INNOVATIVE APPLICATION OF TECHNOLOGIES IN THE REGULAR PLANNING PROCESS IN THE DEVELOPING WORLD

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ABSTRACT

The objective of the paper is to highlight the importance of innovations in planning in the small and medium sized cities. Due to various constraints these cities suffers a most and in many cases are given less priority for development over the big/mega cities. For such cases innovative application of technologies in the planning process can be effective solution. To support the above statement, author presents the case studies of various projects in 4 (medium size & small) Indian cities namely Bhopal, Calicut, Tiruvannamalai and Itanagar, where through technological inputs and knowledge the quality of life has improved immensely. The study points out that how the scientific and technological approach along with the inputs of urban planning can solve some of the basic existing problems of water, sanitation, drainage, solid waste etc. in our cities. These various projects also demonstrate the importance and the potential of community participation in the success and sustainability of the projects.

INTRODUCTION

Sustainable development is a positive change towards improvement of environmental and social systems on which the human race depends. Its success depends on widespread understanding of the critical relationship between people and their environment and the will to make necessary changes. This progress made by the human race in last few centuries was due to a direct consequence of the advancements in technology and progression in social institutions. Now, with the assistance of inputs from science & technology, continued growth and sustainability is a near reality.

In the vast countries like China, India, Africa and other developing nations where a large number of small and medium size cities exist, it is nearly impossible for the government and local bodies (due to financial and other constraint) to meet the high standard of basic infrastructure as like the high level of services in the mega cities, it therefore becomes a vital task for the government to look for some self sustainable solutions with certain innovations to meet the basic necessary requirement of the communities or atleast solve the existing basic problems of water, sanitation, drainage etc. in their cities. In such cases innovative application of technologies in the planning process can be effective solution.

SCENARIO IN INDIA

As per the Census of India 2001, the total population of India is 1.02 billion with a distribution of 286.1 million i.e. 27.8% as an urban population and 742.4 million i.e. 72.2% as a rural population. This total urban population is living in more than 2500 cities in India. The cities with an urban population more than 50,000 are 640 in numbers and they constitute approx. 184.3 million of urban population or in other words. approx. 65% of the total urban population resides in these 640 cities. If we don't consider the mega cities with a million plus population than in that case the numbers of cities with a population between 50,000 and 1,000,000 are 571 (90% of the cities). These small and medium sized cities comprise a major urban population i.e. 110.9 million that is approx. 70% of the total urban population in the country. (Refer Table 1 and Table 2)

Table 1.

	Population	**Share %**
India	1.02 Billions	100%
Rural Areas	742.4 Millions	72.20%
Urban Areas	286.1 Millions	27.80%

Table 2.

Pop. Size	**No. of cities**	**Pop. of cities**	**Share % of pop. of cities**	**Slum Pop.**	**Slum Pop. Share %**	**Slum Pop/city**
4 M+	5	35.0 M	19%	11.0 M	26%	2.20
2-4 M	8	21.2 M	11.50%	3.76 M	8.80%	0.47
1-2 M	14	17.2 M	9.20%	2.88 M	6.80%	0.21
.5 – 1 M	42	31.0 M	16.90%	5.81 M	13.70%	0.14
.1- .5 M	309	60.5 M	32.80%	13.9 M	32.70%	0.04
.05 - .1 M	262	19.4 M	10.60%	5.1 M	12.00%	0.02
TOTAL	**640**	**184.3 M**	**100%**	**42.6 M**	**100%**	**0.07**

It is heartrending that the quality of life in these small and medium sized cities is comparatively poor as compared to the same size of cities in the other developed nation. Infact when compared within the nation with the mega cities with a population of more than 1 million (27 in numbers), the quality of life and level of services are far better as compared to these small and medium size cities. One can have fair idea of the level of services and quality of infrastructure by knowing that the 58% (24 million) of the total slum population (42.6 million) of the nation resides in these small and medium sized cities inspite of being the chances of employment being low as compared to mega cities.

Due to various limitations, small and medium sized cities continue to suffer from infrastructure deficiencies, poor sanitation and solid waste disposal, water shortages, water logging in monsoons, poor transportation and congested roads. The urban environment is deteriorated with dust and air pollution, depletion of green areas and polluted natural watercourses. Inadequate support for the social and economic development of the disadvantaged communities has led to growing illiteracy, deteriorating

health care and frequent epidemics. The aggregate impact of the distress is specially debilitating for the urban poor living in slums. Women and children bear the worst brunt as they continuously manage their daily lives and chores in this environment. The growth and development of urban settlement often take place in an unplanned manner resulting in inadequate infrastructure facilities resulting in distress and decadence.

To improve the facilities and services in these small and medium sized cities which are large in numbers (571), the government and local bodies needs a huge financial and other resources for improving the quality of life. It is known fact that most of the local bodies are financially poor with lack of professional and technical staff. In these prevailing conditions it becomes necessary to look forward for some economical and self-sustainable solutions.

To support the above statement, author presents the case studies of various projects under the Mission for Application of Technology to Urban Renewal and Engineering (MATURE), UNDP- GOI (Govt. of India) programme executed by Department of Science and technology, Govt. of India. Under this programme, author presnts the case studies of projects in 4 (medium size & small) Indian cities namely Bhopal, Calicut, Tiruvannamalai and Itanagar, where through technological inputs and knowledge the quality of life has improved immensely. The study points out that how the scientific and technological approach along with the inputs of urban planning can solve some of the basic existing problems of water, sanitation, drainage, solid waste etc. in our cities. These various projects also demonstrate the importance and the potential of community participation in the success and sustainability of the projects.

In these cities the stress was specifically to improve the quality of life by using innovations and use of technologies in the sector of water, sanitation, restoration, GIS, contour maps etc. The achievements are being discussed in brief in the following paras.

WATER

In Calicut, the “Neelichara”, pond was restored for the purpose of water supply to the surrounding localities. The ground surface of the pond was provided with filter bed for recharging purpose and the protection walls are constructed using low cost materials. Approximately 25 no. of such large water bodies exist in the city, if restored than these may play a major role in solving the water problem in a city like Calicut where 56% of the population are dependent on ground water. The restoration was not possible without the support of the community. Restoration of water bodies can help partially in meeting the water requirements.

Figure 1. (A) NEELICHIRA POND, CALICUT – BEFORE INTERVENTION; (B) NEELICHIRA POND, CALICUT – AFTER INTERVENTION

(A)

(B)

The two rain water harvesting structures were constructed using ferro cement at ‘Asha Bhawan”, a place for old age and mentally distressed women and at “Bal Mandir”, a Juvenile home. Both the places were suffering from the acute shortage of water especially in summers. Due to the intervention, no shortage of water has been reported after that.

Figure 2. (A)SOAMARVARAKULAM –BEFORE INTERVENTION; (B) SOAMARVARAKULAM – AFTER INTERVENTION; (C) INDIVIDUAL TOILETS -TO AVOID OPEN DEFECATION

(A) (B) (C)

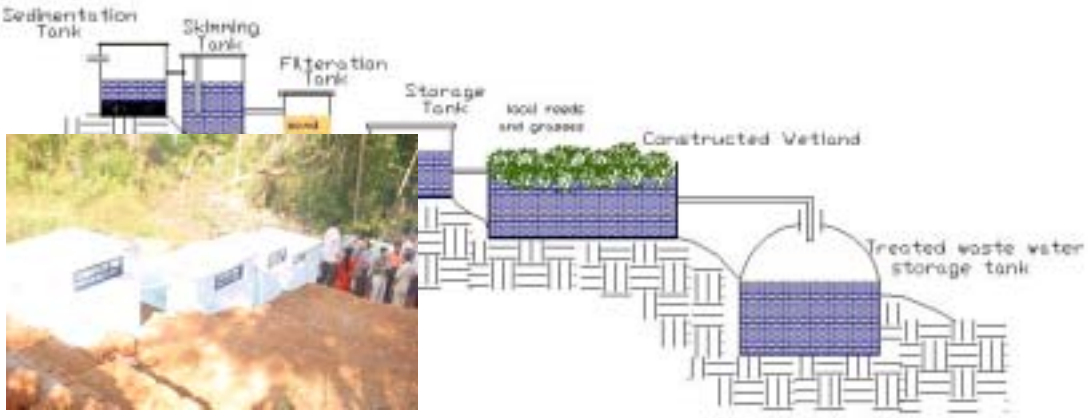
In Tiruvannamalai, the “Somarvara kulam”, a sacred pond situated on a Girivalam (auspicious) path in a religious city, which is flooded with 0.5 million devotees on every full moon day, was restored. Prior, to the intervention this sacred pond was acting as a sewage pond and (Photo a) the open area around the Kulam was being used for defecation by people who did not have toilets inside their houses Seeing the importance being attached to the rejuvenation by the community, the municipality diverted the sewage drains leading to the kulam by changing its slope. The ‘new’ kulam and its surrounding (Photo b) are so impressive that all the families not having toilets in their houses have contributed Rs. 1500/- per family for construction of toilets and the toilets have been constructed in the vicinity of the pond to prevent open defecation. A mechanism has been setup to harvest rainwater from the nearby locality. The use of pisci culture will ensure the good quality of water in the kulam. Women of the surrounding area have promised to ensure cleanliness and maintenance of the kulam.

DRAINAGE & WASTE WATER TREATMENT

In Calicut, the Palyam Junction, a commercial hub, with technical design based on drainage modeling has solved the problem of flooding/ water logging in the area. The innovative twin compartment design is being used each for service duct and storm water drainage. This will avoid the typical routine exercise of digging for service line maintenance (telephone, water etc.). The Calicut Corporation is planning to construct similar drains in other congested areas.

The demonstration model of “artificial constructed wetland” for wastewater treatment has been set up. The results are encouraging and have improved the water quality drastically. Such decentralized model using gravity flow may be very effective in the hilly terrain.

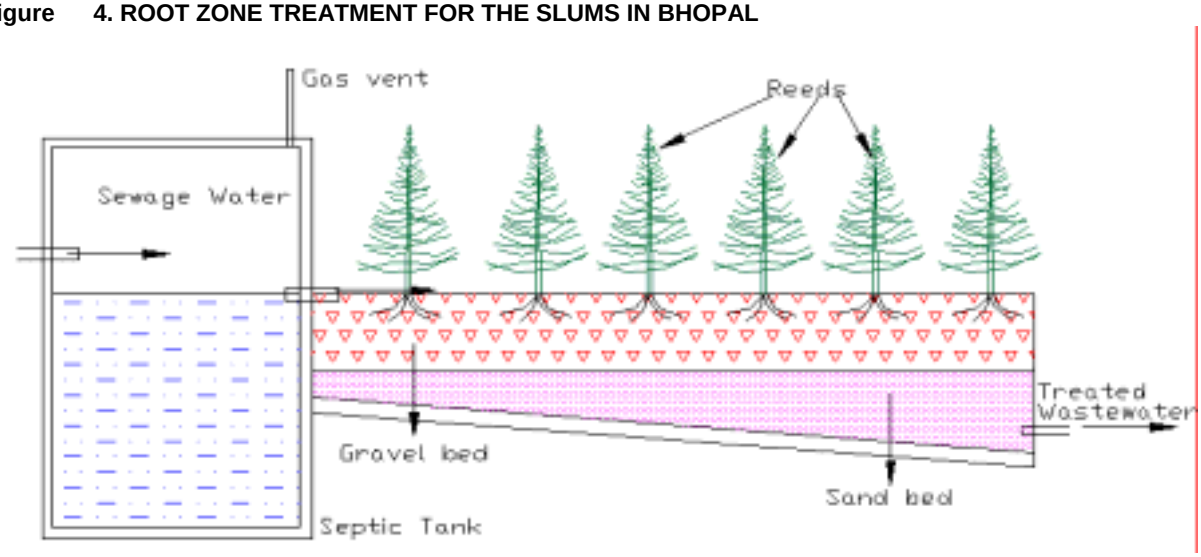
Figure 3. ARTIFICIAL CONSTRUCTED WET LAND – AN OPTIMUM UTILIZATION OF GRAVITY



In Tiruvannamalai, Tamrai Nagar, is an area usually flooded with water during monsoon due to non-existence of drainage and neglected planning (low lying area adjacent to large water body). A drain about 1.3 km long was constructed for draining the floodwater. The drainage with the provision of rainwater harvesting measures will not only solve the flooding situation but will also recharge the ground water.

In Bhopal, the drains were designed and constructed using slopes in slums, generally this area is neglected and is found with poor services and unhygienic conditions. The natural and eco friendly scheme such as root zone technology is being promoted for wastewater treatment. Sewerage from households of slums are directed to septic tanks or bio digester. Wastewater from septic tanks is treated in root zone treatment plant. Root zone treatment is being implemented in the 2 slums selected in Bhopal (Photo c). Root zone sewage treatment comprises an artificially constructed and lined wetland planted with common reeds (Phragmites Australis or Kalka). The sewage flows through a bed of gravel & sand in which the reeds grow. The treatment is mainly biological & in the root zone of the plants the aerobic bacteria grows and treats the waste water by improving the COD, BOD etc contents in the waste water. This system is economical and maintenance free.

Figure 4. ROOT ZONE TREATMENT FOR THE SLUMS IN BHOPAL



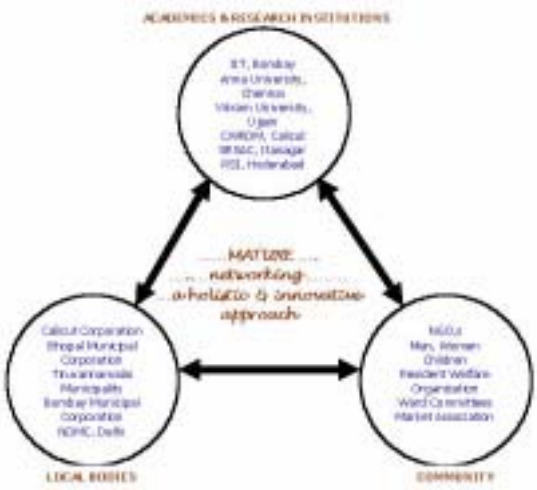
CONTOUR MAPS AND GIS

It is very alarming that the most of the Indian cities are not enriched with the contour maps, which are very essential for infrastructure (water, sewerage, drainage etc.) planning. Due to the non-availability of contour maps, the cities are suffering from water logging, poor sanitation, water scarcity etc. It was also found that lack of information and poor data storage system hinders the development process. Such issues can be resolved by using GIS tool for effective planning and decision-making.

In Calicut & Tiruvannamalai, the contour map exercise has been taken up. By the application of Remote sensing and GIS, such maps have also been prepared for Itanagar, hilly terrain which does not have basic maps for urban planning.

NETWORKING, AWARENESS & ADVOCACY

Figure 5.



A programme of this nature will not succeed if adequate steps are not taken towards networking different players, creating awareness among communities and proper advocacy actions. During the programme, the linkages and partnerships were developed for better convergence. By forging partnership among the academics, research institutions, local/civic bodies, government department, non governmental organization (NGO's), technocrats, administrators & local community, the task ahead became a bit easier in converging resources available for social and physical interventions in the Urban Renewal process. At the institutional level the programme had a good involvement of academic institutions like IIT, Bombay, Vikram University, Ujjain, Anna University, Chennai; research institutions like Centre for Water Resources Development & Management (CWRDM), Calicut, State Remote

Sensing Application Centre (SRSAC), Itanagar; the civic bodies like Calicut corporation, Bhopal municipal corporation, Tiruvannamalai municipality & Bombay municipal corporation. Experts in bio digester design & construction, planning technology, surveys & GIS etc. were actively engaged for specialized services. The community, the people, men, women & children joined hands to accomplish the task with a success note. The team worked together and evolved the design for urban renewal interventions and established the linkages between different sectoral technologies for integrated and sustainable urban development.

Figure 6.

Now the task ahead was to gain the faith of the local bodies & community and to motivate them to adopt the application of science & technology and planning principles in the urban development process. The solitary golden rule for a success is to develop a sense of loyalty & belongingness of the beneficiaries & partners towards the project. This was developed initially through dialogues & discussion with the people, in the process the schemes and its benefits were shared with the community through the 'Participatory & Learning Approach" (PLA) exercise. The importance of cleanliness, water, hygiene, sanitation, solid waste management, roads, environment etc. in day to day life was discussed through various means such as posters, short skit, dramas, visits, competition etc. Special training programmes were also organized on specific themes for the community to make them aware about different techniques available and their usefulness in improving the environment & quality of life. In some of the cases few selected people from the community were also taken to exposure visit to some of best practices available in India. For example, in case of Bhopal, the slum people went to Ahmedabad to see the 'Parivarthan project'. Such visits made a drastic impact on to the people's mind and their attitude. The innovative ideas such as organizing of a 'puppet shows' in Tiruvannamalai on an urban renewal theme brought all men & women together and enhanced their knowledge and understanding in a very simple manner.

CONCLUSION

Through the above mentioned projects and examples, one can conclude that perceptible changes can be made in the process of urban development with incremental interventions through innovative inputs from planning, science and engineering and if problems are properly defined properly, right solutions worked out and demonstrated, the community is ready to come out with support in kind and cash. Local municipalities are also ready to share the burden with cash contribution.

It has been experienced and learnt that the innovative application of technologies in the planning process has improved the environment and quality of life of the populace. Such type of exercise should be taken up in smaller and medium sized cities, as soon some of these cities may become large cities in future- its become more important to diagnose the problem well in advance and provide a solution to it - a stitch in time saves nine.

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