Working Group on Environmental Sustainability of Indian Cities for the formulation of the 12th Five Year Plan

Draft Paper

Introduction: While Indian cities have grown manifold in the past several decades, and there is expectation that the pace of urbanization would accelerate in the future, problems of water supply, sewage disposal, municipal wastes, power supply, open landscaped spaces, air pollution, and public transport, have assumed stark proportions in many urban areas. These are linked, in turn to several causal factors, some obvious or proximate, such as inadequate and improper land-use planning, and others which lie at a deeper level. The latter include primarily issues of governance – the absence of necessary empowerment and democratic accountability of municipal bodies, their inadequate capacities for undertaking policy formulation, planning, regulation, enforcement, essential policy reform, and implementation of programmes and infrastructure projects, besides insufficient financial and human resources, themselves linked on the one hand, to poor governance, compounded by political deadlocks. While a comprehensive approach to these issues is outside the scope of the present paper, we present our proposals on the following key themes on environmental sustainability of Indian cities:

Themes:
Land use, urban and regional planning
Water supply and sanitation
Solid waste management
Energy efficiency
Air quality management

1. Land use, Urban and regional planning

LONG- TERM GOALS AND ACHIEVABLES

From experience across the globe as well as in India it has been observed that planning is best practiced when the decision making power is with local level institutions. Unfortunately in India devolution of power both administrative and financial has not been adequate, and hence land use, urban and regional planning practice is weak due to limited capacities of local and regional level institutions.

The major goals that have been formulated to be achieved are:

Goals to be achieved	Existing Levels			Achievable
Devolution of Planning Functions from state to local authority	Poor	Ave.	Good	Good
Revised Metropolitan structures and their responsibilities	Poor	Avg.	Good	Good
Devolution of decision making to the local level	Poor	Avg.	Good	Good
Mandatory provision for Master Plan/Dev. Plan for all the cities	Poor	Ave.	Good	Good
Integration & Convergence between Regional Plan, CDP, MP etc	Poor	Avg.	Good	Good
Guided mechanism for land acquisition, Development & Management	Poor	Ave.	Good	Good
Clear Policy framework and guidelines for land & housing development	Poor	Ave.	Good	Good

Source: Compiled from Mc Kinsey Report & HEPC Report

CURRENT STATUS OF THE KEY INDICATOR(S)

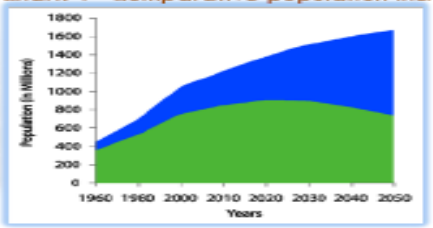
While evidence of urban planning goes back to the Indus Valley Civilization, and there is historical evidence of its practice in later times, right to the Moghul era, , modern planning practice in India, which started during British times, has travelled a long distance from these beginnings. Landmarks like 74thConstitutional Amendment Act and JNNURM are helping to shape India's urban future. But the attempts have fallen short in meeting the rapidly rising demand of the urbanized communities. Some key facts about status of urbanization and urban development are presented below.

THEMES	STATUS	DOCUMENTS REFERRED
Urbanization and Urban Development	• The number of urban settlements in India have increased from 1843 in 1951 to 5161 in 2001, meaning more conversion of rural land into urban. • In 1991 urban population of India was 217.18 million, which was 25.72 per cent of the total population. By 2010, urban population was nearly 481 million that is 39.3 per cent of the total population. • Unplanned sprawled development leading to use of more resources like land, energy etc. is increasing at a rapid pace. • The rapid increase in population is resulting in housing shortage which currently is 24.71 million(World Bank study, 2009) • Pace of demand has not been met with the pace of supply of infrastructure and services due to lack of ULB revenues and expertise. • Overall urban development in India is facing serious challenges as never before.	Mc Kinsey Report HPEC Report NMSH Report

Diagram: 1- Sprawled Urbanisation

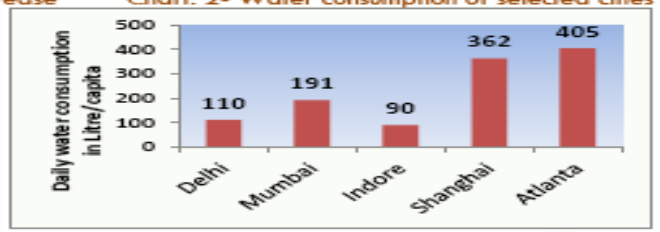
CEPT University, Ahmadabad

Chart: 1- Comparative population increase



Source: Livable cities Report

Chart: 2- Water consumption of selected cities



Source: ADB, 2007

THEMES	STATUS	DOCUMENTS REFERRED
Master Planning/ Development Planning Practice	• Currently Master Plans are available for only 1500 towns out of 5161 urban centers many of which are not reviewed and are outdated. • Master Plan is a Land Use Plan for urban areas and is legally enforceable. It is long term (10-20 years) and rigid in that changes are difficult to accomplish during its legal validity. Though there is provision for periodic review but the same is not complied by most of the cities. • Poor implementation of Master Plans has been the key issue which is largely due to lack of political will. • City Development Plan (CDP) has been key as far as Project and Infrastructure Investment planning for the JNNURM cities is concerned • Little harmonization between Master Plan (Land Use), Regional Plan and CDP. • Regional Planning in India only advisory except in case of NCR and Goa Regional Plan • No Regional Land Use plan exists for most of the city regions, and therefore developments outside Master Plan areas are not planned or controlled. • Special Area Planning in India like SIR's, SEZ's, and Industrial Townships, has not been able to gain traction due to poor planning and implementation. • Town Planning Schemes have been successful in cases of planned urban expansion and infrastructure delivery, but are limited to Gujarat and Maharashtra. • Comprehensive Development Plan which is more like a regional planning practice has been initiated in some states but still not been mainstreamed. • Lack of Regional Planning Practice is resulting in rural-urban divide rather than creating a continuum of development. • Lack of convergence between different levels/sector Plans has been a significant barrier to successful implementation of plans/schemes.	HPEC Report Managing Asian Cities Report Livable Cities Report

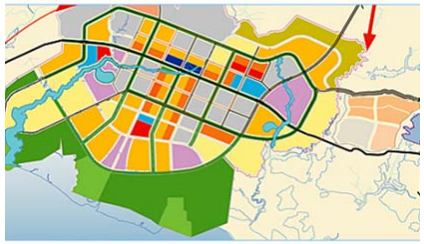


Diagram: 2- Auroville urban design

Diagram: 3- T P Scheme

Diagram: 4- BRTS, Ahmedabad

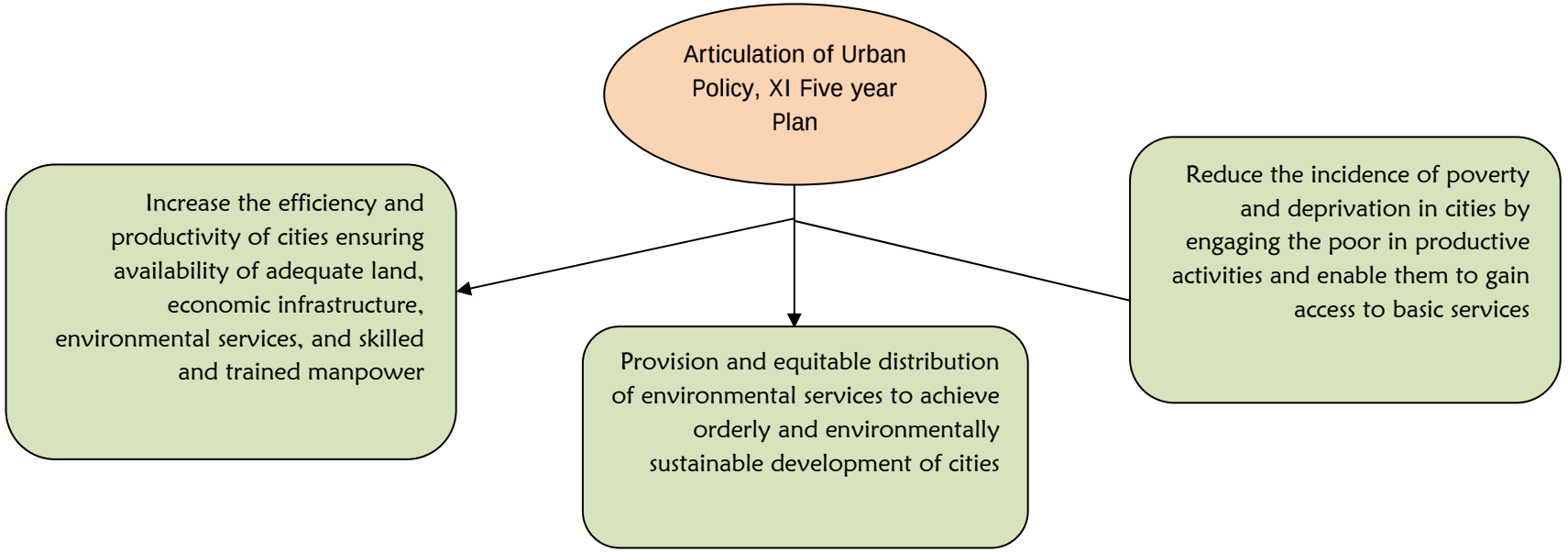
THEMES	STATUS	DOCUMENTS REFERRED
Land Acquisition and Land Management	• Due to larger demands of new developments like SEZ, SIR, DMIC etc., need for land is increasing at a rapid pace, requiring increased supply and imaginative management of land resources. • Land Acquisition due to various reasons has been the key issue of debate all over India needing serious attention-wide political consensus. • Land acquisition conflicts are increasing due to obsolete land acquisition act and provisions for compensation and rehabilitation. • Land Deregulation and augmentation of Land Market lack proper implementation. • Private Sector and Foreign DI, especially as regards urban infrastructure, have been insufficient as compared to the available scope and demand in urban sector due to land problems. • Rent control Act has not proved effective due to disconnect from urban reality. The experience with ULCRA has been similar. • Building New Townships with greater engagement of private sector is gaining momentum due to greater incomes of the middle and upper classes, and the ability of private developer to negotiate land price directly with land owners. • Land Management through various mechanisms like TDR, PPP, and TP Scheme etc. has been weak and needs serious improvements in the practice.	
Policy framework	• Outdated UDPFI guidelines and CPHEEO manuals etc. have weakened the urban development policy framework resulting in unbinding of rules of developments. • Lack of uniform township policy, even at the state level has created regulatory bottlenecks. • Lack of clear lines on how to incorporate private participation has blocked the pace of investment and development. • Change in property tax system, stamp duty etc. has influenced land valuation, impacting the land market.	HPEC Report Sustainable Cities Programme

	• Linkages and co-ordination between institutions responsible for policy making, planning and implementation has been weak at all the three levels of government. • Need to amend or replace the land acquisition act to ensure fair sharing of the premium from regulatory actions between the land owner, developer, and public authorities. Need to make Regional Land Use a legally binding document for large cities • Hierarchy of Plans is required– Regional Plan, Master Plan, Zonal and Town Planning schemes, and Local Plan (Neighbourhood) • Public Participation is important in evolving land use plans besides ensuring that environmental considerations are adequately taken into account. • Weak coordination between Centre, State and Local Governments involved.	
74th Constitutional Amendment implementation	• Provisions of 74th constitutional amendment have still not been implemented in most of the states despite JNNURM reforms. • Schedule 12th not yet transferred to the cities meaning that planning functions in most places are still with the state rather than the local bodies. • Provision of MPC &DPC in 74th constitutional amendment is still not functional in most of the states, leading to weakening the regional & metropolitan planning practice. • Ward committees, local area sabhas, etc. have not been formed although committed by most of the local bodies resulting in limiting the scope of stakeholder participation in planning process.	Mc Kinsey report NMSH Report

In summary, urban and regional and planning in India has long way to go in generating new spaces and in rejuvenating existing cities in a rapidly globalizing context.

EVALUATION OF THE 11TH FIVE YEAR PLAN

The Eleventh Five Year Plan had looked into the linkages between urbanization and economic growth and aimed to expand economic opportunities in Indian cities. To make ensure sustainability of growth, the Plan had suggested strategies related to urban management systems with emphasis on energy, water resources and waste management.



Sl no	XI PLAN PROPOSALS	IMLEMENTATION STATUS
1	Revisions of existing planning laws, norms and space standards to improve private sector participation in urban development,	• No revision has been made to UDPFI, CPHEEO norms, Township policies, and land or housing policies. • Nevertheless there is ample scope left for private participation in urban development.
2	Environmental conservation and energy conscious settlement planning	• Very little effort has been given to formulate urban environmental policy or establishing environmental cells at ULB level • Sustainable Habitat Mission initiated - still at conceptual stage and policy stage not internalized in plans and planning process.
3	GIS based data base creation and maintenance as well as urban research	• ULBs in India have spent nearly Rs 200 crores for urban data base but convergence is still elusive. • Zoning Atlas was a good initiative in the 10thPlan but has not been carried forward and implemented. • High potential as high resolution Remote Sensing Imageries are available • A number of Benchmark studies and performance appraisal for various services have been carried out
4	Update Master Plans of all 441 Class I cities in first phase and 496 Class II towns in second phase.	• Currently Master Plans are available for only 1500 towns out of 5161 urban centers. • Most of these Master Plans are outdated and are not reviewed periodically as per the provisions of the Act.
5	Integrated planning from national level spatial strategy to local area plans	• No national level spatial strategy, or regional plans (except NCR and Goa) have been prepared, and preparation of Zoning Atlas (Spatial Environmental Planning) has been abandoned • Very little effort has been made to coordinate policies and strategies between Centre, State and Local levels. • Preparation of local area or ward level plans is carried out for very few cities.

6	Regional planning has to be given importance as all major developments like townships, SEZ are proposed to follow the regional plan prepared at state level.	• Metropolitan Regional Development Authorities have been set up, e.g. in Delhi, Mumbai, Hyderabad, Bangalore, Chennai, and Kolkata, but their regional vision and planning has been insufficiently implemented. There is lack of integration between these regional plans and other special area plans. • Master Plans still typically view cities in isolation from the broader geographical contexts in which they are located. • Regional Boundary Delineation follows administrative and functionality instead of Eco-system boundaries.
7	Preparation of urban land policy and creation of District Planning Committees and Metropolitan Planning Committees to facilitate integrated planning process in line with 74thAmendment Act.	• Only 4 of the requisite 10 states and 20 of the 29 states have constituted MPCs and DPCs, respectively • The metropolitan master plans created by these MPCs are not binding on city development plans, negating the benefits of metropolitan planning. • At the local level, the planning function has not been fully transferred to municipalities in 12 states • Even where this function has been transferred, state government interventions are still strong and often completely negate the plans of the city administration.
8	Deregulation and development of land market	• Although the land and housing policies have emphasized this aspect, implementation has been weak. • Repeal of ULCRA and Rent control Act are important improvements • In some cities, Ahmedabad, market rates, Jantri rates have been instituted and implemented for land transaction • Innovative provisions like TP schemes and TDR have facilitated land market in a few cities.

9	Urban Land for the Poor and consolidate the highly fragmented urban poverty alleviation programmes into one flexible umbrella programme.	• Town Planning scheme has provision for reservations- 30% land for EWS Housing • JnNURM/BSUP - land and rehabilitation of the poor given priority • The basic approach of providing facilities to the poor rather than facilitating their own efforts has not been changed. • Urban policies to formalize illegal settlements through distribution of tenure rights are still unclear and are not standardized.
10	Micro-financing mechanisms for the urban poor with respect to their income, livelihoods and shelter	Microfinance policy in India is still in evolution.
11	Equitable distribution of environmental services to achieve orderly and environmentally sustainable development of cities	• Spatial environmental planning framework in India is still weak. • There is no agency accountable to local authorities to monitor environmental conditions of cities. • Planning and land development does not necessarily follow environmental impact assessment/vulnerability assessment/screening.

12	Capacity building for urban local bodies to be strengthened in respect of urban planning, finance, e-governance etc. so as to make them capable of preparing and implementing development plans	• Half of the metropolitan cities do not have functioning planning departments supported by a metropolitan enforcement authority. Even where they exist, there is shortage of professional human resources. State town planning departments often do not have the capacity to monitor and evaluate the work of consultants. • Majority of the staff of the planning cells are involved in appraisal of building permit applications rather than creating urban plans. • Lack of coordination between related departments e.g. land and planning departments • In many states, Para-statal agencies are important in land and planning but are weak incapacity. Coordination with other agencies is also weak. • Tools and techniques on how to increase and augment ULB revenues are still unclear to most of the smaller local bodies, and lack local political support. • E- Governance portals do not necessarily share relevant information except in a few big cities. There is tremendous lack of manpower in quantity and quality. • Qualified urban and regional Planners are available only in big and intermediate cities.

PROPOSED STRATEGIES FOR ENABLING THE GOALS TO BE ACHIEVED

CAPACITY

- Planned development in cities needs smart urban and regional land use planning; lack of capacity of ULBs must be taken care of through capacity building initiatives.
- Shortage of staff especially technically qualified persons is a real barrier to urban planning. Dedicated urban planning technical cadres should be created at the state level
- Local bodies should have the power and capacity to hire professionals not included in state or All-India cadres.
- Special emphasis should be given to the capacity needs of the North East, Himalayas, and other tribal areas
- Preparation of CDP, DPRs etc. should be in-house so that the cadres get trained to handle urban issues.
- Initiatives like RTP and RCBH etc. should focus on specific sectors/project level expertise building.
- More Schools of Planning and Urban management Programmes; E- learning can be initiated to create awareness and expertise on urban development.
- Information and knowledge sharing should be formalized through City Knowledge Forums like Pearl City to City Learning etc. which will bring awareness about best practices and modern tools of urban planning.
- Site and exposure visits to other cities should be promoted.
- Urban and Regional Planning related work, e.g. Surveying etc. can also be initiated in ITIs.
- PPP model involving private sector in training.
- Locate training activities in one large and better function cities of the state. Can act as a

Diagram: 5- WBI e-Learning module

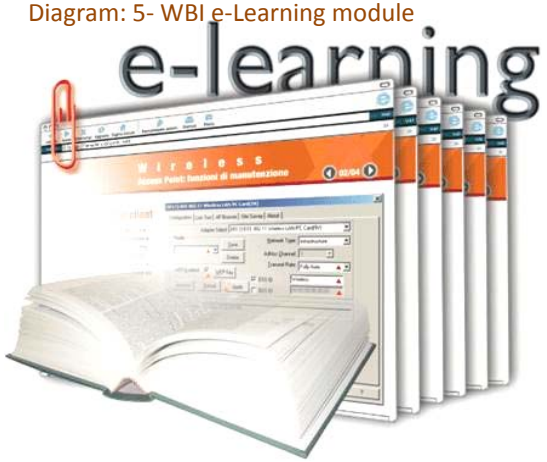
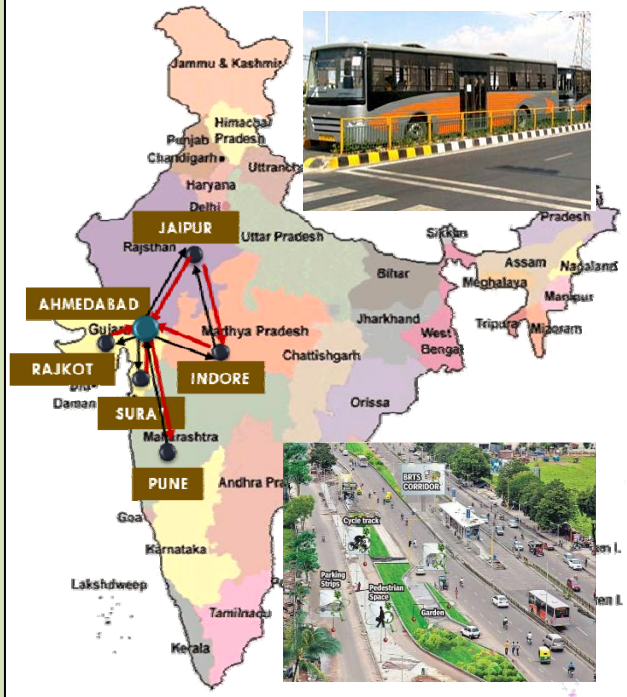


Diagram: 6- City-City Learning, BRTS

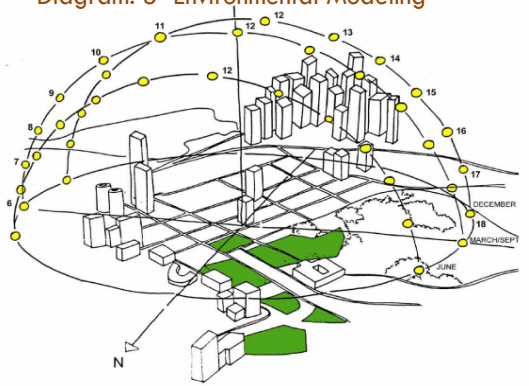


RE-SCOPING/CONVERGENCE

- Planning need to be hierarchical and integrated-Regional, Urban, Zonal and Local for effective land use and environmental sustainability.
- Environment and natural regions should ideally be the basis for Regional and Urban Planning Boundaries. For this, appropriate coordination/joint planning mechanisms may need to be evolved straddling administrative boundaries.
- Urban and Regional planning needs to become integrated, dynamic and flexible, to adjust to the changing realities and addressing present complexities. New and proposed-New Towns, Special Investment Regions, and SEZs should be part of the larger Regional Plan.
- Transport planning should be properly integrated with land use plans and considered as an integral component of urban and regional planning.
- Regional and Urban land development should be seen as spatial environmental planning exercises which will address development issues as well as environmental concerns.
- Regional environmental Impact assessments should be initiated for each Regional Plan/Master Plan/City Development Plan so that adverse environmental impacts are minimized. Formulating and implementing local environmental codes/ bye-laws need to be given greater importance to account for city-specific environmental concerns. Internalizing Climate Change in land use planning and regulations-vulnerability assessment etc should be given priority under the present context of global warming and climate change to address the issue of sustainability of cities.
- Review and revision of existing planning Development Control Regulations (DCRs) and codes etc. should be done at an immediate basis to guide context specific urban development.

Diagram: 7- Land use- transport integration

Diagram: 8- Environmental Modeling



INSTITUTIONAL STRUCTURE

- Greater coordination among central ministries MoUD, MoES, and MoEF should be initiated to ensure greater cohesion in policy-making and regulation.

At the state level, convergence (as per the 74th /73rdCAA) between the state, district level and the metropolitan planning is still weak and should be improved through better coordination of different institutions at the state level.

Convergence of different plans like Regional Plans and Master Plans, CDP, RAY, City Sanitation Plan, Vulnerability Disaster/ Resilience Plan etc. need to be ensured through better coordination among the concerned authorities.

- The concerned state governments and local bodies should set up mechanisms for review of implementation of Regional, Urban and local plans
- Town planning bodies in cities over the years have become very weak and ineffective which should be revived through capacity building initiatives.
- Private sector and Consultants now a day are very strong and technically sound. They should be involved more into development planning practice.
- Only big cities able to get advantage of good consultants in preparation of regional plans and CDPs etc. Therefore building in house capacities becomes more necessary.
- Provision of land through various schemes like JnNURM, TP schemes etc. should be carried out to augment the supply of land resources for balanced development.

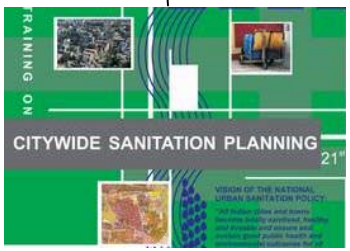
Diagram: 9- Integration of central level institutions

Ministry of Urban Development, Government of India

सत्यमेव जयते
Ministry of Environment & Forests (MoEF)

JnNURM

Rajiv Awas Yojana
Guidelines for Slum-free City Planning



ANSWERING THE UPCOMING CHALLENGES

- Preparation of State level land use plan should be accomplished on an urgent basis. Preparation of zoning atlas was initiated for the purpose but not implemented successfully. Also relevant authorities should decide the land use design in case of broad development zones like DMIC etc.
- Coastal urbanization is bound to increase along with the transport and rail corridors. The developments in these areas should be controlled and regulated in conformity with the Coastal Zone Regulations under the Environment Protection Act.
- Airports may emerge as additional hubs for urban growth. Special land use strategy will have to be evolved to address urban expansion and outgrowth on this account.
- Success of Delhi Metro and BRTS in Ahmedabad have brought to the forefront the need to integrate provision of public transport with land use and urban planning
- Regional and cluster based land use planning should be more practiced for special facilities like solid waste management sites or green building/infrastructure development sites.
- High Density low rise developments should be more emphasized to reduce use of land and stress on urban environments.
- Development plans and Master Plans should focus more on environment and resources like urban water bodies, forest and bio diversity etc. This can shape a city towards sustainable environment creation.
- Urban Farming/ terrace farming plus gardening as a way to enhance green cover should be promoted

Diagram: 11- DMIC corridor & Proposals

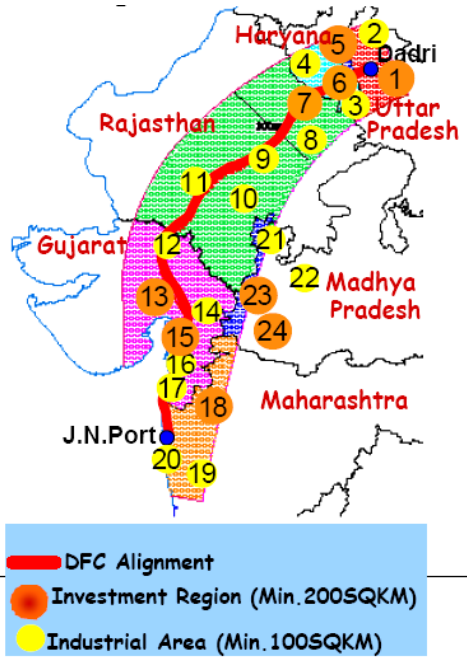
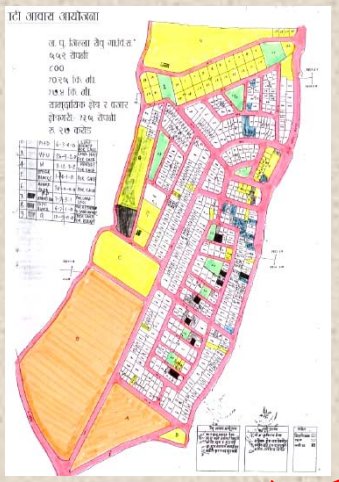


Diagram: 12- Delhi Metro & Associated land use

LEARNING FROM BEST PRACTICES

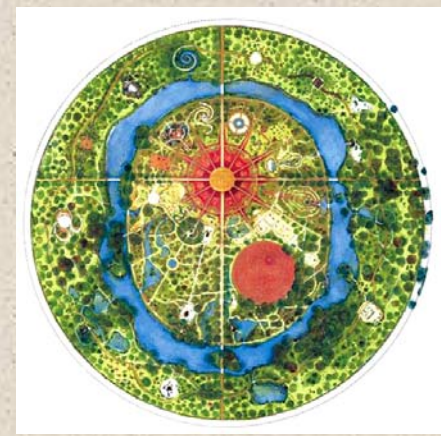
Equitable and inclusive Town Planning Schemes at Gujarat

Formed under the Bombay Town Planning Act, 1915 TP Schemes in Gujarat facilitate equitable and inclusive development. A portion of land is appropriated for accommodating urban poor. Plots providing adequate social infrastructure such as schools, hospitals, dispensaries, clinics, open spaces, housing for the poor, etc., are reserved up to 20% of total development



Auroville Master Plan

The Master plan designed for a time period of 25 years adopted a concept of bio-region. One fourth Land is allocated for urban and residential land use and the rest consists of a 15 sq km productive green area. The plan promotes bio-diversity, environmental restoration, land regeneration, and water management.



HUDA Land Development Model

Formed under the HUDA Act, 1977, it has acquired 6500 acres of land and developed around 4000 acres. It has also facilitated private developers to purchase around 6000 acres and develop)

Green Infrastructure Design

A network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside focuses on clean urban environment and better quality of life

FINANCING/PPPS

- To bridge the gap in financing land development and infrastructure projects, a supportive policy environment should be created to promote PPPs, Joint venture etc.
- In order to increase revenue base of ULBs, GIS based land records should be prepared to update taxing method and increase coverage. Automatic indexation and revision should also be done to tap maximum resources available.
- Innovative mechanisms should be adopted like betterment charges, levies. TP Schemes should avail greater revenues from the benefits of the land-use changes made and developments undertaken.
- Sale of unused land and assets held by ULBs implementing TDR mechanisms etc. can be adopted to help the local bodies to undertake infrastructure projects.
- Reserved land under DP should be released to market if not developed by the agency concerned; agency may also be penalized.
- Innovative financing mechanisms like TDR should be popularized.

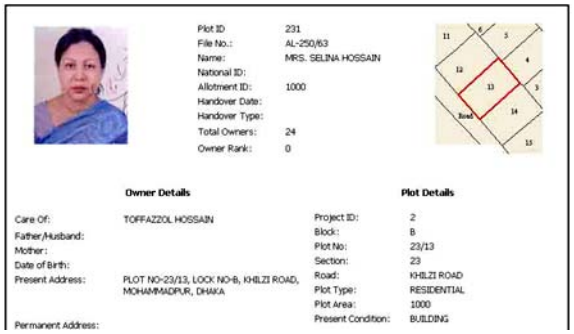


Diagram: 14- PPP models & infrastructure dev.

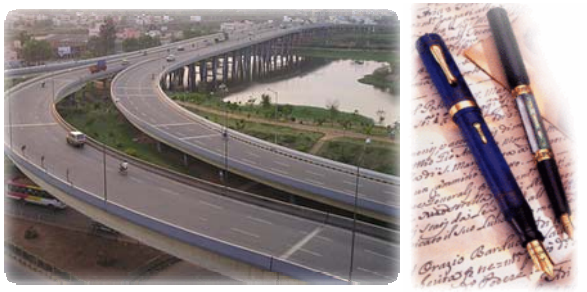
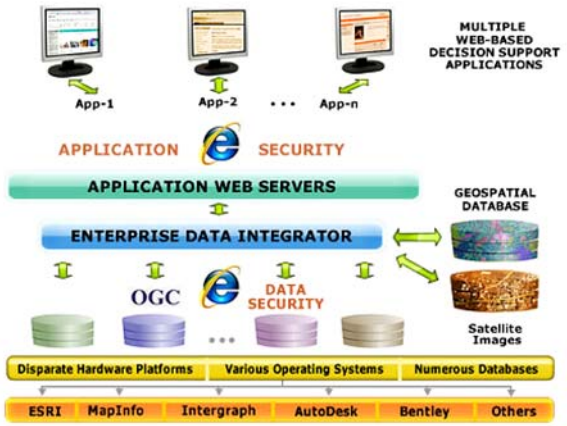


Diagram: 15- Process flow of GIS & MIS based database creation



DATA AND INFORMATION

Creation of GIS and MIS based database for all the ULBs should become mandatory so that there is no information gap to support developmental practices. This information should be publicly available through the web to facilitate public participation.

IMPLEMENTATION MECHANISM (BUDGETARY IMPLICATIONS ANDLOCAL INSTITUTIONS)

The main focus of the various strategies mentioned above is to provide sufficient urban land and infrastructure services to urban agglomerations through different planning instruments. There have been several efforts to estimate investment for urban infrastructure in the India Infrastructure Report (1996), Mohanty et al (2007), HPEC Report (2012-31) etc. Of these the last is considered to have the best methodology and may be employed accepted.

Table 1- Sector wise investment estimates in crores 2012-2031)

Sector	Total (Rs crore at 2009-10 prices)	Relative Share (per cent)
Water Supply	320908	10.4
Sewerage	242688	7.8
Solid Waste Management	48582	1.6
Urban Roads	1728941	55.8
Storm Water Drains	191031	6.2
Urban Transport	449426	14.5
Traffic Support Infrastructure	97985	3.2
Street Lighting	18580	0.6
Total	**3098141**	**100**

Source: HPEC Report

Table 2- Urban Size class wise investment estimate in crores

Class-wise estimates	Total (Rs crore at 2009-10 prices)	Relative share (per cent)
Class IA (> 5 million)	860136	27.8
Class IB (1-5 million)	690463	22.3
Class IC (100000-1 million)	883346	28.5
Class II (50000-100000)	174072	5.6
Class III (20000-50000)	280541	9.1
Class IV+ (< 20000)	209583	6.8
Total	**3098141**	**100**

Source: HPEC Report

In preparing detailed estimates for infrastructure investment in the eight sectors listed in table-1 and 2. Service norms prepared by the Ministry of Urban Development, Government of India have been used. The estimates not only include additional demand over the next 20 years but also the unmet demand for the current population as well as the cost of asset replacement.

Population projection for various size class urban centers has been done on basis of census data and UN Projections of population growth. The estimation for various reasons has not incorporated land acquisition values and possible market cost escalations.

Investment for urban infrastructure over the 20-year period from 2012 to 2031 is estimated at Rs 39.2 lakh crores, at 2009-10 prices, which includes:

- Rs 34.1 lakh crores for asset creation, out of which the investment for the eight major sectors is Rs 31 lakh crores
- Rs 4.1 lakh crores for renewal and redevelopment including slums; and
- Rs 1 lakh crores for capacity building.

However, even more than adequate financial resources to improve the land use and regional planning practice, the capacity of local government institutions need to be enhanced for better and efficient planning and development practice. At the regional level, Metropolitan Committees should be formed for greater urban agglomeration areas which will be primarily responsible for preparation of Concept Plan and Master Plan or Regional Plan, and at the Municipal level the structure suggested below may be responsible for preparation of CDP/Development Plan and various city level plans. The convergence of regional and city level plans should be done with formation and integration of Metropolitan and Municipal

Diagram: 16- Proposed Municipal Structure

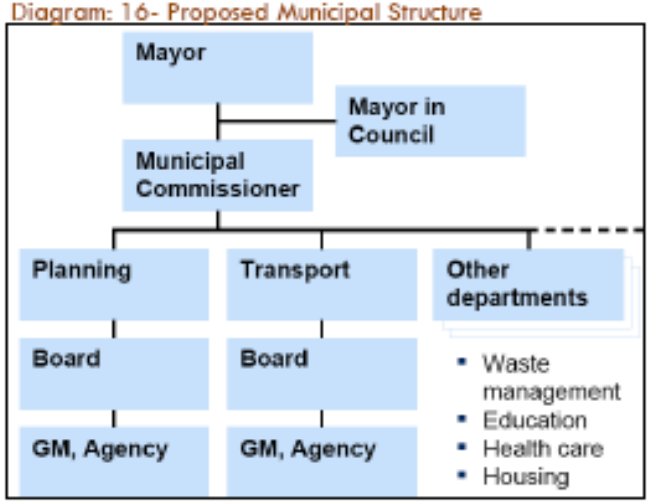


Diagram: 16- Convergence Process of various plans

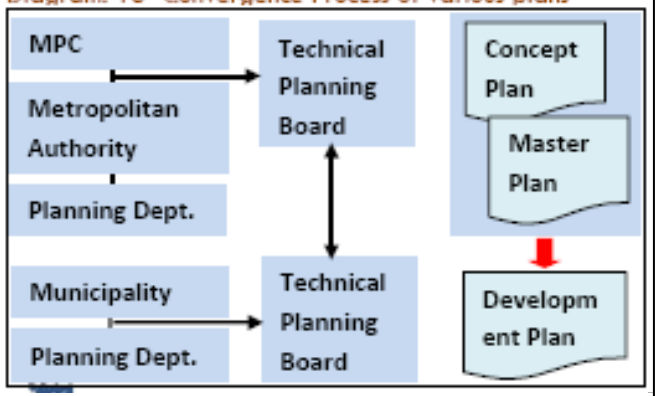
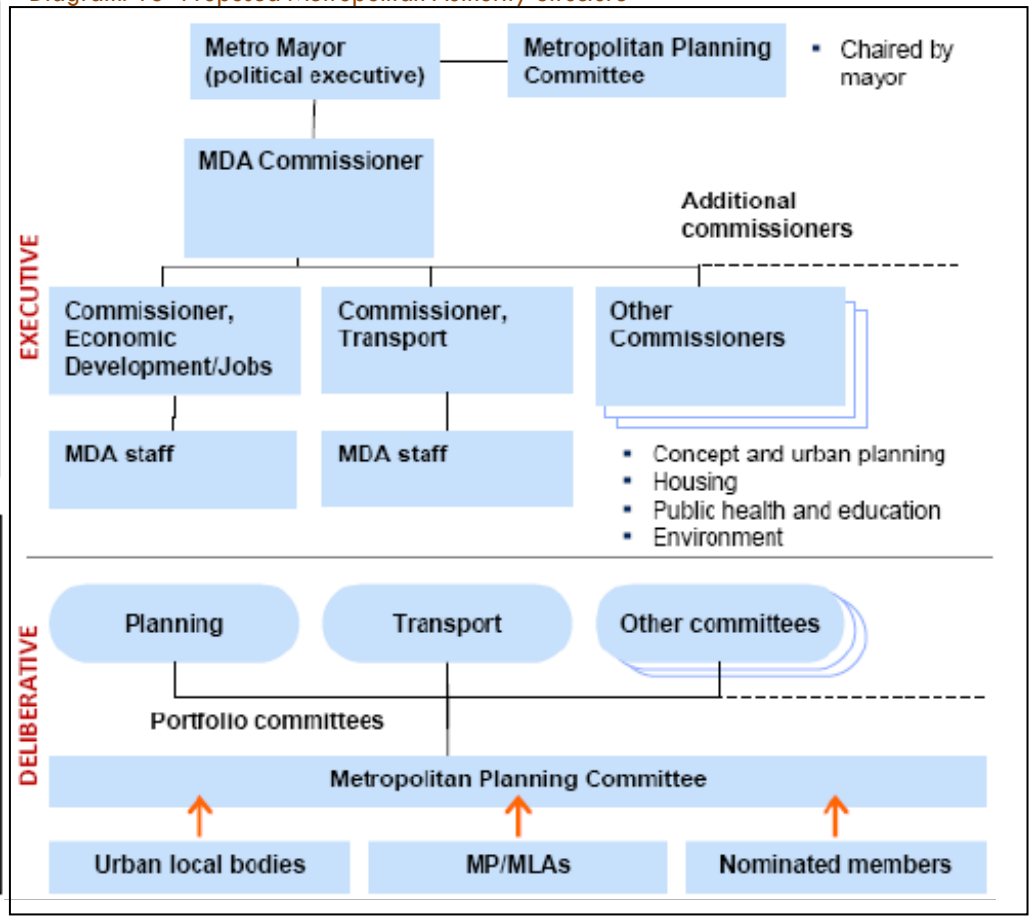


Diagram: 16- Proposed Metropolitan Authority Structure



2. Water supply and sanitation

Long Term Goal:

Environmental sustainability for cities with particular reference to water and sanitation sector requires insight into all the urban areas in terms of – who, what, why and how in terms of water management? This requires understanding of how the cities have organized their multiple institutions dealing with water and sanitation towards sustainability in its environmental, social, and economic dimensions in their policies, plan, programmes and projects.

The need is to explore in-depth the four areas of knowledge, namely – natural resources management (in this case water resources both surface/ground waters including aquifers, water bodies and drainage), sustainable development, planning, and environmental policies framework. The goal is to formulate adequate policies/plan/programmes and projects, encourage institutional reform, and generate awareness with regard to relevant information leading to successful implementation, enforcement, and compliance.

Current Status:

The 11th Five Year Plan for water and sanitation challenges included addressing the need for efficient management of water as an increasingly complex challenge in India. The Plan aimed to emphasize reducing water conflicts and addressing declining water quality in lakes and rivers. Then it was also evident that hardly any Indian city was receiving 24 hour supply of drinking water or even addressing new concerns like climate change and related uncertainty in water availability. For sanitation also the plan highlighted an urgent need to address practice of open defecation and generate awareness linking sanitation and health.

The XIth plan set following key targets:

- To provide 100% water supply accessibility to the entire urban population by the end of the Eleventh Plan in 2012.
- To provide 100% urban population access to sanitation(70 % sewerage and 30% by low cost sanitation)

To provide reform-linked infrastructure facilities in the urban areas, the Government of India had launched the two new programmes namely –

o **JNNURM** covering 63 cities with population above one million as per 2001 census, including 35 metro cities and other State capitals and culturally important towns.

o **UIDSSMT** for the remaining 5098 towns having population less than one million to cover all the towns as per 2001 census, irrespective of the population criteria.

Water Supply & Sanitation

- Flagship Programme – JNNURM's tentative outlay Rs. 1,00,000 crores (with state and ULB contribution)
- Others - Urban Infrastructure and Governance (UIG), Basic Services to the Urban Poor (BSUP), Urban Infrastructure and Development – Scheme for Small & Medium Towns (UDISSMT) Allocated, Integrated Housing and Slum Development Programme (IHSDP)
- Water supply & sanitation to get 40 % of the funds
- Thrust given to O&M of assets created
- Attention given to town and cities affected by surface and ground water contamination
- Comprehensive water tariffs and user charges should be fixed

The mid - term review of XI plan highlights the following status -

What happened and what is lagging?

JnNURM has effectively renewed focus on urban sector along with facilitative environment for critical reforms in states. The programme triggered many innovative ideas in states that will increase their ability to operate and maintain water and sanitation infrastructure. The programme has raised city aspirations – many cities experimenting to generate investment and started exploring innovation.

Around 80 % funds of UIG and more than 90 % under UDISSMT have been committed to water supply, sewerage, drainage and solid waste. Further 66% BSUP committed to slum development project and rest to build support infrastructure.

However, many states lack enabling capacity and funds, some state unwilling to adopt reform conditionalities, government bodies in states/ULBs do not have professionals to manage urban projects, as well as lack robust project approval, implementation, and monitoring mechanisms. The emphasis has been on 'investment projects' and holistic urban renewal, and an integrated view of city's development is currently missing in the implementation. Some other inter-related key steps initiated include:

- Release of the National Urban Sanitation Policy October 2008
- Ranking of 436 Class I cities in 2010 under NUSP
- Set up National Water Awards
- Service level benchmarking: benchmarks adopted in six critical areas including Water Supply and Sewerage etc. -

- Capacity building schemes for Urban Local Bodies – supported by creation of Centre of Excellence (CoE) at nine reputed institutions.
- Set up of National Sustainable Habitat Mission (NSHM), National Water Mission as part of Prime Minister's initiative - National Mission on Climate Change

Summary of Water and Sanitation: Characteristics and Challenges

	Metropolitan Areas (Municipal Corporations)	Cities (Municipal Councils)	Small Towns (Municipal Panchayats)
Number / Population share (% age)	139	1595	2108
Programme	JnNURM	No uniform programme	No uniform programme
Funds	Available	Available in some cities	Negligible
Human Resources	Available	Available in some cities	Number of vacancies
Capacity	Available in some cities	Minimal	Negligible
Political Processes	Good	Moderate	Good in some states
Governance	Variable	Variable	Variable
People's Participation	On the rise	Minimal	Negligible

Source: X111 Finance Commission Report, Government of India and Dr Bhagwat (WaterAid 2011)

The challenges in water and sanitation sector for ensuring environmental sustainability in India cities may be summarized as follows:

- Lack of integrated surface (including storm water) and groundwater as well as land and water management strategies, and includes multitude of authorities.
- Over centralized urban water / wastewater management developed till date targeting only select parts in a city – includes number of failed schemes due to poor O&M.
- Lack of sustainable and affordable decentralized natural water/wastewater management systems (example - rainwater harvesting, DEWATS).
- Extensive focus on water supply resulting in over extraction of groundwater by public utilities, private bodies, and individuals – this show up in total wastewater currently generated / projected in class 1 and 2 cities.
- Lack of focus on sanitation and health – more focus on sewerage.
- With increase in water supply availability wastewater generation is also increasing - cumulative effect of untreated wastewater can have wide-ranging degenerative effects on both the public health and the ecosystem.
- Lack of programme support and funding on water efficiency / conservation including reuse/recycle of water.
- Non-structural measures like flood proofing, flood protection (including protecting lakes/water bodies/wetlands) need to be funded or promoted.
- Cost of water increasing due to dependence on far-off resources.

- Huge distribution losses in water supply (20 – 50%) and water costs double as one-half is lost. Increased pollution in source water adds to cost of water treatment.
- Long transmission lines for both water and sewage infrastructures require high costs of delivery, dependence on electricity and are also cause for inefficiencies.
- Water/Sewage conveyance, pumping and treatment costs are among the major costs of urban local bodies.
- Full cost recovery of sourcing water, treatment, and managing sewage is difficult due to ground realities and only few can pay - class 1 &2 town/cities require financial resources to the extent of Rs. 45,000 crore to Rs 132,000 crore.
- Good practices in water /sewage management, including co-management of water and energy at project/building level, is still not mandatory except for buildings requiring EIA appraisal - new developments lack water sensitive design and planning.
- Water security issues are on rise in all cities – most challenging is small cities/towns. Further the mountain towns and cities are experiencing haphazard growth including provision of water and sanitation facilities to slum dwellers.

Strategy

In all Indian cities the results show substantial gap in respect of all the indicators in spite of the infrastructural additions over the years. In order to contribute effectively towards environmental sustainability in Indian cities, the water and sanitation services need to be made universally accessible and operationally sustainable, but the benchmark studies indicate substantial shortfall in service delivery, posing several challenges. Historically, the planning response to these challenges has been expansion of infrastructure with greater capital investment.

Decentralized governance was attempted with the 74th Constitutional Amendment Act, 1993 delegating the functions of water and sanitation, among others, to the urban Local bodies. Yet, the sector performance could not be improved to compare with the best practices world over as evident from assessments from time to time and from the benchmarking studies.

In a paradigm shift, the Government took up the challenge of implementing urban reforms aimed at improving the delivery of services in the entire urban sector including water supply and sanitation under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) launched in December, 2005. Under the scheme, Additional Central Assistance is provided to the cities and subject to the implementation of a set of reforms. The reforms particular to the water supply and sanitation sector are:

- 100% cost recovery for O&M
- Universalization of service access including the urban poor
- Revision of building bye-laws for making rain water harvesting mandatory in new buildings
- Revision of building bye-laws for reuse of treated waste water

The NMSH sub-group on water and sewage committee has suggested that implementation of service level benchmarking which implies an outcome oriented approach be mainstreamed further at every stage i.e. planning, implementation, and monitoring. In recognition of the fact that the SLB framework may not be met initially, a range of values for SLB indicators has been suggested as per the chart for different grades of sustainability, the ideal being the SLBs themselves (refer annexure). Besides the above, the issue crucial for sustainable habitats, common to both water and sanitation sectors is energy efficiency. The goal is to provide municipal water supply and sewerage services at least cost and least environmental impact.. BEE has identified 171 ULBs for energy efficiency studies under the MUDSM (Municipal Demand

Side Management) Programme being implemented in phased manner. ULBs can also take up energy efficiency studies and measures proactively, based on BEE guidelines

Strategies

Keeping in view the status of urban water supply and sewage management and the wide gap in their delivery, it may be summarized that the availability of water supply will fall short of essential requirements due to increased urbanization and may made worse by the polluting potential of untreated sewage. The following strategies are suggested:

a) Water Resources / Demand - Supply Management:

1) City water resources planning and augmentation plan should include resource sustainability of surface water as well as protection of groundwater recharge areas as a condition of accessing funds.

2) Cities should be encouraged to create/develop own sources to reduce cost of water supply and also to avoid conflicts with irrigation/agriculture sector.

3) Local sources of water such as lakes, ponds, and springs must be environmentally managed and used for water supply. Conjunctive use of surface and ground water should be explored.

4) Water resources departments may adopt socially conscious actions such as imposing royalty on water; mandating water supply to all habitations in the influence area; introducing efficiency incentives/disincentives on the quantum of water drawn with respect to norms; imposing conditions for 100% treatment of waste (return) water and if not, penalties for the same..

5) Intensive and continuous public campaigns implemented for awareness on all water related aspects – cost of water production (the true economic cost of water including its scarcity value), health & economic losses due to polluted water, wastages, and shortages.

6) Cities should be encouraged (or it should be mandatory) to get a part of the water supply from decentralized systems.

7) Water utilities should plan for full cost recovery (including capital and O&M) and share the cost of production with users to help develop sustainable water management models, including by cross-subsidization of supply in case of housing for weaker sections by others.

8) Adoption of universal consumer metering and volume based tariff. Over-consumption of water to be controlled by escalating tariff blocks. Consumption beyond the benchmark should attract progressively increasing tariff. This will lead not only to sustainable consumption but also revenue generation and promotion of equity.

Good Practices:

Rain Water Harvesting (RWH) and Recharge of Aquifers:

RWH and recharge may be made mandatory. Cities should be encouraged (or it should be mandatory) to get a part of the water supply from rainwater harvesting systems – storage or recharge. Ground water recharge areas need to be delineated, mapped and protected. Low lying areas river flood plains and lakes may be identified and reserved for storing rain water for better environmental conditions. A system of ground water table monitoring wells may be developed at ward level to be used for assessing efficiency of RWH measures and also warning against excessive exploitation of ground water.

Water Audit and Water Efficiency

Water audit should include details of source-wise share of water supply. Utilities/ ULBs should adopt universal metering for consumers, bulk supply and transfer etc., of water for enabling measurement of system input and output and calculate the losses. Water Audits may be carried out at periodic intervals. The water supply and other utilities networks should be mapped and city and zonal digital maps prepared for frequent check and validation of the infrastructure. The new developments and additions in infrastructure shall be regularly added to the database and digital maps. Further water efficient fixtures (taps/faucets, flushing tanks, water closets, urinals, bidets and bath tubs) may be promoted through citizen information as well as fiscal incentives.

b) Sewage management

Complete access to sewerage – sanitation

1. Using a combination of on-site and off-site sewerage / sanitation systems for waste water / sewage, 100% treatment should be ensured. City sanitation plan with a sub component plan on septage management should be made mandatory for accessing funds.

2. In view of the higher polluting potential, sewage management charges should reflect full cost recovery of O&M operations, including through cross-subsidization of housing for weaker sections by others.

Good Practices: Recycle and reuse of wastewater:

Cities should be encouraged (or may be made mandatory) to meet part of their water supply, at least for industrial use, by reuse/recycle of treated sewage. (Dis) incentives may be provided to users (through water tariff, property tax etc) for the recycle and reuse of treated wastewater. These should also be incorporated in building bye-laws for new constructions.

Energy Efficiency in Water/Waste Management:

Energy Audit may be mandated at prescribed intervals for efficient functioning of electro-mechanical equipment in the sector.

Mainstreaming of Service Level Benchmarks (SLBs) for sustainability as suggested by the NMSH sub-group on water and sewage committee – refer annexure.

Conclusion:

For overall sustainability in respect of the water and sewage sector in Indian cities, a holistic view needs to be taken, distinct from the piecemeal and segregated approach taken so far, through failure to recognize the unity and integrity in the hydrologic cycle. Small towns/ cities need to develop sustainable and affordable water and sanitation systems (and do not need to go the way metropolitan cities water and sewage is currently managed i.e. first grow and then clean). For environmental sustainability cities need to plan in advance and scale.

The current institutional water/wastewater management model needs rethinking and reworking to ensure community participation and involve in trust building. All of this will be expressed in a wide range of interdependent public policies, plan, programmes/project as well as regulations and law. Thus close coordination between central Ministries (M/o Rural Development, Urban Development, Environment and Forests, Power) and state/ local level institutions is essential for success – a transformational challenge.

3. Solid waste management

Background

- The growth in population, increasing urbanization and rising standards of living have contributed to an increase in the quantity of Municipal Solid Waste (MSW) generation in the country.
- India produces around 70 Million tons of MSW annually, of which at present less than 5% is processed scientifically.
- Given the scarcity of urban land for scientific waste disposal there is the common prevailing practice of open dumping with most of the dumpsites overflowing in our cities. Due to this practice waste continues to be one of the biggest public health, environmental, and land use challenges in urban India.

Current scenario

- Solid Waste Management (SWM) includes collection of the waste, its transport, processing, and recycling/reuse or disposal. Management of MSW is a mandatory function of all Urban Local Body's (ULB's). The regulatory framework is laid out in the 'Municipal Solid Waste (Management and Handling) Rules, 2000'. The Rules emphasize the principle of 3 R's - to Reduce, Reuse and Recycle but have not been sufficiently implemented in spite of Supreme Court intervention.

- Constrained by lack of institutional and financial capability, the municipalities are dependent on budgetary sources of revenues from the State or the Centre. The budgetary allocation by municipalities for SWM is between 20-40% of their total budgets, out of which 80% is spent on collection and transportation and a negligible amount on processing or disposal. Till date forty (40) SWM projects have been sanctioned under JNNURM with a total outlay of Rs. 2186 crores. Most of these resources have gone towards creating capital assets with insufficient emphasis on Operations and Management (O&M).

- There is lack of viable and sustainable business models in the sector to enable private sector engagement under public-private partnerships. With the absence of tipping fee for processing and disposal there is no clarity on roles and responsibilities for SWM. Outlay for emerging issues such as Construction & Demolition (C&D) waste

management and E-waste management is absent. The tendering procedures are not standard and result oriented (as many private sector operators underbid and underperform). There are insufficient incentives/penalties to ensure performance in contracting for MSW projects.

Goals and Focus Areas:

In order to attain clean and hygienic environment for our cities, waste management services need to be streamlined with 100 per cent of solid waste collected, transported, processed, and the process rejects scientifically disposed. This would also be in compliance of the applicable rules. In addition to municipal solid waste, there are other urban waste materials generated, which also contribute to health, hygiene and environmental problems. Some of these are still not well defined and clearly mandated. For example, bio-medical and other hazardous waste generated at home (rejected medicines, paint, injection syringes etc.), automobile garages, small / micro industries (lathe machine, electro-plating etc.). The following focus areas need to be addressed:

(i) Comprehensive and interactive planning involving all the stakeholders and the citizens, which is the clue to success or otherwise of any program.

(ii) Development of technology packages / combinations, suitable for Indian waste for integrated waste management.

(iii) Develop systems for hazardous waste generated at household and commercial levels within the city.

(iv) Introduce 3R approach for reuse and recycling of all possible waste streams. Minimum waste should be permitted in the landfill.

(v) Rationalization of municipal taxation so that the ULBs are financially self-sufficient.

(vi) Institutional capacity building for the ULB functionaries.

(vii) Effective public private partnership is crucial for the SWM sector. Detailed project specifications and standard tendering and concession models with a focus on life-cycle management concept (O&M, post-care).

(viii) Land and Environmental clearances to be provided by the public authorities, preferably prior to tendering, or at least facilitated post-acceptance of bids. These issues are major bottlenecks due to NIMBY ("not in my backyard") syndrome and long time required for clearances.

(ix) Due to the thin margin of operations, regular payment is essential for private sector operators. For bailing out cash deficit municipalities, a 'bill discounting' mechanism backed by the centre / state governments may be put in place to ensure timely payment.

(x) Fiscal and financial incentives for the sector, e.g., transport subsidy for compost, suitable power tariff for waste to energy projects, exemption of sales tax and excise duty on recycled construction and demolition waste products etc. These exemptions / incentives will encourage investors and operators. Appropriate emphasis should be put on ensuring sustainable operation rather than only on capital subsidies.

(xi) Sustained public awareness generation for creating an environment of cooperation and understanding with the ULB.

4. Energy Efficiency Interventions

Goals

- 75% of all new commercial buildings coming up in the 12th plan period between 2012- 2017 (about 369 million sqm[1]) should be ECBC compliant, of which 25% are expected to be complete and operational; 20% of existing commercial buildings (about 745 million sq m) become energy efficient through retrofits. Avoided capacity of 1000mW from both new and existing buildings. Technical potential to save about 10.77 billion kWh by 2017 from new and existing buildings.
- 10 million sqm of built up (2012-2017) area in commercial and residential sector to be GRIHA complaint as per MNRE targets; potential to save 40% in energy and 30-40% in water consumption over BAU.
- Engagement of ESCOs to enable energy efficiency retrofit in existing buildings. The overall energy efficiency investment market size under ESCO system of performance contract in India has been estimated by an ADB study at Rs 140 bn (Rs. 14000 crores) and has the potential to save about 54 billion units of electricity annually.
- Municipal building bye-laws to revised to be compliant with norms of resource conservation (energy, water)and RE integration (solar water heating, meeting part electricity/energy demand by use of renewable energy resources such as solar, wind, biomass etc)
- Public procurement procedures should facilitate induction of energy efficiency products
- BEE labeling should be developed and mandated for all household appliances
- Green building courses should be easily accessible and offered by universities/colleges
- Water efficiency labels to be introduced for faucets etc
- Availability of green products(building materials, lighting and space conditioning equipment ,interior products) that are cost competitive
- Financial products to support the industry to be developed with public/private financial institutions.
- Simpler legal approval process for green buildings
- Establishment of eco cell in Urban development bodies of states to offer advisory services
- Strengthening of implementation and monitoring mechanism

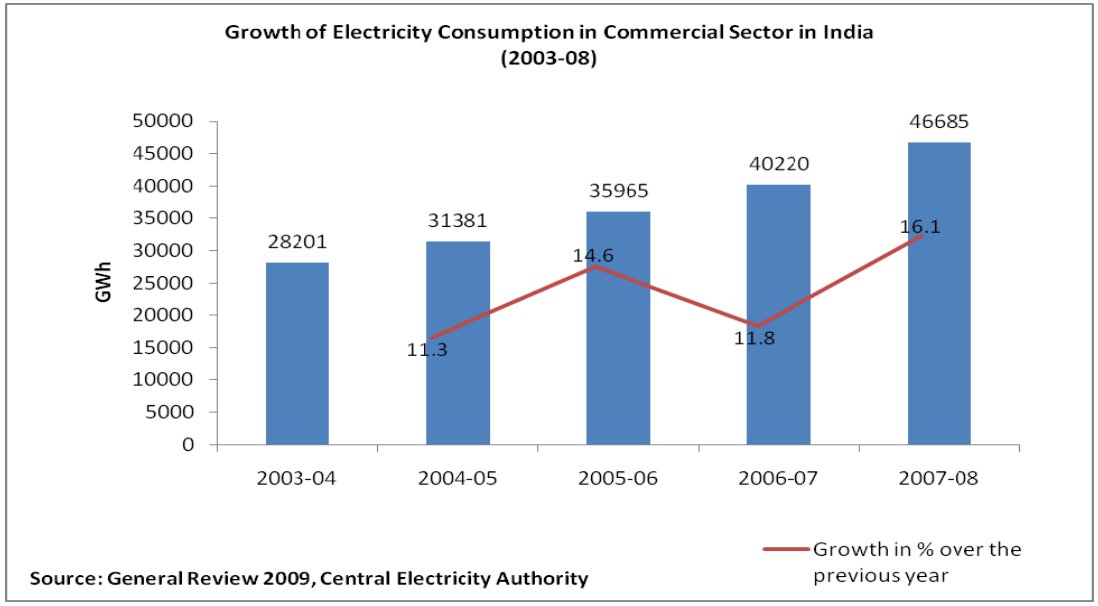
[1] BEE estimates

Current status

- The Bureau of Energy Efficiency (BEE), Ministry of Power, launched the Energy Conservation Building Code (ECBC) in 2007, for voluntary adoption in the country, under the Energy Conservation Act of 2001. The Code regulates minimum energy performance in commercial buildings with a connected load of 100 kW or more. Presently, the code is in vogue on voluntary basis. However some the states have modified and started notification for their states.
- BEE developed model building bye-laws to mandate minimum energy standards for residential and commercial building complexes under a committee constituted by the MoUD for formulation of draft National Sustainable Habitat parameters on energy efficiency.
- Harmonization of ECBC with NBC 2005 has been initiated by including a chapter “Approach to Sustainability”, which being done through a committee is constituted by the BIS.
- The ECOnirman conformance Check Tool has been developed with the objective of helping architects and design professionals to assess the conformance of their designs with the code requirements.
- On the mandatory adoption of the code by the states, the capacity building of the building design professionals & the code compliance authorities would be essential. BEE has developed standard training modules & conformance tools for this purpose.
- BEE has developed a Star Rating Program for existing commercial buildings, which is based on actual energy performance of the buildings, expressed as an Energy Performance Index (EPI) measured in terms of annual electricity consumption per unit of built up area (expressed in kWh/m2/year). 123 commercial buildings comprising day use office buildings, BPOs, and shopping malls have been labeled so far.
- In order to promote energy efficiency in existing buildings, a scheme to promote Energy Efficiency in Government Buildings has been developed by BEE. The approved scheme provides for funding of Investment Grade Energy Audits (IGEA) being arranged by the Central Government Agencies/ State Designated Agencies. Nearly 500 DPRs have so far been made under the scheme.
- 89 ESCOs have been accredited till date with BEE.
- The MNRE is promoting GRIHA Rating System through some promotional incentives under which 126 projects have been registered with 7 million sq. m built up area. ADaRSH an independent registered society for promotion and implementation of GRIHA rating system in the country has been created. As per a discussion of CoS, all Central

Government Buildings are to be constructed as green buildings with GRIHA ratings. The Ministry is providing financial support for capacity buildings, awareness, exemption in rating-cum-evaluation fees, promotional incentives for architects, engineers etc. under the scheme.

- 15 Evaluators & Trainers Workshops have been organized in which 158 Trainers and 158 Evaluators have been trained through who are further promoting green buildings in the country. Eight buildings have been given star ratings under GRIHA.
- A comprehensive GRIHA Manual has been developed.
- Green guidelines for large areas developed by ADaRSH and MNRE.
- ECBC provisions have been incorporated in the mandatory requirements of EIA appraisal for buildings with activity area of more than 20,000 sqm since 2006.



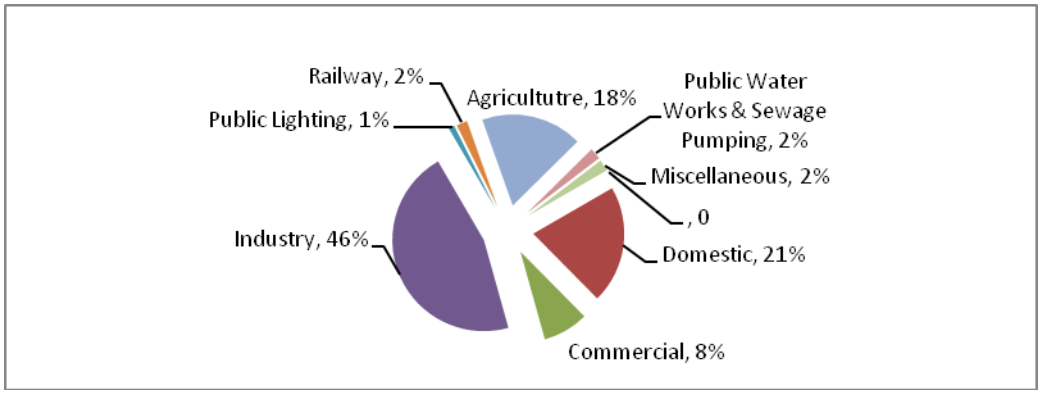
Strategies

To achieve energy savings at the national level, an integrated approach is required in India for implementation and monitoring of the government programmes in place.

- A regular inspection regime in place along with a pool of monitors who can validate performance shall impact building performance. Strengthening of environmental clearance process and synergizing with other mandatory/voluntary approaches that aim to achieve similar objectives (e.g synergizing with voluntary rating systems and ensuring due diligence)
- Synergizing with MHRD to introduce large scale capacity enhancement through education and awareness. Capacity building at various levels, including policy makers and officials involved in implementation of the strategy to ensure a common understanding of objectives to be achieved by various initiatives, would be required as well.
- The National Mission on Sustainable Habitat offers a platform for enhancing compliance with the ECBC and integrating energy efficiency measures in the municipal-level building bye-laws. Review of its implementation should be institutionalized at city, state, and national levels.
- A pool of subject specialists and experts for conducting audits of buildings in India should be developed. Under the current framework, the energy auditors accredited by the BEE do not have a system-wise specialization. However, based on the experience from GRIHA, where evaluation of a GRIHA registered project is undertaken by the subject expert, stronger compliance could be ascertained.
- Protocols and documents such as the Central Public Works Department's Plinth Area Rates and current building bye-laws implemented at the local level require revision to incorporate programmes established at the national level.
- Municipalities should be empowered to take up green building initiatives (PCMC model is one such model).
- Residential buildings (private and public) should be complaint with green norms.
- Extensive research and development support around evolution of materials, techniques and strategies to support the sector

- Milestones & indicators of results
  - No of buildings rated
  - No. of building audited and retrofitted
  - No. of municipal byelaws revised
  - No of ECBC complaint buildings
  - No. of courses launched
  - Energy/water saved
  - No. of people /organizations trained
- Changes required in monitoring of policies

Fig- shows sector wise distribution of electricity consumption, which indicates 8% electrical consumption in commercial buildings, 1% electricity consumption in public lighting and 2% in public water works & sewage pumping.



Budgetary implications of these schemes and programs

BEE proposal

S.no	Activity	Estimated Budget (Rs in crores)
1.	Certification for compliance checks , Stakeholder consultations for product labeling , capacity building of building professionals etc .	7
2.	Incremental Costs in demonstration projects	24
3.	Showcase Technology Interventions	7
4.	IGEAs in 1000 govt / public sector organizations	20
5.	Awareness campaign through Print and Electronic Media	7
T O T A L (2012-2017)		65

(Rs. in Crore)

Sl. no.	Items of the Scheme	2012-13	2013-14	2014-15	2015-16	2016-17	Total
1	Pending Liabilities including the balance registration cum evaluation fee.	**2**	**2**	**1**	-	-	**5**
2	Rating-cum-evaluation fees (10 million sq. m built up area @ Rs. 50 per sq. m)	10	10	10	10	10	**50**
3	Capacity Building activities including Trainings, e-learning tools, Devp of Regional Centers, Lecture Series In educational institutions, Curriculum Devp., Green Building Chair in Institutions etc.	6	6	6	6	6	**30**
4	Awareness Generation Workshops and seminars Advt. , Awards to Students for green building Projects	5	5	5	5	5	**25**
5	Other incentives to Municipal Corp. Awards	5	5	5	5	5	**25**
6	Demonstration of innovative products /technologies / components in existing / new buildings, design development and R&D, Development of guidelines for new sectors etc.	20	25	25	20	10	**100**
7	Green concepts for existing Buildings	5	5	5	5	5	**25**
	Total	**53**	**58**	**57**	**51**	**41**	**260**

5. Managing air quality in cities

Plan to improve air quality in cities as envisaged in the 11th Five year plan (2007-2012)

As many as 76 cities/towns are found to exceed national standards of air pollution parameters mainly due to vehicular and industrial pollution measured in terms of ambient air quality in residential, industrial and sensitive areas for SO2, oxides of nitrogen, Suspended Particulate Matter, RSPM, ammonia, and carbon monoxide.

Key targets of the 11th FYP

Air quality monitoring augmentation plan

- City based Clean Air Action Plans (CAAPs)
- The Air Quality Monitoring network should be expanded from the current 308 stations to 1000 stations. CPCB coordinates monitoring of ambient air quality at 308 stations covering 115 cities/towns in 28 States and four UTs in the country.
- A programme for real time air quality monitoring for cities with population of more than 1 million was started during the Tenth Plan and automatic air quality monitoring systems in about 8 cities. 11th Plan proposed that real time monitoring of PM2.5, ozone, VOCs, PAH, secondary pollutants—sulphates and nitrates—will be organized in about 15 cities per year, to cover the 76 cities which currently exceed the four specified levels of air pollution.
- Source monitoring of VOC, BTX (benzene, toluene, and xylene), and toxic heavy metals will be initiated to develop control measures.
- The monitorable target s for air quality should be to achieve national standards (or WHO norms where national standards have not been notified) of air quality in all major cities by 2011–12.

Status of activities

- **Air quality monitoring stations:** MOEF annual report for 2010-11 gives an overview of the air quality monitoring network established in the country. There are 446 ambient air quality monitoring stations operational covering 182 cities/towns in India and presently, sulphur dioxide (SO2), nitrogen dioxides (NO2) and fine particulate matter (PM10) are monitored under National Ambient Air Monitoring Programme (NAMP) by the Pollution Control Boards, Pollution Control Committees, and Universities and Research Institutes. The 11th plan envisaged establishing about 1000 stations from 308 stations then. Therefore the achievement at the end of 2010 can be termed nearly 50 per cent achievement of the target. However still there is one year to go.

- In selected cities of the country additional parameters for other toxic trace matters and polycyclic aromatic hydrocarbons are also being monitored. Continuous air monitoring has been introduced in 27 cities namely; Agra, Ahmedabad, Bangaluru, Chandrapur, Chennai, Cuddalore, Delhi, Durgapur, Faridabad, Ghaziabad, Haldia, Howrah, Hyderabad, Jaipur, Jharia, Jodhpur, Kanpur, Kolkata, Lucknow, Mumbai, Panipat, Patna, Pune, Solapur, Tuticorin, Vadodara and Varanasi. A total of 81 manual monitoring stations have been added in the network under NAMP during 2010-11.

- **City based Clean Air Action Plans (CAAPs)**: According to information provided in latest available national air quality status report, clean air action plans exist for the following cities:
  - Cities to be reviewed by Ministry of Environment & Forests (MOEF): (7 cities) Agra, Jharia, Varanasi, Faridabad, Patna, Jodhpur and Pune.
  - Cities to be reviewed by Environmental Protection (Prevention & Control) Control Authority (EPCA) (7 cities) Ahmedabad, Kanpur, Sholapur, Lucknow, Bangalore, Chennai and Hyderabad
  - Cities being reviewed by the respective High Courts: (2 cities) Mumbai and Kolkata[i]

State of urban air in Indian cities

- Many Indian cities suffer from high levels of air pollution. There are many challenges. The key metro cities including Delhi where action has started, show improvement and stabilization. But even after improvement the pollution levels are still unacceptably high. In respect of certain parameters. In the meantime, pollution hotspots are proliferating and even some medium and small sized towns have pollution levels as severe as mega cities. National reports are still awaited, but recent data on annual average levels of SO2, NO2 and PM10 for some cities indicates that several cities exceed the PM10 standard and NO2 levels also shows an increase in some cities.

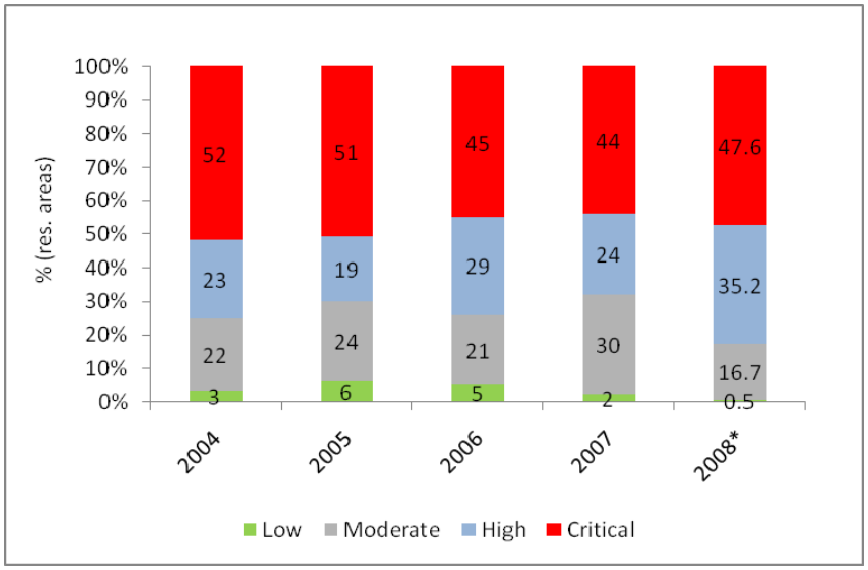
- The most widely monitored air pollutants are particulate matter of less than 10 micron size (PM10), nitrogen dioxide, and sulphur dioxides.

Particulate pollution: Tiny particles of less than 10 micron size that go deep into the lungs are more dangerous than the coarser particulate matter. These show persistently high levels. Out of 130 cities monitored in 2008, about 109 cities (83 per cent) have exceeded the annual average standard of 60 microgramm per cubic metre for protecting human health (notified in 2009).

Severity of pollution varies across regions and cities. According to the air quality classification system developed by the CPCB, 70 cities (54 percent) have critical levels that exceed the new annual average standard by 1.5 times; 39 cities have high pollution (1–1.5 times the annual standard), and only 20 cities have recorded low levels, i.e. s 50 per cent below the standard**.**

Graph: Status of PM10 levels

Nearly half of the cities (residential areas) are critically polluted



*Note: * From 2008 onwards new standard of 60 microgram per cubic metre has been applied*

Air quality classification computed on the basis of standard for residential areas.

1. Cities with annual average level more than 50 per cent of the standard is termed as 'critical pollution level',

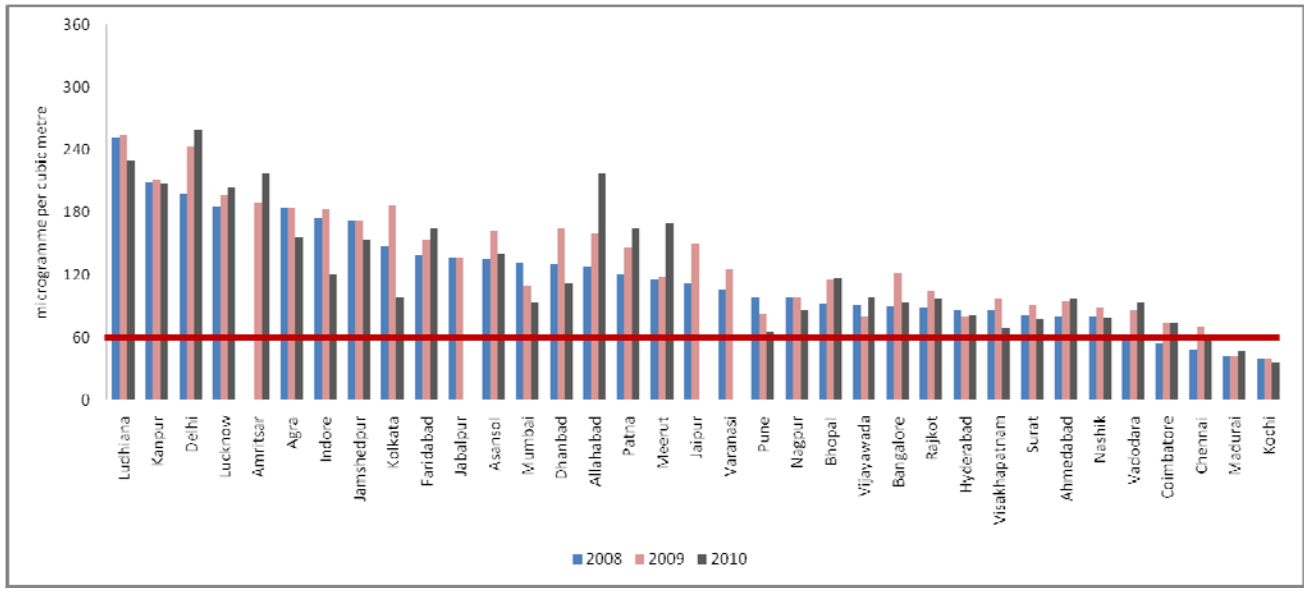
2. Up to 50 per cent above the standard is termed 'high pollution level'

3. From 50 per cent of the standard to the standard limit is termed 'moderate pollution level'

4. Below 50 per cent is termed 'low pollution level', i.e. from 0-30 µg/m3.

Source: Based on CPCB air quality statistics

Graph: PM10 trend 35 metro cities



Source: Anon 2011, Level of Air Pollution in Metro Cities, Ministry of Environment and Forests, 15-March, 2011

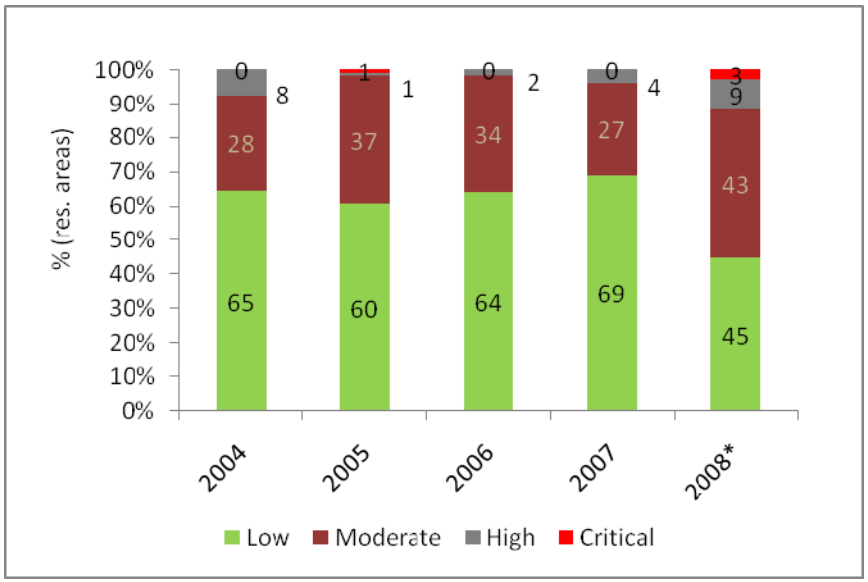
Summary:

- The national ambient air quality status report by CPCB for 2009 and 2010 is still awaited, but other recent data on annual average levels of SO2, NO2 and PM10 for 35 cities indicates that several cities exceed the PM10 standardand NO2 levels also shows an increase in some cities. Of the total selected 35 metro cities by MOEF, the PM10 levels are below the annual standard of 60 microgramme per cubic metre in only three cities namely Chennai, Madurai and Kochi. In terms of annual PM10 levels during 2010 Delhi has the highest level followed by Ludhiana, Amritsar, Allahabad, Kanpur, Lucknow, Meerut, Patna, Faridabad, Agra, Jamshedpur, Asansol, Indore among others.
- India's NAAQS is close to WHO's Interim Target – 1 which is 70 micrograms per cubic metre as annual mean.

Nitrogen oxide levels are rising: Nitrogen dioxides $NO_2$is emerging as a new health threat. The CPCB's National Ambient Air Quality Status for 1998 had reported only 5 locations in India that had exceeded the standard for NO_2. But by 2008 around 19 monitoring locations exceeded the applicable annual average standard. When we apply the CPCB's new health based air quality standards for NO2 (40 microgramme per cubic metre) the data reveals that as many as 62 locations and about 15 cities exceed the standard.` In many other cities NO2 levels are rising steadily, and the levels are higher in the eastern cities. Cities that exceed the annual mean standard are Asansol, Kolkata, Delhi, Jamshedpur and Meerut. However the trend for past three years indicates that NO2 levels are increasing in many cities.

Graph: Status of NO2 levels

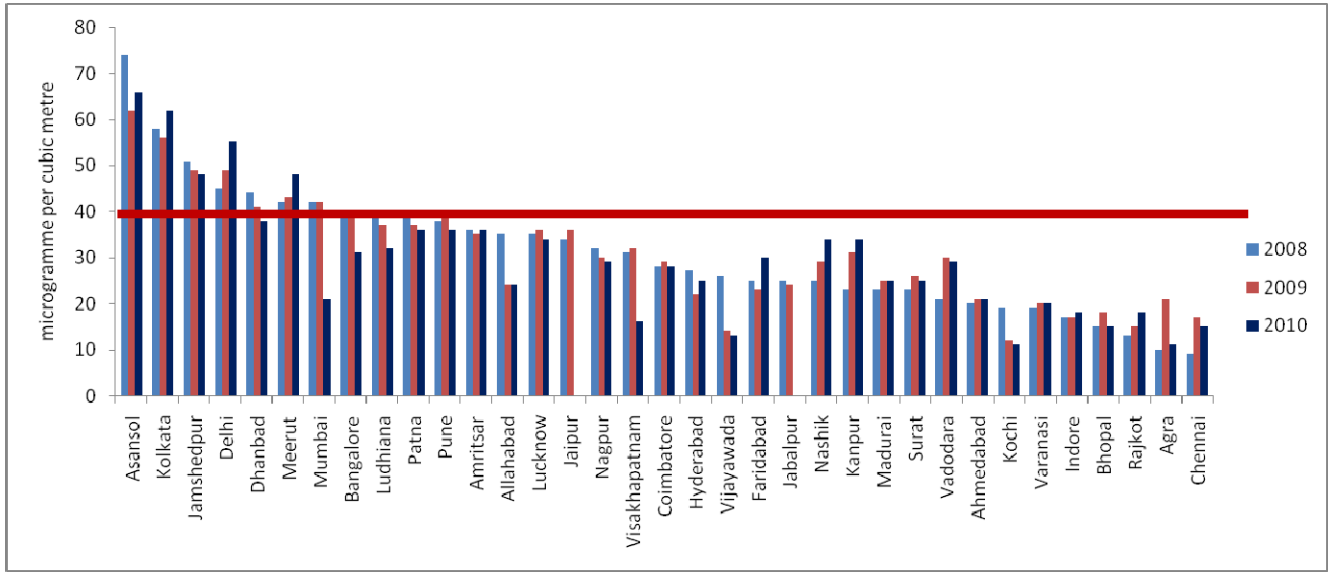
NO2 is an emerging threat in many cities



Note: * From 2008 onwards new standard of 40 microgram per cubic metre has been adopted.

Source: Based on CPCB data

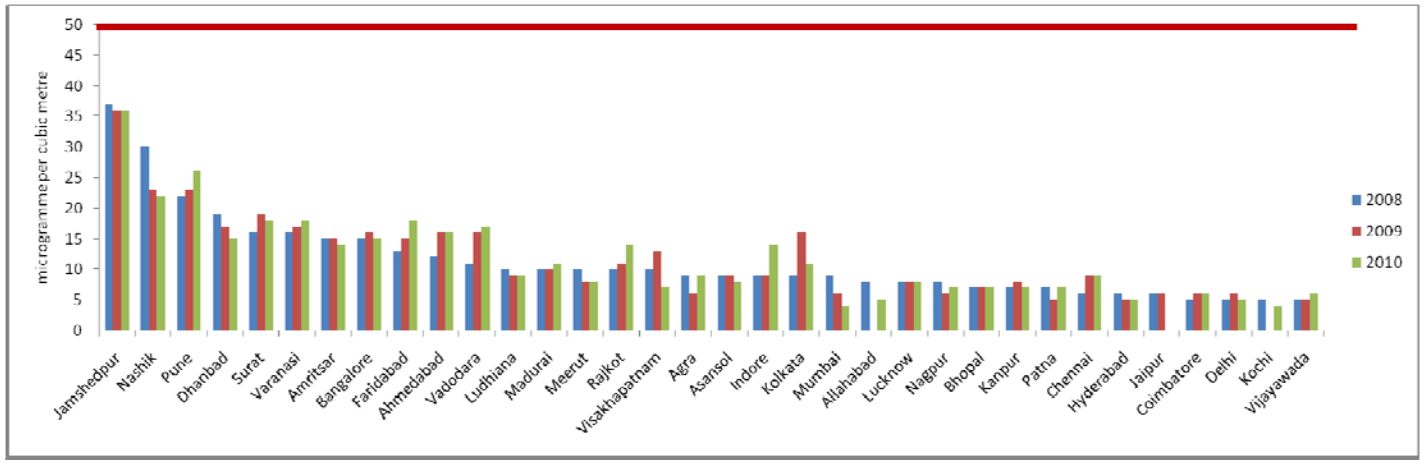
Graph: NO2 trend in 35 metro cities



Source: Anon 2011, Level of Air Pollution in Metro Cities, Ministry of Environment and Forests, 15-March, 2011

Sulphur dioxide under control: Sulfur dioxide that can have lethal effect on human health is not considered a problem in India any more. Its levels are already very low and declining. However, there are some industrial cities such as Jamshedpur, Nashik, Nagda, Chandrapur that have recorded moderate levels. Change in the urban fuel mix including shift from coal in industry and shift to liquefied petroleum gas and kerosene for cooking have largely contributed in lowering of SO_2 levels.

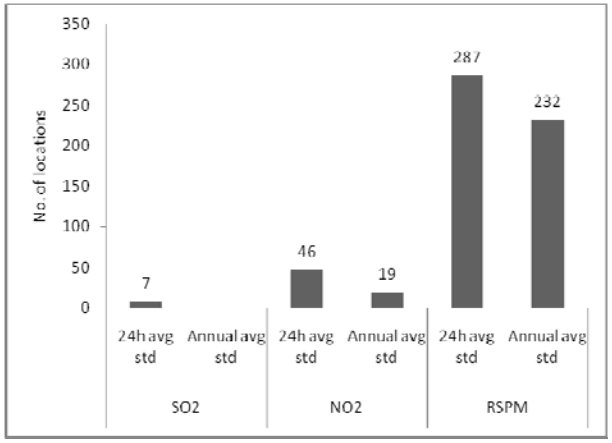
Graph: SO2 trend in 35 cities



Source: Anon 2011, Level of Air Pollution in Metro Cities, Ministry of Environment and Forests, 15-March, 2011

Trends in daily levels: The annual average trends are often not good indicators of actual exposure to pollution levels on a daily basis. Even if annual average levels decline or show a stable trend, number of days and locations exceeding daily standards may increase. The 2008 national air quality status report indicates that the number of stations violating 24 hourly standards is more than stations violating the annual average standard.

Graph: Number of monitoring stations violating NAAQS (2008)



Source: Anon 2009, National Ambient Air Quality Monitoring, Series: NAAQMS//2009-10, National Ambient Air Quality Status 2008, Central Pollution Control Board, Ministry Of Environment & Forests, August 2009, p18

Air toxics: There are also a large number of trace gases in the air that are toxic and/or cancer causing even at very small dosage. CPCB monitors toxic gases absorbed in the particulate matter. These include benzene soluble organic fraction, and polycyclic aromatic hydrocarbons. But the capacity to monitor them is still very limited in India. This data is available from only short term studies and monitoring only in a few locations. In Mumbai PAH levels have been reported in the range of 24.5 and 39 nanogramme. per cum,in Kolkata upto 31 nanogramme per cum, and In Delhi the range has been reported at 6-53 nanogramme per cum. There is need to generate more regular and robust data on air toxics in Indian cities to understand the impact of industries and motorization.

Strategies:

- **Expand and strengthen monitoring network:** India needs to strengthen its monitoring network for more comprehensive population coverage and also generate reliable data on newer pollutants of concern like PM2.5, ozone and air toxics on a regular basis across all cities.

- **Enforce monitoring protocol for credible data**: Quality of data is often suspect as the basic criteria of monitoring like the minimum number of days, siting of monitors, etc. are not necessarily met. This will have to be improved.

- **Smog alert**: Even though there has been considerable improvement in reducing the time lag in reporting air quality data, real time online data to issue daily advisory to people on health precaution is still missing in nearly all cities. Manual processing of data from across the regions is time consuming and not appropriate for daily smog alert. The daily alert system is still very rudimentary in a few cities. CPCB relays some limited data to media. Asystem of daily alert of peak pollution level is needed to warn the vulnerable sections suffering from respiratory and cardiac problems to stay indoors and take precaution as high peaks of ozone, particulate matter can immediately trigger symptoms. Such alert systems are practiced in several other countries like the US, Mexico, France etc. Air quality monitoring can be made more relevant to public health if the daily data is used to implement a daily smog alert system in the cities to enable the city authorities to enforce pollution emergency measures.

- **Enforce quality audits of monitoring stations**: Risk assessment can be seriously hampered if the quality control system for monitoring is not followed.

- **Targets for key pollutants of concern:** The plans must identify pollutants of concern and prioritize the toxic sources for risk reduction. Priority action plan must include strategy to reduce emissions from combustion sources first.(more details on the recent controversy:

- **Vehicular technology and fuel related policies:** would depend on stringency of new standards. The government must work towards the post-2010 roadmap for uniform introduction of Bharat Stage IV standards across the

country and set timelines for Euro V/VI emissions standards for both oil and automobile sectors, to enable them to plan in advance.

The Delhi government has proposed, on environmental grounds, to increase the tax on diesel-run vehicles by 25 per cent at the time of registration. Along with this decision, the Delhi government has also made a significant move towards waiving off VAT on bicycles, to encourage these zero emitting vehicles of the *aam-admi*. There is a need to align small diesel car definition with that of petrol for tax classification. Currently small petrol car is legally defined as one with length not exceeding 4,000 mm and with an engine capacity not exceeding 1,200 cc. For diesel small car this has been relaxed to 1,500 cc Taxes must also begin to reflect the actual fuel use in cars to prevent shift towards bigger cars that use more fuel and threaten energy security.

- **Some mobility related measures**
  - **Augment public transport**
  - **Integrate with IPT and NMT**
  - **Increase road taxes on private vehicles to build a public transport fund:** Simultaneously, the city should increase the taxes on private vehicles, to fund the public transport transition. In this way, the loss of revenue on account of waiver on public transport buses can be offset by higher road taxes on personal vehicles. Higher taxes on personal transport can also help to create dedicated fund to augment public transport facilities in the city.
  - **Parking policy as a strategy to improve public transport and augment the dedicated fund for public transport:** Pricing of parking should be based on principle of 'user pay' reflecting the true opportunity cost of the public good i.e. scarce urban space. Current parking rates in the city are low and act as a hidden subsidy to the car owners. Parking fees should also be designed to target the peak hours and peak demand to influence commuter choice and open up options. This revenue can also be utilized to create a dedicated fund for public transport.
    - Parking provision should work on the principle of parking restraint to put brakes on car growth and usage. And to discourage people from using personal vehicles.
    - **Utilize parking facilities to promote public transport and non-motorized public transport:** The new parking structures should be used innovatively to improve usage and integration of public

transport. Locate parking structures close to the interchange points of the public transport nodes like metro and bus stations, and use them for park and ride system to reduce pressure in the commercial centres. Link them with the targeted commercial areas with feeder services that include three-wheelers, cycle rickshaws, small buses, and easy pedestrian ways. Improving access and connectivity of places through improved public transport that can reduce overall parking demand. Ticketing system of public transport should incorporate park and ride component. Parking rates should favour intermediate transport including three-wheelers and taxis and also non-motorized vehicles. Park and ride systems can help to decongest the busy commercial areas. These facilities can also be developed as an overflow parking plan and other special event transportation management. Taxis and three-wheelers can play an important role in the feeder system for park and ride system.

- **Use variable rates more widely to reduce peak demand:** Parking fees should target the peak hours and peak demand to influence commuter choice and open up options. All municipal agencies must develop variable parking fees according to commercial importance of areas; according to duration of stay to reduce peak demand; according to weekdays when demand is high, and weekends when low. NDMC in Delhi has already started enforcing graded fee structure. This strategy should be developed on a city-wide scale. Civic agencies in other cities should begin to evolve similar pricing strategies. Also discourage payment of parking rates as a fixed annual amount to replace graded fee structure to be paid on usage. Annual payments will defeat the purpose of using parking rates as a demand management tool.
- **Prevent erosion of greenspaces in cities:** The municipal agencies are increasingly looking at the green areas including neighbourhood parks, to create underground parking structures. . Parking under parks should be allowed only as a last resort, with safeguards and conditions of preservation of trees and greens, and restoration to original greens and flat surface.

- **Improve management coordination and enforcement:** There is need for institutional reforms to address parking pricing, management and parking regulations, and enforcement in a composite manner. Ultimately, the traffic management authority should be able to effectively enforce a restrictive parking policy, to collect parking fee, and to fine offenders. Any institutional weakness can undermine the entire initiative.

- **Pedestrian policies**
    - **Harmonize existing laws:** Pedestrian g**o**vernance will continue to have decentralized framework as most policy action will take place at the city levels. However, both Union and state governments will have to take responsibility to create a more unified legal framework for effective implementation.
    - Indian cities need a comprehensive Road Users Act to comprehensively address targeted pedestrianization, mandatory implementation of engineering guidelines for walkways, traffic volume reduction measures, maintaining the integrity of the pedestrian pathways, and strongly enforcing penalty on motorized vehicles for encroaching into pedestrian space, etc. Conversion and acquisition of pedestrian space should not be allowed without public hearing and proper justification.
    - Make pedestrian plans including reformed engineering guidelines conditional to infrastructure funding:
    - Implement walkability and safety audits.
    - Approval and clearance of all road projects should make adherence to pedestrian guidelines mandatory.
    - Public transport plan needs linkage with pedestrian plan.
    - **Special focus on small and medium towns**: Under the national Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). Funded projects include construction/up gradation of roads, and highways/expressways. There is need to make explicit and mandatory provisions for pedestrian infrastructure in these towns. Pedestrian and bicyclist facilities should be designed along all roads and intersections.

Annexure to Water and sanitation section:

Service Level Benchmarks for Sustainability

S.No	Indicator	Green (Sustainable)	Black (Deficient & degrading)	Red Excessive and degrading
WATER SUPPLY				
1	Coverage of connections	100%	<90%	----
2	Per capita availability of WS at consumer end	135 Lpcd	<100	>200
3	Extent of metering of WS connections	100%	<100%	----
4	Extent of Non-Revenue Water	15%	----	>20%
5	Continuity of Water Supply	24 Hrs	<16	
6	Efficiency of redressal of Customer Complaints	80%	<70%	----

7	Quality of Water Supplied	100%	<100%	----
8	Cost recovery of in Water Supply Services	100%	<90%	----
9	Efficiency in collection of Water Supply Charges	90%	<90%	----
SEWERAGE				
1	Coverage of Toilets	100%	<100%	----
2	Coverage of Wastewater network services	100%	<90%	----
3	Collection efficiency of Wastewater network	100%	----	----
4	Adequacy of Wastewater treatment capacity	100%	<90%	>120%
5	Quality of Wastewater treatment	100%	<95%	
6	Extent of reuse & recycling of treated Wastewater	20%	<10%	----
7	Extent of cost recovery in Wastewater management	100%	----	----
8	Efficiency of redressal of Customer Complaints	80%	<80%	-----

9	Efficiency in collection of sewerage-related charges	90%	----	----

Source: Sub-committee on Water Supply and Sewage, NSHM – MOUD report (2011)

[i] CPCB report also provides long term trend of key criteria pollutants in its report page 81 onwards -- http://www.cpcb.nic.in/upload/NewItems/NewItem_147_report-2008.pdf