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Enhancing Citizen Engagement in Smart Cities Mission in India

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ABSTRACT

Infrastructure projects (urban or otherwise) are meant for greater good of people and therefore reflect their needs. Citizen participation is of utmost importance considering this goal. Studies in the past have attempted to define the success of projects through benefits realisation. In public infrastructure projects the end user is the citizen of that nation. However, meaningful citizen engagement has been a challenge for cities all over the world. With the advent of Smart Cities Mission in India in 2015, this aspect of citizen engagement has been brought to the forefront again as an important objective to be achieved. The mission aims to be truly reflective of citizen's aspirations through a massive public outreach programme. In this paper, the processes followed in citizen engagement during the proposal formation phase as well as during the execution phase are studied. The example of City of Pune, is taken to understand the processes during formulation phase.

Keywords: *Smart Cities Mission, Citizen Engagement, Project Stakeholder Management, Public Participation*

INTRODUCTION

The role of citizen in infrastructure development is a crucial one. In most functioning democracies the people's elected representatives are responsible for making decisions regarding the infrastructure vis-a-vis public transport. The elected representatives in a way represent

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people's wishes / desires. However, active citizen engagement is also seem to be affecting the execution of a project. The widespread not-in-my-backyard (NIMBY) effect is visible in developed as well as developing world. Di Maddaloni & Davis (2017) discuss the influence of local community on mega projects and offer how inclusiveness can be a part of project planning. In a developing country like India, the citizen point of view is manifested in the form of protests or delay in land acquisition (Narayanan, Kure, & Palaniappan, 2019; Ren, 2017). In this paper, we look at the Smart City Mission programme of Government of India from the perspective of citizens' engagement.

According to Census 2011, Indian cities accommodate nearly 31 per cent of India's population. Smart Cities Mission is one of the landmark programmes of the Government of India launched in 2015. The mission aims to transform 100 selected cities into 'Smart Cities' by including smart solutions along with provision of basic core infrastructure, specifically "adequate water supply; assured electricity supply; sanitation and solid waste management; efficient urban mobility and public transport; affordable housing especially for the poor; robust IT connectivity and digitalisation; good governance especially e-governance and citizen participation; sustainable environment; safety and security of citizens particularly women, children and the elderly; and health and education" as per the Smart Cities Mission Guidelines. Cities are expected to create a Smart City Proposal (SCP) in tune with the guidelines, and enter the 'Smart Cities Challenge' competition. Each selected city is expected to form a Special Purpose Vehicle (SPV) for implementation of the SCP. The SPV is a limited company incorporated under the Companies Act, 2013 in which the State/UT and the Urban Local Body (ULB) will be the promoters having 50:50 equity shareholdings. The SPV is expected to plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development projects through a Project Management Consultant (PMC).

The Mission Guidelines state objectives and strategies to achieve the same. Urban Local Bodies (ULBs) have the liberty to choose specific projects that each city needs to include and implement based on the city-specific contextual needs. The PMC appointed by the SPV has a crucial role to play as it will essentially develop the SCP and further identify individual projects based on guidelines of the Mission and provide overall technical and project management support to the SPV. Financial support to the tune of Rs 100 crore per city per year is to be provided to each smart city. The total financial support amounting to Rs 48,000 crore will be given by Central Government towards the mission.

The objective of the present article is to investigate: (a) the present status of citizen engagement in selected smart cities; (b) to evaluate the adequacy of measures taken; and (c) application of project stakeholder management theory in enhancing the citizen engagement process.

Methodology

This study focuses on citizen engagement process applied in smart cities in India. The study attempts to investigate whether citizen's point of views are directly or indirectly reflected in the mission implementation. The case of City of Pune in India is used to highlight the process, the extent of involvement of citizens (in terms of number of citizens and type of inputs), its effect on final shape of proposal and key contribution of this step towards smart city development. The ongoing efforts of the smart city citizen engagement process are documented. Further, the application of project stakeholder management theory to the citizen engagement process is demonstrated. The next section presents the literature review highlighting the global scenario and the challenges of smart cities mission in India.

Literature Review

The literature review presented here is divided into four parts. In the first part, the global experience with the citizen engagement is discussed. In the second and third part literature available on Indian smart cities is presented which depicts the process of citizen engagement and delineates the challenges. In the fourth part, the stakeholder management theories are discussed highlighting the potential role of project stakeholder management.

Citizen Engagement in Cities

Citizen participation has been defined as 'involvement in any organised activity in which the individual participates without pay, in order to achieve a common goal' (Zimmerman & Rappaport, 1988). Public participation is 'the process by which public concerns, needs, and values are incorporated into governmental and corporate decision making' (Creighton, 2005). The communication and interaction between citizens and government needs to be a two-way process with the objective of better decisions supported by the public. Community engagement is an essential element which can help in achieving the right level of commitment for successful delivery of smart city projects (Mazhar, Sarshar, Fayaz, Kaveh, & Bull, 2017). The Ladder of Citizen Participation (Arnstein, 1969) can prove to be a useful tool to classify various smart city initiatives with respect to their intended citizen

participation as studied in case of London (Willems, Van den Bergh, & Viaene, 2017) (Refer Table 1).

TABLE 1: THE LADDER OF CITIZEN PARTICIPATION
(ARNSTEIN, 1969; WILLEMS ET AL., 2017)

Citizen Power	Citizen Control	Citizens have full managerial power
	Delegated Power	Citizens can have dominant decision power
	Partnership	Citizens can negotiate and engage in trade-offs
Tokenism	Placation	Citizens are asked for advice, however without decision power
	Consultation	Citizens are being heard
	Informing	Citizens are informed
Non-participation	Therapy	Citizens are symbolically involved
	Manipulation	Citizens are educated and manipulated without consent

City administrators and urban planners have always tried to improve public participation across the world. Currently in Indian Cities, the cities make their 20-year Development Plans or Master Plans mandated by the State Town and Country Planning Acts. Although the process of public participation is laid out in these acts in the form of suggestions and raising objections to the draft plan prepared by cities, the process is rather perfunctory since it only seeks the participation after the draft plan is prepared, and thus lacks meaningful citizen consultations (Mahadevia et al., 2014). Nowhere in the visioning process are the citizens involved as their role is currently in the form of giving suggestions and raising objections to the proposed draft plan. Even the 73rd and 74th Constitutional Amendments aim at devolution of powers of decision making to the urban and rural local bodies which are closest to the citizens. Despite the provisions in the State Town Planning Acts and the above amendments to the Constitution, public participation in Indian city planning is probably at best represented by Tokenism in the 'ladder of public participation' (Arnstein, 1969; Maiti & De Faria, 2017). Although provisions for public participation have existed in earlier government programmes like Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in form of public consultations required for City Development Plans (CDPs), the implementation of all the above provisions in Indian cities remains poor. In this light, the Smart Cities Mission brings the public participation to the focus and through the use of technology (Kumar & Prakash, 2016) right from its inception stage in every city.

Citizen Engagement as an Integral Part of Smart Cities Mission

Citizen engagement and public participation have been emphasised as part of the Smart Cities Mission Guidelines. The aim of the Mission includes 'good governance' through e-governance and citizen participation. Each Smart City Proposal (SCP) is to be prepared through a 'collaborative process as objectives and funding of government departments, parastatals, private agencies and citizens are to be dovetailed together' (Ministry of Urban Development, 2015, p. 9). While preparing the proposals (SCP), the Mission Guidelines mention that it should be "citizen-driven from the beginning, achieved through citizen consultations, including active participation of groups of people, such as Residents Welfare Associations, Tax Payers Associations, Senior Citizens and Slum Dwellers Associations. During consultations, issues, needs and priorities of citizens and groups of people will be identified and citizen-driven solutions generated" (Ministry of Urban Development, 2015, p. 22). While evaluating the proposals, the evaluation criteria for 'process followed' emphasises a process with extensive consultations with citizens including vulnerable sections of the society (disabled, children, elderly), ward committees, area *sabhas* (assembly or gatherings), any associations and organisations such as the Chamber of Commerce, etc.

Challenges in Citizen Engagement in Smart Cities Mission

While the emphasis of the Mission is on public participation; Information and Communication Technologies (ICTs) and e-governance are tools recommended for the same. There are many challenges faced by all tiers of governments - Central, state as well as Urban Local Bodies all over the world. Praharaj et al. (2017) note that digital divide, i.e. the unequal access to infrastructure is a challenge in citizen engagement as even access to a computer or mobile phone or an internet connection for each household are not ensured in Indian cities. Researchers also note that available digital infrastructure is primarily used for entertainment and does not necessarily guarantee public participation in civic affairs. Data from 100 cities in India demonstrates that complex socio-economic and political variables play a larger role in engaging citizens more than mere availability of digital infrastructure. As a part of Smart Cities Mission, the Government of India initiated the citizen engagement through their website, 'MyGov.in'. The objective of this dedicated website was to engage the citizens in activities such as debates, vision sharing, e-voting for smart city services, etc. The level of digital participation for Indian smart cities 'MyGov.in', was compared with similar initiatives taken at global level, with few examples such as 'Talk London' and 'My ideal city Bogota'. This study highlights the importance of role of local government and ownership of digital

platforms in attracting the citizen engagement in smart city projects. The study also revealed the platform 'MyGov.in' was managed by the central government and had less interaction at local level. This was identified as one of the critical parameters for low level engagement in majority of Indian smart cities including those cities with considerable population having internet coverage.

While selecting the right online participatory tool, city governments should consider their own organisational capacity, community capacity, planning problems and participation goals, norms and regulations and the capacity of the tool (Afzalan, Sanchez, & Evans-Cowley, 2017). Other challenges to citizen engagement include contextual factors such as digital illiteracy, accessibility to digital infrastructure and institutional framework; technological factors such as technological advancement and data management; and organisational factors such as process related challenges and availability of human resources, etc. (Falco & Kleinhans, 2018).

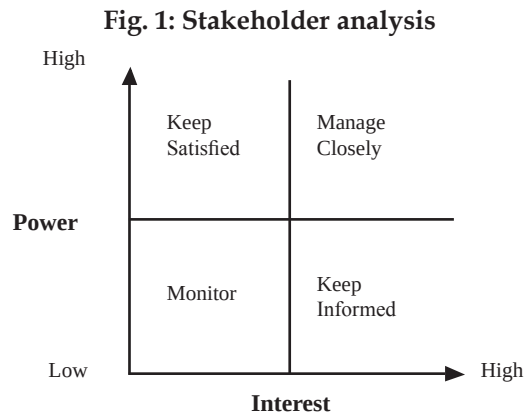
Smart cities involve various different stakeholders that work together. These include governments, industries and universities (Leydesdorff, 2000) and citizens as their main stakeholder along with NGOs, planners and developers. Apart from technological challenges, lack of collaboration and poor communication within different stakeholders of the Smart City, namely governments, various organisations, institutions, NGOs, and citizens is one of the challenges of Smart Cities. Apart from the concerns of how to enable citizens technologically, it is important to motivate and involve citizens, and convey the value of smart city projects to them through continuous communication (Tara Alshahede, 2018). It is also important to not to depend entirely on one form of public participation but explore different forms of participation and roles citizens can play throughout the project right from development to implementation (Cardullo & Kitchin, 2017)

Project Stakeholder Management

The Project Management Body of Knowledge (PMBOK) (Project Management Institute, 2017) emphasises on 'stakeholder management' as one of the critical knowledge areas for project success which can provide useful inputs for citizen engagement. It notes that process of stakeholder identification and engagement must happen in the initiation phase of the project. This includes identification of people, groups or organisations that could impact or be impacted by the project. Stakeholders can be internal or external to the project team or they can be internal or external to the project scope. The stakeholder theory is mainly focused in the areas of project strategy as well as

project evaluation factors such as project success, project risk and project performance (Littau, Jujagiri, & Adlbrecht, 2010). The role of stakeholder theory is increasing and expanding simultaneously. The project management organisation in general or the project manager in particular is responsible to manage the interest of multiple stakeholders throughout the entire project management process. Sutterfield et al. (2006) have recommended a 'strategic project stakeholder management framework' for maximising the positive impact and minimising the detrimental impact of stakeholders on the outcomes of a particular project. Stakeholders outside the project organisation (external stakeholders) offer more complexities especially in megaprojects as they demonstrate diverse interests (Ninan, Mahalingam, & Clegg, 2019). Crawford and Helm (2009) have demonstrated the supporting role of project management in public sector governance. Project stakeholder management has also been an area of investigation in the past (Eslerod, Huemann, & Ringhofer, 2016; Williams, Ferdinand, & Pasian, 2016; Zhai, Xin, & Cheng, 2009) 2007. The necessity of citizen engagement has been recognised as a vital component of project delivery (Chow & Leiringer, 2020) and therefore has gained more attention in the research domain of project management. The research efforts typically conceptualise public engagement using either a relational or risk management approach to stakeholder management. Processual view has been advocated which considers public engagement as dynamic and emergent. The stakeholder analysis recommended by PMBOK (Project Management Institute, 2013) is represented by Fig. 1.

The stakeholders are classified into four segments depending upon the interest and power associated with a given project. The citizen partnership comes under the category of external stakeholders. The



Source: Project Management Institute, *A Guide to the Project Management Body of Knowledge*, (PMBOK Guide), 6th Edition.

citizen engagement in public projects especially of types such as Smart Cities must have active participation from the general citizen as well as representative government authorities.

The salience model (Mitchell, Agle, & Wood, 1997) is another popular theory for identification and categorisation of stakeholders on the basis of power, legitimacy and urgency. These approaches are useful in prioritising stakeholders and selection of appropriate stakeholder management strategy. (Aaltonen, Jaakko, & Tuomas, 2008) in their study of salience in global projects concluded through the literature review, that more attention is given to the stakeholders who are perceived to have more salience (by virtue of power, legitimacy and urgency). The paper demonstrated through a pulp mill construction project case study, different strategies employed by the stakeholders to increase their salience. (Turkulainen, Aaltonen, & Lohikoski, 2016) study and recommend different communication strategies (impersonal, personal and group mode) depending on the stage in lifecycle as well as salience.

The next section illustrates how citizen engagement was conducted for identifying infrastructure projects for the Smart City Proposal for Pune, India.

Citizen Engagement in Case of Pune Smart City

The Pune smart city proposal (Pune Municipal Corporation, 2015) prides itself in creating one of the largest citizen engagement initiatives in India. This exercise was carried out from July 2015 to October 2015. According to the census 2011, the population of city was around 3.1 million with present day population estimated to be about 6.5 million. The interaction was a part of four phases: Envision, Diagnose, Co-create and Refine. In the 'Envision' phase, 300,000 families filled out printed forms (questionnaires) and around 1.2 million inputs were received with citizens' emphasis on Green Pune, better transport and reliable / adequate water supply. In the second phase 'Diagnose', a voting exercise was carried out to identify specific goals / priorities which received about 1.3 million votes. In the third phase 'Co-create', citizens shared their ideas and about 10,207 ideas were received through web portal, mobile app, hackathons (group discussions), contests, etc. In the fourth 'Refine' phase, mini-labs (workshops) were conducted with citizen representatives to refine the solutions. Through various means, the smart city proposal reports that about 50 per cent Pune households were covered. Around 4.6 million impressions (likes, shares) were generated on social media accounts. As a part of Area Based Development citizen outreach exercise, about 19,000 citizens accepted the final shared proposal.

Looking at the statistics, the city of Pune seems to have conducted one of the best outreach programmes with the citizens. The expectations of the citizens are in line with the citizens of any country facing infrastructure deficit (good public transport, reliable water supply, proper sanitation, etc.). The noteworthy aspect of this outreach programme is that the solutions or votes are invited for some of the proposed solutions by the ULB.

A few important takeaways from citizen engagement are given below:

1. The smart city proposal has created a baseline (existing situation) and an aspirational situation based on the citizens' inputs which will be used for project identification.
2. Area Based Development gets a prominence in smart city proposals in India. More than 80 per cent of allotted money for that city is spent on the selected community (in the case of Pune, Aundh-Baner-Balewadi which is almost 900 acres (3.6 sq km) but small compared to entire city). This selection of Aundh-Baner-Balewadi was direct result of the citizen engagement.
3. As mentioned earlier most of the smart city proposals are on the expected lines. The citizens aspire for a sustainable/ environmental friendly city ('green' Pune, eco-friendly transportation, etc.). But one of the important aspects (in relation to the environment) of smart city which is missing in the city of Pune is the lack of emphasis on energy efficiency in the buildings. The general public can easily attribute pollution to the smoke coming out of a vehicle, but may not be aware of overall toll on the environment due to energy usages in the building. There are awareness initiatives such as 'Earth Hour' which raises these issues, but the energy efficient buildings are not included as a part of the Pune Smart City Proposal.

A newspaper report (Shinde-Nadhe, 2016); however, does not paint a rosy picture as described above in the Pune Smart City Proposal. One of the local Members of Parliament (upper house / Rajyasabha) quotes "It's a misnomer that the Smart City project has anything to do with the city. The way the plan has been developed, it seems it's only about a part of the city". The local NGO (Sajag Nagrik Mancha) also raises questions about participatory nature of citizen engagement in Pune Smart City (National Institute of Construction Management and Research (NICMAR), 2019). In spite of the criticism, the intention demonstrated by the municipal corporation / MoUD is laudable and the efforts undertaken are commendable. These types of exercises have been

carried out throughout the 100 smart cities listed in India. Meaningful citizen participation is expected to be a norm in future rather than an aberration. The effort undertaken during the conceptual phase of the smart cities; however, has not kept up during the execution phase. This issue is further discussed in the upcoming sections.

Project Stakeholder Management in Smart Cities

This section presents an analysis of stakeholder management activities carried out by select smart cities in India from a citizen point of view. Project Stakeholder Management is a coalition building process which is essential for smooth execution of the project. It is imperative from the Project Stakeholder Management theory that both internal (part of the project team) and external stakeholders (citizens) must be identified for the Smart Cities Mission in the initial stages of the project with a suitable stakeholder management plan in place. The stakeholder management plan essentially comprises of: (i) Identification / categorisation of stakeholders, (ii) Planning and executing stakeholder management (appropriate communication strategy), and (iii) Controlling stakeholder engagement process. The role of communication strategy is crucial. The stakeholder communication strategies can be pushed (e-mail, newspaper advertisement), pulled (website update which can be accessed whenever stakeholder feels like it) or interactive (meetings, workshops). The communication strategy also should include a plan for periodic engagement with the stakeholders (weekly, monthly, etc.) and the stakeholders should be informed about availability of such feedback or redressal mechanism.

Internal Stakeholders

The internal stakeholders for the Smart Cities Mission are identified as follows:

In the initial stages of the process, the municipal corporations of each city are expected to play a key role in preparing the Smart City Proposal (SCP) and thus citizen engagement in the initial stages is also a responsibility of the municipal corporations. Citizen engagement in the proposal stage is achieved through extensive consultations with various citizen groups for the visioning and needs assessment process. As can be seen from the discussion on Pune city experience (which is replicated elsewhere), this stage was well managed by the Municipal corporations. All forms of communication strategies (push, pull and interactive) were leveraged to engage citizens for proposal formulation. The same level of communication appears to be missing from many smart city project initiatives during the execution phase. While it is expected that the need

TABLE 2: INTERNAL STAKEHOLDERS WITH THEIR ROLES AND RESPONSIBILITIES

<i>Sr. No.</i>	<i>Internal Stakeholders</i>	<i>Roles and Responsibilities</i>
1.	Ministry of Housing and Urban Affairs	Prepare guidelines of the Mission, evaluate Smart City Proposals, qualify a panel of consulting firms, provide seed funding
2.	States / UTs	Select consultants from the suggested panel (or otherwise)
3.	Urban Local Body (Municipal Corporation)	Play a key role in forming the Special Purpose Vehicle for the city and prepare the initial Smart Cities Proposal (SCP) to compete in nationwide selection process, citizen engagement for visioning process
4.	Special Purpose Vehicle	Execute the project as per approved proposal, continuous citizen engagement throughout execution
5.	Project Management Consultant	Prepare the detailed project report and technical assistance in project execution

Source: Compiled by the authors.

for citizen engagement has been reduced since the proposals are frozen and thus engagement can be considered to be limited to updating the status of projects. In some instances, the communication strategies can be useful in getting citizen support and patronage to some of the smart city initiatives (such as ridership for electric bus initiative).

In the project execution stage, the role of the Special Purpose Vehicle (SPV) is a crucial one. The SPV is formed by the state government with support from the Urban Local Body (or Municipal Corporation). The SPV is responsible for execution of the entire project as per proposal and is thus responsible for management of external stakeholders including citizens and citizen organisations mainly during the execution stage (Refer Table 2). The SPV (though representing ULB and state government) is an independent body (with lesser oversight from the municipal corporation or the state government). This organisation is a lean organisation (very less direct employees) and majority of work done through private contractors with the aid of a Project Management Consultant (PMC). Each SPV has a PMC which looks after processes such as DPR preparation, tendering / bidding, execution, report preparation etc. The professionalism and efficiency of the private sector was expected to implement the project faster. This does not reflect in the actual speed

of implementation. As per the Smart Cities Mission official website of Government of India (smartcities.gov.in/content), only 20 per cent of the projects have been completed out of all possible 3,008 projects (as on 21st January 2019). In terms of share of project cost, it is only 5.4 per cent. Numerous reasons can be assigned here for lack of progress but the aspirations set in the proposal are not close to reality after five years of launch of such an ambitious programme. This paper emphasises the need for communication with the external stakeholders to avoid any delays. It is important that the citizens are informed regarding the progress of the dreams promised to them.

External Stakeholders

External stakeholders must be provided with information about list of projects underway, details of the same, online tendering system, chosen project contractors, progress of the project, etc. and continuous dialogue must be initiated regarding any inconveniences caused to local citizens during the execution phase. Dialogue with citizens must also be initiated in the operational phase on completion of project. It may also be noted that SPVs sometimes do not have separate staff of their own and thus may depend heavily on the municipal corporation's resources. It is implicit that the success of smart city projects will depend upon the role played by citizens as external stakeholders.

A representative analysis of external stakeholders (with respect to power-interest matrix) for smart city projects is indicated in Table 3.

TABLE 3: EXTERNAL STAKEHOLDER ANALYSIS IN THE EXECUTION STAGE

<i>Stakeholder analysis</i>	<i>External stakeholders for smart city project</i>
Manage closely (High power and high interest)	A. Board of Directors such as Chief Secretary, Chief Executive Officer, Law-makers, Mayor, etc. B. Project affected persons (land requirement for smart city projects) C. Patronage / support to offered initiatives
Keep informed (Low power and high interest)	General local residents living in the vicinity of the project, NGOs, citizen organisations, representatives of smart city forums
Keep satisfied (High power and low interest)	Local and central regulatory authorities that are not actively involved in the smart city project but may be associated for necessary approvals.
Monitor (Low power and low interest)	Neighbouring citizens and businesses not directly influenced by the project outcome

Source: Compiled by authors.

If the citizen engagement (external stakeholders) falls in the category of only 'Monitor' (refer Fig. 1 and Table 3) instead of 'Keep satisfied' or 'Manage closely' or 'Keep informed', the possibility of achieving the desired project outcomes from smart city project will be at stake. A compilation of citizen engagement initiatives by first ten selected smart cities in India as per their rank is presented in Table 4. Since the presence of SPV in itself is important for engaging external stakeholders in the execution stage of the project, this has been chosen as a parameter. The parameters used here for studying the effectiveness and transparency in citizen communication include: presence of an independent website, a citizens charter displayed on website, list of projects, project status updates, online tendering system, information about Right to Information (RTI), social media presence, annual reports availability, and a mobile app for citizen e-governance.

It can be inferred from Table 4 that Bhubaneswar and Pune are the two cities which score 9 and 8 respectively out of 10. 'Formation of SPVs' is completed in all the selected cities with score of 10. SPVs are entrusted with the project implementation and thus being also responsible for public participation initiatives. 'Social media presence' is the second high scoring parameter (8), closely followed by 'List of projects available online' and 'tenders available online' (both with 7). Six out of ten cities also use an app for citizen communication. These apps are mostly common with the city corporation apps. Data shows that online 'availability of citizens' charter' and 'annual reports' is observed only in two cities. 'Information about RTI' and 'project status update' are the second most neglected parameters. As noted earlier, the SPV is typically heavily dependent on the resources of the municipal corporation and thus some SPVs also use the existing mobile apps of the cities for citizen communication.

Citizen Engagement in Pune Smart City

This section notes a couple of citizen engagement initiatives of Pune Smart City in detail. The Pune Smart City project has pedestrian-friendly streets as one of the initiatives in which the carriageway width (part of the road where vehicles are plying) is reduced and the footpaths are widened. In line with the National Urban Transport Policy (2007), the idea is to create more walkable, pedestrian-friendly communities encouraging Non-motorised Transport (NMT). This initiative, however, does not translate immediately into acceptance by one and all. The shopkeepers in some of the locations where such road improvements have been carried out are concerned about reduced foot fall in the shops because of lack of parking spaces. Few citizens also lament lack of parking

TABLE 4: CITIZEN COMMUNICATION AND COLLABORATION INITIATIVES BY
FIRST TEN SMART CITIES IN INDIA AS PER RANK (APRIL 2020)
(1= PRESENT, 0= ABSENT)

Rank	Name	SPV formed	Indepen- dent Website	Citizen Charter	List of Projects available online	Social Media Presence	RTI Informa- tion Available	Project Status Updated	Tenders Available Online	Annual Reports Available	App for Citizens Communi- cation	Total Score
1	Bhubaneshwar	1	1	1	1	1	1	1	1	0	1	9
2	Pune	1	1	0	1	1	1	0	1	1	1	8
3	Jaipur	1	1	0	1	1	0	0	1	0	1	6
4	Surat	1	1	0	1	1	0	0	1	0	1	6
5	Kochi	1	1	0	1	1	0	1	1	0	0	6
6	Ahmedabad	1	0	0	0	0	0	0	0	0	0	1
7	Jabalpur	1	1	0	1	1	0	0	1	0	1	6
8	Vizag	1	0	0	0	0	0	0	0	0	1	2
9	Solapur	1	0	0	0	1	0	0	0	0	0	2
10	Davangere	1	1	0	1	1	0	0	1	0	0	5
	Total Score	10	7	1	7	8	2	2	7	1	6	

Source: Compiled by authors.

space on the street as well as general lack of parking in the vicinity. The problem of lack of parking is real and is expected to force people to opt for public transport. Unless there is an awareness campaign which is run by the SPV / ULB / Government, it is difficult to find ready acceptance of such improvements. The citizens while framing the proposal have highlighted urban mobility and sustainable transportation as priority areas. However, what sustainable transportation entails and sacrifices to be made are not readily apparent to them.

A survey by Tata Institute of Social Sciences in Aundh area of Pune highlighted that the residents had a very vague idea about the project and did not seem to understand the purpose of street redesign (Dharwadkar, 2017). The street vendors and some slum dwellers from the vicinity claimed to be completely left out during planning as well as the execution phase. They were unaware of any feedback channel or any redressal mechanism.

The bicycle sharing programme under the Pune Smart City Mission initiative is another noteworthy example. This initiative received the National Smart City Award from Ministry of Urban and Housing Affairs in the year 2018 (Welankar, 2019). The programme is now considered as a failure as the initiative did not find enough people ready to utilise the bike sharing facility. The authorities highlighted vandalism as one of the major causes of failure of the programme in the year 2019. While the bicycle sharing programme needed vigilance and maintenance by Pune Smart City Development Corporation Ltd (PSCDCL), the need for proper communication strategy cannot be emphasised more at the same time.

In terms of communication strategy at the execution phase, there is a greater emphasis on website updating, newspaper reports, use of variable message sign boards, etc. as a way of creating awareness regarding the smart city project initiatives. The component of interactive communication is missing. The PSCDCL officials do speak at public forums (conferences, symposiums, etc.), a dedicated interface for creating awareness or highlighting benefits of initiatives appears to be missing.

CONCLUSION

The level of satisfaction of the end user is one of the important parameters for judging a project as a success or a failure. Specifically, when we consider public projects, evaluation of benefits derived from the project, gains further significance. Citizen participation is crucial for realising benefits from investment in infrastructure projects. There

are many studies (Breese, 2012; Serra & Kunc, 2015) that attempt to relate benefits realisation management and project success. This article investigates the aspect of citizen participation in the Smart Cities Mission from conceptualisation phase to the execution phase. The programme has been able to ensure mass citizen participation during the project formulation phase. However, the level of engagement and transparency has reduced during the execution phase. Although the Smart Cities Mission emphasises on ICT and e-governance for citizen engagement, there are limitations to how citizen engagement can be achieved through it due to various issues such as access to digital infrastructure, choice of participation tool, etc. Literature shows that a key reason for lack of participation is poor communication and collaboration amongst various project stakeholders.

The project stakeholder management theory provides important insights in categorising the project stakeholders into internal and external stakeholders and also entrusting the responsibility of stakeholder management throughout the project in a methodical way to the project manager. In Smart Cities Mission, the participating cities thus should ensure citizen engagement in a methodical way in the initial stage and the SPV should be entrusted with citizen engagement after its formation until completion of the project. The current strategies for citizen communication and collaboration by the first ten participating smart cities (Table 4) shows that continuous citizen communication needs to be enhanced in the execution stage through project status updates, annual reports, citizen charter and RTI information, etc. A citizen engagement plan must be drafted for various internal and external stakeholders (refer Table 2 and 3) in the initial as well as execution stage of the project. For a truly 'citizen-centric' or 'citizen-driven' project as per the Smart City Mission Guidelines, different interactive forms of citizen engagement should be explored other than ICT and e-governance to overcome the limitations associated with the same. This paper has analysed the way in which citizen engagement was carried out in case of the Pune Smart City Mission. A citizen-centric approach will go a long way in removing at least some of the obstacles in upcoming infrastructure projects.

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Slums and the “Right to the City”: Insights from Mumbai Slum Upgradation Policies

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ABSTRACT

Rapid urbanisation in India over the last few decades has resulted in the overcrowding of cities and the emergence of slums. Mumbai, one of the largest cities in India, houses a considerable segment of its population in slums. There have been several attempts to initiate slum policies that meet the housing and community needs of slum dwellers while also gaining the broader objective of urban development. This article examines the impact of slum policies on slum dwellers in Mumbai, using the lens of Henri Lefebvre’s “Right to the City” specifically the aspects of equality, equity and justice. The author concludes by stating that the existing policies overlooked most of the rights of slum dwellers while benefitting other participants such as the real estate developers.

Keywords: City, Slums, Slum Upgradation Policies, Implementation

INTRODUCTION

The surge in urbanisation in India can be traced to the expansion of the Indian economy into the global marketplace as well as liberalisation policies. These caused the process of urbanisation to accelerate, leading to a considerable inflow of people from small towns and rural areas to large cities such as Delhi, Kolkata, Mumbai and Chennai, which were by this time already heavily populated (Ganguly, 2019) and made them megacities (Giri, Wassey & Dogra, 2020). Across the globe, these and

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other megacities are home to more than half of the world's population, and this is expected to grow to five billion by 2030 (Obaid, 2007). However, a troublesome aspect of this expansion is that 40 per cent of it is anticipated to be in the shape of slums (Palanivel, 2017).

Recent statistics indicate that nearly a third of India's urban population, which accounts for about 34 per cent of the country's total population, resides in slums (Oxford Policy Management, 2018; Palanivel, 2017). The 2011 Census of India revealed that 17.37 per cent of urban households reside in slums, with states such as Maharashtra, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, West Bengal, and Odisha, having a slum population greater than the national average (National Buildings Organisation, 2013). Moreover, living conditions differ across slums as the provision of amenities in a slum is contingent on its status (Banerjee & Chattopadhyay, 2020). For instance, notified slums (i.e., areas notified as slums by any Act) receive greater amenities than recognised (i.e., areas not notified as slums by any Act) or identified slums (i.e., areas which are neither notified nor recognised as slums but are a dense space with a population of 300 in badly constructed crowded tenements with inadequate hygiene and sanitation) (Banerjee & Chattopadhyay, 2020; National Buildings Organisation, 2013).

It appears that with increasing urbanisation, the number of individuals living in slums correspondingly keeps on increasing. Stokes (1962) noted that the slum "is the home of the poor and the stranger... classes not (as yet) integrated into the life of the city" (p. 187). Further, he observed that the "distinctive feature of slums is not appearance as such, then, but the relation between the slum and its inhabitants and that neighborhood and its inhabitants which the city regards as having met minimum livability standards" (p. 187). By these, he indicated that the nature of slums differs across the world. Nevertheless, their function in the development of a city, at any time, is to accommodate those "classes" which are not directly involved in the city's financial and societal existence (Stokes, 1962). However, the perception of slums has, over the years, progressed from being regarded as an annoyance to an overall consensus that they are distinctive environments which have gradually evolved to accommodate the needs of people living in them (Andavarapu & Edelman, 2013).

The recent Sustainable Development Goals (SDGs) proposed by the United Nations have established targets to make sure that by 2030, all the world's citizens have access to sufficient, secure and reasonably priced housing and fundamental amenities (De, 2017). Consequently, it has become a necessity that slums be improved or eradicated in a comprehensive manner across the globe in general and in India, in particular.

Policies and Responses for Slums in India

Section 3 (Chapter II) of the Slum Areas (Improvement and Clearance) Act, 1956, of India declares: "Where the competent authority upon report from any of its officers or other information in its possession is satisfied as respects any area that the buildings in that area—

- (a) are in any respect unfit for human habitation; or
- (b) are by reason of dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light or sanitation facilities, or any combination of these factors, are detrimental to safety, health or morals, it may, by notification in the Official Gazette, *declare such area to be a slum area.*"

Zhang (2018) suggests that slums are often the outcome of unplanned development. However, their spread and permanence are entrenched in their functions, which are political and socio-economic. Slums offer reasonably-priced housing and essential economic prospects for dwellers of the city. They have a fundamental role to play in electoral politics as they serve as 'vote banks' for politicians, both national and regional. Post-Independence, governmental intervention in slums has evolved from harsh government regulation and destruction to acceptance and renovation and schemes are driven by the market (Zhang, 2018).

In general, the government is considered to be responsible for the provision of housing. Provisions in the Constitution of India stipulate that land, accommodation, development of cities and establishment of civic infrastructure are matters of the State, and consequently under the complete control of State Government (Bardhan, Sarkar, Jana, & Velaga, 2015). Accordingly, since Independence, various policies associated with slums and housing have been executed at different times in the planning of cities. However, these seem to have been ineffective as the growth of slums in India has not diminished (Bardhan et al., 2015).

Overall, Bah, Faye, and Geh (2018) highlight that there are different methods to deal with slums such as slum upgrading and provision of reasonably-priced and adequate housing options for the destitute. Slum upgrading entails policies and initiatives for accommodation, relocation and redevelopment of slums, expenditure and financing of upgradation, and involvement of the private sector. On the other hand, provision of housing options entails gradual development of housing, sites and services programmes, rental housing, social housing, housing cooperatives, housing transformation, support services for housing,

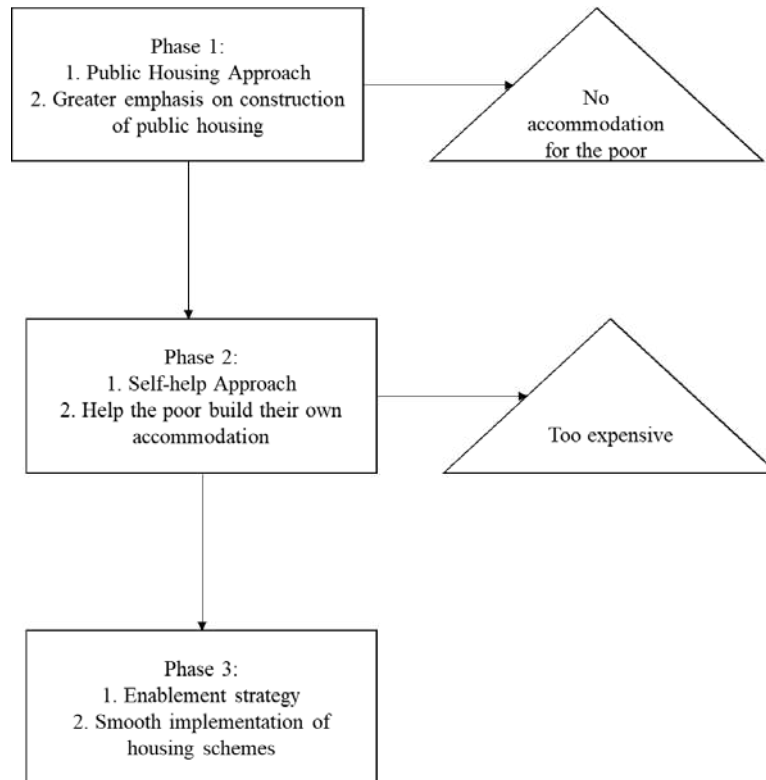
and partnerships between public and private sectors. Specifically, the improvement of slums focuses on access to sanitation and safe water, ensuring that the tenure status is secure, housing is durable, and provision of adequate area for a living (UN-Habitat, 2006).

The UN-Habitat (2012) highlights that three categorisations exist with regard to policies and responses to slums, namely, "*laissez-faire, restrictive or preventive, and supportive*" (p. 8). Early policies (prior to the 1970s) placed emphasis on preventive actions. For instance, clearance of slums, rehabilitation of cities by remodelling or restoring derelict buildings, etc., and relocation. This philosophy favoured the option of slum redevelopment by means of transfer of inhabitants to new municipal housing properties. A parallel philosophy at the time was the *laissez-faire* philosophy which supposed that slums and random colonies were a temporary occurrence. Relatedly, improvement of slums was regarded as a transitory course of action merely to make sure that the facilities for residents conformed to the minimum requirements pertaining to basic environmental health while they waited to be rehoused in municipal housing (UN-Habitat, 2012).

A later philosophy in the 1970s saw the move to upgrade the settlements. This move was perceived to be feasible, and sometimes even advantageous, and entailed upgradation of the setup and social amenities. In this approach, communities were left intact. Another approach involved the support of self-building endeavours in different sites. Both of these approaches indicated an initial essential change in housing policy, a move from the complete provision of municipal housing to civic assistance for construction of housing and provision of infrastructure for underprivileged households (UN-Habitat, 2012). Subsequent changes to the policies included the integration of upgradation of slums into housing policies and more recently (from the mid-1980s), from haphazard upgrading of settlements to slum upgrading programmes that spanned the city (UN-Habitat, 2012).

Housing policies in India can be considered to have followed a similar trajectory (Fig. 1). That is, they commenced with the construction of public housing and progressed to an enablement strategy. However, it is significant to note that though the shelter was identified as a fundamental human requirement, the first National Housing Policy was not introduced until the year 1988. Nevertheless, initial policies were targeted at selected segments of Indian society. For instance, the government's focus on the First Five Year Plan was to provide housing for persons in Low Income Groups (LIGs). In the Second Plan, the emphasis changed to the improvement and resettlement of slums (Bardhan et al., 2015). Emphasis continued to be placed on weaker sections until the

Fig. 1: General Evolution of Housing Policies
(adapted from Bardhan et al., 2015, p. 3)



Fifth Plan (1974-1979). Subsequently, commencing with the Sixth Plan and there onwards, programmes for community advancement actively involving non-profit organisations were supported. The Eighth Plan (1990s) saw the Indian economy becoming liberalised and consequently market forces became more significant and the role played by the States progressed to one of facilitation from one of provision (Mukhija, 2004). Despite these policies, it would seem that developing cities continue to have significant concerns with housing and growth of slums which have resulted as a side effect of the process of urbanisation.

Policies for Slums in Mumbai

Historically, it appears that it is the typical inclination of a 'planned city' to leave out the poor (Watson, 2009). Moreover, slums are typically viewed as breeding grounds for crime and thus removing them is regarded as a prerequisite to making cities secure and liveable (UN-Habitat, 1996). This viewpoint can be perceived in Mumbai's

early planning policies. Moreover, attempts to make city areas less vulnerable have frequently been interpreted to signify movement or total eradication of slums (Stecko & Barber, 2007). Nevertheless, slums continue to exist in the city and in most zones, house more than half the zonal population (Bardhan et al., 2015).

It is reported that about half of the population of Mumbai reside in slums (Burra, 2005; O'Donovan, 2020). In the decades following Independence (1950s-1960s), the Maharashtra government and the municipal corporation worked toward demolishing slums and clearing encroachments. It soon became evident that this policy had failed as people merely rebuilt their homes in the same site or another vacant site in the vicinity (Burra, 2005).

The evolution of policies related to slums in Mumbai is summarised in Table 1.

Overall, it is evident that different policies have been implemented in Mumbai with regard to slum eradication and/or improvement. Nevertheless, the extent to which these policies have contributed to include slum dwellers into the social fabric of the city remains to be seen.

It has been argued by Holston (2008) that the struggle for entitlement to a day-to-day urban existence of dignity is a new interpretation of residency, one that is envisioned in domestic existence. With regard to Mumbai, Weinstein and Ren (2009) found that the administrative disputes resulted in the creation of a more defensive system and which transformed slum residents into urban residents who were livelier and who expressed their entitlements with regard to accommodation and made new demands on the city. Processes of exclusion due to schemes for slum redevelopment, in some instances, have resulted in slum residents expressing their opposition employing a discussion of human privileges and fairness (Imas & Weston, 2011)

Consequently, several works focus on the support of the underprivileged, whether hypothesised as "insurgent citizenship" (Holston, 2009), 'political society' (Chatterjee, 2004), the 'right to the city' (Huchzermeyer, 2011; Weinstein & Ren, 2009), or other kinds of social crusades (Hooper & Ortolano, 2012; Mahmud, 2010; Paller, 2012).

The present article chooses, therefore, to use a theoretical perspective to analyse policies related to slums in Mumbai. In particular, it uses Henri Lefebvre's conceptual and practical work regarding urban space. In *"The Right to the City"* (Lefebvre, 1968), his seminal work, Lefebvre articulates the conflict between place separation and misuse together with the displacement of residents. In this regard, the "World

TABLE 1: EVOLUTION OF POLICIES FOR SLUMS IN MUMBAI

<i>Approach / Policy</i>	<i>Year (Timeline)</i>	<i>Resettlement Plan, If any</i>	<i>Demolition/ Eviction</i>	<i>Thrust</i>	<i>Status/Impact</i>
Clearance and Redevelopment	1896 - 1970s	None, Cleared land	No, significant eviction and demolition	This approach utilised a physical planning model which was a legacy of colonial rule. The emphasis of this model is on the eradication of slums.	This policy was not effective since people would either rebuild their huts after some time at the same location or, move to another piece of empty land in the vicinity if there was extreme persecution. In case apartment blocks were built in the cleared sites, these were often too expensive for slum dwellers and they returned to slum settlements. Landowners show limited interest in creating new supplies of accommodation
Maharashtra Slum Areas (Improvement, Clearance, And Redevelopment) Act, 1971	1971	Yes, Resettlement began to be considered	Yes, Permanent	The focus was on identifying notified slums and working on those slums. Improvements under the Act were carried out only in slums on government lands, earmarked for 'improvement' in the Development Plan.	Resettlement of dwellers in other unauthorised locations

(contd. Table 1)

<i>Approach / Policy</i>	<i>Year (Timeline)</i>	<i>Resettlement Plan, If any</i>	<i>Demolition/ Eviction</i>	<i>Thrust</i>	<i>Status/Impact</i>
Centrally-Funded Environmental Improvement of Urban Slums (EIUS)	1972	On-site improvement related to environmental issues	No, efforts to improve the living conditions on the assumption that these settlements would not be demolished in the near future.	The focus of the scheme includes the provision of water supply, sewerage, storm water drains, community baths and latrines, street lighting, broadening and covering of present roads, community centre, common municipal service centres, disposal of garbage, and maintenance.	Experienced difficulties due to limited space for implementation. Further complications were caused by court stay orders. Slums on state-owned land were improved, but those on private or central government land could not be improved.
The Maharashtra Vacant Lands (Prohibition of Unauthorised Structures and Summary Eviction) Act	1975	No	Yes, alternative accommodation	As per this Act, all encroached lands are deemed to be vacant, slums included in the Act are transient and can be eradicated. The Act also allows mobilisation of police for eviction of slum dwellers. In this event, alternative housing has to be given.	Slum-dwellers and squatters evicted on a large scale; no suitable resettlement strategies

(contd. Table 1)

<i>Approach / Policy</i>	<i>Year (Timeline)</i>	<i>Resettlement Plan, If any</i>	<i>Demolition/ Eviction</i>	<i>Thrust</i>	<i>Status/Impact</i>
Sites and Services Provision	1983	Redevelopment of land	No	The focus moved from slum demolition and building of accommodation to offering plots that were fully serviced. The model's attractiveness was since it provided a method to reduce costs, enhance the flexibility of investing in housing. It also restored to some extent the capability to enforce norms and regulation., It provided enhanced conditions for living and health for underprivileged households together with financial security and involvement in the development of the economy.	Implementation experiences resulted in the demise of this model. However, it delivered affordable, effective, and well- targeted accommodation.
Slum Upgradation Programme (SUP) (World Bank funded)	1985	Temporarily for a few months	Yes, on-site Up- gradation	The focus of this programme was a two-pronged strategy regarding making squatter settlements regular together with the provision of serviced land to manage the slum problem.	Encountered several difficulties such as, hostility from the slum community, unavailability of relocation sites, establishing eligibility of households.

(contd. Table 1)

<i>Approach / Policy</i>	<i>Year (Timeline)</i>	<i>Resettlement Plan, If any</i>	<i>Demolition/ Eviction</i>	<i>Thrust</i>	<i>Status/Impact</i>
Prime Minister's Grant Project (PMGP)	1985	Yes, rental transit accommodation while construction was in progress	No, on-site settlement	The focus was on the improvement of living conditions of Mumbai slum dwellers. This resulted in a significant change in the strategy regarding enhancement of squatter communities with the commencement of redevelopment projects.	Construction delays, increase in tenement costs, inadequate transit camps.
Slum Redevelopment Scheme (SRD)	1971-ongoing	Yes, for a limited time in transit housing	Construction on existing slum area	The focus was on redeveloping notified in the same location by private builders who were offered the incentive of increased maximum Floor Area Ratio (FAR) of 2.5 by the government.	Ineligible slum dwellers excluded. Limited interest from private developers.
Slum Rehabilitation Scheme (SRS)	1995	Yes, temporary resettlement	Flats, land as a resource	Focus on the rehabilitation of slum dwellers. Increase in carpet area and free tenements. Constitution of the Slum Rehabilitation Authority (SRA)	Implementation process had large gaps. Maintenance costs were higher; the living structure of residents affected; the real estate market's strength affects the success of the scheme.

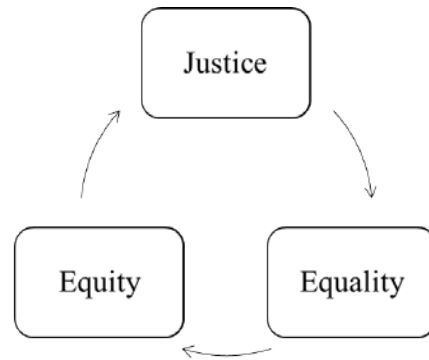
(contd. Table 1)

<i>Approach / Policy</i>	<i>Year (Timeline)</i>	<i>Resettlement Plan, If any</i>	<i>Demolition/ Eviction</i>	<i>Thrust</i>	<i>Status/Impact</i>
Valmiki Ambedkar Awas Yojana (VAMBAY)	2001	Yes, to clear existing land and provide slum dwellers with new accommodation.	Flats, bulk construction	Provision of houses for persons Below Poverty Line (BPL), co-funded by the Government of India subsidy (50%) and State Government (50%).	Identification of beneficiaries was challenging, absence of basic amenities resulted in dwelling units not being claimed
Jawaharlal Nehru National Urban Renewal Mission (JNNURM)	2006	Yes, taking care of essential services, new houses were constructed.	Flats	Housing units with services (e.g., water supply, sanitation, sewerage, disposal of solid waste, etc.) for urban poor, in general, and slum dwellers, in particular.	Various issues in implementation such as, inadequate community engagement, no stipulations for environmental sustainability of projects
Rajiv Awas Yojana (RAY)	2010	Yes, city beautification Public-Private Partnership.	Plot or Flat: "Land as a resource."	"Slum Free City"	Community awareness and involvement needs to be higher

*Compiled from Bardhan et al., 2015, p. 5-8; Burra, 2005, p. 69-72; O'Hare, Abbott, and Barke, 1998, p. 277-281; Owens, Gulyani, and Rizvi, 2018, p. 261-265; Risbud, 2003, p. 13-17.

Charter for the Right to the City” (Habitat International Coalition, 2005) specifies that “Cities should constitute an environment of full realisation of all human rights and fundamental liberties, assuring the dignity and collective well-being of all persons, in conditions of equality, equity, and justice. All persons have the right to find in the city the necessary conditions for their political, economic, cultural, social, and ecological realisation, assuming the duty of solidarity”. Also considering the recommendations of Vale (1996) and Mukhija (2000) it is advisable for researchers to evaluate using multiple indicators, the three parameters of equality, equity and justice. Various slum redevelopment policies have been implemented in Mumbai thus far, or are in the process of being implemented, in terms of the “right to the city” (Fig. 2).

Fig. 2: “Right to the City”: Evaluation Indicators



Source: World Charter for the Right to the City

Li and Wang (2020) highlight the frequent identical usage of terms ‘equality’, ‘equity’ and ‘justice’. Equality focuses on all people having the same status; justice emphasises moral responsibility based on equality; and equity, which is more flexible, permits equality without necessitating precise uniformity (Guy & McCandless, 2012).

The objectives of this paper are: a) to review the concept of the “right to the city” in the context of slum redevelopment, b) to assess the application of the concept concerning slum redevelopment policies used for Mumbai in light of justice, equity, and equality and to suggest steps for moving closer to implementation of the concept of the “right to the city” for Mumbai slum redevelopment policies.

UNDERSTANDING “RIGHT TO THE CITY”

The notion of the “right to the city” can be traced to the writings of the French geographer, Henri Lefebvre in his book *Le Droit à la Ville*

(1968). This notion exists in conjunction with Lefebvre's enduring interest in the importance of urban existence and space in a capitalist scenario (Lefebvre, 1991). The central point of Lefebvre's notion is his idea of the city as an end product, or as a composition resulting from the effort and day-to-day activities of city dwellers. Thus, for Lefebvre, the "right to the city" has a considerable significance.

Moreover, it also signifies the privilege to generate city existence on fresh conditions (unconstrained by the pressures of exchange value) and the entitlement of residents to remain included in city existence. Lefebvre simply describes the "right to the city" (1996, p. 158) as a "transformed and renewed right to urban life." Neil Smith (2003) observes that Lefebvre's idea of the city indicates a move away from both the more traditional sociological investigations of city existence and the more conventionally socialist methods.

Further, in his book, Lefebvre submits that the capitalist economy has an adverse effect on cities, as it transforms the city into a product that merely serves to increase capital. The notion of the "right to the city" was proposed as a novel political view point in response to the impacts caused by neoliberalism. For example, the sale of city neighbourhoods to private owners, usage of the city for commercial purposes including, businesses and industrial zones. In other words, due to its being overwhelmed by the pursuit of wealth, the city no longer belonged to the public. Consequently, Lefebvre advocates for the "rescue of man as the main protagonist of the city he has built." Hence, the emphasis of the 'right to the city' is to re-establish the essentialness of the city to its dwellers, setting up the chance for all to have increased satisfaction with life, and building the city as "the meeting point for collective living" (Lefebvre, 1968).

The city, to Jordi Borja (2003), is a political area where it is possible for a collective will to express itself. Moreover, it is an area for both concord and discord. In this context, the right to the city signifies the construction of a city wherein people can exist with dignity and where it is possible to uniformly circulate resources of all types (e.g., health, housing, education, labour, symbolic resources, membership and right to utilise information). Further, the "right to the city" is everyone's right to construct cities that suit the requirements of humans. The rights of people to construct the various kinds of cities they desire should be equal. As argued by David Harvey (2009) in his inaugural talk at the Urban Reform Tent, January 29, 2009, World Social Forum, Belem, "the right to the city is not simply the right to what already exists in the city but the right to make the city into something radically different."

More than 50 years after the notion of the 'right to the city' was first formulated, it continues to support and bring varied scholastic and societal developments and civil society associations together from diverse parts of the globe (Mathivet, 2011). He clarifies that the 'right to the city' is "not an additional human right." Instead, it is the right to implement other rights already in formal existence. By itself, the basis of the 'right to the city' is "a dynamic of process and conquest" the accomplishment of which is driven by societal measures (Mathivet, 2011, p. 24). The 'right to the city' is composed of various dimensions. For instance, it encompasses the right to 'habitat' that enables a system of societal associations. Further, it is the right to 'social cohesion' and the city's 'collective construction.' Moreover, it is the right to 'live' in the city with self-esteem and the right to 'co-existence.' Finally, it is the right to 'influence' and have access to the civic administration, and the right to 'equal rights' (Mathivet, 2011, p. 25; Velázquez, 2007).

As per the "World Charter for the Right to the City" (Habitat International Coalition, 2005), the "*Right to the City*" is defined as the: "*equitable usufruct of cities within the principles of sustainability, democracy, equity and social justice.*" Further, it is the "*collective right*" of city dwellers, especially defenceless and disregarded groups, that bestows "*the legitimacy of action and organisation, based on their uses and customs, with the objective to achieve full exercise of the right to free self-determination and an adequate standard of living*" on them. Overall, the "right to the city" is reliant on all human rights that are globally devised and acknowledged. Consequently, it encompasses all "*the civil, political, economic, social, cultural and environmental rights*" already standardised in human rights agreements across the world.

Overall, the Charter submits that the "right to the city" concerns the achievement of three principal aspects:

- (a) The implementation of complete citizenship, that is, the accomplishment of all human privileges to guarantee the aggregate prosperity of inhabitants and the social development and the administration of their environment.
- (b) The democratic administration of the city through the immediate involvement of society in administration and planning, in this way fortifying regional governments and community administration.
- (c) The social purpose of the city and city property, with the mutual good taking precedence over individual property rights, entailing a usage of urban areas in a manner that is both fair to the society and the maintenance of the environment.

Mitchell (2003) suggested that the city, for Lefebvre, was a work comprising the varied notions of unrelated people struggling over the form of their city. Lefebvre contended that the “right to the city”, “complemented by the right to difference and the right to information, should modify, concretise and make more practical the rights of the citizen as an urban dweller (*citadin*) and user of multiple services” (as interpreted by Kofman & Lebas, 1996, p. 34).

Slums and the “Right to the City”

In a study based in Brazil, Friendly (2020) used the perspective of social citizenship, property rights and insurgency, to scrutinise the ‘right to the city’ debate in the country. This study emphasised three concerns: the dimension of rights, the role played by the social purpose of property in city statutes and the role of ‘insurgent planning’ manifested in city social programmes. Further, while land and property rights are frequently separated from discussions regarding social citizenship, the case of Brazil offers proof that the two are unmistakably interwoven.

Again, regarding Brazil’s development around legal reforms, Fernandes (2007) suggested that this has been founded on two mainstays of the “right to the city” proposed by Lefebvre: the right to habitation and the right to cooperation. Lefebvre alluded to the right to inhabit and the right to housing as parts of the right to appropriation, including the rights of inhabitants to truly get to, consume and utilise urban space. Specifically, the Right to Participate in choices creating urban space has been taken up as social movements, including in Brazil (Mayer, 2012). Undoubtedly, Lefebvre underscored the need to completely perceive use values to review the chronicled awkwardness coming about because of accentuation on trade values run of the mill of the entrepreneur creation of urban space (Fernandes, 2007). Bah and colleagues (2018) highlight that the urbane governance policy of Brazil, in its entirety, has been re-constructed around the notion of the ‘right to the city’. For instance, in 2001, federal legislation acknowledged the ‘right to the city’ and instructed that city dwellers be included in the process of urban planning.

Uwayezu and De Vries (2018) connected the ‘right to the city’ with the concept of spatial justice. Drawing on the work of prior researchers such as Lall, Freire, Yuen, Rajack, and Helluin (2014), it has been stated that social justice must be embedded into community policies. This is to ensure that rights can be conferred on all groups of citizens to own or utilise land resources. Uwayezu and De Vries (2018) suggest that this is established in the agenda of encouraging the ‘right to the city’ which is the concept corresponding to spatial justice throughout the city (Bret,

Gervais-Lambony, Hancock, & Landy, 2010; Fainstein, 2014; Iveson, 2011; Lefebvre, 1968). Further, they highlight that 'right to the city' is composed of two principal items that can be measured: 'participation' and 'appropriation.' Participation indicates that all city dwellers actively participate in decision-making and enactment of policies that promote the development of city spaces.

On the other hand, appropriation comprises the actual entitlement of city dwellers to the right to use and inhabit the city space in order to engage in their occupations and be involved in the construction of urban space (Lefebvre, 1968, 1991). A mutual facet of these items is the equal opportunity for all citizens to use or enter spatial resources, not excluding the land (Chatterton, 2010; Harvey, 1992; Njoh, 2013). Further, it encompasses the recognition and safeguarding of entitlement to land and accommodation for all citizens, irrespective of their societal and financial standing (United Nations Secretariat, 2016).

Agencies of the United Nations such as, the United Nations Secretariat (2016) and UN-Habitat together with UNESCO (UN-Habitat, 2009), place emphasis on the necessity to practice spatial justice in the different facets of city development and (re)development to avoid all kinds of spatial inequalities that can intensify scarcity of resources or promote uncertainty in land tenure (Dikeç, 2009; Marcuse, 2010). City planners and corporations are encouraged by these agencies to safeguard the privileges of all city dwellers to accommodation and land resources irrespective of their schemes for tenancy. In keeping with the World Charter (Habitat International Coalition, 2005), many countries have begun since 2012 to implement a worldwide scheme for the urban rights of humans. Among the intended objectives are support for the right to use reasonable accommodation and safeguarding the rights of people to property (UCLG, 2012).

Bah and colleagues (2018) suggest that slum-related policies have changed and in the present day, they are prepared in acknowledgement of slum dwellers' "right to the city". As per the UN's Rights to Housing, "right to the city" indicates the promotion of *"equal access to the potential benefits of the city for all urban dwellers and encourages the democratic participation of all urban dwellers in decision-making processes, notably at the municipal level, so that they may fully realise their fundamental rights and liberties"* (Bah et al., 2018, p. 223). The implications of this are significant for slums (including upgradation, redevelopment and relocation) and affordable housing initiatives. However, as Atlaw (2014) notes, "Relocation erodes communities' access to all elements needed for their well-being – economic activity, social ties, and urban services" (p. 2391). In other words, their "right to the city" is compromised (Bah et al., 2018).

POLICIES FOR SLUMS IN MUMBAI AND THE “RIGHT TO THE CITY”

Even before the notion of the “right to the city”, the Constitution of India had incorporated provisions envisioned to offer “equality, equity and justice” to all citizens of the country and by so doing, remedy the offences of the past (Shilpi, 2014). Table 2 summarises the findings of different studies of policies related to slums in Mumbai, as shown in Table 2.

CONCLUSION

The review of studies which had evaluated slum policies revealed that the policies had not achieved the outcomes of equality, equity and justice envisioned by the ‘right to the city.’ Instead, it appeared that the slum dwellers had been at the receiving end of gross injustice and their needs had been overlooked. Indeed, it appeared that emphasis had been placed on benefitting policy-makers and private developers. Lefebvre believed that space, which is a natural resource, should be associated with equal right to use, ownership and distribution. That is, it is not a matter of welfare or charity, rather a fundamental right to the citizens of a city. Consequently, it appears that there is a need for fresh policies to be made regarding the slums in Mumbai which acknowledge the rights of slum dwellers to live in the city as equal participants in its features and facilities. In this regard, some recommendations provided by Magalhães and di Villarosa (2013) in the context of designing public policies for upgradation of slums and development of cities may be profitable for consideration in the context of Indian slums, in general and of slums in Mumbai, in particular. These are as follows:

1. Two prerequisites determine the successful implementation of any programme: “legitimacy, based on mature social demand” and a “favourable political-institutional climate;”
2. The goal of urban policies must be “integral and sustainable;”
3. Another significant concern is quality (architectural and urban) and costs.

Further, Magalhães and di Villarosa (2013) highlight the significance of political motivation together with participation of essential public stakeholders; a comprehensive approach entailing policies which deal with urban poverty and program sustainability in a balanced manner; achievement of quality regardless of restraints on cost; the need for design to be flexible; and appropriate focusing on programs based on geography and community.

TABLE 2: EVALUATION STUDIES OF POLICIES FOR SLUMS IN MUMBAI

<i>Evaluator</i>	<i>Policies/ Programmes Evaluated</i>	<i>Evaluation Based on</i>		
		<i>Equality</i>	<i>Equity</i>	<i>Justice</i>
Shailesh Gandhi (2007)	Slum Rehabilitation Scheme (SRS)	Cut-off dates for eligibility creates inequality among the citizens.	—	This scheme resulted in stakeholders indulging in rent-seeking and unethical practices. This was attributed to the scheme's lack of endeavour to synchronise the market price of the accommodation with the income of the household to which it was assigned.
Sahil Gandhi (2012)	Rajiv Awas Yojana (RAY)	—	—	Fundamental economic principles should be satisfied to prevent the failure of the market for housing
O'Hare et al. (1998)	Slum policies on the whole	Slum policies emphasize the role played by the housing market and self-help (i.e., community-based projects)	—	—
Bardhan et al. (2015)	Slum policies on the whole	Limited participation of slum dwellers has resulted in their actual needs being overlooked by the policy-makers.	—	Policies mirror the political situation instead of the genuine interests of slum dwellers. Interests of the direct stakeholders (i.e., slum dwellers) being overlooked in favour of other stakeholders, e.g., private developers)

(contd. Table 2)

<i>Evaluator</i>	<i>Policies/ Programmes Evaluated</i>	<i>Evaluation Based on</i>		
		<i>Equality</i>	<i>Equity</i>	<i>Justice</i>
Burra (2005)	Slum policies on the whole	–	–	Distribution of land ownership between central and state governments limits their support and participation in resettlement and rehabilitation of slums.
Chatterji (2005)	Slum policies on the whole, Dharavi slum, Mumbai	Slum-dwellers believe that slum development is an avenue by means of which they can express a “sense of shared future” (p. 217)	–	The role of the government is described in three ways in slum legislation: “controller, provider and facilitator” (p. 201). This implies that legislation is oriented towards a certain perspective and can alter over time.
Cadavid (2010)	Slum policies on the whole	New living status given to slum dwellers.	The additional expenses overtake advantages of rehabilitation due to the new living status.	–
Murthy (2012)	Slum policies on the whole	In slums, dwellers are entitled to use water and sanitation based on whether a dwelling was built before January 1, 1995. This is because there is greater land security for the dwellings constructed before that date.	–	Distribution of land ownership between central and state governments limits their support and participation in resettlement and rehabilitation of slums.
Doshi (2013)	Slum policies on the whole	Community groups harnessed	NGOs involved using participatory approaches to facilitate slum clearance	State government depends on private developers’ profit motives to finance low-cost resettlement.

Nevertheless, this study is not without limitations. It relies principally on secondary data to draw conclusions. Moreover, some elements of the researcher's subjectivity could have influenced the evaluation of policies and the selection of studies in this matter. Further, the researcher's interpretation of equality, equity and justice may not correspond to that of another researcher. Future researchers could pursue an empirical study involving various slum stakeholders (slum dwellers, government agencies, NGOs, private developers, etc.) to obtain their individual perceptions regarding the efficacy of current slum policies in the light of the 'right to the city'.

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Unrecognised Urbanisation in Uttar Pradesh: Issues and Approach

U. B. SINGH*

ABSTRACT

Uttar Pradesh, the most populous state in India falls amongst the states experiencing moderate urban growth but quantum jump in the emergence of census towns, as per census 2011. The increase was quadrupled over 2001. The eastern part of the state has larger number, but smaller census towns, in comparison to its western counterpart which is more urbanised, commercialised and industrialised. These towns contain about eight per cent of the state's urban content, but are administered rurally. The Ministry of Urban Development has advised the states to convert these census towns to statutory towns with urban local body on priority. The state government seems determined to expand its urban network provisioning basic services to a large segment of the population. In last decade little more than a score of census towns have been converted to statutory towns, whereas about 80 new towns with municipality have been created. It is advisable that census towns near to statutory towns should be merged with existing statutory towns. Census towns in western region containing large population should be converted to statutory towns with municipality on priority.

Keywords: *Urban Growth, Enhanced Revenue, Hidden Urbanisation, Visible Urbanisation and Dimension*

DEMOGRAPHIC PROFILE OF URBAN UTTAR PRADESH

Uttar Pradesh is the most populous state in the country, accounting for 16.4 per cent of the country's population. It is also the fourth largest state covering 6.88 per cent of the country's total geographical area, encompassing 2,43,290 sq km. The state is still in the early stages of its urbanisation process. The pace of urbanisation has been lower than most states in the country. The numbers of urban centres with more than one lakh population have grown slowly over the last 30 years.

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The growth of urban centres with population less than five thousand have, on the other hand, have grown more significantly and these centres have grown in larger numbers in the western part of the state. Urban population, however, has been concentrated in larger urban centres, showing heavy-up bias. Further, the tremendous increase in number of Census Towns (CTs) from 43 in 1991 to 66 in 2001 further to 267 in 2011 (Census: 2011) has added another but acknowledged management complexities, though unrecognised by the urban policy makers and planners, so far. Demographic details of the state are compiled in Table 1.

TABLE 1: UTTAR PRADESH: DEMOGRAPHIC PROFILE, 1901-2011

<i>Year</i>	<i>Population (crore)</i>	<i>Decadal Growth (%)</i>	<i>Urban Population (crore)</i>	<i>Decadal Growth (%)</i>	<i>Level of Urbanisation (%)</i>
1901	4.86	-	0.54	-	11.09
1911	4.82	(-)0.97	0.49	(-)8.98	10.19
1921	4.67	(-)3.08	0.49	0.61	10.58
1931	4.98	6.66	0.56	12.81	11.19
1941	5.65	13.57	0.70	26.00	12.41
1951	6.03	6.61	0.86	22.93	14.31
1961	7.38	22.37	0.95	9.90	12.85
1971	8.83	19.78	1.24	30.68	14.02
1981	11.09	25.49	1.99	60.54	17.94
1991	13.21	19.12	2.60	36.63	19.67
2001*	16.62	25.85	3.45	26.82	20.78
2011	19.98	20.23	4.45	28.75	22.28

Source: Compiled from different Census Reports; Population of Uttar Pradesh retrieved from Statistics Times.com on August 29, 2019.

*A new state of Uttarakhand (comprising hilly region) was created out of Uttar Pradesh in 2000.

As per 2011 census, Uttar Pradesh has 915 towns, consisting of 648 statutory towns (containing about 92 per cent of the total urban population) and 267 CTs (inhabiting about eight per cent of the total urban population) See Table 2. The statutory towns consist of 630 municipal towns, five industrial townships (containing a meagre portion of 0.21 per cent of the total urban population or 0.23 per cent of the population contained by statutory towns) and 13 towns

administered by Cantonment Board. Number of municipal towns has since increased to 707 (as of November 2020) as many new municipalities of different types have been created. A number of proposals for constituting new municipalities are under consideration by the state government. Administratively, about eight per cent of urban population inhabiting in these census towns in the state is beyond the purview of municipal laws and is still governed by rural laws.

TABLE 2: TOWNS IN UTTAR PRADESH

Year	Statutory Towns		Census Towns		Total	
	Number	Variation (%)	Number	Variation (%)	Number	Variation (%)
1991*	710	-	43	-	743	-
2001	638	(-)10.14	66	53.49	704	(-)5.25
2011	648	1.57	267	304.55	915	29.97

*Including Uttarakhand, created in 2000.

Source: Census of India, Town Directory of Uttar Pradesh; Population Statistics 1991, 2001 and 2011.

Emergence of Census Towns

The definition of urbanisation in India is rather restrictive. It is the only country to use population, density and economic character together as criteria. In addition to India's 'hidden' urbanisation (Mukhopadhyay et al., 2016), the successive census reports post-Independence have been highlighting a new feature in its urban transformation in the emergence of settlements identified as Census Towns (CT). Census Towns are part of India's "visible" urbanisation (Mukhopadhyay: 2016), since they satisfy the three criteria set by the Registrar General of India Census Operations for defining an urban area: population of at least 5,000, density of at least 400 persons per square kilometer and workforce of at least 75 per cent of male main workers in the non-farm sector (earning their livelihood from non-agricultural activities). The remarkable increase in number of CTs in the state between 2001 and 2011 means that a large number of settlements were reclassified from rural to urban, because of the change in their demographic and workforce characteristics. Census Towns are areas that are not defined as towns by the census operation having urban characteristics, but no urban local body. Kumar (2019) suggests that the emergence of CTs is a result of people in rural areas shifting from agriculture to non-

agricultural sectors such as construction, trade and manufacturing. So it is only Uttar Pradesh which has experienced many new census towns notwithstanding moderate urban growth. However, it can partly be attributed to its sheer size – as it is one of the states which has a highest number of districts and the largest population.

The administrative dimension distinguishes between: (i) Statutory Towns, which are administered by different types of Urban Local Bodies (ULBs), Cantonment Board (CB) and Industrial Townships (ITs); and (ii) Villages, which are administered by village councils (*Gram Panchayats*). The two categories of local governments in the country function under different principles outlined in the 73rd (rural) and 74th Constitution Amendment Acts, 1992. Therefore, among settlements, Census Town (CT) is a specific subgroup defined as urban by the Census of India but under rural governance. The existing separation between rural and urban structures is not in sync with the spatial and economic reality of these settlements. Various options can be envisaged that require more or less interventions ranging from evolving solutions to activate efficient District Planning Committees (DPCs) to more radical solutions such as ending the binary rural/urban status created by the 73rd and 74th Constitution Amendments on decentralisation (Roy & Pradhan: 2019).

Characteristics of Census Towns in Uttar Pradesh

(i) Location of CTs

Uttar Pradesh presently is divided in 75 administrative units--districts. The analysis (Table 3) shows the existence of Census Towns only in 54 districts in the state. The district of Varanasi (eastern region) has the most number (34) in the state, followed by Ghaziabad (western) and *Prayagraj*, earlier known as Allahabad (eastern region). The remaining districts (21) showing non-existence of CTs are least urbanised ones.

(ii) Classification by Economic Regions

The state is generally divided into four economic regions – Western (most urbanised, industrialised and developed); Eastern (less urbanised and less developed); Central (urbanised, having large urban centres, industrialised and developed); and *Bundelkhand* (sparsely urbanised and less developed). On further analysis, it is found that Eastern Zone has (about 49 per cent) the most number of census towns, followed by Western Zone (about 41%). *Bundelkhand* has the least (meagre 2%). In Eastern zone Varanasi district tops, whereas the district of Ghaziabad

TABLE 3: DISTRICTS WITH CENSUS TOWNS (2011)

<i>No. of CTs & Districts</i>	<i>Name of the Districts</i>
34 (1)	Varanasi
15 (2)	Ghaziabad, Prayagraj
13 (1)	Agra
12 (1)	Aligarh
10 (1)	Bareilly
08 (4)	Azamgarh, Bijnor, Sonbhadra, Mathura
07 (3)	Gautam Buddha Nagar, Mau, Muzaffarnagar
06 (2)	Chandauli, Gorakhpur
05 (5)	Jaunpur, Mirzapur, Moradabad, Saharanpur, Sultanpur
04 (6)	Bulandshahr, Gonda, Kanpur Nagar, Kheri, Meerut, Sant Ravidas Nagar
03 (7)	Ayodhya, Barabanki, Ferozabad, Hathras, Jhansi, Kanpur Dehat, Unnao
02 (13)	Ambedkar Nagar, Auraiya, Ballia, Balrampur, Farrukhabad, Kaushambi, Lalitpur, Lucknow, Pratapgarh, Pilibhit, Rampur, Sant Kabir Nagar, Siddharthnagar
01 (8)	Amroha, Bahraich, Chitrakoot, Etah, Kasganj, Kushinagar, Maharajganj, Sitapur
0 -no census towns	21 Districts

Source: Analysis done on the basis of Town Directory, UP, 2011.

Figure in () denotes number of districts

is at the top in Western zone. In Central region, Kanpur *Nagar* has the most (4), and the district of Jhansi tops in the *Bundelkhand* region with three Census Towns (Table 4).

However, the content-wise analysis is quite revealing. The western region having second highest number of CTs shared more than half (more than 58 per cent) of the total population of such towns in 2011. This shows that the census towns falling in western zone are highly populated and have industrial and commercial base. NOIDA and Greater NOIDA are its examples. The CTs in eastern region cumulatively contains less than one-third of population, because they are small in size and content. The village hamlets therein are transforming their livelihood nature, as agricultural holdings

TABLE 4: DISTRIBUTION OF CTs BY ECONOMIC REGIONS (2011)

Economic Regions	Number	Population	Percentage Distribution		District having highest numbers of CTs in the region
			Numbers	Population	
Eastern	130	1153,463	48.67	32.23	Varanasi (34)
Central	21	300,841	07.89	08.41	Kanpur Nagar (4)
Western	110	2079,513	41.20	58.12	Ghaziabad (14)
Bundelkhand	06	44,318	02.24	01.24	Jhansi (3)
STATE	267	3578,155	100.00	100.00	

Source: Calculated on the basis of Town Directory, UP, 2011.

*Details are given in Endnotes of this paper.

in this part of the state are quite small and people are able to earn their livelihood mainly from agriculture only, in view of their weak commercialized base and less urbanisation.

(iii) *Classification by Population-size*

The content-wise analysis is quite interesting. More than half (about 63 per cent) of the census towns are small and have population less than 15,000. Surprisingly, a number of towns (21) contain the less population than the population size for categorising as census towns is taken into account by the Registrar General of Census Operations. It may be that these small compact settlements are separately situated from the main village. Actually these should fall under 'ignored' CTs. Only 22 towns, having population of 20,000 or more have two-fifth (40%) of the total population of Census Towns in the state (Table 5).

(iv) *Distribution by Region and Population size*

It is seen from data compiled in Table 6 that more than three-fourths (about 77%) of the small Census Towns having a population of minimum size prescribed by the Census Operations (5,000) exist in eastern region of state. A little less than one-fifth (about 18%) is found in western region. Strangely, one settlement situated in Ghaziabad district has a population of less than one thousand (757). Such small towns account for about eight per cent of total CTs. This seems that these settlements are far away from the main village and are dependent on non-agricultural activities for their livelihood.

More than half (about 55%) of the CTs fall in 5000-10,000 category.

Out of these more than half (53%) are situated in eastern region.

TABLE 5: DISTRIBUTION OF CTs BY POPULATION SIZE (2011)

<i>Population</i>	<i>Number</i>	<i>Population</i>	<i>Per cent to total numbers</i>	<i>Per cent to total population</i>
Less than 5,000	22	89,713	08.24	02.50
5,000-10,000	147	1041,622	55.06	29.11
10,000-15,000	58	697,206	21.72	19.49
15,000-20,000	18	316,143	06.74	08.84
More than 20,000	22	1433,471	08.24	40.06
STATE	267	3578,155	100.00	100.00

Source: Calculated on the basis of Town Directory, UP, 2011

This constitutes more than one-fourth (about 29%) of the total number of Census Towns in the state. Western zone comes next with about two-fifths of towns in the category.

TABLE 6: DISTRIBUTION OF CTs BY REGION AND POPULATION SIZE

<i>Regions</i>	<i>Population Size</i>					<i>Total</i>
	<i>Less than 5,000</i>	<i>5,000-10,000</i>	<i>10,000-15,000</i>	<i>15,000-20,000</i>	<i>More than 20,000</i>	
Eastern	17	78	21	07	07	130
Central	-	06	11	-	04	21
Western	04	59	25	11	11	110
<i>Bundelkhand</i>	01	04	01	-	-	6
STATE	22	147	58	18	22	267

Source: Calculated from data compiled in Town Directory, UP, 2011

Situation in respect of higher population brackets is quite different. Both the regions (eastern and western) contribute almost equal in number, reflecting a marginally upper hand of western zone. This corroborates the fact stated earlier that eastern part of the state experiencing less urbanisation and less development and lacking industrialisation has census towns more in numbers, but less in population, contrary to its western counterpart which is more urbanised, more industrialised and more developed having such settlements less in number, but more population content. Census Towns in eastern region are small in size, whereas the same in western zone are large. A good part of western zone falls under National Capital Region, hence it is more commercialised and developed.

(v) *Existence of Civic Service*

Since Census Operations differentiate such settlements from rural

villages mainly on the basis of measures adopted for earning their livelihood and population density. Availability of services therein is not a criterion at all; hence it is assumed that in terms of service provision, the level of basic amenities would remain very low. In addition to increasing population densities, and even in the absence of radical economic transformations, CTs appear as emerging centralities in their respective territories. Since these CTs are sites where increasing numbers of people live and work, public investment to ensure higher levels of service provisions such as water and sanitation needs to be called for. These towns by the expansion of local markets bring demands for improvement in the provision of services such as solid waste management and street lighting, which are mostly non-existent therein (WB: 2016). It is illustrated that across India villages are getting urbanised, the extent may vary. In Uttar Pradesh majority (about 78%) of population still lives in rural areas. Despite moderate urbanisation the state shows quantum jump in the number of CTs from 26 (in 1981) to 43 (in 1991) to 66 (in 2001) and further to 267 in 2011. This warrants a comprehensive study and an appropriate approach to deal with this hidden, unrecognised and ignored urbanisation in the most populated state in the country.

Approach

The future discourse of CTs calls for more attention for the development of this rurally administered urban population which is driven by a variety of processes. There are a number of issues that are important in this regard. These spaces are transforming, both socially and economically. The provision of infrastructure is one of these key drivers (Asher: 2016). One of the other activity which is flourishing in these places is investment in housing and construction, which can be encouraged by not only providing support to rural housing, but also reducing the disjoint in terms of basic services provided to places which are governed as urban (Statutory Towns) and counted as urban (STs and CTs).

Towns emerging as a transformation process occurring in the rural areas are indeed an important aspect of urbanisation in India. Population growth and diversification of activities in the rural areas are an endemic part of this transformation process. However, there is ample evidence to suggest that a large component of the rural non-farm sector activities is not induced by demand side factors alone. Agricultural stagnation, small land holdings, especially in eastern part of the state and the lack of scope to enhance productive employment opportunities in the agriculture sector are some of the possible factors responsible for a residual

absorption of labour in low-productivity non-farm activities. The lack of rural industrialisation seems to have aggravated the 'employment problem' in the rural areas. On the whole, these census towns do not seem to have emerged in response to agricultural prosperity (Mitra & Kumar: 2015).

Urban development in India depends substantially on the pattern of emergence of these new urban centres (Census Towns). Small towns can be instrumental in improving the rural-urban linkage and enhance market-based agricultural activity. Further, they promote non-farm employment. Planned urban development requires conversion of Census Towns into statutory Urban Local Bodies (ULBs). As per the guidelines of Fourteenth Finance Commission issued by the Ministry of Finance a weightage is accorded to the extent of urban areas within the state. The guidelines for Atal Mission for Rejuvenation and Urban Transformation (AMRUT) also provide for 50 per cent weightage to be given to the number of STs in a state for determining the allocation from funds among the states. The conversion of Census Towns into statutory ULBs entitles states to central assistance. In May, 2016, the states were asked by the Ministry of Urban Development to take immediate and necessary action to convert Census Towns into Statutory Towns.

The letter states that "...timely declaration of a habitat having urban characteristics as a statutory urban local body is the first step towards coordinated infrastructure development, enhancement of revenues and efficient delivery of citizen's services leading to the overall growth of economic activities. The opportunity of planned urban development might get lost if unplanned construction and ad hoc provisioning of infrastructure is allowed to take place over a long time" (in Census Towns). The letter further reiterates that " this (conversion from Census Towns to statutory ones) will not only trigger the process of preparing land use master plans leading towards planned growth but also will support provisioning urban infrastructure by leveraging resources available through various schemes/programmes and devolutionary grant". (MoUD: 2016)

Generally, states are reluctant to notify Census Towns as Statutory Towns since granting the former ULB status requires funds for infrastructure development. This has led to the haphazard growth of emerging urban centres (Census Towns), and these lack the facilities and services which are present in Statutory Towns governed by ULBs (Kumar: 2019). Urban scholars and researchers have diverse opinions. Some feel that converting all CTs into STs is the right approach. It should be done on a case by case basis. The minimum criterion of population content is not uniform across states. So, unless states use their

prerogative power or combine settlements to achieve that population threshold, it is unlikely to convert all CTs into STs. Conversion of CTs into STs could be useful for planned governance of some of the CTs, in particular, for some of the larger ones. However, the applicability of this particular mechanism to all CTs is very doubtful. For example, if a CT is in the periphery of a large city, merging the CT into the city could be more helpful. Similarly, if multiple CTs lie close to each other, they can be combined together to make a larger ST (Pradhan: 2017).

CONCLUSION

The state government seems determined to extend urban basic civic services to a large segment of population by expanding the geographical area of existing urban local bodies and/or converting large villages to Statutory Towns with urban local body. To address the growing urbanisation and to ensure planned development in the state 14 Census Towns (as of date) have been converted as Statutory Towns with urban local body whereas some 56 new *Nagar Panchayats* have been created in December 2019, 41 municipalities got their boundaries extended, and two *Nagar Panchayats* were upgraded to *Nagar Palika Parishad* (Municipal Councils). Further the government has approved to create 28 new *Nagar Panchayats*. Besides, the area of some 12 *Nagar Panchayats* and nine *Nagar Palika Parishads* (Municipal Councils) and two Municipal Corporations either has also been expanded or under the process (ToI: 2020). It is a welcome move. The state government should consider the gravity of about a little less than one-tenth of the state's urban population administered by rural laws and deprived of urban basic services. Western part of the state is most industrialised and urbanised; has Census Towns with large population. The Census Towns in this part should be given priority in conversion process. On the contrary in eastern part smaller CTs should either be merged with existing nearby STs or consolidated together to form the statutory town with municipality, if viable. The government should decision on case-to- case basis while converting them.

Endnotes

1. Regional Classification of Uttar Pradesh (showing districts having census towns in 2011)
2. Eastern Region Districts: Chandauli, Sonbhadra, Mau, Gorakhpur, Varanasi, Prayagraj, Azamgarh, Mirzapur, Jaunpur, Gonda, Ayodhya, Sant Kabir Nagar, Pratapgarh, Ballia, Ambedkar Nagar, Balrampur, Siddharth Nagar, Bahraich, Maharajganj, Kushinagar, Sant Ravidas Nagar, Sultanpur, Kaushambi
3. Central: Lucknow, Kanpur Nagar, Kheri, Unnao, Barabanki, Sitapur, Kanpur Dehat, Auraiya

4. Western: Ghaziabad, Agra, Aligarh, Bareilly, Bijnor, Mathura, Muzaffar Nagar, Saharanpur, Gautam Budh Nagar, Moradabad, Meerut, Bulandshahr, Ferozabad, Hathras, Rampur, Farrukhabad, Pilibhit, Kasganj, Amroha, Etah
5. Bundelkhand: Jhansi, Lalitpur

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Implementation of Integrated Solid Waste Management through Public Private Partnership in Dehradun Town

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ABSTRACT

Dehradun is the capital of Uttarakhand province of India, created in 2000 after carving it out of Uttar Pradesh province. Since then, Dehradun has been the hub of all the major developmental activities. Due to population influx from its neighbouring hilly districts and huge growth of the industries, there was high pressure on its civic authorities and the municipal bodies to dispose the waste generated by the households and the commercial units.

Domestic waste is for the most part discarded by the residents on the roads, drains, open ground, fallow land, and so on, sometimes burnt in open, which creates unhygienic environment for their well-being. There is no existing methodology available or practiced by the municipality for scientific and integrated solid waste management. Thus, there is a strong and urgent need to introduce required changes in solid waste management by Dehradun municipality in order to make the town hygienic and beautiful. This paper suggests an integrated management approach by using Public Private Partnership (PPP) for Dehradun.

Keywords: Solid Waste Management, Municipal Corporation, Public Private Partnership, Recycling

OUTLINE OF THE PROBLEM

Dehradun has seen huge rise of urban population in the recent years and consequently rise in the urban waste also. The population of Dehradun was 1.69 million in 2011 (Census 2011), whereas it was 1.28 million in 2001 (Census 2001), therefore there has been around 32 per cent increase in its population since it became capital of Uttarakhand province. The growth of industries in Dehradun has also been

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phenomenal during this period (DIC Dehradun, 2012), from 247 units in 2001 to 3044 till 2011-12. The municipal waste generated by urban areas is 291.8 million tonne per day (Urban Development Report, 2015). The waste generated is disposed by citizens either on the roads or fallow lands or by municipality (Urban Development Report, 2015) by doing collections to some extent and then throwing at a dumping ground at Sahastradhara, which activates methane emission due to anaerobic decomposition of waste (UNFCCC, 2012) and also contains perilous, chemical and factory wastes (Fig. 1).

Fig. 1: Dumping ground at Sahastradhara, Dehradun



Source: *Hindustan Times*, 11 Nov. and 26 Dec. 2017.

This procedure of unscientific waste disposal and methane emissions cause a number of health issues (Pandey Vidush, 2017) not only for the residents of Dehradun but also for its neighbouring areas. Also, the recent burning of the waste caused breathing problems for the students of the school nearby (*Pune Mirror*, 11 Nov. 2017). Another severe repercussion of this is that the water of Bindal river (a small rivulet flowing through the town) has become black in colour having all sorts of toxic elements in it (Pandey Vidush, 2017).

There is also an absence of segregation of waste at source by the residents. The financial position of the Municipal Corporation is also not very sound and workers are not being paid their salaries in time leading to strikes which are resolved by intervention of the Ministry of Urban Development (*Amar Ujala*, 28 Apr 2017)

In order to have a solution to these problems, this paper outlines suggestions to develop a new policy on Integrated Solid Waste Management (SWM) of Dehradun urban area through Public Private Partnership (PPP).

Possible Opportunities for Change

Various rules and provisions such as Municipal Solid Waste (Management and Handling) Rules 2000, Jawaharlal Nehru National

Urban Renewal Mission (JnNURM) 2005, a flagship scheme of Government of India and Swachh Bharat Mission (Clean India Mission) (SBM, 2014) aims at clean India Programme. Availability of efficient private sector in the market to handle such types of work and various successful examples in the country (Nagpur, Chennai, Pune) shows that Public Private Partnership (PPP) could be an effective tool to dispose solid waste (GoI-ADB-PPP initiative, 2010). Many municipalities are facing financial problems and are not in a position to set up an integrated SWM on their own and therefore introduction of PPP can be an effective way of solving this problem.

National Green Tribunal (NGT, 2015), Central Pollution Control Board and Hon'ble Supreme Court of India has also passed directions to the Government of Uttarakhand to come out with the solution to this problem in a time bound manner.

The Current Scenario

Under the Government of India flagship scheme of JnNURM 2005, the municipal corporation of Dehradun started the waste management by involving the private enterprises for door-to-door unsegregated waste collection and dumping it at the earmarked landfill site at Sahastrdhara (Urban Development Ministry Report, 2015) without any processing. The waste is simply dumped at one place, leaving it to rot and emit greenhouse gases much to the discomfort of the public. The private operator roped in through outsourcing by the Municipality also faced operational problems due to pressure groups' interference with regard to dumping problems. Public have started protesting against this dumping of waste and overflowing of dustbins (Fig. 2). Common dustbins are not cleaned regularly and are left overflowing with waste, waiting to trigger health hazards.

The problem of dumping the waste at Sahastradhara site has become a highly volatile matter with the public up in arms (*Pioneer*,

Fig. 2: Overloaded Dustbins in Dehradun Town



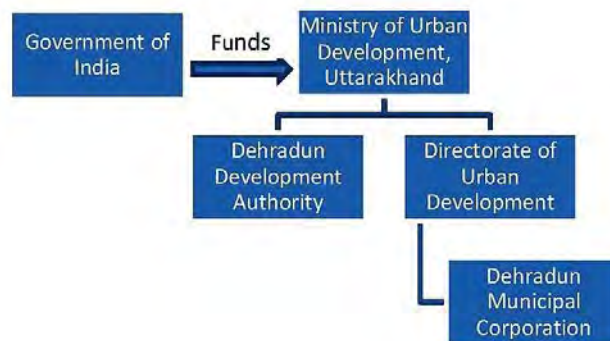
Source: *Times of India*, 12 Nov., 2016.

16 July, 2016) against the municipal authorities due to problem getting aggravated day-by-day. Therefore, the current situation confirms the inadequate mechanism in place for solid waste management and the city requires an integrated approach in order to have the long lasting solution instead of a cosmetic one.

Role of the Government

Ministry of Urban Development, Government of Uttarakhand and the Municipal Corporation Dehradun are the responsible agencies to undertake the effective solid waste management. Government of India has provided funds to municipal bodies to improve quality of life and infrastructure of cities, with solid waste management being an integral part of it. The urban development ministry has a defined organisational structure in order to perform waste management task (Fig. 3).

**Fig. 3: Waste Management Administrative Setup
(Urban Development)**



Source: Ministry of Urban Development, Government of Uttarakhand 2017

The mandate of these departments is to have a balanced town planning along with provisioning of basic urban infrastructure to the residents (CDP, 2007). The Ministry is required to enact the policy and do necessary resource allocation for the effective implementation by the Municipal Corporations. Another ambitious project of Government of India, i.e Swachh Bharat Mission also mandates every municipality to work towards effective and scientific solid waste management (SBM Guidelines, 2017).

Existing Data

A draft action plan (MoUD, 2015) on Solid Waste Management was prepared by department of urban development to suggest improvement in solid waste management. One study (Kalyani KA, Pandey K K, 2014)

came out with strong recommendation on utilisation of option of waste to energy conversion. Confederation of Indian Industry conducted a study on four Indian cities and came out with recommendations on using incinerators (CII, 2017). Another study worked on problems of Dehradun waste management and emphasised on increasing awareness amongst the public (Pandey Vidush, 2017). One more study worked on Futuristic Projection of Solid Waste Generation in Dehradun City of Uttarakhand using Supervised Artificial Neural Network-Non-Linear Autoregressive Neural Network (Saini, Ahuja, Bahukhandi, 2017). A DPR was prepared for Urban Development Directorate by a consultant suggesting financial plan, implementation methods and sustainability of waste management of Dehradun (IPE Global, 2008). Another study came (Ahuja J N, 2013) out with a suggestion on a user-friendly expert system on solid waste management of Dehradun.

Most of the studies emphasised on scientific disposal of the municipal waste by recycling and conversion of waste into energy. These have been practiced at many places especially in South Korea (Ryu C, 2010). However this requires huge initial capital cost (CAPEX) and maintenance cost (OPEX) and the financial conditions of municipal corporation do not allow to take this step (DMC, 2016). Moreover, this problem is sometimes further aggravated by the human resource management issues hence an integrated approach either by financing from the government or by using PPP mode is needed.

Strategy for designing and implementation of integrated approach towards Solid Waste Management

The causal theories are very important with respect to formulation of a public policy and the difficulties remain buried until or unless we get agitated about it (Stone D A, 1989). We also understand how evidence and knowledge are fused to have a policy translation. (Ingold and Monaghan, 2016). Studies have suggested various sustainable options for solid waste management which can be best described by the desirability pyramid showing various methodologies of waste disposal (Fig. 4).

Keeping in mind sustainable, scientific and effective waste management, a strategy is proposed on the lines of Build, Operate and Transfer (BOT) for Integrated Solid Waste Management of Dehradun under Public Private Partnership mode with following components:

- a) Door-to-door collection of municipal waste from the residential and non-residential areas of the town, its transportation to the dumping/processing site.

Fig. 4: Hierarchy of Sustainable Waste Management



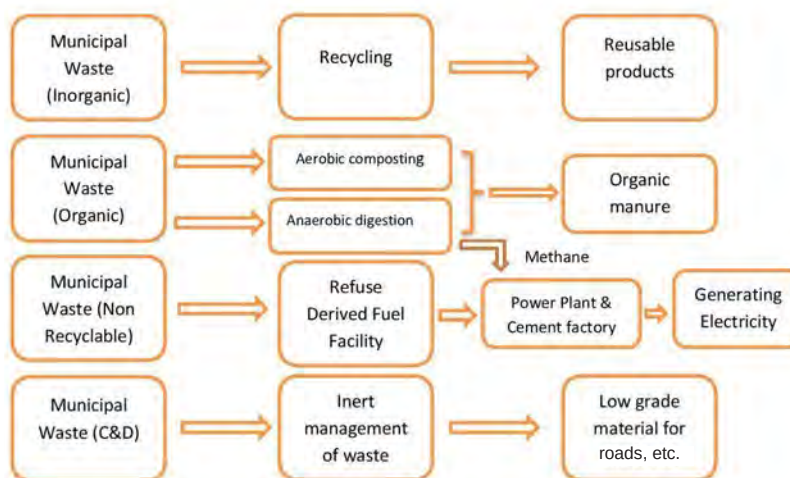
Source: Annepu R. K., 2012, WTER, Columbia University.

- b) Directions to all the construction agencies to dump their construction and demolition waste at the processing site earmarked above.
- c) Installation of Binless collection of waste at common locations. This is a unique technique to be used to get rid of overflowing dustbins. This is more hygienic, good aesthetics and easy to handle also.
- d) Installation of waste processing plant with following facilities;
 - i) Recycling
 - ii) Aerobic Composting
 - iii) Anaerobic Digestion
 - iv) Refuse Derived Fuel
 - v) Waste to Energy Combustion
- e) A recycling Plant is to be installed for recycling plastic, paper, glasses, etc.
- f) A plant for the aerobic composting of the organic waste to compost is to be installed. This kind of composting avoids emission of green house gases.
- g) Treatment of organic waste by anaerobic digestion to convert it into energy in the form of bio gas (Biomethanation). This can be used as a fuel or if used in generator can produce electricity.
- h) A plant to convert the municipal waste into Refuse Derived Fuel (RDF). RDF can be used as a substitute for coal for industrial combustion requirements.

- i) A plant for converting waste to energy by the process of controlled combustion by thermally breaking down combustible solid waste to an ash residue and in the process producing electricity. South Korea is using this technology very effectively by generating electricity equivalent to 1.66 million tonne of oil equivalent (TOE) (Jeong and Jihyun, 2017).
- j) Conversion of construction and demolition waste into building material of low standard to be used for road construction, can be done by using inert waste management technology.
- k) Department of Urban Development, Government of Uttarakhand has to ensure the fulfilment of all the prerequisites for the smooth implementation of the project, whether it is land availability, environmental clearance or any other legal matter in this regard. The whole process has been depicted in the form of flow chart (Fig. 5).

Dehradun Municipal Corporation is required to prepare a Request for Proposal (RFP) to invite bids from interested parties to perform the above scope of work under Public Private Partnership. Since this integrated system would require an initial capital infrastructure, Government of Uttarakhand, Department of Urban Development can have this PPP by providing financial support to the concessionaire in the form of Viability Gap Funding (PPP Cell, 2005). During operation the concessionaire would recover its cost by levying user charges on the residents and other agencies from where the waste is collected. Also, the concessionaire would be selling the compost, recycled

Fig. 5: Proposed Waste Management Plan



materials, RDF and the electricity generated and earns revenues (carrots for it) out of it. The PPP would be having a span of at least 15 years in order to have the effectiveness and financial viability for the concessionaire.

Evaluation of the Proposed Strategy

Monitoring and evaluation of a public policy is highly important to judge effectiveness, efficiency, service orientation, accountability, democratic process and the trust of the people (Davies Phillip, 2008). Whatever strength a policy or strategy has, the assessment of the magnitude of the policy instruments has major challenges in the form of various interferences it faces (Naoko Tojo, 2008).

The project would be evaluated on the following phased pattern in order to judge its impact and need for any intervention. It is proposed that both qualitative and quantitative method of data collection (Silverman, 2004) would be employed.

- 1) During first year, the performance of the concessionaire would be monitored on regular door-to-door collection of waste. For this a survey would be conducted from a sample of residents. Data comparison would be done about the solid waste generated by the households and other entities during the previous year.
- 2) During the second year an audit of the performance of this action plan would be conducted to assess its progress and financial position. The water of the streams inside the city, e.g Bidal and Rispana would be tested to judge the effect of the project. The condition of the underground dustbins would be monitored.
- 3) During the third year, need for revision in tipping fee may be explored as per concession agreement. It is to be judged by the Municipal Corporation Dehradun whether this policy of having integrated system has been an effective way of SWM or a fragmented one would have been better. The quantity of the bi-products produced and its sale by the concessionaire would be an indicator of its profitability.
- 4) All this assessment would be repeated in a phased manner to judge the sustainability of the project and to preserve the nature (Sofía García-Cortés, Ellen Gunsilius, Barbara Ölz (2014).

CONCLUSION

The Government authorities and the public should work sincerely to advance source level separation of waste, accomplish higher rates of recycling and deliver usable manure from organics. While this is being accomplished and reusing is expanded, arrangements ought to be made to deal with the non-recyclable waste. State governments should play a proactive role in streamlining the implementation of these endeavours. Enhancing SWM in India is very important. Recycled materials and electricity recuperation from waste is a critical part of enhancing SWM in India. Having an integrated and effective approach would serve a long lasting purpose.

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Land Utilisation in Special Economic Zones in India: A Macro and Micro Scenario

SURYA TEWARI*

ABSTRACT

The present article examines the issue of utilisation of land in Special Economic Zones (SEZs) in India. A significant proportion of land is lying vacant in SEZs. Low proportion of operational SEZs – with the addition of only few new – together with denotification are co-existing. Since India is a land-starved country, any under utilisation of land is a colossal waste of the scarce resources. The article, therefore focuses on understanding the land aspect of the SEZs at macro and micro level. The macro level analysis is carried out at an all-India level using secondary data while micro level at the level of particular SEZ using primary data generated from the field survey conducted in two SEZs located at Jaipur. Much of the analysis is based on cross tabulation and GIS mapping technique. The analysis reveals level of utilisation of SEZ land to be about 37 per cent at the national level. Within processing area around 45 per cent land is lying vacant. The issue is visible at micro level as well. The setting up of new units in already existing SEZs and linking incentives and conditions to quantum of exports, investment achieved, and location of those zones in unproductive lands appears to be the best possible strategy to ensure land utilisation.

Keywords: *Land Utilisation, Processing Area, SEZ and Land Monestisation, Denotification*

INTRODUCTION

The policy of Special Economic Zones (SEZ) came into inception in April 2000 with the objectives of enhancing export led growth, foreign investment and infrastructure development. In 2005, the Parliament enacted SEZ Act so as to create an environment of confidence

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and stability in setting of SEZs in the country. Accordingly, by November 2006, 235 SEZs were given formal approval by the government (*Rediff.com*, February 21, 2007).

With the setting up of SEZs, many issues and controversies also came to the fore. Some of them were related to location of SEZs, land use conversion from agriculture to non-agricultural uses, land utilisation under SEZs, price of land, problems of displacement, rehabilitation and compensation to the affected people, misuse of allotted land for the real estate activities, relocation of industrial units, loss of revenue and SEZs as instrument of capital accumulation (Gill, 2007; Sharma, 2007; Gopalkrishnan 2007; Levien 2011; Bannerjee-Guha, 2008, 2017).

In many cases SEZs proposals caused displacement which led to the protest and opposition from political parties, civil society organisations and local people. The case of Nandigram in West Bengal is an important example where huge backlash led to the termination and shifting of ongoing project. The major protests were for the return of unused land acquired for SEZs development (*The Hindu*, October 1, 2018a). The problem of unused land is in highlight along with issues of low level of operationalisation, few additions and denotifications (*The Indian Express*, July 26, 2017).

It is pertinent to mention here that the only requirement to apply for SEZ is to have minimum quantum of land which is specified by the government. Moreover, the land for developing these SEZs has basically been obtained from the government (GOI, 2014a). In such a scenario, interest in the SEZs could also be due to the promoters' (or developer, used interchangeably) interest in the land rather than in manufacturing or services. The allowance for non-processing use (residential, recreational, social and commercial infrastructure) together with normal activity of processing (manufacturing of goods or rendering of services) may also be in the direction of igniting the interest of investors in manufacturing via capitalizing on land. While specifying the size of SEZs, no consideration was laid on the quality of the land. The only emphasis was to ensure that SEZs do not fall in reserved or ecologically fragile areas. It was only in the year 2010 that in a guideline it was laid down that first preference for setting up of SEZs should be on land which is waste and barren in nature. But the guideline does not restrict use of cultivated land as it states that in the absence of sufficient land the cultivated area could also be taken (GOI, 2010).

Available literature dealing with SEZs focus on issues like employment, export, investment, FDI, incentives, backward and

forward linkages, sale to domestic tariff area, land acquisition, and compensation. See for example research works of Aggarwal, 2007; Sharma, 2007; Gill, 2007; Sampat, 2008; Sharma, 2009; Rawat, Mamidi, and Surepally, 2011; Pratap, 2012; Aggarwal, 2012; Khurud, 2013; Shah, 2013; Cook, Bhatta, and Dinker, 2013; Chakraborty, Gudimeda, and Kathuria, 2017; and Mukherjee *et al.*, 2016. Land as a factor of production has not been adequately explored in these publications.

In view of scarce nature of land and declining per capita availability together with the challenge of industrialisation in the country, the analysis of following issues in the article are very important.

- Level of utilisation of land in SEZs.
- Number of SEZs being added over the years and number being denotified during the same period.
- Time taken by notified SEZs to become operational.
- Differences in the level of land utilization in a private and state government SEZ.

The first three analyses are undertaken at macro level(all India level) and the last one at micro level (at the level of selected SEZs). Macro analysis is based on secondary data while micro analysis is based on primary data generated through field survey conducted in two SEZs in Jaipur.

The paper is divided into seven sections. Besides this Introduction part of Section one, Section two, explains the analytical framework of the study. Section three analyses the utilisation of land in SEZs by state, developer and sector at all India level. Section four investigates the additions and denotifications. Section five examines the difference in level of operationalisation of existing SEZs notified in different years. Sections six covers the comparative analysis of field data on SEZs. Section seven concludes the article.

Analytical Framework

The macro analysis is carried out using secondary data pertaining to SEZs as existing on January 23, 2014 and December 01, 2017. Data was extracted from the website of the Government of India. Data relating to January 2014 are used for analysing the level of land utilisation. This was the only data available on land information, viz. notified, utilised, and extent of vacant land in processing area of each notified SEZ at the time of commencement of the work. In January 2014, eighteen states and two UTs had approved SEZs. From this list, the SEZs in Telangana have

been separated from those in Andhra Pradesh (Telangana was formed on June 2, 2014). For analysing additions and de-notification, notified and operationalised data relating to December 2017 have been used. The total number of SEZs considered includes Export Processing Zones (EPZs)/SEZs rechristened or set up respectively, before the introduction of SEZ Act 2005.¹

The micro analysis is based on field data generated from the field work conducted in Jaipur during January–February 2019 in two SEZs: Jaipur SEZ (of state government) and Mahindra World City SEZ (of private sector, hereinafter Mahindra SEZ). Mahindra's had five different SEZs which had been merged into one in April 2018. As of now Mahindra and Jaipur are the only operational SEZs in the state of Rajasthan.²

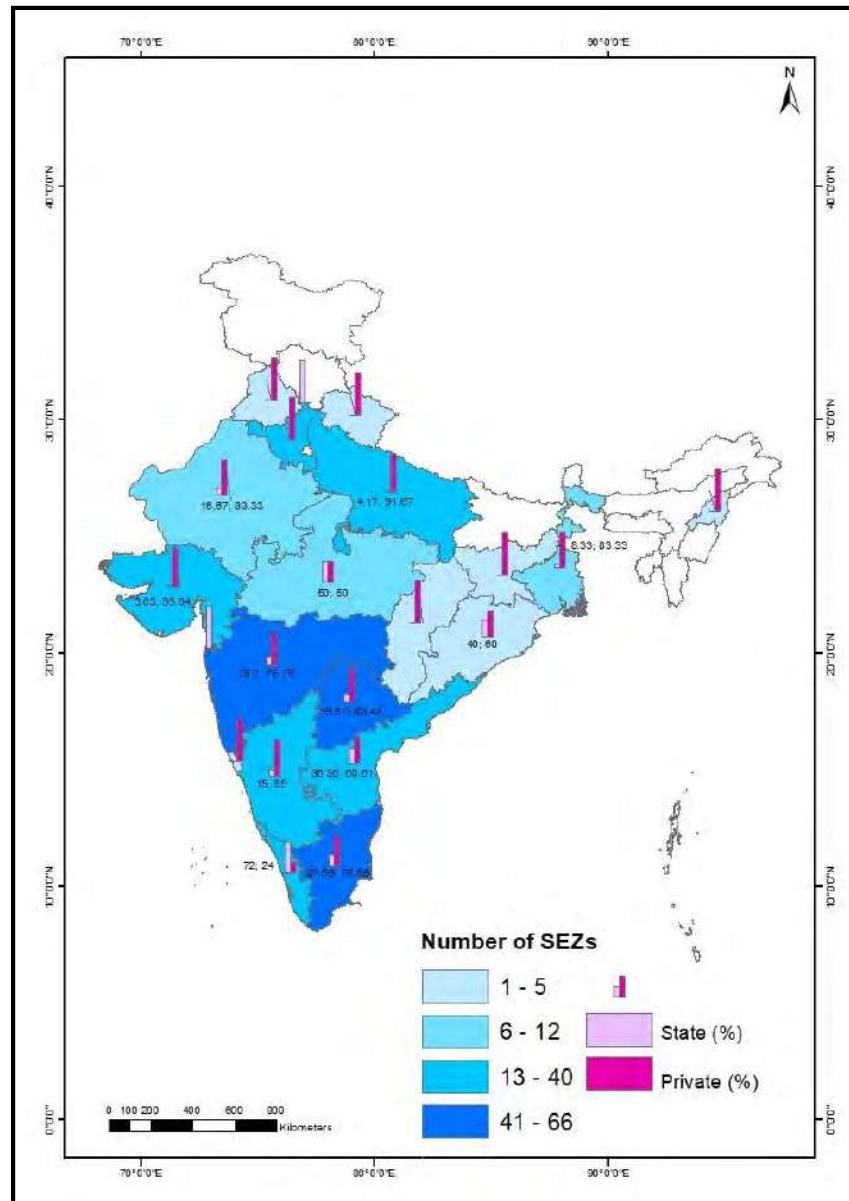
The choice of Jaipur for field work was guided by the fact that the city is the capital of the state of Rajasthan, one of the million-plus cities with location close to Delhi NCR and houses both the state and privately developed SEZs. Furthermore, private SEZ is one of the earliest large-sized zone which got land allocation of 3000 acres at a time when people vehemently opposed such big projects (Levien, 2011).

Field work was based on questionnaire survey with both closed- and open-ended questions. The questionnaire was canvassed both with the developer and the operational units in the month of January and February 2019. Efforts were made to cover as many units as possible. In all, there were 56 units in Mahindra SEZ, of which 51 units were on developer's land (44 allotted and 7 rented) and five on co-developer's land. Out of these 56 units, 34 were operational units, five were under construction, and 17 were under different stages of implementation. Of the 34 operational units, 25 units were covered in the field survey. These 25 units included four units on co-developers land as well. In Jaipur SEZ there were 145 operational units as on June 7, 2018. But door-to-door effort to establish contacts with the units revealed that there were only 59 units which were operational. Rest of the units were found closed. Of these 59 operational units, contact had been established with 28 units. The representativeness of these 28 units could be understood from the fact that these units account for 50 per cent of the total area under the 59 units.

Distribution of Land and its Utilisation

Figure 1 records the distribution of SEZs by state across 21 states/ Union Territories (UTs) of India. Following features stand out from the figure: (1) Majority of SEZs are located in Maharashtra, Telangana and

Fig. 1: Distribution of SEZs by Developers
(as on January 23, 2014)



Source: Constructed from the data extracted from Zone Wise Notified Land Area Details as on January 23, 2014 (GOI, 2014b). Accessed on April 26, 2018.

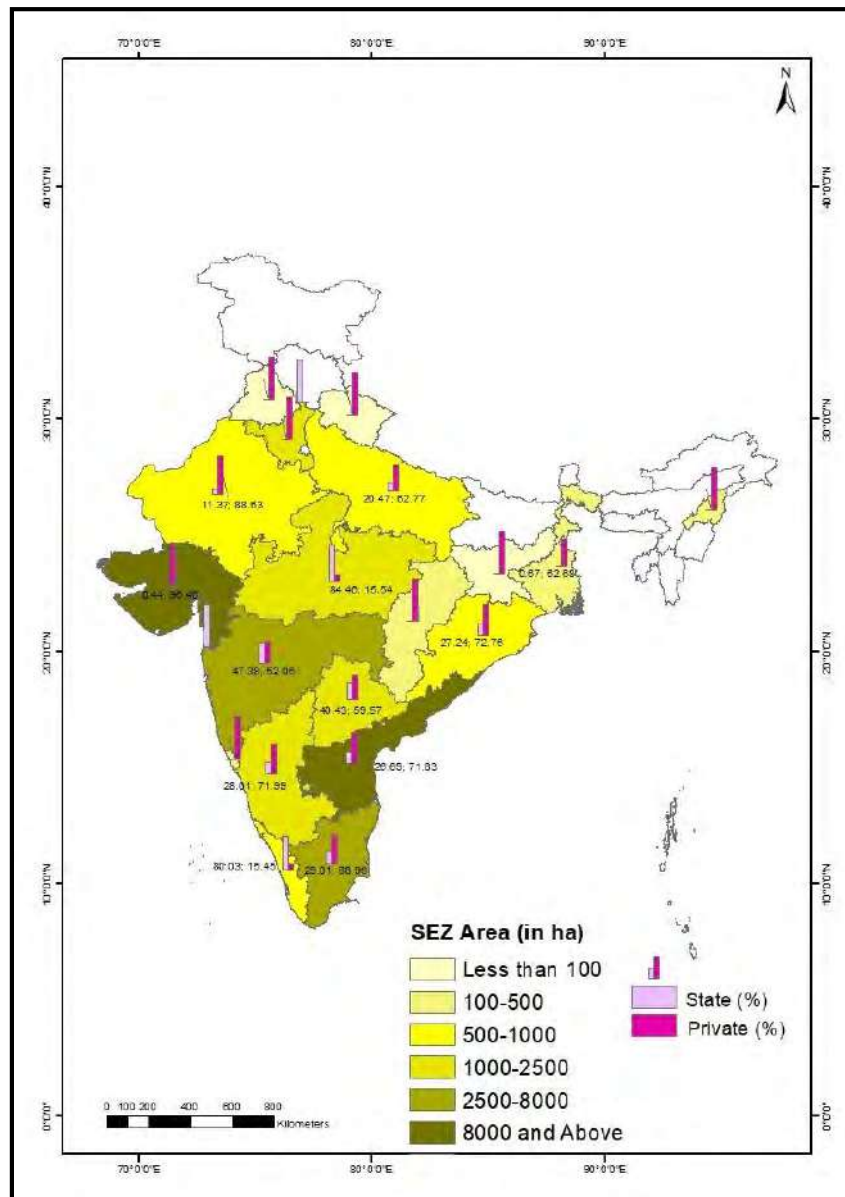
Tamil Nadu. (2) The SEZs are mainly promoted by the private sector. In many of the states, the share of private sector is high, reaching up to 100 per cent as in Punjab, Haryana, Uttarakhand, Chhattisgarh, Jharkhand, Nagaland, and Goa. However, except Haryana (having 29 SEZs), the number of SEZs is low in all these states. (3) In three states – Kerala, Madhya Pradesh, and Odisha – the state government share is comparable with that of private SEZs. In Kerala, most of the SEZs (72 per cent) have been developed by the state government. This may be due to the fact that the state has categorically specified that it is not going to make land available to private enterprises or undertake acquisition on behalf of the private entity (Government of Kerala, 2008). The state also demands the processing area to be 70 per cent (remaining 30 per cent as non-processing) of the notified land, plus it permits implementation of all prevailing labour related Acts in the SEZs.

A study of Figure 2 brings out firstly, that the physical size of SEZs varies significantly across states – smallest aggregate size being less than 100 ha to the biggest size of about 13,000 ha. The area in the biggest size bracket is in Gujarat and Andhra Pradesh. Both the states have the highest number of multi-product SEZs in the country. Secondly, northern states have smaller SEZs in comparison to the southern states. Thirdly, in the southern states of Kerala, Karnataka, and Telangana, the size of the SEZ is comparatively small due to the fact that these are mainly in the IT/ITES sector. The minimum area requirement for this sector was 10 ha, a condition that was dispensed with subsequently. And, fourthly, since the share of private SEZs is generally more in each state, the area under private SEZs is also more. Privately developed SEZs account for about 76 per cent in terms of numbers and about 73 per cent in terms of area.

However, when it comes to utilisation of land (includes utilisation in processing and amenities),³ utilisation by privately developed SEZs is similar to state government SEZs (Table 1). Both have been able to utilise a little over 1/3 of the respective notified land. However, comparison at intra-state level reveals differences with better utilisation in state government SEZs.

Land utilisation is slightly above 50 per cent only in the state of West Bengal and Gujarat. At the promoter level in the privately developed SEZ, Gujarat tops in land utilisation at 51.7 per cent. Interestingly, in Madhya Pradesh, Jharkhand, Uttarakhand, Nagaland, and Goa, no land has been utilised in the privately developed SEZs. Since the percentage of land utilised also covers the area under amenities, no utilisation means that the private sector in these states has not yet started work to develop the SEZs. In case of state government developed SEZs such

Fig. 2: Distribution of Notified Area in SEZs by the Type of Developer (as on January 23, 2014)



Source: Constructed using data extracted from Zone Wise Notified Land Area Details as on January 23, 2014 (GOI, 2014b). Accessed on April 26, 2018.

TABLE 1: PERCENTAGE OF UTILISED LAND TO NOTIFIED AREA
(AS ON JANUARY 23, 2014)

State/UT	Total	State Government	Private Sector
	Percentage of land utilised from SEZ Area in the state/UT	Percentage of land utilised from SEZ Area under State Government	Percentage of land utilised from SEZ Area Under Private Sector
West Bengal	57.90	73.76	37.23
Gujarat	53.38	100	51.70
Odisha	49.45	48.09	49.96
Kerala	46.74	47.84	25.89
Tamil Nadu	40.94	58.57	31.78
Chandigarh	40.40	40.4	
Karnataka	39.27	33.18	41.65
Andhra Pradesh	37.6	41.61	34.96
Uttar Pradesh	30.25	7.11	19.18
Maharashtra	23.74	28.67	18.43
Chhattisgarh	21.76		21.76
Telangana	19.93	23.86	17.27
Punjab	18.19		18.19
Rajasthan	16.77	37.55	14.11
Madhya Pradesh	13.27	15.71	0
Haryana	3.34		3.34
Dadra and Nagar Haveli	0	0	
Jharkhand	0		0
Uttarakhand	0		0
Nagaland	0		0
Goa	0		0
Total	36.96	35.40	35.79

Note: In Karnataka, in two IT/ITES SEZs, same area equivalent to total notified area was mentioned in the categories of utilised and vacant which is not possible. Since IT/ITES are quick to start we have considered the area as utilised and make vacant area as zero. The blanks denote non-existence of SEZ with the state/private sector in that state or UT.

Source: Computed from Zone Wise Notified Land Area Details as on January 23, 2014 (GOI, 2014b). Accessed on April 26, 2018.

situation exists in the UT of Dadar and Nagar Haveli. In state promoted SEZs, utilisation of land is 100 per cent in Gujarat and 73.76 per cent in case of West Bengal.

Extent of Vacant Land in Processing Area

Low utilisation of land in SEZs is also brought out by the extent of vacant land in the processing area (Table 2).

TABLE 2: PERCENTAGE OF VACANT LAND IN PROCESSING AREA TO NOTIFIED AREA (AS ON JANUARY 23, 2014)

<i>State/UT</i>	<i>Total</i>	<i>State Government</i>	<i>Private Sector</i>
Dadra and Nagar Haveli	100	100	
Goa	100		100
Jharkhand	100		100
Nagaland	100		100
Telangana	75.61	76.14	75.25
Punjab	67.04		67.04
Maharashtra	64.15	73.42	56.41
Chandigarh	59.60	59.60	
Tamil Nadu	50.90	38.56	57.59
Odisha	50.55	51.92	50.04
Kerala	48.20	46.75	69.34
Rajasthan	47.52	58.29	46.14
Karnataka	45.76	52.86	43
Gujarat	40.13	0	41.57
Chhattisgarh	38.18		38.18
West Bengal	36.73	26.24	54.2
Madhya Pradesh	31.09	30	37.07
Uttar Pradesh	28.39	92.89	14.93
Andhra Pradesh	27.63	32.04	26.43
Haryana	4.08		4.08
Uttarakhand	0		0
Total	44.6	52.08	43.17

Note: The percentage of area vacant under each category (total, state, and private) is calculated from the total area under that category in the state/UT. The blanks denote non-existence of SEZ with the state/private sector in that state or UT.

Source: Computed from Zone Wise Notified Land Area Details as on January 23, 2014 (GOI, 2014b). Accessed on April 26, 2018.

From Table 2 one can notice that vacant land in processing is almost half the area (45 per cent of the total notified area) under SEZs in the country. Moreover, in Dadra and Nagar Haveli, Goa, Jharkhand, and Nagaland, the entire notified area meant for processing is vacant. Among other states the share of vacant land is notable in Telangana, Maharashtra, and Tamil Nadu. These are states with large areas and the higher number of SEZs in the country.

In privately developed SEZs, vacant land is the largest in Telangana (75.25%). Vacant land amounts to over 50 per cent of the notified land in the states of Kerala (69.34%), Punjab (67.04%), Tamil

Nadu (57.59%), Maharashtra (56.41%), and West Bengal (54.20%). In state government promoted SEZs, vacant land in processing area varies from 50 per cent to 93 per cent, with highest in Uttar Pradesh, followed by Telangana, Maharashtra, Rajasthan, Karnataka, and Odisha.

The sectors like IT/ITES, biotechnology, gems and jewellery and handicrafts, are less land-intensive than engineering, textiles, or chemicals. However, there is no difference in the extent of vacant lands.

Additions and De-notification of SEZs

By analysing the SEZ data of 2014 and 2017, we found additions of 49 SEZs and probable denotification of 78 SEZs in the country between 2014 and 2017 (the SEZs of 2014 do not appear in the list of 2017).

Out of the 49 SEZs added, 37 have been added in just three states-Telangana (16) Karnataka (14), and Maharashtra (7).

Highest number of SEZs (around 22) were denotified in Maharashtra (Table 3). Haryana has also probably denotified nine SEZs. Clearly, these are cases of total denotification, partial denotification may also have taken place after the revision of the area in August 2013 (GoI, 2013). The denotification is basically of private SEZs and mainly of the one in IT/ITES sector.

From 2006 to 2013, there was a 50 per cent reduction in area requirement of many of the sectors. In another notification dated September 19, 2018, area requirement of 10 ha for biotechnology and health sector (excluding hospitals) was withdrawn (GoI, 2018a). The recent notification of December 17, 2019 made significant change in the land area requirement (GoI, 2019). According to this notification, all existing notified SEZs would deem to be multi-sector SEZs with minimum land area requirement of 50 ha.

Operational Status of Notified SEZs

From the list of existing SEZs we found that many of them were notified in the years immediately following the implementation of the SEZ Act (Fig. 3). Figure 3 presents SEZs as existing in December 2017 by their year of notification. In addition, if these SEZs have been operationalised by December 2017, they have been placed in the Figure 3 corresponding to their year of notification.

The peak in notification is observed in 2007 with most of them being notified between 2006 and 2009. The slightly upward trend is noticed from 2015 onwards.

TABLE 3: CHANGE IN THE NUMBER OF SEZs BETWEEN JANUARY 2014 AND DECEMBER 2017

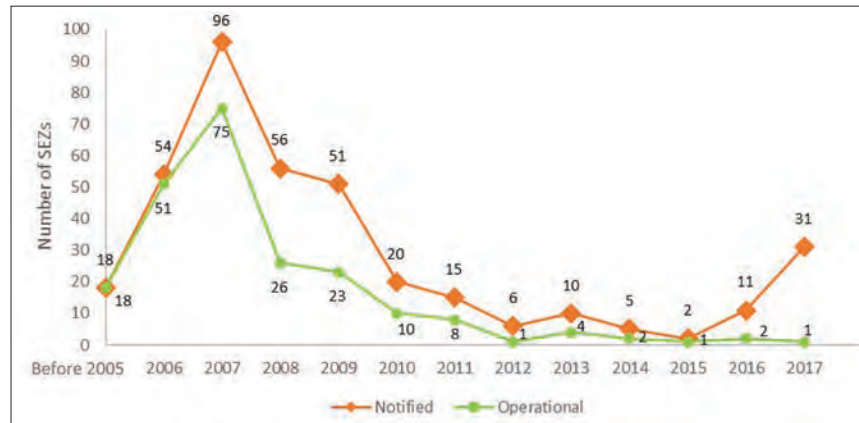
<i>State/UT</i>	<i>Notified SEZs (2014)</i>	<i>Removed SEZs</i>	<i>New Notified SEZs</i>	<i>Total Notified SEZs (2017)</i>
Andhra Pradesh	33	7	2	27*
Chandigarh	2			2
Chhattisgarh	1			1
Dadra & Nagar Haveli	1	1		
Goa	3			3
Gujarat	33	5		27*
Haryana	29	9		20
Jharkhand	1			1
Karnataka	40	3	14	51
Kerala	25		1	26
Madhya Pradesh	10	4		6
Maharashtra	66	22	7	51
Manipur			1	1
Nagaland	2			2
Odisha	5	1	1	5
Punjab	2		1	3
Rajasthan	12	3		9
Tamil Nadu	58	8	2	52
Telangana	46	5	16	57
Uttar Pradesh	24	5	4	23
Uttarakhand	1	1		
West Bengal	12	4		8
Total	406	78	49	375

Note: The total number of SEZs is 408 in January 2014. But in that list, two SEZs—Luxor Cyber City and Uppal Developers Private Limited in Gurgaon, Haryana—are marked crossed through horizontal line running in the middle, thereby bringing the number down to 406. In Andhra Pradesh, Kakinada SEZ 1 and 2 were merged in 2016, which brought the number to 27 rather than 28. Similarly, in Gujarat, Adani, and Mundra Ports were merged in 2016, thus bringing the number down to 27 rather than 28.

Source: Zone Wise Notified Land Area Details as on January 23, 2014 (GoI, 2014b) and List of Notified SEZs of India as on December 01, 2017 (GoI, 2017a). Accessed on April 26, 2018.

With respect to operationalisation, as per the Rules, the SEZ must begin operations within three years of receiving formal Letter of Approval (LOA). To be precise, at least one unit should start functioning within three years of receiving the formal LOA. By giving leverage of three years one may ignore the proportion of operational SEZs in 2015 and later years; however, the proportion of operational SEZs notified

**Fig. 3: Notification and Operationalisation of SEZs
(as on December 01, 2017)**



Source: Constructed from the data obtained from the website on list of Notified and Operational SEZs as on December 01, 2017 (GOI, 2017a; GOI, 2017b). Accessed on 26 April 2018.

earlier than 2015 is low. It can be clearly seen from Fig. 3 that the operational percentage of SEZs notified as early as 2008/2009 is below 50 per cent. SEZs that were notified in 2006/2007 have best operational level. From 54 currently existing SEZs that were notified in 2006, 51 are operational. Of 2007, it is 96 notified, of which 75 are operational. In all other years the operational level is low, falling to 17 per cent of those notified in the year 2012 (notified – 6; operational – 1).

Land Utilisation of SEZs in Jaipur

Government of Rajasthan via its industrial organisation-Rajasthan Industrial Investment Corporation (RIICO), played an important role in establishing both the SEZs. While Jaipur SEZ of state government was developed entirely by RIICO, in the case of Mahindra SEZ, land was made available by RIICO to the developer Mahindra Lifespaces, a subsidiary of Mahindra & Mahindra Company.

Both SEZs are located in Sanganer Tehsil and within the statutory limits of the Jaipur Development Authority (JDA), a statutory body to control the development of Jaipur city. Prior to the setting up of SEZs, the land was in agricultural use with cultivation of single crop of irrigated and unirrigated type.

Jaipur SEZ extends over 44.87 ha of land. The area was carved out from the Sitapura Industrial Area of RIICO. The entire area of the SEZ is under processing i.e., for manufacturing of goods or rendering of services.

To Mahindra SEZ, the land was made available by RIICO through JDA. In all, 3000 acres (1214.06 ha) of land was leased out by RIICO to the developer for 99 years. While 1000 acres (404.69 ha) land was already in occupation of JDA, fresh acquisition of 2000 acres (809.37 ha) was carried out by JDA. The process of acquisition began in 2005 (Levien, 2011). As per the developer office, land was contained in seven villages.

Out of the total leasehold area with Mahindra, 604.58 ha has been notified under SEZ, and the rest of the area is being developed as Mahindra's Domestic Tariff Area (DTA) (See Figure 4). While the SEZ area is completely under processing use, the DTA area is being planned for residential and related infrastructure projects like schools, hospitals, retail stores, financial facilities, and entertainment. The distribution of SEZ and DTA *vis-à-vis* each other can be noted from Fig. 4.

Fig. 4: Mahindra SEZ – Master Plan (Not to Scale)



Source: Mahindra World City Jaipur Handbook, obtained from Mahindra SEZ Office.

From the figure, one can see residential development by real estate companies in the area surrounding the SEZ. Some of them are Emaar MGF, Ashiana housing, Unique City, and Omaxe City.

Expenditure Incurred by Developers for Developing the SEZs

The per hectare cost of land lease to the developer is 3.027 million in Jaipur SEZ while 2.650 million in Mahindra SEZ. Land compensation paid is low by around 0.4 million per ha in Mahindra SEZ in comparison to Jaipur SEZs. This is when land for Jaipur SEZ was in occupation of RIICO since 1994-95 and in case of Mahindra SEZ the government started the acquisition process on behalf of Mahindra in 2005 (Levien, 2011). The breakup of expenditures is noted in Table 4.

TABLE 4: PER HECTARE EXPENSES IN SETTING UP SEZs
(RS IN MILLION)

SEZ	Year of Notification	Area (ha)	Total Expenditure	Per Hectare Land Compensation	Per Hectare Cost of Amenities	Per Hectare Cost of Development
Jaipur	2003-04	44.87	377.7	3.027	5.391	8.418
Mahindra	2007*	604.58	5688.8	2.650	6.759	9.409

Source: *Primary Survey*, January-February 2019.

Note: 2007 is the year when the first SEZ of Mahindra was notified. The rest four SEZs were notified between 2009 and 2012. In April 2018, all five were merged into multi-product.

While in the case of Jaipur SEZ, pricing of plots is based on the principle of 'no profit, no loss', in the case of Mahindra SEZ being a private entity, there is a margin for profit.

Extent of Processing and Vacant Area in SEZs

Turning on to extent of land utilised in both the, SEZs i.e. under processing and amenities, it is found that significant area goes under the development of amenities. In Jaipur SEZ, around 45 per cent area has been used under amenities, thereby leaving 24.45 ha to be used under processing. In case of Mahindra, 35 per cent area is under amenities. This leaves 392.98 ha area to be developed as processing area. From the processing area of both the SEZs, 20 per cent area is lying vacant in Jaipur SEZ, and 60 per cent in Mahindra SEZ (Table 5).

TABLE 5: EXTENT OF AREA UNDER DIFFERENT USES
(IN HA)

SEZ	Total Area	Amenities Area	Processing Area	Processing Area Utilised	Processing Area Vacant	Percentage of Vacant Area to Processing Area
Jaipur	44.87	20.42	24.45	18.98	4.97	20.33
Mahindra	604.58	211.60	392.98	158.39	234.59	59.70

Source: Computed from the data obtained from *Primary Survey*, January-February 2019.

Parcelling of Land and its Utilisation

While the entire processing area of 24.45 ha in Jaipur SEZ has been parcelled out into 241 plots (as per master plan), in the case of Mahindra 125 plots have been carved out. The utilisation of the plots is as under (Table 6).

TABLE 6: UTILISATION OF PLOTS

SEZ	Total No. of Plots	Allotted Plots	Vacant Plots
Jaipur	241	185	56
Mahindra	125	74	51

Source: *Primary Survey*, January-February 2019.

Out of the total number of plots in Jaipur SEZ, 56 plots still need to be allocated. These vacant plots include the ones which have not been allocated so far as well as 10 plots of eight units that have made exit from the SEZ.

At the time of the field survey, 13 units made an exit from the SEZ, with two occupying the same plot of which one is on rent. Four plots of exiting units have been reallocated to three units.

The allotment is made on first-come-first-serve basis. As per the procedure fixed, the interested entrepreneur applies for setting up of a unit in the SEZ by submitting 26 per cent of the lease cost of the plot. Once the unit gets the provisional letter from the committee comprising RIICO officials, it is required to get a Letter of Offer and Acceptance (LOA) from the Development Commissioner, NOIDA SEZ within 60 days. Once this is done, the final allotment of the plot is made from RIICO on payment of the due amount. Initially, the allotments were made at the rate of Rs 1100 per sq m. This was raised to Rs 1500 per sq m, then to Rs 4800 per sq m, and currently it is Rs 6000 per sq m. The same rate is followed in the allotment of industrial plots outside the SEZ in the industrial zone. As per the developer's office, the cost of plots at any given point of time is the cost of land, development charges and interest charges on the amount invested (till that date) divided by plot area.

In the case of Mahindra, 125 plots have been parcelled out, of which 51 plots are still to be allocated. Moreover, as per the developer's office, a portion of the land has still to be plotted. As Mahindra SEZ caters to different sectors, the utilisation of plots as per the sectors reveals 41 of the total 81 plots in engineering are vacant (Table 7). In case of handicrafts, there were 26 plots of which nine are vacant. In IT/ITES, all but one from the total of 18 is vacant.

TABLE 7: MAHINDRA SEZ - SECTOR-WISE UTILISATION OF PLOTS

<i>Sector</i>	<i>Total Area (ha)</i>	<i>Allotted</i>	<i>Vacant</i>	<i>Total</i>
Engineering	233.34	40	41	81
Handicrafts	165.21	17	9	26
IT/ITES	92.91	17	1	18
Total	491.46	74	51	125

Note: Area under IT/ITES is exclusive of 93.48 ha area with co-developers as that land is outside the purview of Mahindra's on allotment to co-developers.

Source: *Primary Survey*, January-February 2019.

Since land availability was high in Mahindra SEZ, the allotment was made on the choice of the entrepreneur. Before conversion into

multiproduct, the plots in the SEZ zone that were earmarked for setting up the units of specified sectors were shown to the entrepreneurs. Modification was also made in the plot sizes wherever required. Since the demand for land is not more than what is available, no problem has been faced and is foreseen in allocation.

In the beginning, the allotment in Mahindra SEZ was made at the rate of Rs 680 per sq m. The rate was applicable to only a few units (1 to 2) which were persuaded by the developer to begin operations in the SEZ. The rate was later raised to Rs 1235 per sq. m and currently it is Rs 3954 per sq. m. The rate is in fact found lower than Jaipur SEZ or Sitapura Industrial Area where plots are available at Rs 6000 per sq m. In an interview, one of the unit head said that if the land in Mahindra SEZ gets denotified then the price would increase, say, between 8,000 and 10,000 per sq m. Few of the units reported availability of cheaper land as one of the reasons for coming to Mahindra SEZ.

With respect to fixation of prices, no outside intervention is faced by Mahindra in deciding the prices. For deciding the prices, three things are taken into consideration: (i) market survey based evaluation of the demand for the plots, prices buyers are willing to pay and the rates in the nearby industrial areas; (ii) readily available stock of land; (iii) the positives of their area vis-à-vis other industrial areas. So, in a way the price component has land charges, development costs, and profit margin as well.

Plot Size of the Units

In Jaipur SEZ, the plot sizes vary from minimum 500 sq m to maximum 4000 sq m (Table 8). But in the case of Mahindra, the minimum area is 4000 sq m. The area has reached to size of 28000 sq m. There are five units in the largest size range of 24000 to 28000 ha. Maximum units fall in the area bracket of 8000 to 12000 sq m.

There may be two reasons for the large plot size of the existing units: one, the units had future expansion in mind at the time of making investment in the SEZ, and two, their sector (nature) of work demanded large-sized land.

On the issue of expansion, however, out of the 25 units surveyed in Mahindra, 11 stated no expansion plan, nine have plans for expansion but would be accommodated in the current space, and only five units need to buy more land for expansion. It is important to note that units are aware of sunset clause applicable from March 2020 and the extent and duration of income tax benefits available to them.

TABLE 8: PLOT SIZE OF UNITS

<i>Area (in sq m)</i>	<i>Jaipur SEZ</i>	<i>Mahindra SEZ</i>
500-700	144	-
1000-1500	68	-
2000-4000	29	-
4000-8000	-	12
8000-12000	-	18
12000-16000	-	6
16000-20000	-	6
20000-24000	-	2
24000-28000	-	5

Note: Size of the plots in Jaipur SEZ is as given in the master plan. In case of Mahindra, the sizes of the SEZ plots have been gauged from the area of 44 units which have been given plots on lease by Mahindra. Of these 44 units, five have expanded their respective areas. The expansion is considered as a separate plot size. The area is in acres with the minimum being one acre. The areas have been converted into sq. m. and rounded off.

Source: *Primary Survey*, January-February 2019.

To examine whether the sectors of operation demand larger plot size, we have calculated the per cent built-up area of the surveyed units. The results of 21 surveyed units in case of Mahindra SEZ (excludes 4 surveyed units on rented space) arranged according to the sector and the size of the units (investment in plant and machinery as per MSME Act 2006) As per MSME Act 2006, in case of manufacturing, the units having investment in plant and machinery are below Rs 25 lakh are micro, between Rs 25 lakh and Rs 5 crore small and from Rs 5 crore to Rs 10 crore are termed as medium. In the study manufacturing units having investment more than Rs 10 crore are regarded as large units. In case of services, units having investment upto 10 lakh are micro, between Rs 10 lakh to Rs 2 crore are small and between Rs 2 crore to Rs 5 crore as medium. In the study, service units with investment more than 5 crore are regarded as large service units (Table 9).

From Table 9, one can clearly note lowest land utilisation in IT/ITES sector. The IT/ITES units have constructed space to the extent of 32.94 per cent of their total plot area with small-sized units having built-up area of only 13.53 per cent. The percentage of the built-up area increases in the case of large units. In case of engineering, the built-up area of micro & small units is more than that of the large units. Amongst the three, handicrafts unit has the best built-up area at 63.82 per cent.

On the question of whether the required plot size of the units is different from the allotted size, all but two units stated allocation of same plot size as demanded. The two units that demanded smaller plot

TABLE 9: MAHINDRA SEZ - BUILT-UP AREA AS PERCENTAGE OF TOTAL PLOT AREA

Sector	No. of Surveyed Units	Total Plot Area (ha)	Built-up as a Percentage of Total Plot Area		
			Micro & Small	Large	Overall
Engineering	9	11.20	55.51 (7)	46.33 (2)	52.31
Handicrafts	5	6.61	63.82 (5)	-	63.82
IT/ITES	7	23.57*	13.53 (4)	36.88 (3)	32.94
Total	21	41.38	49.25 (16)	38.45 (5)	43.12

Note: Figures in parenthesis correspond to the number of units. The breakup of micro and small is one and six in engineering and one and four in handicrafts. There is no micro unit in IT/ITES. ‘*’The plot area of one unit, which is also a co-developer, is around 17 ha.

Source: *Primary Survey*, January-February 2019.

size were from the IT/ITES sector. Both the units came at a time when allotment in the respective SEZ had almost been made, leaving them with the limited choices.

In case of Jaipur SEZ, the built-up area of surveyed units as percentage of their plot area stands at 90.99 per cent (Table 10).

TABLE 10: JAIPUR SEZ - BUILT-UP AREA AS PERCENTAGE OF TOTAL PLOT AREA OF SURVEYED UNITS

Sector	No. of Surveyed Units	Total Plot Area (in ha)	Micro	Small	Medium	Overall
Gems and Jewellery	27*	4.28	61.30 (5)	90.89 (19)	110.85 (3)	90.99

Note: Figures in the parenthesis correspond to number of units. ‘*’ One small-sized unit has been excluded as its built-up area was very high. The inclusion of that unit inflated the built-up area of small-sized units to over 300 per cent.

Source: *Primary Survey*, January-February 2019.

Micro units have a small built-up area but that may be because of their scale of operation. The built-up area as percentage of total plot area increases from micro to medium size.

CONCLUDING OBSERVATIONS AND POLICY RELEVANCE

Following features have emerged from the analysis:

1. Special Economic Zones are mainly developed by the private sector- in some of the states, the SEZs have been entirely promoted by the private sector.

2. However, when it comes to utilisation of land, SEZs are able to utilize only 37 per cent of notified lands.
3. It is only in state government promoted SEZs in Gujarat and West Bengal that the utilisation is 100 per cent and 74 per cent respectively; in all others it is below 50 per cent.
4. Within processing area, vacant land constitutes nearly half of the area under SEZs in the country. Vacant land is significant in states like Telangana, Maharashtra, and Tamil Nadu, notable with respect to quantum of SEZ area and number of SEZs in the country.
5. No difference in proportion of land used is observed in the SEZs dominated by sectors requiring large quantum of land and whose land requirement is not so large.
6. Between the year 2014 and 2017, 49 new SEZs have come while 78 SEZs have probably been denotified with the maximum numbers in Maharashtra followed by Haryana. The denotifications are mainly of private SEZs and that, too, of those in IT/ITES sector.
7. Many of the existing SEZs were notified in the years immediately following the implementation of the SEZ Act. The peak in notification was observed in 2007 with most of them being notified between 2006 and 2009. The percentage of operational SEZs, which are as old as 2008/2009, is below 50 per cent.
8. Out of the total processing area, around 20 per cent in Jaipur SEZ and 60 per cent in Mahindra SEZ is vacant.
9. The plot size in Jaipur SEZ varies from 500 sq. m to 4000 sq. m. In case of Mahindra, the plot size ranges from 4000 sq. m to 28000 sq. m with maximum 18 units on plot size of 8000 sq. m to 16000 sq. m.
10. The IT/ITES sector units have lowest land utilisation among the three sectors in Mahindra SEZ. The overall built-up percentage of surveyed units in Mahindra SEZ is 43.12 per cent, while in Jaipur SEZ the built-up is 90.99 per cent with the built-up percentage increasing with an increase in the size of the unit.

From the preceding analysis it is very much clear that there is substantial unutilised land with SEZs both at the macro and micro level. Sizes of SEZ appear to have been arbitrarily defined. Had the size been scientifically determined, the reduction in specification of area would not have taken place. The change in the principle requirement of land

size over time shows lack of any principle in deciding the sizes. The reduction in land size requirement for SEZs may lead to denotification of the excess land held by different SEZ developers. But the question is whether or not the denotified (excess land) land would be used for industrial purpose. In the past the state of Haryana has given one-time relief of developing industrial colonies to the denotified SEZs (*The Tribune*, April 24, 2016). Similarly, Maharashtra government approved of converting Navi Mumbai SEZ into an Integrated Industrial Area (*The Hindu*, 2018b). However, whether the land will be used for industrial development would only be reflected in the times to come.

Unutilised land with SEZs appears to be a result of the transfer of large areas of land from the government (in all those cases where government transfer or acquire land on behalf of the private promoters).

Though no speculative use is expected in case of government SEZ, the large extent of vacant land can be taken as an indicator of inefficiency. In private SEZs, other than the indication of inefficiency, the vacant land also exhibits future use and land hoarding. Since the majority of the SEZs are located in and around urban areas (Mitra 2007; and Mukhopadhyay & Pradhan, 2009), the speculation cannot be missed. The proximity to urban areas and speculative use are well documented in the literature (Fisher, 1933; Madhab, 1969; Archer, 1973; Wadhwa, 1983; Ramachandran, 1989; and Goldman, 2011). The urban areas have tendencies to sprawl which make their fringes the preferred site for investment to gain from speculation

However, one has to look for what all alternatives could be there to deal with unutilised land in SEZ. One option could be to de-notify the SEZs altogether where necessary and to use them for industrial purpose outside SEZ. But it would depend on kind of possession (ownership or leasehold), government regulation with respect to land use in master plan, incentives/benefits outside SEZ would be worthwhile to be seen in all such cases. In such an environment of uncertainty what is required is critical review of incentives to SEZ.

The second alternative could be to return the unutilised and denotified land to the farmers. In fact, farmers have also raised this demand. Returning unutilised land, is however difficult. One of the questions is: How can compensation be recovered, and would it be possible to put the land to agricultural use if that was the case before acquisition/purchase? If changes have been made to the original structure of the land through construction, etc., then it would be difficult to restore the land to its original level. In case of Singur (Indian Kanoon, 2016), for example, the Supreme Court had ordered for return of land

to owners without recovering the compensation. Such an order makes it clear that compensation paid may have to be relinquished by the government. Since the state government was on the same page with farmers, it made it a clear-cut policy to return the land to unwilling owners who did not accept the compensation (Government of West Bengal, 2011). From the ground it is known that the return process has been completed except to those landholders whose names were there but could not be traced (benami landholders). Farmers are however, holding the land for future sale as cultivation is next to impossible on the plant site. The soil was dug so deep now it is impossible to excavate any further. Moreover, the areas surrounding the plant which were purchased by private entities in anticipation of development of area are also kept idle. In such a scenario it is important that land be put to industrial use only, if not in SEZ than outside SEZ. It is worth researching whether micro, small or medium enterprises could be established by training willing entrepreneurs in such locations.

Another alternative could be to develop new units in existing SEZs rather than developing new SEZs. This appears to be a best strategy. Focus may also be laid on first time entrepreneurs or first-time exporters. However, this would require a lot more effort in terms of finding markets for them, establishing linkages with clients, helping them to innovate, and so on. In one word, handholding would be required till the unit reaches at least the break-even point. Few of the units in Mahindra World City mentioned this fact. If focus is on inviting first timers (sector wise or export wise first), then full support has to be provided to them. Should the developer be assigned new functions with respect to monitoring, guiding, and marketing? From the field survey it is noted that no serious effort is made to attract units. In case of Jaipur SEZ no thinking and effort is there in attracting units, by Mahindra SEZ, road shows and seminars are being conducted but that are mainly with the Export Oriented Units. Basically, a unit planning to set up operations in an SEZ has to approach the developer. There is no mechanism of advertising in electronic and print media. The lack of vision in developers to attract units could be due to the fact that the developer is only supposed to meet land requirement in setting up an SEZ. While applying for setting up an SEZ, the developer has to give export and employment projections for the first five years, but certainly there is no mechanism to review and monitor this information. Once the SEZ is notified, it will remain so till the developer applies for denotification. No *suo moto* denotification of SEZ takes place. With respect to monitoring, the supply of only those goods and services which come into the SEZ are monitored to ensure that the authorised operations are being carried out by the developer. Other than this, no checks are conducted.

An option could also be to throw open the SEZs to meet domestic demands as well. In fact, the expert group appointed by the government also recommended the same (GOI, 2018b). As per the Rules sale in domestic market is, however allowed on payment of custom duties. Unless one has a niche market for the product such a sale become unprofitable. In order to overcome this issue, expert group recommended reversal of duties on inputs when sold in the domestic market. To accommodate this change, the committee recommended renaming SEZs as Employment and Economic Enclaves (3Es), giving option to units to migrate to 3Es framework. However, instead of changing the character of SEZs as 3Es what is needed is linking incentives and conditions to quantum of exports, location of SEZs in unproductive lands, etc. This would remove unnecessary duplication with other zonal schemes like Industrial Clusters, Investment and Manufacturing Zones.

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Endnotes

1. The January 2014 database contains data of 19 EPZs and SEZs, rechristened or set up respectively, before the enactment of SEZ Act, 2005 (GOI, 2014b). In case of December 2017 database, the list of notified SEZs is of SEZs notified in SEZ Act 2005 (GOI, 2017a). The list of operational SEZs on the other hand contains the EPZs/SEZs of prior to SEZ Act as well (GOI, 2017b). With one SEZs in Jodhpur got denotified in May 2014 the number of previously existing EPZs/SEZs reduced to 18 (*Patrika*, May 10, 2014). The number of SEZs thus considered in 2017 database thus includes these 18 EPZs/SEZs. One more SEZ has been added in the list of SEZs of 2017. The SEZ was in Information Technology Enabled Services (ITES) located at Madhurwada in Vishakhapatnam, Andhra Pradesh. This SEZ is run by Andhra Pradesh Industrial Infrastructure Corporation Ltd and is being mentioned in the list of operational SEZs but not in the notified list. Its year of notification on the website of Andhra Pradesh Industrial Infrastructural Corporation Ltd. (APIIC) is given as April 11, 2007.
2. Other than Jaipur and Mahindra SEZs, there are three more notified SEZs in the state. These are Genpact in IT/ITES at Jaipur, RNB infrastructure in Textiles at Bikaner, and Somani Worsted in ITES in Alwar. All three are in the private sector. However, none of the three are operational.

3. The official data provides figures on total utilisation of land in SEZs. Utilisation has not been defined anywhere in the Act or Policy. From the Secretary, NOIDA SEZ, it was known that the total utilised area includes area utilised under processing; under amenities like roads, parks, substations, and common facility; and under green belt. The area utilised under processing is also known as plot area.
4. As per the SEZ Act, Domestic Tariff Area (DTA) refers to the whole of India, including the territorial waters and continental shelf but excluding the SEZ areas.

ENERGY EFFICIENT LANDSCAPES: A CASE STUDY IN THE NATIONAL CAPITAL REGION OF DELHI

ASHI VASHIST*

ABSTRACT

Landscaping gives the expression of freedom and extreme happiness in an individual's mind. This study discusses how to conserve energy in a site or a building through landscape architecture. Since the world is going through adverse climatic changes, it is important to conserve energy and do our best to make it a habitable place for our future generations.

Keywords: *Energy efficiency, landscape, open spaces*

SECTION 1: INTRODUCTION

Landscape architecture is one of the most significant form of art that has been practiced throughout ages and a basic need for humankind. Although landscaping is an important part of architecture as well as day-to-day to life, it becomes quite tedious to build up an environment with convincing energy efficient landscape designs. Energy efficiency in landscaping is important to study the extreme climate changes to provide a greener future. The objectives of this study are: (a) to study energy efficient landscapes and techniques; (b) to study the various landscaping features used in Delhi through a case study; (c) to study the energy efficiency in a building through landscaping; (d) formulate various design guidelines for landscaping in Delhi focusing on its climatic conditions; and (e) overall analysis of the collected data and conclusion.

Research questions in the study are as follows:

What are energy efficient landscapes and what are the factors affecting it?

Energy-efficient landscaping is the type of landscaping designed for the purpose of conserving energy. A well-designed, energy efficient landscape can reduce heating, cooling and lighting costs. In some

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circumstances, carefully positioned trees and shrubs can save up to 25 per cent of the energy in a typical household. Energy efficient landscaping has additional benefits like lower maintenance costs, a reduction in water use, a quieter home and cleaner air.

While designing an energy efficient building or even remodelling a home, much time is spent on the building envelope, electrical systems and appliances. But strategic exterior landscaping can affect the energy performance of our homes and make them more efficient. Well-placed plantings can cool the house in summer, warm it in winter, and save water year round. According to the Department of Energy, a landscape designed with conservation in mind saves enough energy to pay for itself within a span of just eight years.

- **Architectural Factors Affecting Energy Efficiency**

Following are some factors that directly and indirectly affect the microclimate of a region. These in turn, affect the thermal comfort and energy consumption of that site: Landscaping; Ratio of built form to open spaces; Location of water bodies; Orientation; Building Envelopes; and Materials used in Landscaping.

Landscaping

Landscaping refers to the activity that modifies the visible features of an area of land, including living elements, like flora or fauna; or what commonly is called as gardening; the art, craft of growing plants with an aim to create a beauty within the landscape; natural elements such as landforms; terrain shape and elevation; Water bodies; and abstract elements such as the weather and lighting conditions.

Landscaping is an extremely important element in altering the microclimate of a place. It reduces the direct sun from striking and heating up buildings surfaces. It also creates different air flow patterns and can be used to direct or divert the wind advantageously.

Open Spaces

Open spaces seen in conjunction with built forms govern air movement and heat gain and loss. In composite climate, compact planning with little or no space, would be advisable to minimize both heat gain and loss for which the ground should be soft and green.

Water Bodies

Water bodies absorb large amount of radiation and provide

evaporative cooling. Areas near the water bodies are generally cooler during daytime and warmer at night time.

TABLE 1. CLASSIFICATION OF MICRO AND MACRO LEVEL

<i>Micro Level</i>	<i>Macro Level</i>
1. Erosion and sedimentation control	1. Urban heat island effect
2. Storm water management	2. Site selection
3. Site disturbance	3. Brownfield sites
4. Water efficiency	4. Transportation
5. Innovative wastewater technologies	5. Light pollution
	6. Local/regional material
	7. Rapidly renewable material
	8. Renewable energy

Orientation

Orientation of a building is significant mainly with regard to solar radiation and wind.

In cold regions, buildings should be oriented towards maximize solar radiation; the reverse is advisable for warm regions. In some regions where seasonal changes are very pronounced, both the situations may arise periodically.

The perimeter to area ratio (P/A) of a building is an important indicator of heat loss and heat gain. For greater P/A ratio, there should be more heat gain at daytime and more heat loss at night.

Building Envelope

The primary elements impacting the performance of a building envelope are: Materials and construction techniques; Roof; Walls; Fenestration and shading; and Finishes.

There are various factors affecting the energy conservation. It varies from macro level to micro level of the environment as shown in (Table 1). These can be classified as:

Elements of Landscape

The various elements of landscape are :

- Trees, planters and vegetation
- Pathways and walkways
- Softscape and hardscape
- Water bodies

Trees and Planters

Trees play a tremendous role in conditioning environment. They cut off 69 per cent of sun's heat from the ground, reduce wind velocity by 63 per cent, reduce dust pollution by 66 per cent, and reduce noise pollution by 50 per cent.

The selection of suitable plants for shading is dependent on the part of the building (example: walls, outdoor living areas, windows) to be shaded. Different types of plants like trees, shrubs and vines can be selected on the basis of their growth habitat (tall, low, dense, light permeable) to provide the desired light for various window orientation and situations.

Pathways and Walkways

Pathways in landscaping connect from one place to another, create focus and give direction to the people. Landscape architects, make a distinction between the terms *walkway* and *pathway* (See Table 2).

TABLE 2

S.No.		<i>Pathways</i>	<i>Walkways</i>
1.	Shape	A meandering route	Often straight routes
2.	Material	Casual & rustic materials Eg. Loose gravel	Hard paving materials Eg. large slabs and pavers
3.	Width	0.9 M	1.2 M

Hardscape and Softscape

Hardscape and softscape are the absolute opposites of each other, yet both are necessary to make a landscape fully functional.

Hardscape is the hard stuff used in the landscaping of a yard: concrete, bricks, and stone. Other examples of hardscape include retaining walls, pavers for paths or patios, outdoor kitchens, water features, gazebos, decks, and driveways.

Softscape is the soft, growing stuff, like perennial flowers, shrubs, succulents, and trees. Softscape is mostly living, whereas hardscape is not.

Water Bodies

Water is a great modifier of microclimate. It causes a cooling effect due to evaporation especially in hot and dry regions. On the other hand,

in humid regions, water bodies should be avoided as these add to the humidity of the atmosphere.

SECTION 2: ENERGY EFFICIENT LANDSCAPING TO CONSERVE ENERGY

As urban areas develop, modifications occur in the landscape. Roads, buildings, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist generally become impermeable and dry. This development consequently, leads to the formation of urban heat islands—the phenomenon whereby urban regions experience warmer temperatures than their rural surroundings.

1. Reduction of Urban Heat Island Effect

Many urban and suburban areas experience increased temperatures compared to their outlying rural surroundings; this difference in temperature is what constitutes an urban heat island.

Causes of Urban heat island effect:

- Reduced Vegetation in urban areas;
- Properties of urban materials; and
- Urban geometry - refers to the dimensions and spacing of buildings within a city. Urban geometry influences wind flow, energy absorption, and a given surface's ability to emit long-wave radiation back to space.

Urban heat island effect can be reduced by the following:

Trees and Vegetation

Shading trees and small plants such as shrubs, vines, grasses, and ground cover, help cool the urban environment.

Trees and vegetation cool urban climates through evapotranspiration and shading. Leaves and branches decrease the amount of solar radiation that reaches the area below the canopy of the tree or plant. The amount of sunlight transmitted through a canopy varies based on plant species. In summer time, generally 10 to 30 per cent of the sun's energy reaches the area below the tree, whereas in winters, the range of sunlight transmitted through the tree is much wider—10 to 80 per cent—because evergreen and deciduous trees don't have the same winter-time foliage, with deciduous trees losing their leaves and allowing more sunlight through.

Trees and vegetation are useful as a mitigation strategy when planted in strategic locations around buildings. Researchers have found that planting deciduous species to the west is most effective for cooling the building, especially if the trees shade windows and part of the building's roof. Shading the east side of the structure also decreases air conditioning demand.

Planting trees to the south decreases summer-time energy demand. Depending on the trees, the building's height, the distance between the trees and the building, trees may be detrimental to an energy efficiency strategy if they block useful solar energy in the winters, when the sun is quite low in the sky, without providing much shade during summers, when the sun is high in the sky.

Shading decreases surface temperatures below the tree canopy. These cooler surfaces, decrease the heat transmitted in buildings and the atmosphere.

Evapotranspiration. Vegetation and trees absorb water through their roots and emit it through the leaves – this movement of water is called as “transpiration.” A large oak tree, for e.g., can transpire 40,000 gallons of water per year; an acre of corn can transpire 3,000 to 4,000 gallons a day. Evaporation, the conversion of water from liquid to gas, i.e. water vapor, also initiates from the soil around vegetation and from trees and vegetation as they intercept rainfall on leaves and other surfaces. Together, these processes are called as evapotranspiration.

Evapotranspiration cools the air by utilising heat from the air to evaporate water. Evapotranspiration, alone or in combination with shading, can aid to decrease peak summer air temperatures. Various studies have evaluated the following reductions:

- Peak air temperatures in tree groves that are (5°C) cooler in comparison to over open terrain.
- Air temperatures over irrigated agricultural fields that are (3°C) cooler than air over bare ground.
- Suburban areas with mature trees that are (2 to 3°C) cooler than new suburbs without trees.
- Temperatures over grass sports fields that are (1 to 2°C) cooler than over bordering areas.

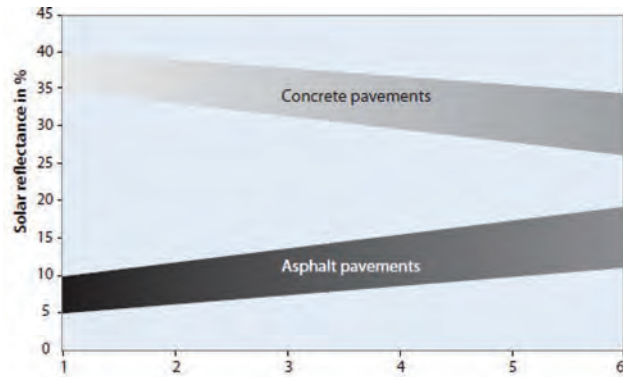
Cool pavers

These pavement technologies usually store less heat and may have lower surface temperatures in comparison to conventional products.

They can help address the issue of urban heat islands, that result in part from the increased temperatures of paved surfaces in the city or suburb.

Conventional pavements in India are *impervious concrete* and *asphalt*, which can reach peak summer-time surface temperatures of (48–67°C) (See Figure 1).

Fig. 1: Typical Solar Reflectance of Conventional Asphalt and Concrete Pavements overtime



Source: Reducing Urban Heat Islands: Compendium of Strategies

How it works : Solar energy is composed of ultraviolet (UV) rays, visible light, and infrared energy. Solar reflectance, or albedo, is a percentage of solar energy reflected by the surface. Most of the research on cool pavements has focused on this particular property, and is the main determinant of the material's maximum surface temperature. Albedo also impacts pavement temperatures below the surface, because less heat is available at the surface to be transferred into the pavement. Table 3 shows the Albedo percentages of some soils.

TABLE 3: ALBEDO PERCENTAGES OF SOME SOILS

Soil	Albedo
1. Moist dark cultivated	5-75%
2. Moist grey	5-15%
3. Dry sandy	10-20%
4. Wet sandy	25-35%
5. Dry sand dunes	20-30%
6. Dry soil	30-35%

Below mentioned are brief descriptions of potential cool pavements and their typical uses:

- **Conventional asphalt pavements** consist of the asphalt binder mixed with aggregate, can be changed with very high albedo

materials or treated after installation to increase reflectance. This specific material has been applied for decades in a wide range of functions from parking lots to highways.

- **Conventional concrete pavements** are made by mixing Portland cement, water, aggregate, can be used in a wide range of applications like trails, roads, and parking lots.
- **Other reflective pavements** are made from a variety of materials, mostly used for low- traffic areas, such as sidewalks, trails and parking lots. Examples: Resin based pavements, which use clear tree resins in place of petroleum-based elements to bind an aggregate.
- **Coloured asphalt and coloured concrete**, with added pigments or seals to increase reflectance;
 - **Resin based pavements** that use clear tree resins in place of petroleum- based elements to bind an aggregate;
 - **Coloured asphalt and coloured concrete**, with added pigments or seals to increase reflectance.
- **Non-vegetated permeable pavements** contain voids and are designed to allow water to drain through the surface into the sublayers and ground below:
 - Porous asphalt;
 - Rubberised asphalt, made by mixing shredded rubber into asphalt;
 - Pervious concrete; and
 - Brick or block pavers, are made from concrete or clay, and filled with rocks, gravel, or soil; available in the variety of colors and finishes that are designed to increase reflectance.
- **Vegetated permeable pavements**, like grass pavers and concrete grid pavers, utilize plastic, metal, or concrete lattices for support and further, allow grass or other vegetation to grow in the interstices.

SECTION 3: CASE STUDY OF TERI RETREAT CENTRE, GURUGRAM

Location: TERI Golf Course, Faridabad - Gurgaon Road, Gwal Pahari, Gurugram, Haryana 122102.

Project Details

RETREAT is a residential training Centre for executives, is designed to be self-sufficient, and independent of any external power supply. It consists of living quarters with 24 single-occupancy rooms and six suits complete with Conference Centre with a large hall, a dining hall, a lounge, recreational facilities and a library.

Architect – *Sanjay Prakash*

Client – Tata Energy Research Institute, New Delhi.

Area - 3000 sq m

Energy Efficiency Building Design Criteria and Factors

- Site selection, urban design, landscape planning;
- CO₂ emissions, acid rain, ozone depletion, rainforest depletion;
- Environmental policy, transport strategy, building maintenance;
- Energy performance, renewable energy, water conservation;
- Material selection, recycling of materials, waste management, disposal and reuse; and
- Air quality, thermal comfort, lighting and noise, hazardous materials.

Site Selection

- Site selection and development of site infrastructure to reduce vehicular transportation and easy access to daily facilities. Site layout with respect to wind direction and sun path;
- Appropriate erosion control mechanisms, top spoil preservation, prevent run-off from site and prevent heat island;
- Reduce site disruption by appropriate planning, preservation of natural vegetation, appropriate landscaping; and
- Energy efficient lighting on site including the use of renewable energy sources for external lighting.

Energy Efficiency in RETREAT Campus

- Use of phragmites for waste water treatment (See Figure 2).
- Use of renewable forms of energy;
- Use of solar passive strategies, use of onsite sources and sinks;
- Use of energy efficient lighting and control devices; and
- Enhance system efficiency and maximize use of renewable forms of energy.

Fig. 2: Phragmites used for treatment of sewage water



(Source: teriin.org)

Building Material Selection

- Best for options as per the climate suitability and specific construction requirements for that region;
- Allow significant reduction in transportation contributes to low embodied energy consumption and life cycle costs; and
- Use materials, which are manufactured from waste or recycled materials, products which can be reused.

1. Water Management

- Water quality standards and treatments required;
- Reduction of water usage by efficient fixtures and fittings;
- Reduce landscape water requirement by using indigenous species, enhancing irrigation efficiencies, restricting water consuming landscaping e.g. lawns;
- Waste water treatment/ recycling/ reuse; and
- Rainwater harvesting for storage/recharge.

2. Waste Management

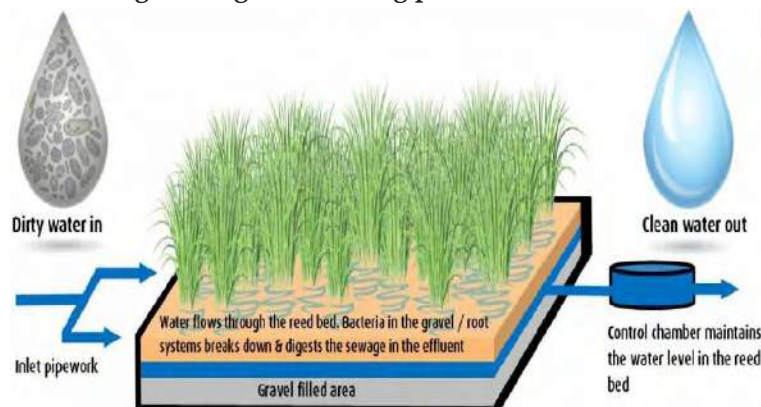
- Appropriate waste segregation and collection;
- Identity facilities for recycling of non-biodegradable wastes such as plastics, glass and paper;
- Develop decentralised treatment systems based on composting or anaerobic digestion process for segregated organic waste at the site;

- Identify appropriate options for use of products – biogas and manure from treated organic waste; and
- Develop norms for use of non-degradable and inert waste in landfills based on local standards to ensure safe environment in the surrounding areas.

Analysis and Conclusion

- The complex has harnessed both traditional and modern means of trapping renewable sources of energy to offer modern amenities such as lighting, air conditioning, cooking, laundry, and so on at substantially reduced costs.
- The complex saves 40 per cent to 50 per cent of energy costs in comparison to conventionally designed buildings at an additional investment of about 25 per cent.
- Twenty- four solar water heating panels provide up to 2000 litres of hot water every day.

Fig. 3: Diagram showing process of treatment



(Source: threelittlebirdsresort.com)

Fig. 4: Solar panels



(Source: terrin.org)

Fig. 5: ACs are not used because of EAT



(Source: terrin.org)

Fig. 6: Landscaping done on building facades



(Source: Author)

Fig. 7: Green roofs



(Source: Author)

Fig. 8: TERI-Deakin Nano-Biotechnology Centre



(Source: Author)

Fig. 9: Pebbles used in pathways to retain rainwater



(Source: Author)

Fig. 10: Vegetated pathways



(Source: Author)

Fig. 11: Natural contours of the site have not been altered



(Source: Author)

- The whole site runs on Solar photovoltaic system (with battery backup) and a 100kW biomass gasifier.
- Effective insulation and shade provided by trees along with a network of underground earth air tunnels circulating cool, subterranean air all around the residential block ensure that the temperature in the complex remains even all year round at 20°C in winter, 28°C in the dry summer and 30°C in the monsoon.
- The system has been augmented by the addition of chillers for dehumidification and additional cooling during the monsoon.
- A bed of reed plants (phragmites) clarifies five cubic meters of waste water from the toilets and kitchen every day, the recycled water is then used for irrigation.

The RETREAT building has deciduous trees on the south side to cut off summer heat gains. The trees shed leaves during winter so that winter sun can cause a warmer environment in winters. The wind breaks are provided in the north and north- east to protect from the winter winds. Effective roof insulation can be provided by providing vermiculite concrete. This has been used in the RETREAT building at Gual Pahari (near Delhi) and has reduced roof conduction by 60%.

Earth Air Tunnel for rooms—four tunnels of 70 m length and 70 cm diameter each laid at a depth of around four m below the ground supply conditioned air to the norms.

SECTION 4: RECOMMENDATIONS AND TECHNOLOGIES FOR COMPOSITE CLIMATE: NEW DELHI

New Delhi has a composite climate. It has a very hot, dry summer, followed by a humid season with monsoon rains. With the departure of the monsoon, it slowly becomes comfortable in autumn, followed by a short winter with the cloudy and wet as well as sunny periods. Before the summer returns there is a comfortable but short spring season.

Microclimate

The conditions for transfer of energy through the building fabric and to determine the thermal response of people are local and site-specific. The conditions are generally grouped under the term of 'microclimate', which includes wind, radiation, temperature, and humidity experienced around a building. A building by its very presence will change the microclimate by causing a bluff obstruction to the wind flow, and by casting shadows on the ground and on other buildings. A designer has to predict this variation and appropriately account for its effect in the design. The microclimate of a site is affected by the following factors:

- Landform
- Vegetation
- Water bodies
- Street width and orientation
- Open space and built form

Strategies and Techniques

1. Energy Efficient Strategies of Landform

- For hot and dry climate like Delhi's, summer requirement is heat loss and winter requirement is heat gain. If sufficient slope is available, building can be built in a slope.
- Earth contact- at the depth below 20ft, the soil temperature is stable and equal to the average annual surface temperature. Design can be of two types-
 1. *Direct contact*—where the building envelope is completely or partially buried underground.

2. *Indirect contact*—where building is cooled by buried heat exchangers such as pipes or air tubes.
- In hot climate, building in a depression can take the advantage of relatively low temperature. Leeward site is preferable which has less impact of warm breezes. The depression also helps in formation of water bodies and aids in further cooling.

2. Energy Efficient Strategies of Vegetation

Vegetation can also be used to provide shade and reduce heat gain. They can direct or deflect air movement according to design requirement. The two important factors that can be modified by vegetation are—radiation and wind. At higher temperature, more radiation is emitted.

- During winters, landscape should be designed such that it allows sun to strike fully on the building surfaces. Deciduous trees serve this purpose.
- Trees should be provided that have big canopies to provide shade, like banyan tree, peepal tree and ashoka trees.
- Installing garden roofs can capture rain water and return a portion of it to the atmosphere via Evapotranspiration. Garden roofs also provide insulating benefits and aesthetic appeal.
- Vegetative paving reduces storm water runoff by allowing precipitation to infiltrate the undersurface through voids in the paving materials.
- Vegetated swales are broad, shallow channels designed to convey and infiltrate stormwater runoff. The swales are vegetated along the bottom and sides of the channel.

3. Energy Efficient Strategies for Waste Water Systems

Conventional waste water systems require significant volumes of potable water to convey water treatment facilities. However, grey water can be substituted with potable water to flush toilet and urinals. Once waste water has been conveyed to treatment facilities, extensive treatment is required to remove contaminants before discharging into receiving water body.

- The construction of artificial wet lands for waste water treatment can be incorporated on multiple scales to accommodate projects ranging from individual buildings to large developments. Aquaculture system, where contaminants in waste water become food for fish and plants.

- Phragmites can be installed in sewage treatment plants on smaller scales as they purify the water without any heavy machinery and also absorb any kind of foul smell.

4. Energy efficient strategies for Water bodies

Native landscape that have lower irrigation requirements tend to attract native wildlife, including birds, mammals and insects, creating a building that is integrated with natural surroundings.

- Perform a soil, climate analysis to determine which plant will adapt best to the site's soil and climate and specify plants that are more suitable for site conditions.
- Use techniques such as mulching, alternative mowing and composing to maintain plant health.
- Design the site landscape with indigenous plants.
- Water bodies should be sufficiently shaded so the water remains cool during summers.

5. Street and Orientation

In composite climates, the main concern is to minimise the heat gain. Align the street width narrow and running north-south to enable mutual shading. Avoid east-west orientation to prevent uncomfortable low sun in morning and evening.

6. Surface Character

Surface character determines whether the incident radiation is absorbed, reflected or stored and radiate later. In composite climate, surfaces should preferably be green to minimise heat gain.

Hard surface and paving should be light and rough which facilitates maximum reflection and re-radiation. During winter days, surfaces should be dark and smooth. This would ensure greater absorption and less re-radiation.

7. Open and Built form

Open spaces seen in conjunction with the built forms govern air movement and heat gain and loss. In a climate like Delhi, a little compact planning with open spaces would be advisable to minimize both heat gain and loss. The ground should be soft, preferably green. deciduous trees are preferable for permitting winter sun.

Analysis and Conclusion

Energy Consumption

- Improve the microclimate by reducing artificial heat islands through effective usage of pervious pathways, pervious parking lots, underground parking, high albedo and light colored materials, vegetative shading, roof gardening, etc. which reduces heating and cooling load of the overall site.
- Appropriate site selection leads to a plant and indigenous wild life preservation. Building on floodplains, landslide should be avoided. Properly planned environment encourages community living, the essence of life. Cost on additional or new infrastructure can be avoided.
- Develop the brownfield site which can reduce pressure on undeveloped land and expenses on additional infrastructure can be avoided.
- Use local/ regional materials which may reduce transportation costs, pollution and support local economy.
- Use of rapidly renewable material reduces major energy spent on non- renewable materials.
- Use renewable sources like wind power, geo thermal, solar power etc.
- Control of erosion and sedimentation leads to reduction of contaminated water and it reduces size, complexity and cost of storm water management.
- Reduce the building foot print. Minimal site disturbances can protect open spaces, site ecology, indigenous plant and animal species.
- Provide on site water recycling which reduces the cost on public infrastructure and energy use. Local aquifer is improved by reduction of portable water use.
- Encourage natural process of evaporation and infiltration. Storm water harvesting from roofs and hardscape can be used for non-portable uses. Install green roof, pervious paving.
- Use native plant palette which induces low irrigation requirement and less fertilizer usage. Consider species factor, density and microclimate factor while seeking plant species which ultimately reduces water consumption.

Microclimate

- Key point of microclimate landscape design is wind and radiation. Instead of spending time to alter the humidity and air temperature, it is wise to concentrate on altering the radiation and wind through landscape element.
- Consider transitivity of trees to reduce the impact of radiation.
- Select trees that cater both for summer and winter needs.
- Wind modification can improve the energy efficiency of a building.
- Properly sited water bodies in design can reduce the heat load of building.
- Use appropriate surface characteristics and color according to climate type.

Strategies for Composite Climate

- Removal of obstructions to prevailing and otherwise predictable warm season breezes.
- Use plants and landforms to funnel and accelerate warm season breezes.
- Curtail and limit plant growth between one ft and 10 ft which can limit wind flow.
- Locate outdoor activities in areas which maximises exposure to cool breezes.
- In composite climates, the main concern is to minimise the heat gain. Align the street width narrow and running north-south to enable mutual shading. Avoid east-west orientation to prevent uncomfortable low sun in morning and evening.
- Perform a soil, climate analysis to determine which plant will adapt best to the site's soil and climate and specify plants that are more suitable site conditions.
- During winters, landscape should be designed as such that it allows sun to strike fully on the building surfaces. Deciduous trees serve this purpose.
- Trees should be provided that have big canopies to provide shade, like banyan tree, peepal tree and ashoka trees.
- Vegetated permeable pavements, like grass pavers and concrete grid pavers, utilise plastic, metal, or concrete lattices for support and further, allow grass or other vegetation to grow in the interstices.

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