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Title: Way to Sustainable Development Of Urban Management: Green City In India

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1. INTRODUCTION:

The last few decades have been the emergence of sustainable development as the guiding principle of public policy and action for civil societies. The United nationss conference on Environment and Development (UNCED) held in Rio de Janerio Broadband the framework of sustainable development to a more comprehensive view embracing socio-economic development. This holistic representation is reflected in Agenda 21.India has always assigned primacy to integration of sustainability considerations in its development process. The five year plans (being formulated since independence) have been guided by the overarching objectives of poverty approach to planning process in the country. With these plans incorporating social, econmic and environmental dimensions, the need for National Agenda 21 was ruled out.The principles underlying Agenda 21 have been central to Indian Planning.High economic growth, growing population and persistant poverty have put pressure on natural resources in Indian arena.The objective is to put in place instituions and processes that will translate intentions into practices together with concerned action from all stake holders and co-operation among them. In context of City, one which is self relient and healthy , not overcrowded to jeoparadise living space.The broad regulatory and incentive structure needed to support the achievement of development goal, within a framework which promotes local and global sustainability, is relatively easy to conceive under two broad heading:

I. Ecological sustanability
II. Economic viability

2. NEED OF STUDY:

Agenda 21, adopted by the United Nations Conference on Environment and Development on 14 June 1992 in Rio de Janeiro, is the international community's response to the United Nations General Assembly's call for halting and reversing the effects of environmental degradation. It is a comprehensive programme of action to be implemented by Governments, development agencies, organizations of the United Nations System, and independent groups in every area where human activity affects the environment.As one of the signatories of the resolutions regarding Agenda 21, India is committed to the implementation of Agenda 21. Accordingly, India is considering applying the Green City concept to Gurgaon City as "Model for Sustainable Urban Management" by incorporating environmentally sustainable solutions with respect to:

I. Water Supply And Waste Water Treatment;
II. Energy Supply, Energy Savings And Renewable Energy Development;
III. Waste Management, Soil Pollution And Air Pollution;

IV. Cleaner Industrial Technologies And Environmental Management;
V. Agriculture And Food Industries;
VI. Building Construction And Urban Ecology Management;
VII. Urban Traffic And Transportation.

Gurgaon is one of 22 “satellite” town in this region, today turned over a new leaf, joining important position on the industrialmap of India and now Gurgaon is challenged by a very fast growth rate and it is one of the most prestigious industrial townships in India and is home to major icons in information technology. Its close proximity 25 km to Delhi will make it an ideal showcase for the whole of India.

3. AIM OF STUDY:

This paper aims to integrate above aspects of Model Green City by using a information Technology. This is comprehensive and holistic in nature covering all aspects of environment including land use planning in order to make cities economically vibrant, socially equitable and environmentally supportive. The first task in this direction is translation of this conceptual frame work into 'Environment Management Plans', (EMP) by using information technology to collect, collate and disseminate of information by local people, local organisation, institutions, local authority to policy maker, which will lead to preparation of implementable time bound action plan in respect of the city from Bottom-Up approach.

4. AT A GLANCE :

Gurgaon, with a standard urban area at about 50 square km. and a resident population of about 230,000 (1997 figures), the floating population is 10,000 per day. Average annual population growth is 18-20%. The district headquarter is situated in Gurgaon city. Now Gurgaon has become one of the most important corporate and industrial hubs of state Haryana in India. Gurgaon also known as 'Guru Gram' or 'Guru Gaon' (village of the spiritual teacher) was named after Dronacharya, a character in the Epic Mahabharata. It is said that Guru Dronacharya of the Pandavas and the Kauravas gave spiritual instructions to them at this place. The office and manufacturing plant of India's largest car maker Maruti Udyog Limited is situated here as are a large number other industries. Another area in which Gurgaon is excelling is the IT industry and software development. Real estate is booming here with new buildings coming up at an astronomical pace. Now this city is chosen for a showcase for sustainable urban development as a model for other Indian.

Gurgaon city is located at 28? 53’ N latitude and 75? 35’ E longitude and is situated at a distance of 25 kms south-west of Delhi, the national Capital and 285 km from state headquarters of Chandigarh. It lies at 229 meters above mean sea level and forms a part of the National Capital Region. Gurgaon district is an area of confluence of aravalli huills, Indo-Gangetic plains and Indian desert, Gurgaon urban area can be broadly classified under two district sections namly the HUDA(Haryana Urban Development Authority) area and the old town (municipal area limit). The area under HUDA can be further subdivided into

(i) Private coloniser area,
(ii) Huda sector
(iii) Institutional area and
(iv) The urban villages.

The current estimated population of Gurgaon including the urban area, the existing town, and the 17 village surrounded by urban development is 400,000 (HUDA 2001). The projected total population of the urban area for the year 2011 is around 1.6 million.

Fig 1: GURGAON METROPOLITAN AREA:

The Gurgaon city has been the head quarters of Gurgaon district, the southern most district of Haryana since 1816, and has exhibited steady growth after the partition. Spread over an area of 15.33 sq km the Gurgaon town had a population of 1,73,542 and the Gurgaon urban area had a population of 2, 29,243 spreading over an area of 30.2 sq km according to 2001 census. The population density shows that Gurgaon city and urban area are densely populated as compared to the Gurgaon ditrict. The most important factor for this is its close proximity to Delhi.Rewari railway line on the south-western outskirts of Delhi. National Highway No. 8 passes throgh its main core of city. This Gurgaon originated as a village called Guru gram. Since that time it has

been undercontrol of various rukes who come to rule from Delhi like Maurya, Tomar, Chauhan and Mughals. The Gurgaon district passed into British hands in 1803 and revealed in 1851. In 1966 Haryana took birth and it was designated as district and has been Tehsil and district headquater. The first development pro was in 1971, 77 and further 82 and NCR in 1989 asigned as important hub for development. In 1981 haryana model has been eveolved as Public-private partnership and it was boost up as Electronic City. But it was boost up where Maruti udyog has been set up in 1984 and in 1997 been develop Corporate park.It becomes recognise as class I town in 1991.The city has developed into 4 phases:

I. 1968-71:

II. 1975-78:

III. 1985-95

IV. 1995-present

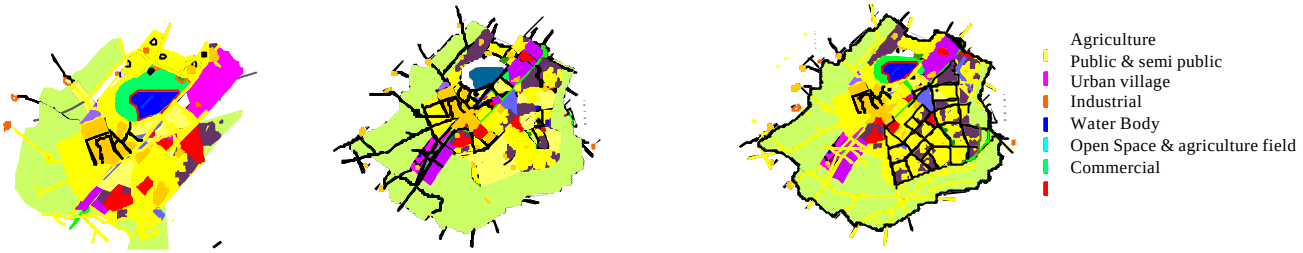

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Fig2: GROWTH OF GURGAON CITY

5. EXISTING ENVIRONMENTAL STATUS:

The urbanisable area is divided into 57 sectors under various land uses. The extent of land use is given below:Haryana urban development Authority has so far acquired and developed most modern lines with a network of wide sector roads. In residentioal sector minimum 45% of area under a particular sector is kept for parks, open spaces, roads and community building including community centres, dispansaries, schools, creshes, police post, post office, electric sub station, etc. As per the norms adopted by HUDA. Even higher order facilities provided for every estimated population of one lac persons include provision of colleges, hospitals, police stations, telephone exchange, fire stations. To meet the Commercial needs of the town, a City-Centre in Sector No. 29 covering 480 acres of land has been acquired and planned to provide for facilities like World trade Centre, Finannce District, Commercial Office towers, departmental stores, Cimnma house, hotels, fire station, leissure valley, amusement park, etc. Three other District Centres in sector 23A, 56 and 47, to serve a clusters of adjoining sector have also been planned besides the local convenient shopping centres in each residential sector.Three sectors viz. Sector 18(part), Sector 32 and 44 have exclusively been planned for institutional land use which include Corporate Offices, Training, research and development Institutions like Pepsi , Coca Cola British Telecom, Flour Daniel, GE Capital, CI Dunpont , Global business park etc.It has excellent location for future growth,too.

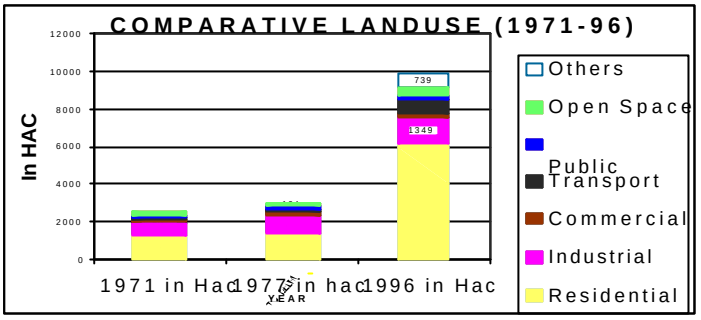

Fig 3: COMPARTATIVE LANDUS OF CITY FROM 1971 TO 1996

More than 80 % population are literate . The economic charecteristics of an area play a determining role in the overall development of the region. In Gurgaon, the maximum share of population is in tertiary sector (72.6%) followed by secondary (25.7%) and primary sector (1.7%). The functional classification of Gurgaon can be designed as service town.

The urban services provided under the master infrastructural plan by HUDA encompasses the urbanizable area of Gurgaon(covering a part of the town area also). These include the following services:

I. Drinking water Supply: total capacity is 12.5 lacs gallons which have been installed to serve across national Highway include sectors of 29, 30, 41, 27, 28, 25 18, 19, 20 24, 26, 26a, 42, 43, 53, 54 & 55, 56.(fig 3)

II. Sewerage System: As per topography of Gurgaon, the sewerage systemhas been divide into four zones. The slope of the urban area is toward the western side and the Najafgarh drain is vailble at a distance of 6 Kms from Gurgaon.the sewerage of the entire area will be collected near sector 4, near Delhi-Rewari railway Lione and be treated by the Sewerage Treatment Plant.Total capacity is 68 MLD , constructed under the Yamuna Action plan is functional .(Fig 3)

III. Storm water Drainage: It is situated at the tail of the Aravalli hiils has a natural gradient from the northeast direction to southwest direction.previously the storm water from the Aravalli hills and from the catchment area of Gurgaon flowed through the natural creeks and surface drains existing in the area with ultimate disposal to the Najafgarh drain. Due to urbanisation, the storm drains foe drainage has been channelised into seven zones.

IV. Street Lighting: gurgaon has total network of master roads i.e. V2 roads (60 meter R.O.W) and V3 roads (30 meter R.O.W) of 151.05 kms, of which the existing PWD (B&R) roads is 41.80 kms. The street lighting network is about 151.05 kms i.e. V2 roads is 40.48 Kms and V3 roads is 110.57 Kms of which the existing PWD, B&R roads forms part of master roads is 41.80 Kms.

V. Horticulture and Arbosiculture:Master Horticulture provides planting of trees along the roadsides, gree belt and in open space bersides development of green belt along National highway-8 and along roads 60 meter and 30 meter wide. Development of liesure valley on 29 sector is also used for this plan.Under this head road side plantation,provision of M.S. tree guars, plantation of shrubs, development of green Belts and thick plantation in green belts are also proposed.

VI. Community Building- External & internal: gurgaon town has 35583 residential building and 8127 shops/ institutional building as per the Municipal survey of 1999.There are 341 industries, 42 big marketts, 11 small markets 10 hotels & 134 big and small restaurant in Gurgaon Town and 42 hospital including nursing homes/dispensries and 71 schools/ colleges in UA. Total status of infrastructure of this are are as folows

6. CRITICAL ISSUES:

The urban- environmental issues in Gurgaon if not addressed and managed today, the stress on infrastructural provision will be reflected by the year 2010 AD when the construction of houses and colonies will be at their completion stage. The plethora of plans and policies, for sustainable urban development process in Gurgaon has assumed prime importance. Though, the few issues that still require urgent attention includes:

I. Solid waste disposal sites and cremation grounds

II. Need to shift from the traditional approach of planning to to more participatory and realistic planning. For that there is need full information to people.

III. Villages within the Urban Area tend to become repository of the poor and also acquire slum like character . The growth of informal sectors, unathorised colonies and urban villages along with the high rise private developers building have given rise to peculiar situation in Gurgaon.Hence all the areas need to be carefully planned and integrated within gambit of planning.

IV. A large proportion of the Gurgaon's population is still using water and as a result the ground water is becoming brackish due to over exploitation. The dramatic ground water lowering in Gurgaon poses a serious threat in future, with the depth of water lowering upto 40 meters in the central area and 30 meters in the adjoing areas.

V. Gurgaon poses an attractive land market for the investors/developers wherein a large proportion of the flats which are being built by the developers are kept vacant and speculation on the land considered.

VI. Having one main single connectivity from south Delhi to Gurgaon (Mehrauli-Gurgaon) the 21- Km Delhi Gurgaon stretch handles over 1.9 lakh passenger car units daily against its capacity of 40 PCUs. There is need to introduce intra city transportation system and strengthen inter city transport system is of critical importance in Gurgaon.

VII. The inclusion of low energy building and newer techniques to conserve energy must be incorporated in the plan from initial stage itself.

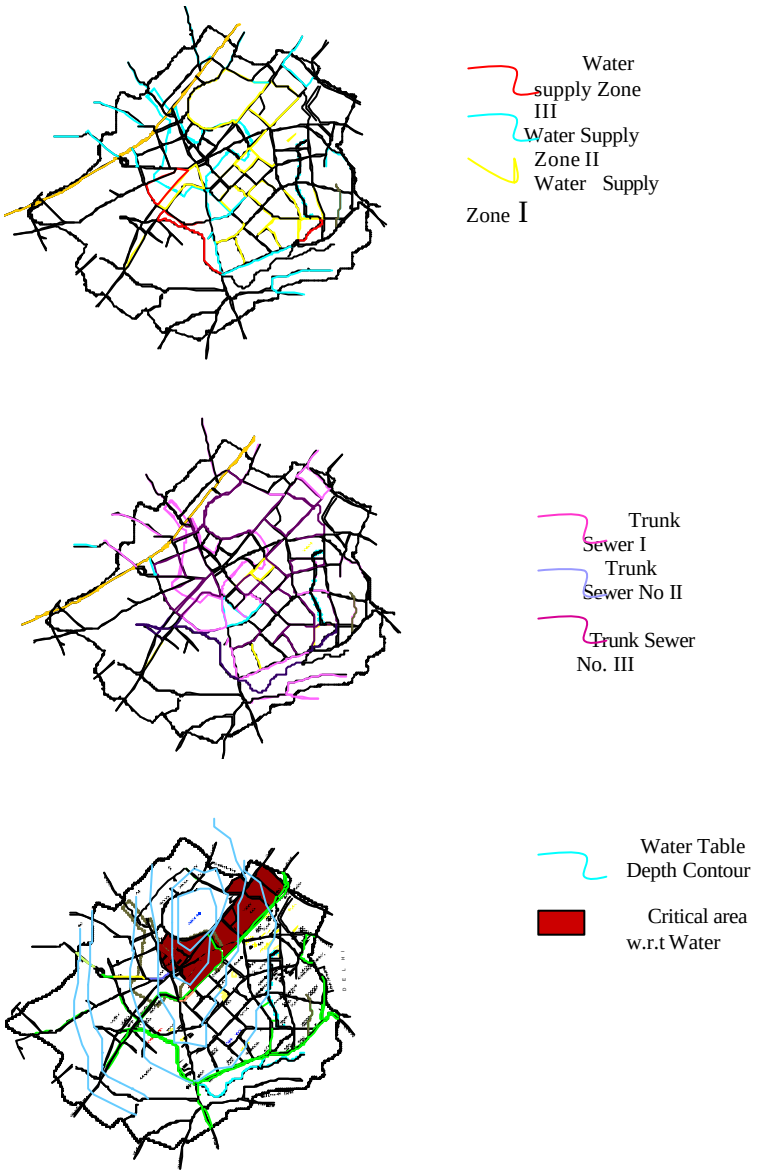

Fig 4: IDENTIFIED CRITICAL AREA BASIS OF URBAN NEEDS & ITS PARAMETERS

The resource potentials and carrying capacity of the region to be assesed and incorporated in the plan, whereby giving the details of the existing situation and future projections. To carry out carrying capacity in order to assess the extent to which development activity could proceed without endengering the environment. Basically carrying capacity refers how much land can carry in tern of human and animal population by supplying the basic needs like water, land, food and fodder. The carrying capacity has two aspects:

I. Supply side of environment; life supporting system

II. Demand site.

To carry out this analysis here to work out throgh use of GIS tool to assess the gap betwwn demand and supply as sector wise. Each parametersof Green city concept are taken for assesing the carying capacity of area in terms of:

I. **water supply and waste water treatment** can be done by using recycle of water use and water harvesting method:
   A. Recycling of Waste Water:
      a. Total sewage generation:10.2 Mld
      50% can be recycle= 5.2 Mld
      out of that it would waste water i.e 80% 1 mld
      if again it will recycle 2.5 mld.
      Total Fresh water demand 5.19mld
      From recycle of water 2.15
      Remainn gap= 3.14 Mld
   B. Rain water Harvesting:
      a. Total run off Residential Housing=0.2 mld
      b. Total run off Public & semi public area=0.01 mld
      c. Total run off paved area 0.0035 mld
      d. Total run off grenn are 0.5 mld
      e. Total run off =0.7135mld
      f. Remaining gap=3.14 - 0.7135=2.416 mld

So, there is need for reduce of use by using ultra modern toilet facility and new plumbing design .

II. energy supply, energy savings and rene wable energy development:

III. **waste management, soil pollution and air pollution**;
   a. Total population:5000000
   b. 1% floating population: 50000
   c. For floating population solid waste generation:250gm /day=12500kg/day or1.25 tonnes
   d. For residential 0.3 to 0.6kg=250 tonnes
   e. For commercial =100 tonnes
   f. For street sweeping=50 tonnes
   g. For institutional =50 tonnes
   h. For industrial=50 tonnes total solid waste=450 tonnes
   i. Existing area for land fill site 4.2 hac
   j. So, need for segration of biodegradable waste and collect from door to door.

IV. **cleaner industrial technologies and environmental management**: The most important objective of the waste management policy is to reduce waste amounts, and prevention has top priority by recognized waste hierarchy system:

? Cleaner technology - initiatives to prevent waste generation and maximum recycling and reuse.

? Incineration – waste is incinerated when it cannot be recycled and when residues from incineration do not cause environmental problems. Energy is recovered for generation of electricity and heat.

? Landfill disposal.

For these three hierarchcal set up these following issues are taken into consideration

- ? Waste management system – optimal operation of collection, transportation, treatment, and final disposal.
- ? Waste administration, organization, and economic instruments.
- ? Reuse – recycling, energy recovery, etc.
- ? Environmental communication.
- ? Sustainable landfills.
- ? Capacity building – legislative and administrative capacity as to planning, monitoring, and control.
- ? Training and education.

IV. agriculture and food industries:Food industry and beverages help to susstain villages and regional area to self sustain

V. building construction and urban ecology management: Energy efficient buildings are inograted over this are to take way of sustainb le developmennt:

Basic energy sources in an eco-friendly building complex

Sky	Sun	Air	Water	Earth
-day lighting - heat sink	-heating - electricity generation - day lighting - greenhouse effect - solar chimneys	-ventilation - heat sink	-roof gardens - earth berms for insulation	-roof ponds - fountains for humidification - rainwater harvesting

The first stage of green building design is to incorporate solar passive design interventions and try toreduce the loads on conventional systems. Energy conservation is possible by judicious design of lighting and HVAC (heating, ventilation and air conditioning) systems, controls and operation strategies.

VI. urban traffic and transportation.Intra sector transportation is needed and as well as restriction of car movement of internal road and padestrianisation can be done and cycle path is beneficiaries.

Hence the comprehensive profile of this area by identifying the major issues provides imperatives for devising planning inputs in formulation of concrete plan for this region. The accessibily of physical and social infrastructure of this area is mismatch in developmental process. Some area is having more and some are having less. As well as total quantum of fcility are also inadequate .

	SECTOR							SUPER SECTOR				DISTRICT MODEL				CITY	AREA PER UNIT
	STANDARD	31		32		40		STANDARD		32	40						
FACILITY	8	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed		
EDUCATION FACILITY		Situation		Situation		Situation		Situation		Situation		Situation		Situation			
Pre primary school	4	1	7		8	6	2										0.08 HAC
Primary School	3	3	2			3	1										0.20 HAC
Senior Secondary School		1		3		1	2										1.60 HAC
Integrated School								1		1		1					3.50 HAC
College								1		1		1					4HAC
University																1	10 HAC
Technical Education Centre																	4HAC
HEALTH CARE FACILITY																	
Intermidiate Hospital								1									2.70HAC
General Hospital								1				1					4HAC
Poly Clinic								1	1								0.30 HAC
Nursery Home	2	1				1			1								0.30 HAC
Dispensary		1				1											0.20 HAC
SOCIO CULTURAL FACILITY																	
Community Park	4																0.06 HAC
Library	1																0.2 HAC
Recreational Club								1									1.0 HAC
Music, Dance, Drama																1	1 HAC
Socio Cultural Centre												1					0.15 HAC
Distribution services																	
Petrol Pump																	
Milk Booth	4																
LPG Godown		1						1									
Police Station		1						1									1.5 HAC
Police Post	31	1															0.16 HAC
Jail																1	1 HAC
Fire Station												1					
COMMERCIAL CENTRE																	
Formal Shop	55							365									0.03HAC
General retail	36							295									0.05 HAC
Fruits & Vegetable	6							40									0.08 HAC
Service & Repair	13							30									
RECREATIONAL FACILITY																	
Local Park & Play Ground	4																
Community Park								3									
District Level Park																	

Due to unavailability of infrastructure some of sectors are lacking to pace of development . Some are developed i.e. which are under private coloniser and as well as land value is also high, some are lacking behind to grab the opportunity due to several constraints. To overcome the situation there is need Participatory technique to maintan the information by local people and plan accordingly.Because Environmental Information is a source, which together with Physical, economical, technical and human resource is essential for national development. Sustainable development, which has evoved as the goal for human welfare in recent times, is rooted in the availability of right information to the right person at the right place and at th right time. The need for information arises at all levels, neghbourhood/ community level to Local ward office level or municipal authority level to higher policy makrer. This dessimaniation information is uploaded on-line in particular programme and after collecting this information policy has to be prepared and implementation can be drwan for future Ecological Sustainable and Economic Viable city.

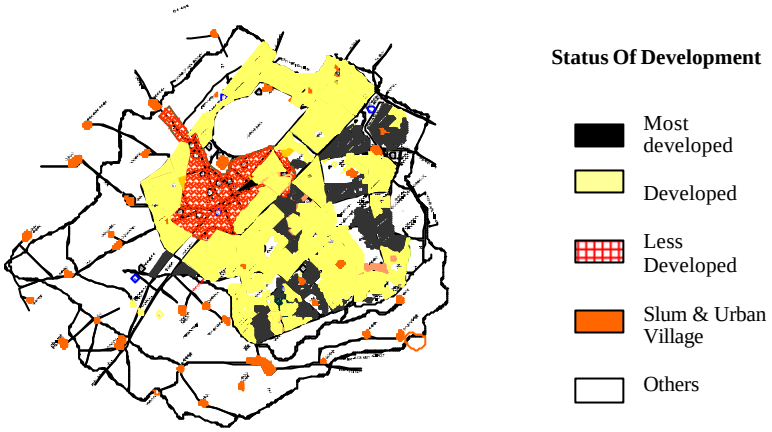

Fig 5: STATUS OF DEVELOPMENT OF GURGAN URBAN AREA

7. WAY TO SOLVENT:

In order to make Gurgaon into a green city, the action plans have been formulated database development through collecting data by local people, local organisation, institions, local authority (government and non government) can feed data according to suject head of Green City (Parameter) on internet line. After collecting data, data can be processed second level planning authority and can be analysed throgh GIS tool and has been provided with internet facility.At Focal point policy has been made and disseminate again in

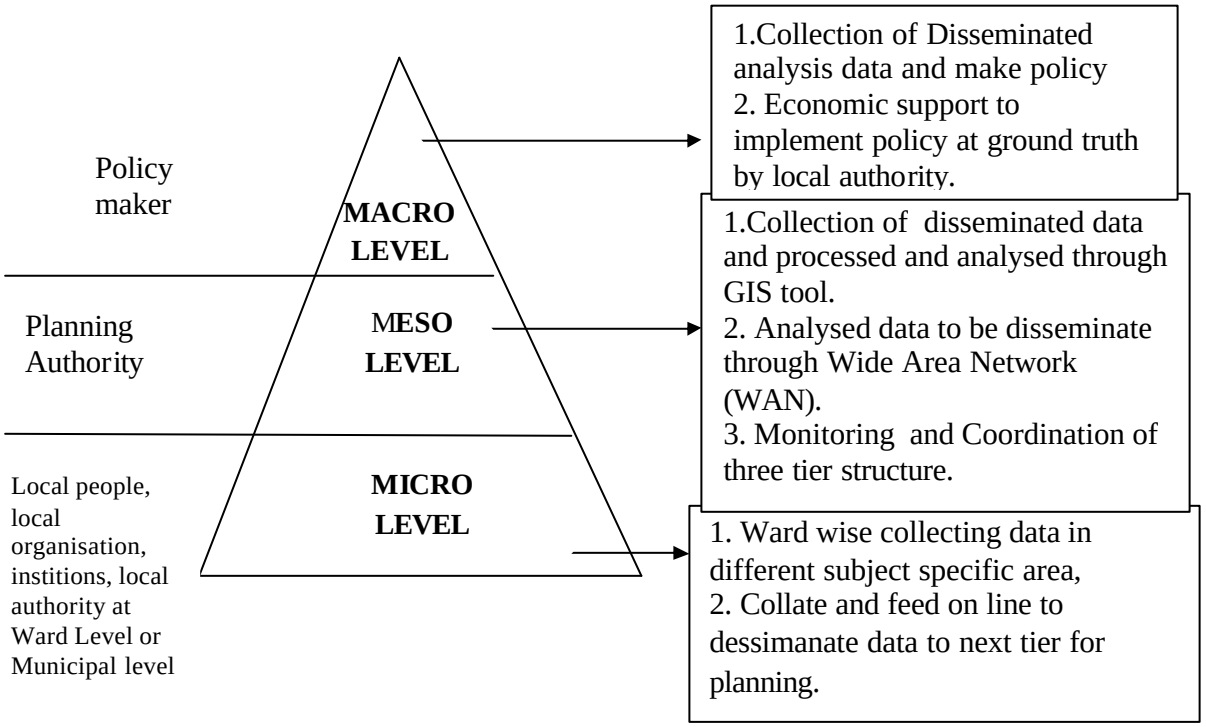

Fig 6: CONCEPTUAL FRAMEWORK OF SUSTAINABLE URBAN MANAGEMENT

internet and plan has to work out at local level planning.This process is basically to collect, collate processed, analysed dissemination of information by electronic mediaby using MIS Tool in planning measures.To work out the programme every sector can be used as area for implentation.