM dump site (legacy waste) through Bio-mining need to be prioritized and the lands need to be restored.

2. The ULB’s need to calibrate and arrive at an effective solid waste management system in various locations based on certain parameters like wind direction, hinterland habitation, water body, flora & fauna, wind direction, appropriate, land availability, etc. The ULB’s need to also explore whether to set up a decentralized Solid Waste processing/Management (SWM) or to set up SWM for selected clusters of habitations, based on cost and location parameters.

3. For smaller ULB’s there is a need to set up the Solid waste Management processing Plant which will collect wastes vide Mini-tippers, tractor trailers with GPS tracking System. Integrated Sanitation Plan, with an objective to manage and process Solid waste, Sullage/ grey water and Faecal Sludge management, could be the solution.

4. The GoK plans to create public awareness on segregation of waste through various social media, pamphlets, Dash Board (using IED), announcements, transgender, women self help groups and interaction through citizen associations.- as this program is funded by the “Swatch Bharath Mission”

5. An action plan on controlling Plastic waste has been prepared by State Level Special Task Force Committee and the same has been sent to Central Government for approval. As per National Green Tribunal (NGT) orders, the State Government has already prepared “Environment Management Plans” for 14 districts and the remaining District EMP is getting prepared.

6. Many online monitors are imported from either China or Europe and not legally authenticated and readings are very subjective and hence the production cost will certainly go up. This has to be fixed. Regarding the Hazardous output of Electronic industry, the “Extended producer responsibility”- should finally eliminate the un-scientific scrap dealers who further pollute the environment.

7. It is advisable that the KSPCB to look at the two popular European Union regulations affecting the electronics manufacturing industry, viz., Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Registration, Evaluation, Authorization and Restriction of Chemcials (REACH)

8. There is a need for certified battery bins located at appropriate locations in the city to be managed by NGO’s who could handle this and place it for recycling.
9. Atleast one Construction Debris Wastes (CDW) aggregation dumping yard is needed per 4 wards. Infact, wet lands and lakes are getting affected due to illegal dumping. There a very low level of awareness amongst the builders regarding CDW processing.

10. Apart from decentralized waste management, the KSPCB need to develop mega recycling hub for plastic, medical and e-waste as per scientific method with very low impact on environment. The concerned authorities may engage youth organizations such as NCC, NSS, NYK and school students, women Self Help Groups (SHG’s), Transgenders and conduct public movement on cleanliness and awareness drives.

References


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3. E-Waste Is a Cyber-security Problem, Too- by JULIANNE PEPITONE


5. The Competitiveness of Global Port-Cities-OECD

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7. REFORMS IN URBAN PLANNING CAPACITY IN INDIA Final Report September 2021, NITI Aayog

8. URBANISATION IN KARNATAKA: TREND AND SPATIAL PATTERN- Meghana EswarI and Archana K Roy

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<th>DISTRICT</th>
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**KALYANA KARNATAKA REGION (HYDERABAD REGION)**

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### Table 16.9: Slums in Karnataka-District-Wise

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**Source:** Collated from the data procured from Karnataka state slum clearance board