POLICY AUDIT

Peri-urbanity and the Smart City

Case Studies of Bhopal and Visakhapatnam, India

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1. INTRODUCTION: THE SMART CITY MISSION

In 2014, India's Prime Minister Narendra Modi launched a programme to be executed in a mission mode, of smart cities to overcome India's urbanization problems, including that of rapid population growth (37.5 per cent of India's population was urban according to the 2011 census). 100 cities were to be selected as smart cities. The mission has a clear mandate, budgetary allocations, identification of cities and action plans with timelines. According to the Ministry of Urban Development (MoUD) objective of the smart city mission is to: "promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'smart' solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities," (MoUD, 2015 : 5).

The Smart City Mission Guidelines rightly does not try to define a smart city. Instead it says, "There is no universally accepted definition of a Smart City. It means different things to different people. The conceptualisation of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. A Smart City would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a Smart City," (Ibid).

The core elements of a smart city would include (MoUD,2015:5-6):

The core infrastructure elements in a Smart City would include:

i. adequate water supply
ii. assured electricity supply
iii. sanitation, including solid waste management
iv. efficient urban mobility and public transport
v. affordable housing, especially for the poor
vi. robust IT connectivity and digitalization
vii. good governance, especially e-Governance and citizen participation
viii. sustainable environment
ix. safety and security of citizens, particularly women, children and the elderly
x. health and education

37.5 per cent
of India's population was urban according to the 2011 census

The purpose of the Smart Cities Mission, "is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving liveability of the whole City. New areas (greenfield) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities" "(MoUD, 2015:5).

Thus there is a clear emphasis on comprehensive and holistic inclusive development using ICT, employability and so on.

2. OBJECTIVES OF THIS PAPER

In the Guidelines it is clearly mentioned that, "To provide for the aspirations and needs of the citizens, urban planners ideally aim at developing the entire urban eco-system, which is represented by the four pillars of comprehensive development — institutional, physical, social and economic infrastructure. This can be a long term goal and cities can work towards developing such comprehensive infrastructure incrementally, adding on layers of 'smartness'." (ibid :5).

The above para clearly shows that the government recognises the need to develop the *entire urban-ecosystem.* Obviously these eco-systems are specific to each city and cannot be generalised. However, what is missing from the mission statement and also the documents relating to most of the cities is the role of peri-urban ecosystems, their linkages and the symbiotic relationships with urban eco-systems. Peri-urban areas make multiple contributions to the city, including building up its resilience and ignoring them will be counter-productive to the goals of building sustainable smart cities. The cities need to be conceptualized in its

larger context of the rural-urban connect where peri-urban spaces are crucial.

At the outset, it has to be pointed out that none of the relevant documents perused, like the city development plans, master plans or the Smart City proposals, at the national or at the city level, even mention the word "peri-urban." The 2030 Agenda for Sustainable development places key importance on issues related to sustainable urbanization, and a specific goal (number 11) has been adopted towards this end, namely, *'make cities and human settlements inclusive, safe, resilient and sustainable'*. A number of other goals, including, *inter alia*, those on ending poverty (Goal 1), health (Goal 3), gender equality (Goal 5), education (Goal 4), water and sanitation (Goal 6), sustainable energy (Goal 7), inclusive economic growth and productive employment (Goal 8), and climate change (Goal 13), are all linked strongly with urbanization issues. This paper argues that neglecting the peri-urban will not enable the meeting of these goals or the objectives of the Smart City Mission.

Various critiques of the smart city mission have appeared recently, including its elite orientation, lack of inclusiveness and being techno-heavy (Somvanshi, 2016). We do not wish to replicate those criticisms rather we would like to point out that the very idea of smartness entailed in the mission objectives needs redefining and re-orienting. The point of departure according to us is not taking a rural vs. urban point of view (with the peri-urban thrown in between) or looking at the urban as "human made" and the rural as "natural," getting into dichotomies and false debates (like the rural or urban bias in Indian Planning). Rather we look at continua and transitions, synchronies and dysfunctions following an eco-systems approach as stressed in the approach paper (MoUD,2015: 5). The resilience to climate change in any city is boosted by open spaces. It can be argued that the national and the city documents all stress on green-fields, mostly parks within specific area limitations. While parks are good and necessary for beautification and perhaps the health and relaxation of it residents in its vicinity, such "environmentalism" can become tokenism inasmuch as they are not substitutes for open spaces like say a natural forest, water body, marshland, agricultural fields or pastures. This is partly because parks and such open spaces do not take into account the topography. Moreover, in the smart city schemes they are confined to specific localities and do not cover the entire city.

Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services

Parks may be good for its citizens to breathe in or relax but do they allow the earth to breathe and relax? Peri-urban areas can and do play the latter role.

This paper discusses these issues with the examples of two cities, Bhopal in Madhya Pradesh and Visakhapatnam in Andhra, drawing on smart city proposals and related documents, secondary literature as well as field observations.

This paper is divided into five sections. After the introduction (Section 1) and the objectives of the paper (Section 2) in Section 3 some conceptualisations and definitions are laid out. Section 4 discusses some key peri-urban issues in Visakhapatnam and Bhopal and how they are treated if at all in the respective smart city proposals. Section 5 is the concluding one.

3. SOME CONCEPTUALISATIONS AND DEFINITIONS

Given the objectives of this paper, it is essential to outline a few core concepts before discussing the smart cities and their sustainability.

3.1 Peri-urban Areas

A rough working conceptualisation of the peri-urban is the area lying between the municipal limits and the city development boundary as reflected in the relevant master plan, where such plans exist. This can be problematic as often, like in Visakhapatnam, villages are found within the municipality itself. Moreover, many villages also exist just a few meters outside the development authority boundaries that show all the characteristics of those within the boundary. Essentially it is problematic adhering to rigid definitions of peri-urbanity. In the academic literature the peri-urban is regarded as the transitional zone between a sprawling city and its rural surroundings, neither rural nor urban in its outlook and characteristics (Dutta, 2011, Prakash 2012). Not definable clearly, given the contextual and situational specificities involved, it remains a fact that in most parts of the world, peri-urban spaces are

rapidly expanding and being occupied by increasing numbers of people (McGregor et al, 2005). Peri-urban areas are marked by uncertain land tenure, inferior infrastructure, low incomes, and lack of recognition by formal governments (Hogrewe et al, 1993). Other typical characteristics include a mix of agricultural and non-agricultural land uses, flows of goods, services and resources between villages and urban centres and a social profile that is very heterogeneous and in a state of flux (Narain 2010).Peri-urban areas are spaces in themselves, enveloping dynamic interactions between population and the landscape and their associated land uses and livelihoods, supporting the notion of a vibrant flow of agricultural goods and ecological services both within peri-urban zones and between peri-urban and urban core areas (Lerner and Eakin, 2011).

Peri-urban boundaries are forever shifting, followed by extending urban areas engulfing the interface in route. Due to rapid urban growth, city peripheries undergo multiple transformations – physical, morphological, socio-demographic, cultural, economic and functional (Dupont, 2004, Brook and Davila, 2000). These transformations cause this area to experience high spatial uncertainty resulting in undesirable, complicated land use/land cover necessitating the protection of land –use patterns and common property resources that are diverted to other activities and purposes (Narain, 2009; Narain and Nischal, 2007).

3.2 The Ecosystems Approach to Resilient Urbanisation

The necessity of an urban eco-system approach is recognised in the smart city approach in India (MoUD, 2015:5). Maintaining the health of the eco-system is crucial to develop the resilience of urban spaces, a process that not only would contribute to the 'smartness' of the city, but also because of the criticality of the ecosystem services that further build resilience. These ecosystem services include:

- **Supporting services:** ecosystem services 'that are necessary for the production of all other ecosystem services' (MEA, 2005: 40) such as nutrient dispersal and cycling, seed dispersal, primary production.
- **Provisioning services:** products obtained from the ecosystems such as food, fuel and water, fodder, fibres, genetic resources, medicines, energy or ornamental products.
- **Regulating services:** 'benefits obtained from the regulation of ecosystem processes' (ibid) such as carbon sequestration and climate regulation, waste decomposition and detoxification, water and air purification, natural hazard mitigation, pest and disease control or erosion control.
- **Cultural services:** 'non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences' (ibid).

Overall, the different ecosystem services enhance the redundancy and flexibility of urban systems, and can help ensure that any failures are 'safe failures' so as to minimise damages (Mitra, Wajih and Singh 2015). Our contention is that the peri-urban has to be considered along with the urban eco-system and it cannot be ignored. The peri-urban forms a rapidly changing, semi-natural ecosystem which provides natural resources for growing cities while depending on the urban markets for sales and employment. This two-way interaction changes even the lifestyles and mentalities of peri-urban inhabitants. The 'extractive' nature of urbanisation places a low premium on preserving the ecosystem, affecting not only the livelihoods of those directly dependent on it, but also on the city itself. Peri-urbanisation leads to usurpation of ecologically sensitive lands for housing and other construction activities. These change the face of agriculture, reduce open spaces and enhance pressure on natural resources like water (Ibid). These areas are marked by a lack of hygiene and sanitation infrastructure, industrial effluence, air pollution and inadequate provision of basic services. Often, the solid waste of a city is dumped in peri-urban areas (Marshall et al, 2009:7, Mitra, Wajih and Singh, 2015).

Evidently, proper ecological management of peri-urban areas is critical to the sustainability of urban and rural development as the ecological, economic and social functions performed by and in them impact both the city and the countryside (Dutta, 2012:4; Narain, 2009; Allen, 2003). Contemporary land acquisition policies in developing cities disregard social equity and environmental integrity, undermining a city's capacity to adapt to climate change and rendering the peri-urban areas and poorer populations very vulnerable. Environmental degradation, natural resource conflicts, health concerns and social injustice are particularly acute in the peri-urban areas that are

excluded in formal planning processes (Prakash, 2012; Marshall et al, 2009, Mitra, Wajih and Singh, 2015). The lack of basic knowledge and timely information of the urbanisation process and its long-term ecological impacts constrains development planning authorities in analysing, managing and restoring peri-urban ecosystems (Dutta, 2012; Narain, 2007). Left unaddressed, the process leads to rural-urban synergies breaking down, environmental degradation and rising urban inequities and poverty (Prakash, 2012) which could be worsened by the impact of climate change (Mitra and Singh, 2011; Mitra, Wajih and Singh, 2015).

3.3 Peri-Urban Agriculture

Central to a systems approach is the protection of urban and peri-urban agriculture defined as, "Agricultural (including livestock) production, processing, and distribution activities within and around cities and towns, whose main motivation is personal consumption and/or income generation, and which compete for scarce urban resources of land, water, energy, and labour that are in demand for other urban activities," (Gundel, 2006).

Peri-urban areas are not 'waiting rooms' for entry to urban areas. A fundamental change in mind-sets is needed, to prevent further land-use changes and unregulated construction activities. While international agencies like FAO and CGIAR articulate the need to for supporting policies and practices for urban and peri-urban agriculture (Marshall et al, 2009; FAO, 2007), they do not seem to consider agriculture as part of an integrated system within ecological settings which contributes to the overall resilience of the city. This holds true of the Smart City Mission also.

Good urban and peri-urban agricultural practices, from across the world, highlight the need to identify the potential human and environmental health risks, city by city and to develop and implement evidence based policies with multiple stakeholders to eliminate / minimise these risks. But this will necessitate a major shift in the way we think about development.

Urban and peri-urban agriculture has been promoted and adopted across the world to adapt with changing climate (cf. Mitra Wajih and Singh2015). The climate risks ranging from floods, heat waves, sea level rise and scarcity of water are some of issues cities are facing globally. Maintaining the land use pattern beyond the city edge or protection of open space in city's periphery has been tested in adapting to flooding by a range of enterprises from productive greening strategies involving fruit trees, herbal shrubs, high-value vegetables, and on hill slopes and in valleys to increase water infiltration and reduce the time lag for flood occurrence (Ibid).

Increased urban and peri-urban agriculture also has adaptation potential with respect to heat waves by moderating microclimates. During the hot season, temperatures tend to be high, but when neighbourhood and city level productive greening involving trees is practiced, this has a potential for reducing high temperatures and effects of urban heat island. Although provisioning potential is not as high as regulatory, urban/peri-urban can also help households of the urban poor supplement food supplies, thereby adapting to changes that might affect distant hinterlands that are the supply regions for food into the city. A conducive policy framework is essential for this process. Today urban or peri-urban farmers are not recognised as such and do not get essential support from the state in the form of credit or subsidised inputs especially seeds (Ibid). Given that a majority of peri-urban farmers are women, they too need to be recognised as farmers. Moreover, mechanisms of direct sales of their products to consumers instead of going through agents and middlemen are essential. This has to be accompanied by the development of good roads and transport facilities.

Against this background, the smart city documents of Bhopal and Visakhapatnam are discussed next in reference to some key themes relating to sound ecological management. It has to be re-iterated that neither city has looked into per-urban issues or even mentioned the term in the document. Indeed there are elements that can further jeopardise the situation in the peri-urban areas.

4. PERI-URBAN ISSUES IN BHOPAL AND VISAKHAPATNAM

In this section relevant themes of the smart city proposals of Bhopal and Visakhapatnam are discussed in relation to the major peri-urban issues in the two cities.

4.1 Ecosystems and the City

Visakhapatnam has a land area of 620 sq.km and an overall population of 18, 81,952 with an average density of approximately 3,320 people per sq.km (Visakhapatnam Smart City Proposal). Though it is considered a coastal city, there are four sub-systems within it: hills, upland tracks, rolling plains and coastal. The smart city proposal or the city development plans (CDP:2015) do not recognise this aspect, adopting a uniform approach to the city as a whole.

However, it has to be noted that the smart city proposal does not cover the entire city. Only the RK beach area, with a population of 80,000, under the area development plan is proposed to be covered (Visakhapatnam Smart City Proposal). This is already a rather posh area with numerous hotels and other tourist spots. However, a major slum, Pedda Jalaripeta, is close by.

Bhopal city had a population of 17.98 lakh according to the 2011 census and 18.86 in the Bhopal metropolitan area. Presently the Bhopal Municipal Corporation (BMC) has 450 sq. km under it according to the Smart City Proposal. The city can be divided into three areas topographically: hills, lakes and plains. But the smart city proposal does not recognise this aspect. Only Shivaji Nagar area will be taken up under the area development plan.

Thus it is clear that the smart city proposals of both the cities do not follow an ecosystem based approach. Select areas of the city that are rather well developed have been taken up for further development of infrastructure, including roads, transport systems, bus rapid transport (BRT) corridors, ICT, uninterrupted power supply, solar power and so on. Even the pan city proposals do not consider the peri-urban areas nor do they follow an eco-system approach.

It may be argued that given financial constraints, the entire city cannot be taken up at the same time for development. The area covered would act as models for the other areas including the peri-urban. It is debatable whether the peri-urban areas would attract this level of financing. It is probable that the existing inequalities will increase between the core areas of city and the peri-urban areas.

4.2 Rapid Expansion of Built-up area and Decline of Peri-urban Agriculture

Both Visakhapatnam and Bhopal have seen the rapid expansion and the consequent decline of peri-urban agriculture (Mitra et al, 2017).

In the previous decade, agriculture was the main primary sector activity that contributed to Visakhapatnam's' growth (CDP,2007:10). Irrigation was mostly through small rain water harvesting structures. The sub-urban pockets near Kapuluppada, Mehadrigedda and Gambheeram grew vegetables and commercial crops(CDMP, 2016 : 28). Today peri-urban agriculture in Visakhapatnam is vanishing rapidly due to land diversions for industrial and commercial purposes. Private builders have purchased many acres of lands from small holder farmers in the vicinity of industries like the NTPC and the Steel Plant. They have developed empty plots for housing on these farms. Consequently the supply of fresh vegetables, fruits, flowers, milk, meat and eggs from nearby peri-urban areas is reducing. The entire Sagar Nagar colony and Singapore Society in the northern part of Visakhapatnam has developed by acquiring agricultural lands. Usurpation of common property resources like grazing lands have led to fodder shortages and subsequently of the farmers moving out of agriculture (Mitra et al, 2017).

Conversion of agricultural lands into housing estates and colonies has been rapid in peri-urban Bhopal as well (cf Gupta, 2013). The city has expanded tremendously over the last few decades transforming the entire peri-urban land use patterns. Even the catchment area of the city's lake system has been encroached on (Mitra et al, 2017).

4.3 Water Bodies and Smart Cities

Visakhapatnam is a coastal city. Yet it has many water bodies, 23 geddas (streams) and small lakes. However, Visakhapatnam's water situation is gradually getting critical. With the municipal water supply unable to keep up with the rapid expansion of the city boundaries, many areas face shortages in summer. A recent study covering 936 km^2 (GVMC area and the catchment of the springs draining into it) found that between 1976 and to 2010, there was a 2.48 per cent loss of water bodies : the loss in fresh water bodies

being 0.64 per cent and loss in marshes and back waters is 1.84 per cent. In 1975, the total water bodies were 6.69 per cent out of which 3.75 per cent were fresh water bodies and 2.94 per cent were marshy and back waters. In 2010, total water bodies were 4.21 per cent of which 3.11 per cent were fresh water bodies and 1.10 per cent marshes and back waters. (Rajamani, 2014). A decreasing trend of surface area of fresh water bodies were observed at many places as fresh water lakes or small ponds were converted in to land and built-up area (Ibid). A 2011 study over an area of 1143 sq. km in the environs of GVMC reveals found high levels of metals like aluminium, manganese, copper, zinc, selenium, rubidium, cadmium, lead and cobalt in the groundwater in the areas like Akkireddypalem, Balacheruvu and Lankelapalem. These areas are in the vicinity of industries like Hindustan Zinc Limited and Visakha Steel Plant (Babu et al, 2013).

Against this background, the smart city proposal reports the following as threats (Visakhapatnam Smart City Proposal) :

- "Solid waste dumping into the drains has severely altered the natural drainage of the city, causing water logging during monsoons;"
- " Untreated storm water is released directly onto the beach areas;"
- "Water supply and demand gap is resulting in unabated ground water extraction which will eventually lead to salinity ingress and loss of aquifers"

Bhopal is known as the city of lakes. There are some 14 lakes in the city but most of them, including the Ramsar site, the Bhojtal, is under threat from a) encroachments of the catchment areas. "Around 80 percent of the catchment [of Bhojtal] is peri-urban though 'officially' rural and dominated by agriculture. Intensive chemical agriculture is practised in the catchment and chemical fertilisers and pesticides are used during cultivation. The agriculture runoff from the rural catchment enters directly via streams into the lake, predominantly on the southwest side and flows from the west to the east. It affects the quality of water in the wetlands and is a long-term threat to the health of the lake. Finally, the bulk of the silt inflow takes place from the rural side of the catchment, (Purohit: 2017)." The other major reason is the dumping of solid wastes into the water bodies. This will be discussed later.

Yet no effective solutions for water management are proposed in both the cities' smart proposals. Solutions to water problems cannot be found unless

a. proper land use planning that regulates the built up area so that the catchment areas of the water bodies are not ruined in perpetuity and also ground water can be recharged
b. effective waste management and regulation so as not to block the various streams and rivers draining into a water body.

The stress in both the cities is on water metering! Needless to say the peri-urban areas suffer the most from mismanagement of water resources.

4.4 Waste Management

Solid and liquid waste management is a hot issue all across the country. The urban areas are not well managed but the peri-urban areas suffer the most as the solid and liquid wastes are dumped there adding to the misery of the residents. Thus in 2012, it was reported that out of the 193 million litres per day (MLD) of sewage officially generated in Bhopal, only 39 MLD of sewage gets treated. The remaining sewage goes into water sources like the upper lake which is also a source of drinking water for 40 per cent of Bhopal's population (CSE, 2012). Bhopal's smart city proposal recognises the enormity of the task on hand in presenting the following picture of sewerage and solid waste management.

Sewerage

a. Efficiency of collection of sewerage is 31.85 per cent
b. Existing sewerage network of 466 km against required network of 2000 km
c. Sewerage treatment capacity of 74.53MLD against required capacity of 234 MLD

Solid Waste

a. 57 per cent collection efficiency in gated colonies
b. 10 per cent collection efficiency in slums and 62 per cent efficiency in old city
c. Only 77 solid waste management vehicles

Solid waste management is a serious issue in Visakhapatnam too. The GVMC is responsible for waste management. The municipal dumping yard is located at Kapuluppada, a peri-urban locality about 25 km from the city, in Zone 1 of GVMC. Around 920 tonnes

of solid waste is generated within the GVMC limits per day. In most wards of the city door to door waste collection happens but the waste is not segregated at source. Recyclables like newspapers, plastics and metals are collected by rag-pickers. A small composting plant in ward number 10 is making compost from 5-6 tonnes of recyclables and bio-degradable received per day. The waste is transported from the secondary open collection points on streets and dumper bins to transfer stations and windrows compost with the help of dumper placers, tippers and tractors. Finally, the waste from the transfer stations is transported to Kapuluppada dumping yard with the help of 10 big trippers. This dumping site of 80 acres has been operational for the last seven years and about 700 tonnes reach it daily. There are no treatment plants and often the waste is openly burnt. Toxins leach into the soil and pollute the ground water. Scientific waste processing as per Management of Solid Waste Rules 2000 rules is absent (SWM, DPR, Visakhapatnam, 2016).

Landfill gas, mainly consisting methane is getting generated by anaerobic decomposition of organic content of the waste. The land of dumping site is located down hills of three hillocks forming a boundary from the north, east and southeast side of the plot.

Visakhaptnam and its peri-urban areas do not have adequate sanitation facilities. Only 48 per cent of the city has closed drains (HRVA, Visakhapatnam, 2014). The parts not covered by the sewerage network depend on individual toilets and septic tanks. There is a shortage of sewage treatment plants. The sewerage collected from individual properties is pumped through the pumping stations to 70 MLD Sewage Treatment Plants (STPS) present in the city. The treated sewerage is discharged into the sea and nullahs within GVMC limit. However, out of the 149 MLD sewerage generated within the city, GVMC treats only 30 MLD at secondary stage (Rapid Baseline Assessment of Visakhapatnam City, 2013). Majority of the slums on the outskirts/peri-urban areas have open drains for domestic sewerage (HRVA, Visakhapatnam, 2014).

Yet the smart city proposals of both the cities do not seem to address the problem of waste management effectively. Apart from emphasising that it will be done, waste will be disaggregated at source, waste to energy projects will be undertaken and announcing budgets, there is not much of a blue-print of the modalities in which this will be undertaken.

4.5 Health

In Visakhapatnam contaminated/polluted water, lack of sanitation and heavy atmospheric pollution (the city is one of the most polluted ones in the country) due to industrialization is affecting silently thousands of its residents. Diseases like swine flu, chikungunya, dengue, malaria and anthrax have emerged as new diseases in the last 30 years in the city and peri-urban areas due to climate change, deterioration in sanitation conditions, dumping yard and industrial pollution. The human resources in the medical department are not proportional to the increasing population which results in lack of services in many areas. With this rapid pace of urbanization and changing lifestyle of people diseases like HIV and hepatitis are expected to increase (Mitra et al, 2017).

Women seem to be worse off. A study on the health of fisherswomen living in peri-urban Vasavanipalem, Peda Jalaripeta, Sivaganesh Nagar, Kotha Jalaripeta found women suffering from fever and headache, diarrhea, gynaecological problems, anaemia, joint pains, skin diseases, blood pressure, diabetes, T.B, jaundice and HIV. This morbidity pattern could be attributed to poor access to primary health care facilities, lower socio-economic status where they cannot spend much on healthcare, poor access to clean water and sanitation and lack of knowledge about hygiene and also gender discrimination within the household (Teerividhi, n.d.).

The Smart City proposal places a lot of emphasis on controlling atmospheric pollution. However, while the overall health of the residents is sought to be improved, the mechanisms of doing so, both in terms of preventive and curative aspects, is not spelt out.

In Bhopal the health situation is rather bleak. Rising atmospheric as well as water pollution levels are high, as is malnutrition. Vector borne diseases are on the rise. In a single week in October 2016, around 100 dengue and 40 Chikungunya cases were diagnosed in Bhopal, making it one of the worst weeks on record.[1] The government hospitals were unable to deal with the large influx of patients. The situation has not improved in 2017. As per an article in The Times of India (7/8/2017), “every second day a patient is diagnosed with dengue or Chikungunya in the state

1 http://timesofindia.indiatimes.com/city/bhopal/Health-dept-alert-on-chikungunya-dengue-outbreak/articleshow/55041193.cms [Online: web] Accessed 13/09/2017 2017

capital."[2] Cholla road and the road leading up from Bhopal railway station are areas considered prone to vector epidemic. Last year, Chikungunya affected eight members of a single family near the railway station colony. With vector-borne diseases threatening to turn into an epidemic, BMC is yet to fine houses and commercial compounds where dengue larvae breed. In 2016, over 700 cases of dengue and Chikungunya were reported in Bhopal.[3] Unfortunately there are no corresponding statistics from the peri-urban areas of Bhopal regarding vector borne diseases.

As such, the overall thrust in Bhopal is towards privatization of health care. With the passing of the 'Health Service Investment Policy, 2012,' health care has been accorded the status of an industry[4]. Obviously this means a further decline in the government health supply systems plagued as it is with inadequate infrastructure, staff and finances. At the receiving end will be the urban poor as well as most residents of peri-urban areas who cannot afford private health care. The Smart City Proposal mentions some general measures relating to health care, including supporting the All India Institute of Medical Sciences (AIIMS) Bhopal, efficient emergency transport systems and so on. Measures to take up atmospheric pollution are also discussed. However, the issue remains open about ensuring affordable care, especially to the poor.

4.6 Marginalisation

Peri-urban areas are marginalized in every possible way. This is best reflected in the growth of slums and squatter settlements. Visakhapatnam had around 793 slums according to the 2011 census that housed 44 per cent (195000) of the city's households (Water Aid, 2016). Yet another source points out that out of 741 slums housing 8.21 lakh people in the GVMC area, three lakh are living on the hill slopes always facing a perennial threat of landslips. Around 641 slums came up in the government land, six colonies in Railway lands, two colonies in Port Trust lands, 20 slums in Endowment lands, eight slums on Wakf property, four slums in private-government lands mix and one slum in defence property. Of the 741 slums, the GVMC is yet to notify 415 slums depriving them of all the benefits under the 1956 Slums Act (Hans, 2017).

Bhopal had about 380 slums with a population of 9.36 lakh in 2011 (City Profile, BMC). Thus 52 per cent of Bhopal's 17.96 population (2011 census) lives in slums.

Given that the residents of these slums not only shoulder the burden of production both in the formal and informal sector as well as provide essential services like waste management, it remains a dilemma whether they should be allowed to settle in the fragile ecosystems like the hills or to resettle them elsewhere. However, often the slum dwellers are victims of a lopsided development process that puts urbanisation above farming. Often these people have been displaced from elsewhere but provide essential services to the city (Mitra A and Singh BK, 2011).

Visakhapatnam, according to the Smart City Plan envisages to be slum free by 2030. Bhopal's smart city proposal does not broach this issue. However, in both the cities there is emphasis on provisioning of toilets and drinking water. Visakhapatnam mentions skill development programmes in the slums.

Visakhapatnam has an additional aspect of marginalisation that is linked to land-use changes. In a blatant violation of Coastal Regulation Zone (CRZ) rules, private and government agencies have built hotels and other entertainment sites along the coast. This has impacted adversely the fisher communities living in coastal villages like PeddaJalaripeta (cfMitra et al 2017). The Smart City proposal places a lot of emphasis on tourism development especially along the coast. Even the chosen area, RK beach, is along the coast and has seen many violations of the CRZ. However, there is no mention in the proposal of whether these will be rectified.

5. CONCLUSIONS

In its present form and content, the smart city concept in India remains rather segmental and fragmented. Certainly, a lot of stress is on infrastructure building, transport, clean drinking water supply and so on. However, these proposals focus mostly on some core, already developed areas of the city, like Shivaji Nagar in Bhopal and RK beach in Visakhapatnam. Resilience to climate change and extreme event shocks are laudable goals. However, Bhopal does not have a city disaster management plan in place and the draft Visakhapatnam city disaster management plan has just been completed.

The Smart City concept is not based on an eco-system approach. This leads to ignoring the role of peri-urban

2 http://timesofindia.indiatimes.com/city/bhopal/cases-of-dengue-emerging-every-second-day-in-city/article-show/59946597.cms [Online: web] Accessed 13/09/t 2017
3 Ibid
4 http://www.freepressjournal.in/bhopal/health-services-get-industry-status-in-mp/45494, Accessed 13/09/2017.

ecosystems and peri-urban agriculture, leading to questions on the sustainability and resilience of the city. Environmental issues are relegated to providing clean air (a welcome step) and parks. However, parks are not essentially based on a hydro-geological understanding of the topography. They do not necessarily for instance guard against water logging nor do they provide critical ecosystem services like food.

This entails redefining the very notion of smart cities and prioritising the essentials. ICT is important but peri-urban agriculture is equally so in building the resilience of a city. Cities have their own character, history and political economy. What is needed is to build up on them to integrate local wisdom with global knowledge and technology. This will require a lot of inter-disciplinary research and building of common data bases. The smart city proposals do not seem to have any element of research built into it.

The ultimate in smartness would be to develop models of eco-system based agro-horticulture as well as fisheries (including marine), that can with organic certification become sources for financing the city as a whole. Both Visakhapatnam and Bhopal offer tremendous opportunities in this regard.

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