URBAN GROWTH: PLANNING SUSTAINABLE CITIES

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FROM ASSET TO CHALLENGE…….

❑ Development showcase achievements of humankind

- From water front settlements to centers of technological, commercial, administrative power
- Concentration of population, activities, buildings

- Diminishing natural areas and increased temperatures
- High energy consumption and pollution levels
- Increasing water consumption and waste disposal

Table 3.1 The growth of world and urban population, 1950–2025

	World population (millions)	Urban population (millions)	Urban population as % of total
1950	2,516	734	29.2
1960	3,019	1,032	34.2
1970	3,693	1,371	37.1
1980	4,450	1,764	39.6
1990	5,246	2,234	42.6
2000	6,122	2,854	46.6
2010	6,989	3,623	51.8
2020	7,822	4,488	57.4
2025	8,206	4,932	60.1

Source: United Nations, *Urban and Rural Population Projections 1950–2025: The 1984 Assessment* (New York, 1986).

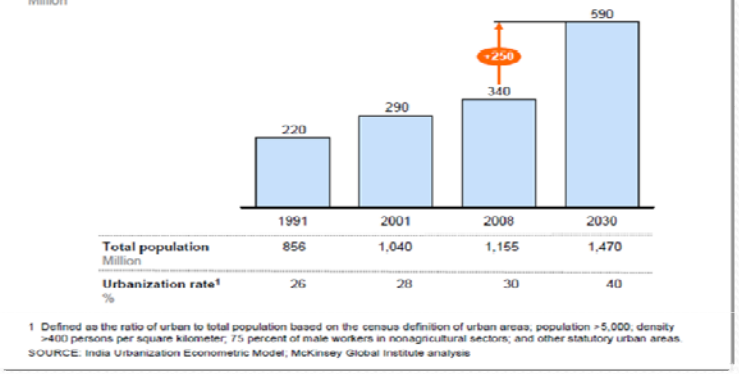
Table 3.2 Urban population in developed and developing countries, 1950–2025

	Developed countries		Developing countries	
	Urban population (millions)	% of total	Urban population (millions)	% of total
1950	447	53.8	287	17.0
1960	571	60.5	460	22.2
1970	698	66.6	673	25.4
1980	798	70.2	966	29.2
1990	877	72.5	1,357	33.6
2000	950	74.4	1,904	39.3
2010	1,011	76.0	2,612	46.2
2020	1,063	77.2	3,425	53.1
2025	1,087	77.8	3,845	56.5

Source: United Nations, *Urban and Rural Population Projections 1950–2025: The 1984 Assessment* (New York, 1986).

Exhibit 1

In MGI's base-case scenario, cities are likely to house 40 percent of India's population by 2030

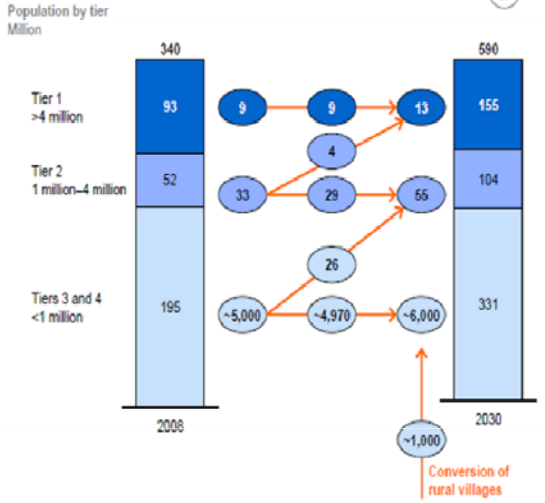


1 Defined as the ratio of urban to total population based on the census definition of urban areas, population >5,000; density >400 persons per square kilometer; 75 percent of male workers in nonagricultural sectors; and other statutory urban areas.

SOURCE: India Urbanization Econometric Model, McKinsey Global Institute analysis

Exhibit 3

India will have 68 cities with population of more than 1 million by 2030, up from 42 today



SOURCE: India Urbanization Econometric Model; Census 2001; McKinsey Global Institute analysis

Exhibit 4

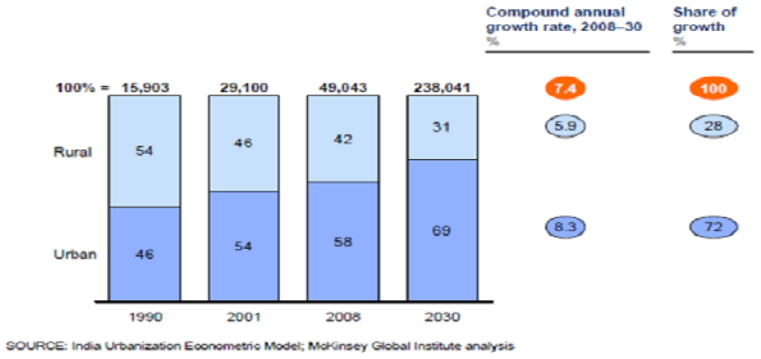
Thirteen cities will have a population of more than 4 million

	Population in 2030 Million	GDP, 2030[1] $ billion	Per capita GDP, 2030[1] $ thousand
Mumbai (MMR)	33.0	265	8.0
Delhi (NCT)[2]	25.9	296	11.4
Kolkata	22.9	169	7.4
Chennai	11.0	73	6.6
Bangalore	10.1	127	12.6
Pune	10.0	76	7.6
Hyderabad	9.8	67	6.8
Ahmedabad	8.4	68	8.1
Surat	7.4	53	7.2
Jaipur	5.4	24	4.5
Nagpur	5.2	37	7.1
Kanpur	4.2	15	3.6
Vadodara	4.2	35	8.5

1 2008 prices.
2 National Capital Territory; excludes Noida, Gurgaon, Greater Noida, Faridabad, and Ghaziabad.
SOURCE: India Urbanization Econometric Model; McKinsey Global Institute analysis

Exhibit 5

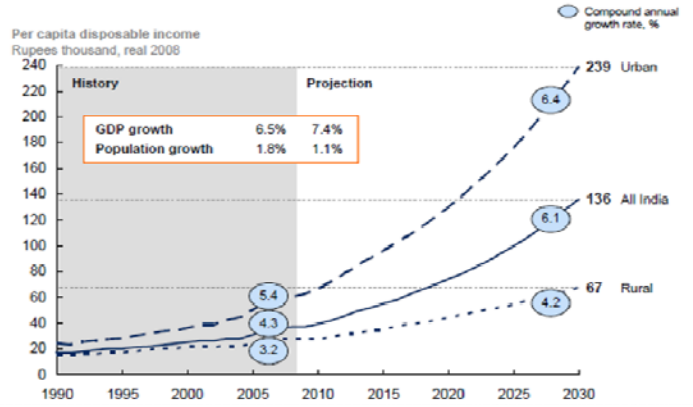
Cities will account for nearly 70 percent of India's GDP by 2030



SOURCE: India Urbanization Econometric Model; McKinsey Global Institute analysis

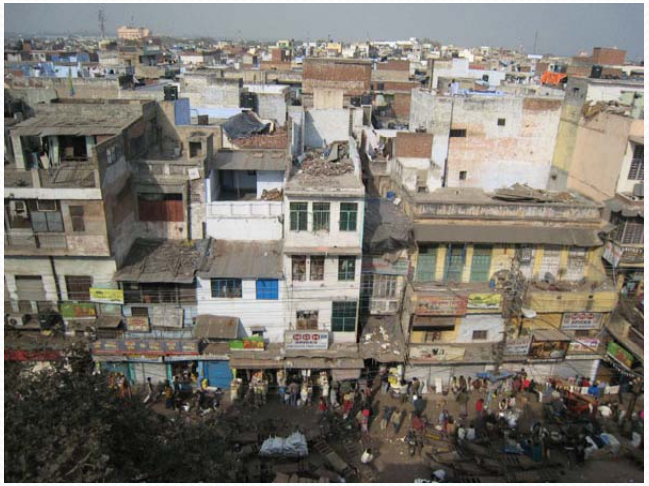
Exhibit 6

Urban India will drive a near fourfold increase in average national income



SOURCE: India Urbanization Econometric Model; McKinsey Global Institute analysis

HARMONY WITH NATURE TO SUPREMACY OVER NATURE…….



ENVIRONMENTAL ISSUES: the Indian experience……
……URBANIZATION

-The distribution of population in India is exhibiting top heavy growth pattern of the largest cities where about two-thirds of them live employment opportunities compared to those with smaller population size.

- Rapid expansion of the mega cities is leading to:
• uncontrolled conversion and loss of fertile agricultural land
half to three fourths of India's urban population have no access to urban services,
• safe drinking water supply system,
• hygienic sanitation,
•decent housing,
•solid waste management system and
• public transport system.
•Also in the largest cities, one quarter to a little less than a half of the citizens are poor

- Due to inadequate sanitation, rivers passing through such cities are serving virtually as open trunk sewer lines.

- Cities on the hilly terrain such as Shimla and Darjeeling are growing on to the slopes leading to severe deforestation, quarrying and landslides.

- India's coastline is about 7000km long. Cities, towns and villages in the coastal area seem to be increasingly vulnerable to cyclones and tsunamis Triggered by periodic climatic changes and global warming.

- Pilgrim cities such as Puri, Ujjain and Ajmer that have traditionally hosted huge annual congregations since centuries. After every such congregation, the city environment is perturbed, disrupted and damaged, sometimes beyond repair.

•Though several environmental laws as well as town planning laws were enacted early enough, they were not effective in either protecting and conserving India's rich and varied natural environment or ensuring creation and maintenance of a good environment inside the existing towns and cities.

•Nearly three decades after gaining independence, the Water and Air (prevention of pollution) Acts were enacted in 1974 and 1981 respectively.

• The very important Environmental Protection Act was enacted in 1986. Subsequently, this act has been amended in 1991, 1994 and in 2006.

• The Central Ministry of Environment and Forests (MoEF) was created in 1982 and its counterparts were established in the States over the next few years. As the operational arm of the MoEF, Central Pollution Control Board (CPCB) was created at about the same time (as the MoEF) and the State Pollution Control Boards (SPCB) were created subsequently.

•The National River Conservation Plan (NRCP) was created in 1995 with a clear terms of reference to monitor the heath of rivers of India.

LESSONS LEARNT…….

❑ In spite of provisions, environmentally conflicting activities are seen to continue in and around cities, towns and villages, those which are growing rapidly.

•Thus the task of responsible environmental planning in India that would make a perceptible difference on ground, is truly complex in nature

• It is gigantic in scale that cannot be taken up by a handful of experts or specialized agencies.

• Participation of citizens supported and guided by ULBs (Urban Local Bodies) seem to be a promising approach – leading to creation of a sustainable machinery to carry forward objectives of environmental planning.

SUSTAINABLE DEVELOPMENT…….

"SUSTAINABLE DEVELOPMENT IS DEVELOPMENT THAT MEETS THE NEEDS OF THE PRESENT GENERATION WITHOUT COMPROMISING THE NEEDS OF FUTURE GENERATIONS" Our Common Future …. 1987

TOOLS OF URBAN ENVIRONMENTAL PLANNING …….

- Environmental surveys
  Survey of ecological unit (EU)
- Environmental monitoring:
- EIA Environmental Impact Assessment
- Land Suitability Analysis
- Climate resilience

Aspects and parameters of survey of Ecological Unit

SN	Aspects	Examples of parameters
1	Land and terrain characteristics	•Area, land use map; •proximity to prominent natural and man-made features; topography & drainage; •contour map, ridges & valleys; soil map; •micro-watershed boundaries; •stone quarrying sites;
2	Geological characteristics	•Location in geological time; •bed rock type, characteristics; •seismic activity history; •location of faults, fissures;
3	Water regime and hydrological characteristics	•Surface and sub-surface water sources, their quality & quantity; •drainage pattern; •eroding shore lines
4	Vegetation characteristics	•General vegetation regime e.g. Subtropical coniferous, Tropical dry deciduous, Tropical thorny, Tropical wet etc.; •map showing location of typical vegetation; •list of species;
5	Climatic characteristics	•General conditions: temperature, precipitation, relative humidity, wind rose, rainy days etc. •Incidence of cyclones, storms
6	Settlement pattern	•Average size; demographic characteristics; •Location pattern; services & facilities; •predominant occupation; social, economic, cultural profiles; •typical built form, characteristics;
7	Prominent changes	•Perceived changes in the characteristics of any or all of the above aspects within about last 100 years

Air & noise quality

Exposure to pollutants of air and noise are proved to be causes of health problems among citizens, particularly in the largest cities. Maximum permissible pollutant levels prescribed by the CPCB (Central Pollution Control Board), Government of India are to be used for evaluating the air quality of the city by three typical locations: residential area, industrial area and sensitive area. The parameters commonly used for depicting air quality include:

SPM	Suspended Particulate Matter
RSPM	Respirable Suspended Particulate Matter
SOx	Oxides of Sulphur
NOx	Oxides of Nitrogen and
CO	Carbon Monoxide

[

Water quality

Like air quality, water quality evaluation is an essential component of environmental survey for cities. Beginning from potable water, five qualities of water have been identified by CPCB. Each is described in terms of parameters and their maximum permissible limit. In case of a given city, it is most important to feel confident about the quality of water being consumed by citizens at the users' end. This may be achieved by undertaking sample surveys in the residential and other areas, using portable water testing kit. Though the parameters used for assessing water quality vary with the purpose of use, the basic parameters are as below:

Turbidity, odour
TDS Total Dissolved Solids
BOD Biochemical Oxygen Demand
DO Dissolved Oxygen
Dissolved metals & minerals

The quality of water identified as A, B, C, D and E by the CPCB have specific range of permissible limits for each of the parameters.

Built form

the built-form survey and its analysis must consider the factors not only from the point of view of their ability to modify natural climate closer to comfort conditions, but also from the point of their suitability with respect to natural disasters.

A few typical built-forms are referred to as:

Type of built form	Brief description	Environmental suitability
Low rise-high density	up to 4 storeys, with building blocks close to each other or even packed tightly forming clusters	Hot semi-arid and arid climate
Low rise-low density	up to 4 storeys, with building blocks sufficiently separate (by 5 to 10m) from each other forming a sparse pattern	Humid & tropical coastal climate
High rise-high density	8 to 20 storeys high building blocks with inter block distance of 5m to 10m approximately	Temperate to cold climate with low humidity
High rise-low density	8 to 20 storeys high building blocks with inter block distance of 30m to 60m approximately	Temperate climate

Methods of EIA by their level of complexity

Type of method by level of complexity	Name of method(s)	Advantages	Disadvantages
Relatively simple	Ad-hoc, Checklist, Indices or indicators, Visual images Simple matrices Simple overlay mapping Scenario building	Quick results; does not require special experts & large support infrastructure; can be developed on the basis of similar previous experience;	Descriptive, generalized results; lack of pointed conclusions; contextual new dimensions not visible; decision depends on decision makers' judgement;
Moderately complex & investigative	Advanced checklist Expert/ professional opinion Laboratory testing Weighted matrices Conceptual modeling: qualitative & quantitative, Trend extrapolation, Network/ impact trees	Better rational base; contributes to decision making; case specific; tends to expand k-base & experience	Need good experts & trained assistants; time consuming; costlier that simple methods; not necessarily useful for other projects;
Highly complex, investigative & focused on decision making	GIS based overlay mapping, network with consequence depiction, laboratory scale models, matrices with MCDM/ MAUM, environmental benefit cost analysis,	Easy to appreciate; accurate assessment and impact prediction; case specific;	Need highly experienced experts & well trained assistants; time consuming; need large data base & support infrastructure;

CLIMATE RESILIENT CITIES

NATIONAL ACTION PLAN ON CLIMATE CHANGE

EIGHT NATIONAL MISSIONS

NATIONAL SOLAR MISSION

NATIONAL MISSION FOR ENHANCED ENERGY EFFICIENCY

NATIONAL MISSION ON SUSTAINABLE HABITAT

NATIONAL WATER MISSION

NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM

NATIONAL MISSION FOR A GREEN INDIA

NATIONAL MISSION FOR SUSTAINABLE AGRICULTURE

NATIONAL MISSION ON STRATEGIC KNOWLEDGE FOR CLIMATE CHANGE

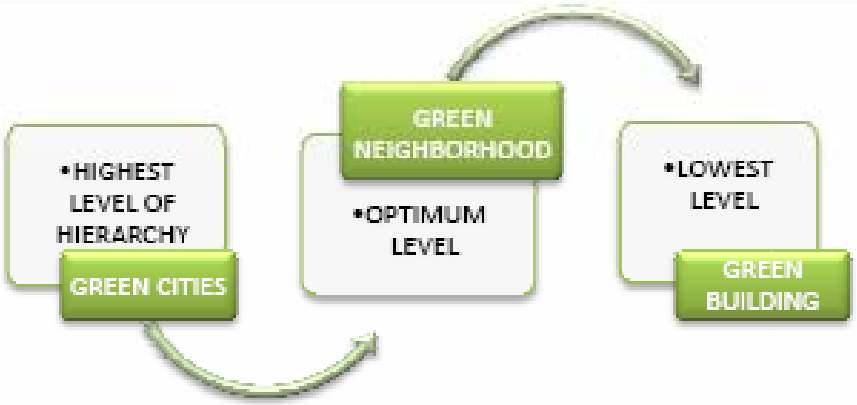


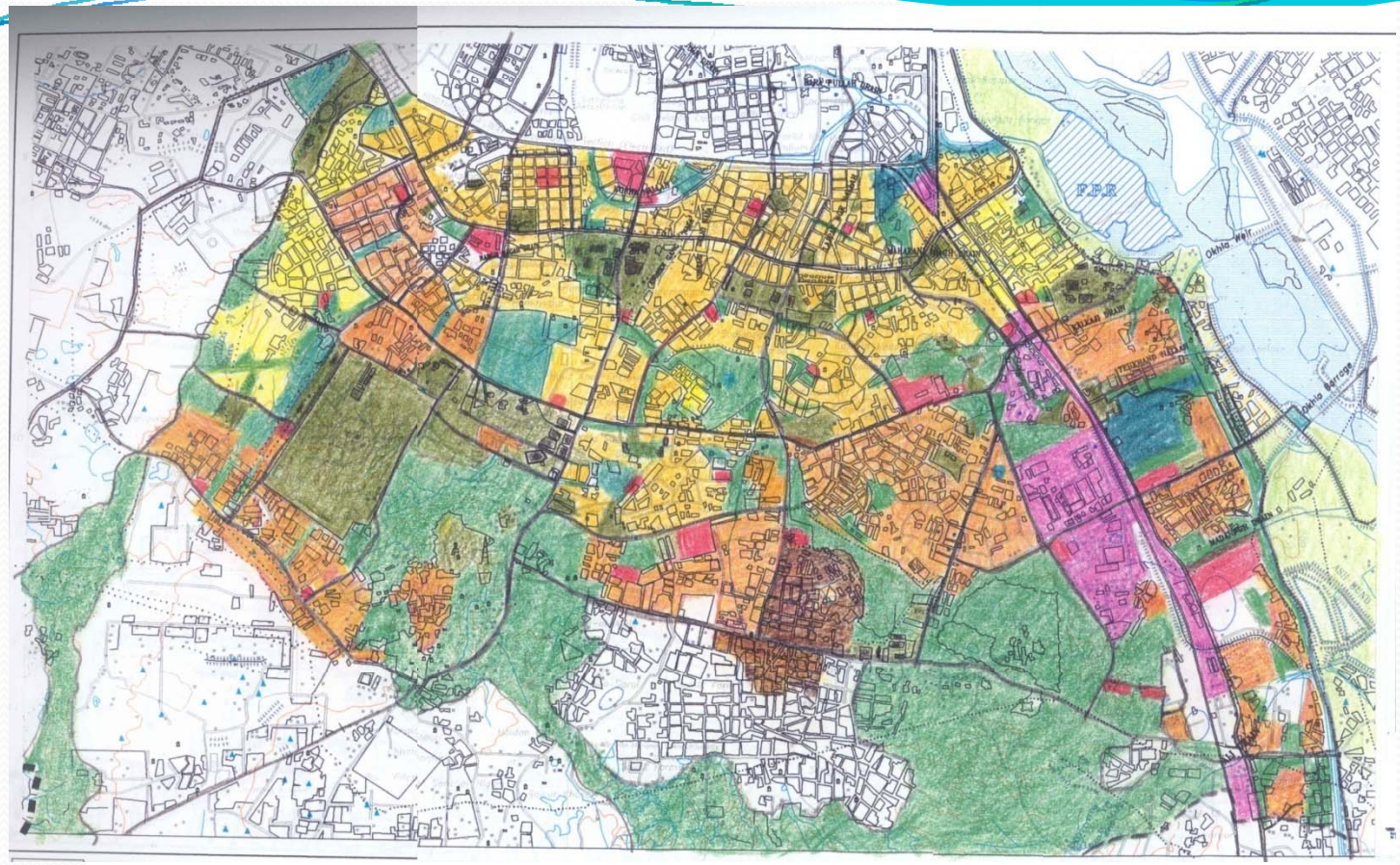
Figure 2.2 levels of green development.

Table 2.1 Comparison of Different Levels of Green Development

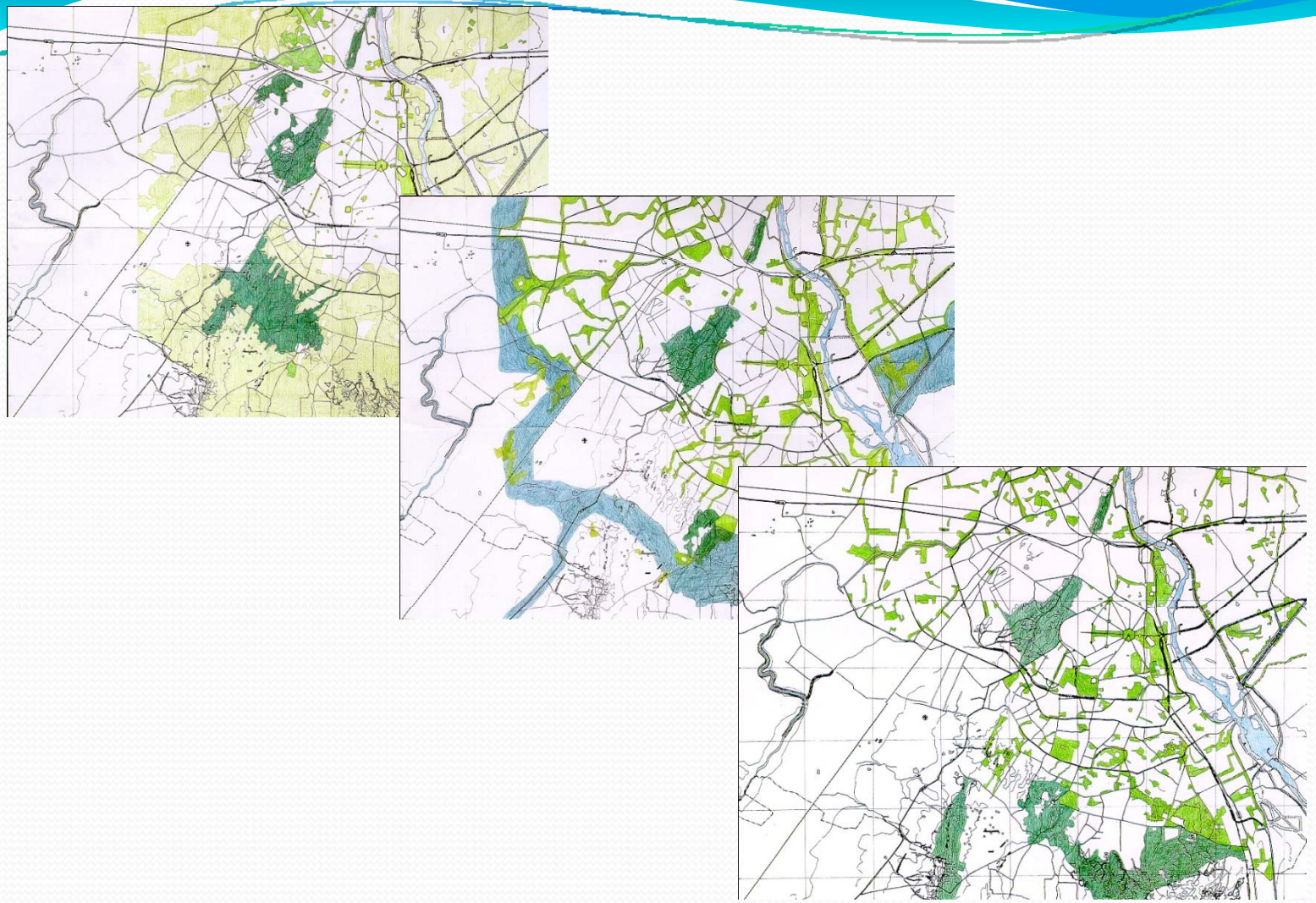
ISSUES	GREEN CITY	GREEN NEIGHBORHOOD	GREEN BUILDING
SCALE OF DEVELOPMENT	Large	Medium	Small
GOVT. INITIATIVES	Maximum	Very limited/ but there is control	Minimal
RESULTS	Good but requires lot of maintenance	Achieved with less effort	Achieved with less effort
DECISIONS	Complicated takes long time for implementation	Simpler ,can be taken within a short period	Very simple and a building level
IMPLEMENTATION	Complicated	Easy to handle	Easier
ENVIRONMENT PROTECTION	At a larger level if implemented properly	At a smaller but adequate level	Only at building level
QUALITY OF LIFE	Can improve standard of living but is difficult to achieve	Improves standard of living at a manageable scale	Improves quality of working in that particular building

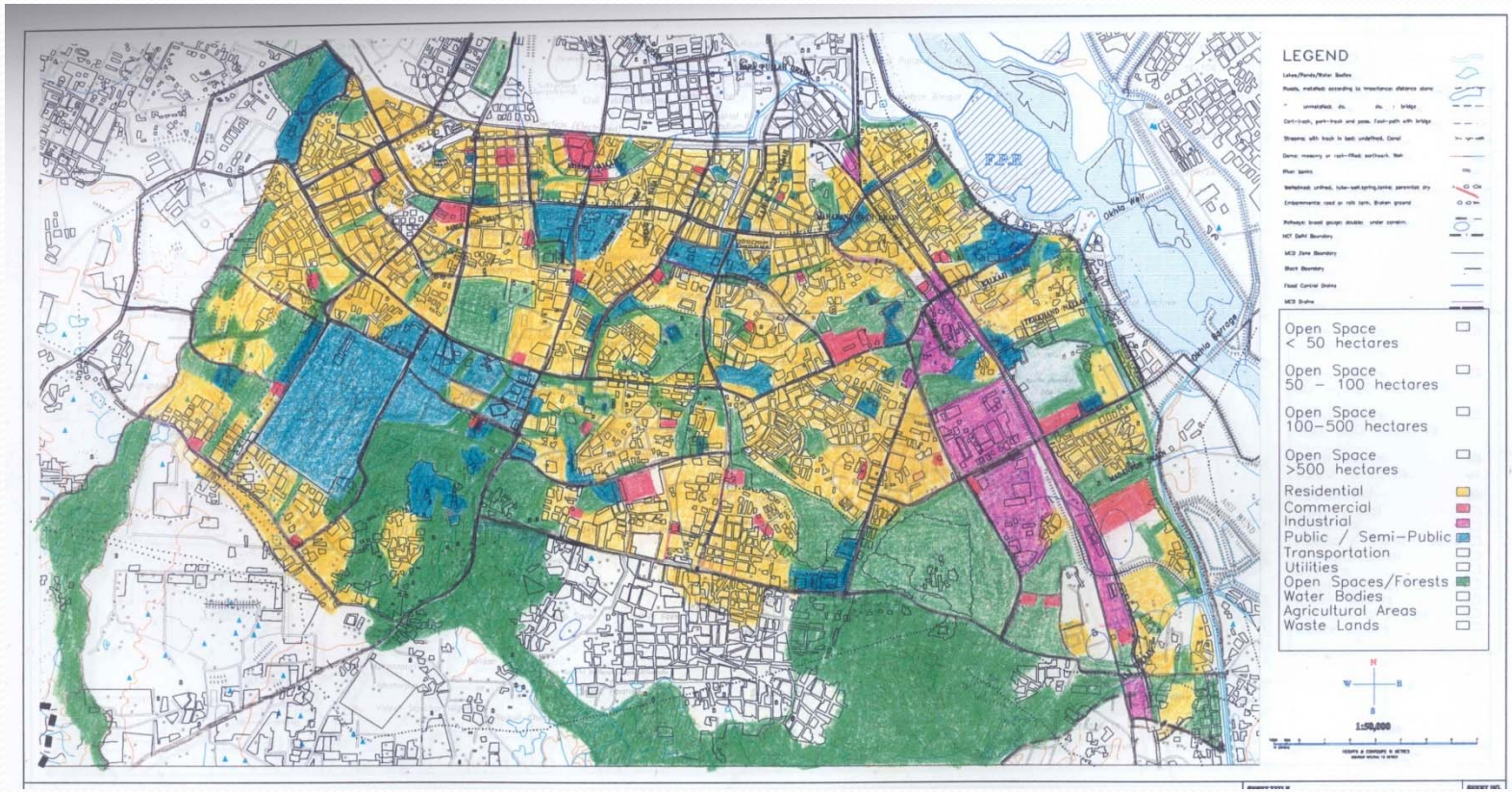
An attempt to view human settlements as ecosystems identifies the critical role played by the natural resource base to sustain the human population.

URBAN OPEN/ GREEN SPACES	Regulation Functions	• Regulates the chemical composition of atmosphere and purifies the local air.
		• Controls the runoff and flooding.
		• Regulates the hydrologic cycles.
		• Supports the biological diversity in the city.
		• Prevents soil erosion and sedimentation.
		• Regulates the local and global climate
	Carrier Functions	• Provides food and raw materials
		• Conserves the energy in the city through controlling the micro climatic variations
		• Provides recreation and tourism.
		• Integrates urban man to the nature
	Production Functions	• Produces oxygen
		• Recharges the ground water tables
		• Provides medical resources.
		• Produces raw materials for some of the human activity.
	Information Functions	• Aesthetic information.
		• Spiritual and religious information
		• Cultural and artistic inspiration.
		• Scientific and educational information source.[24]

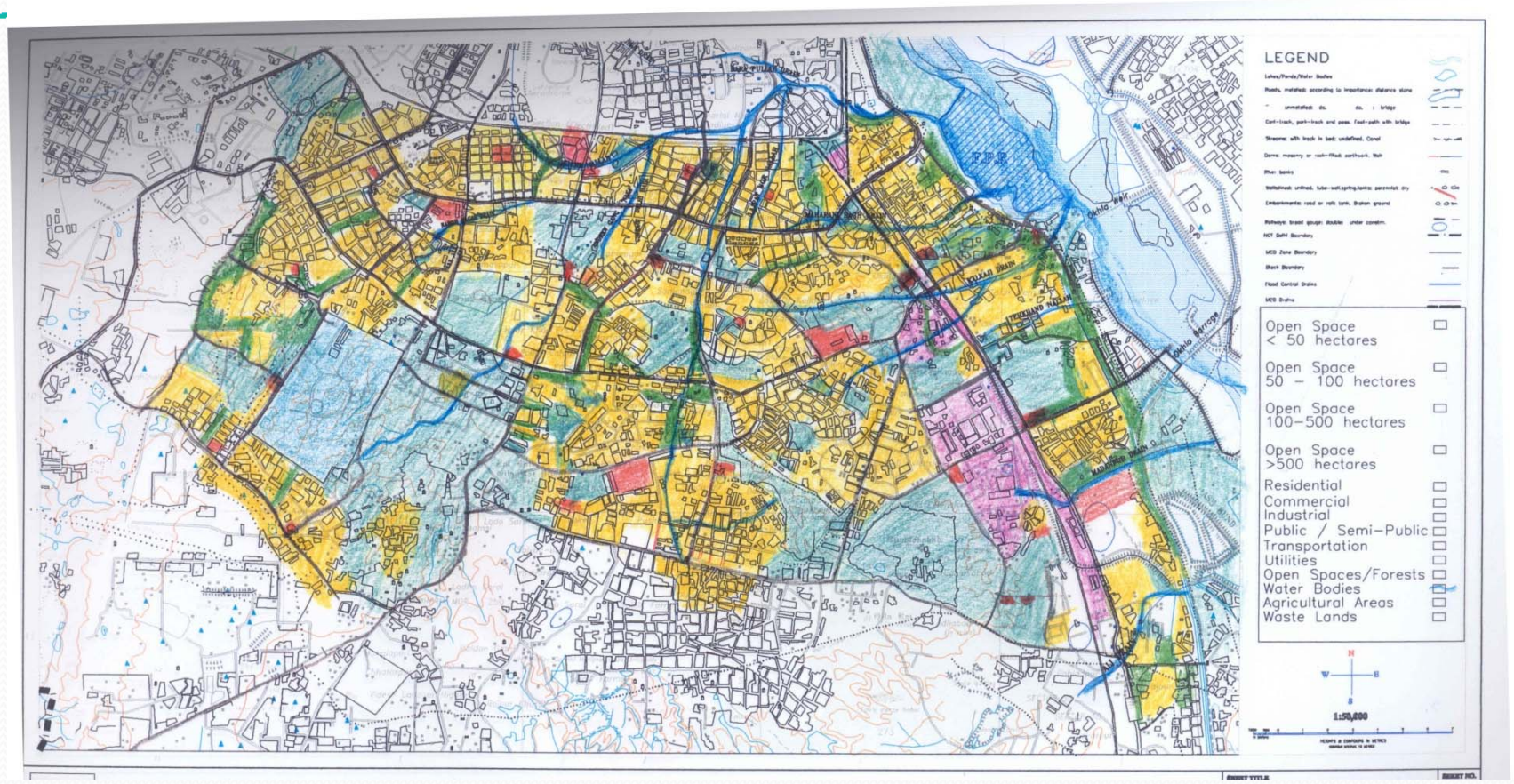


Map 4.7 GREEN LANDUSES – ZONE F





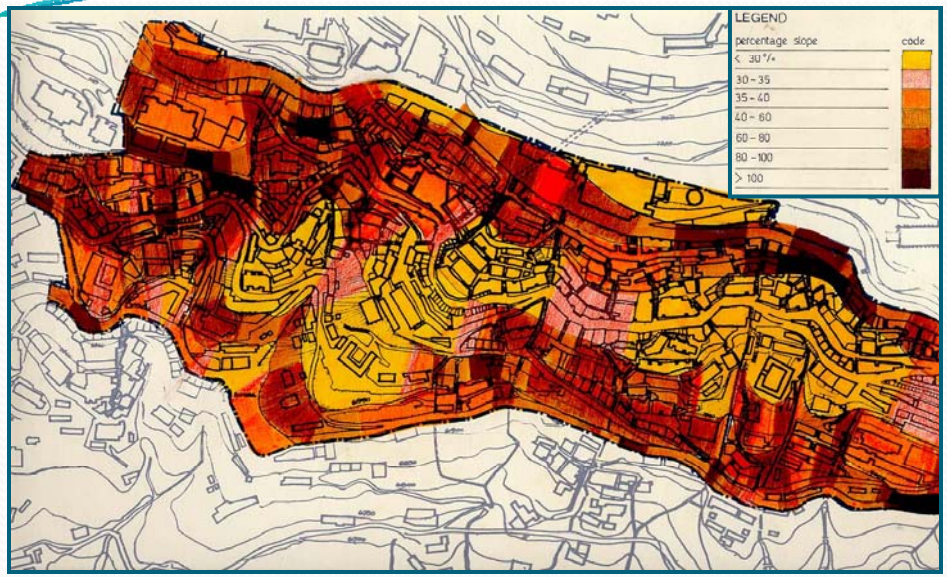
PROPOSED LANDUSE 1981-ZONE F



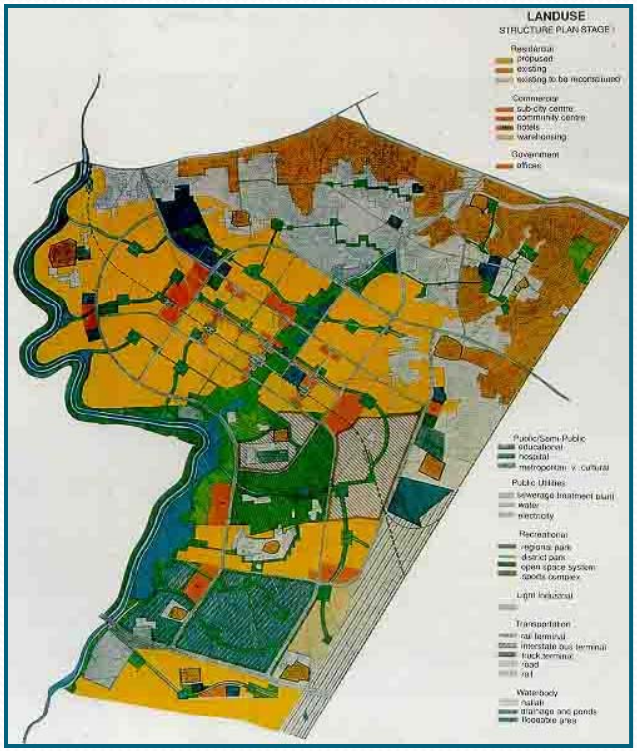
Green Corridors Blue Corridors Green Patches Other patches

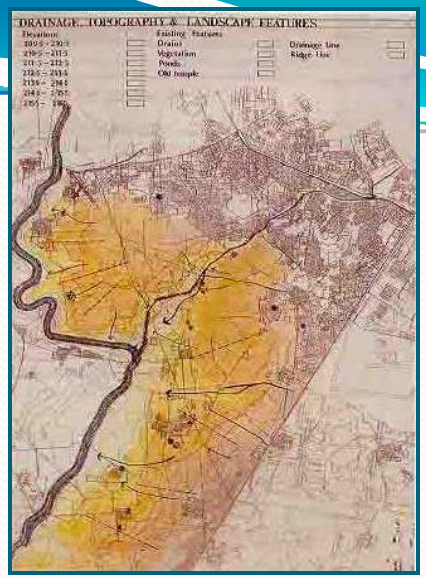
Map 4.8 LANDSCAPE ELEMENTS

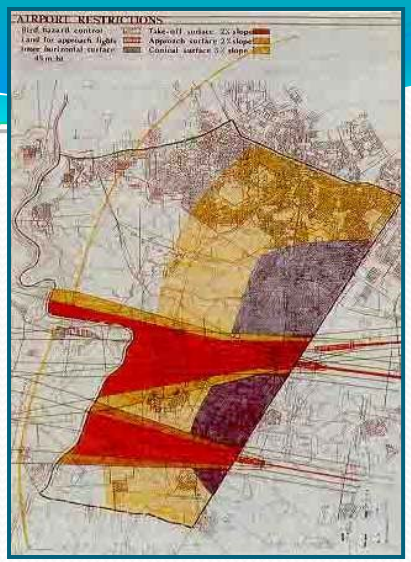
ENVIRONMENTAL IMPACT STUDY - SHIMLA

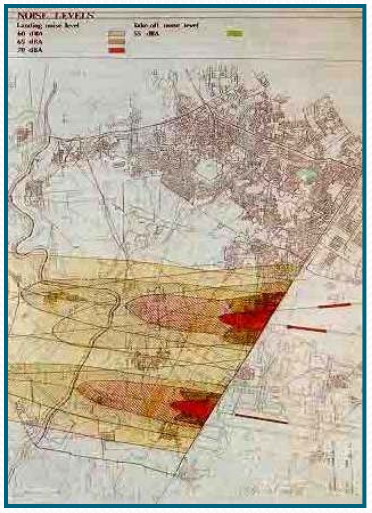


Papankala Sub-City





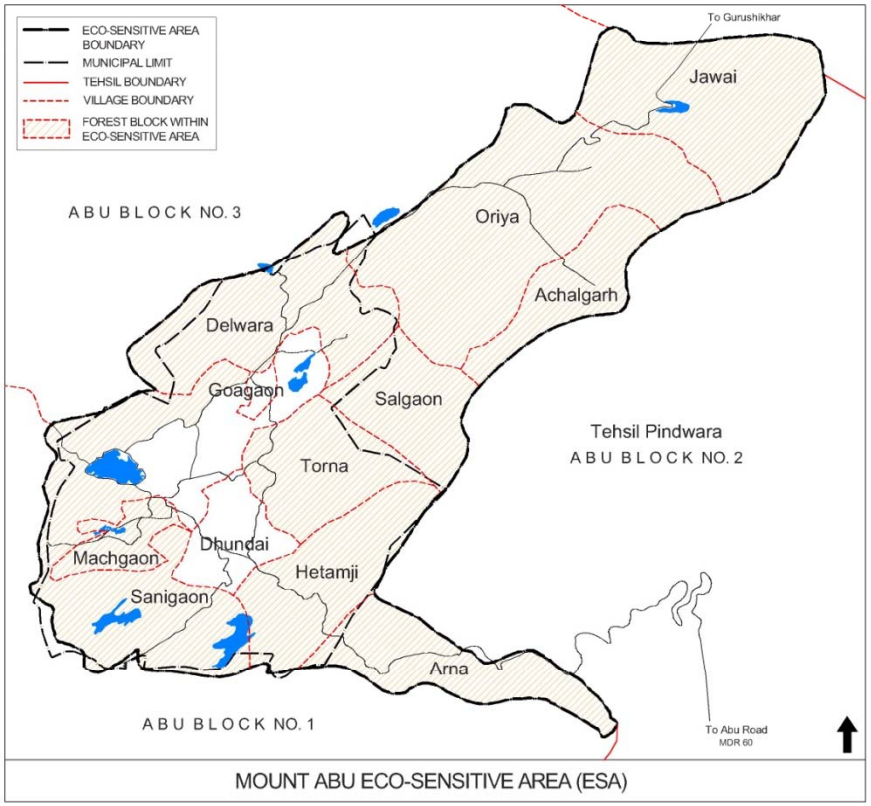




MOUNT ABU AS AN ECO-SENSITIVE AREA

The major reasons for declaring Mount Abu as an Eco-Sensitive zone are as follows:

- **Presence of Significant Ecology**
- **Presence of various rare & endemic species**
- **Presence of various Natural & Manmade Heritage components/ features**
- **Environmental Degradation due to various activities.**



MOUNT ABU ECO-SENSITIVE AREA (ESA)

The government notification for Mount Abu eco-sensitive zone

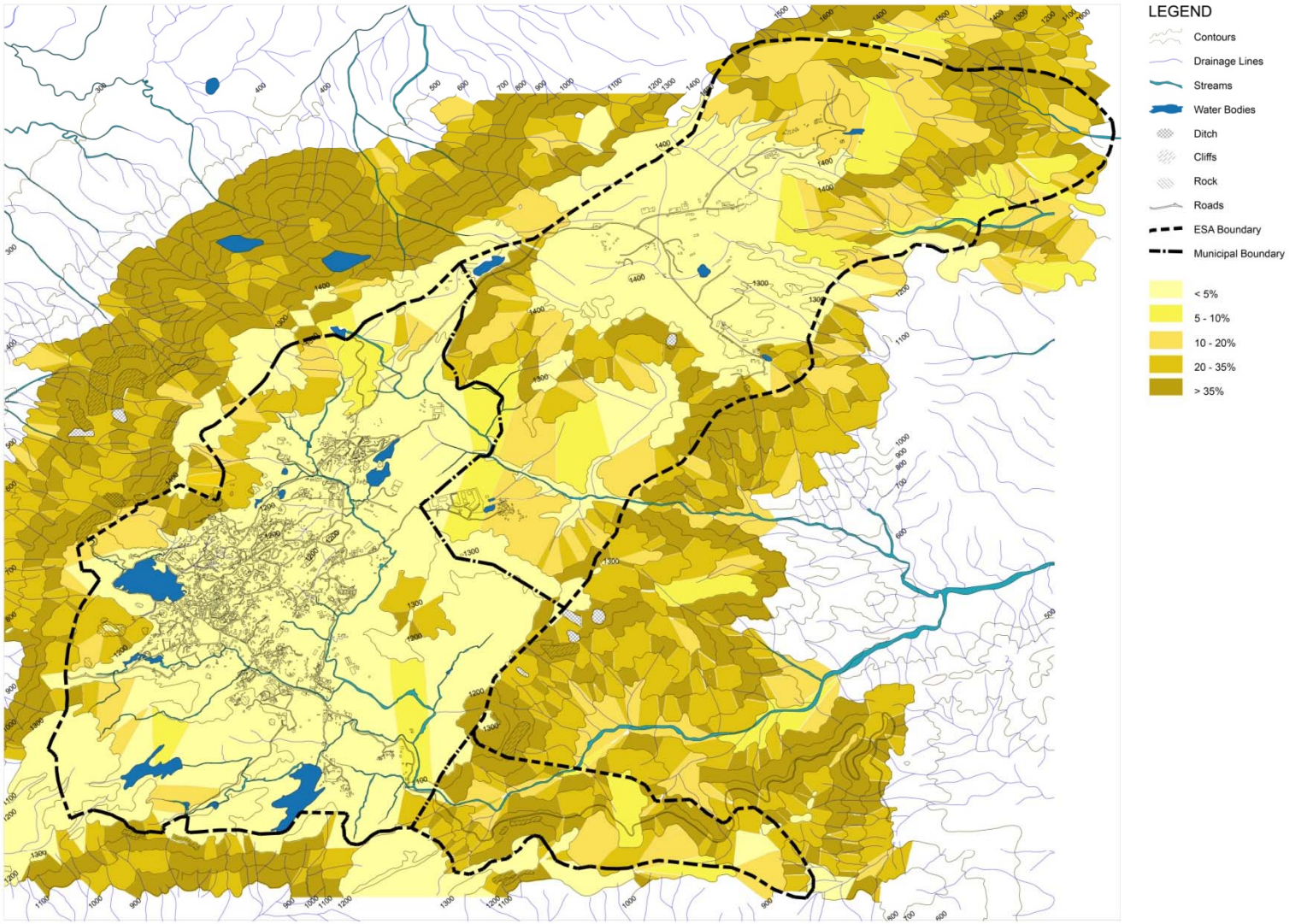
The ministry **of environment and forest (MoEF), under** the government of India, declared Mount Abu as an Eco- sensitive area through its notification issued on 25th June 2009.

The Eco-sensitive Zone covers the entire area of Notified Urban Area Limit, including Mount Abu Municipal Limits adjoining Forest Block Areas

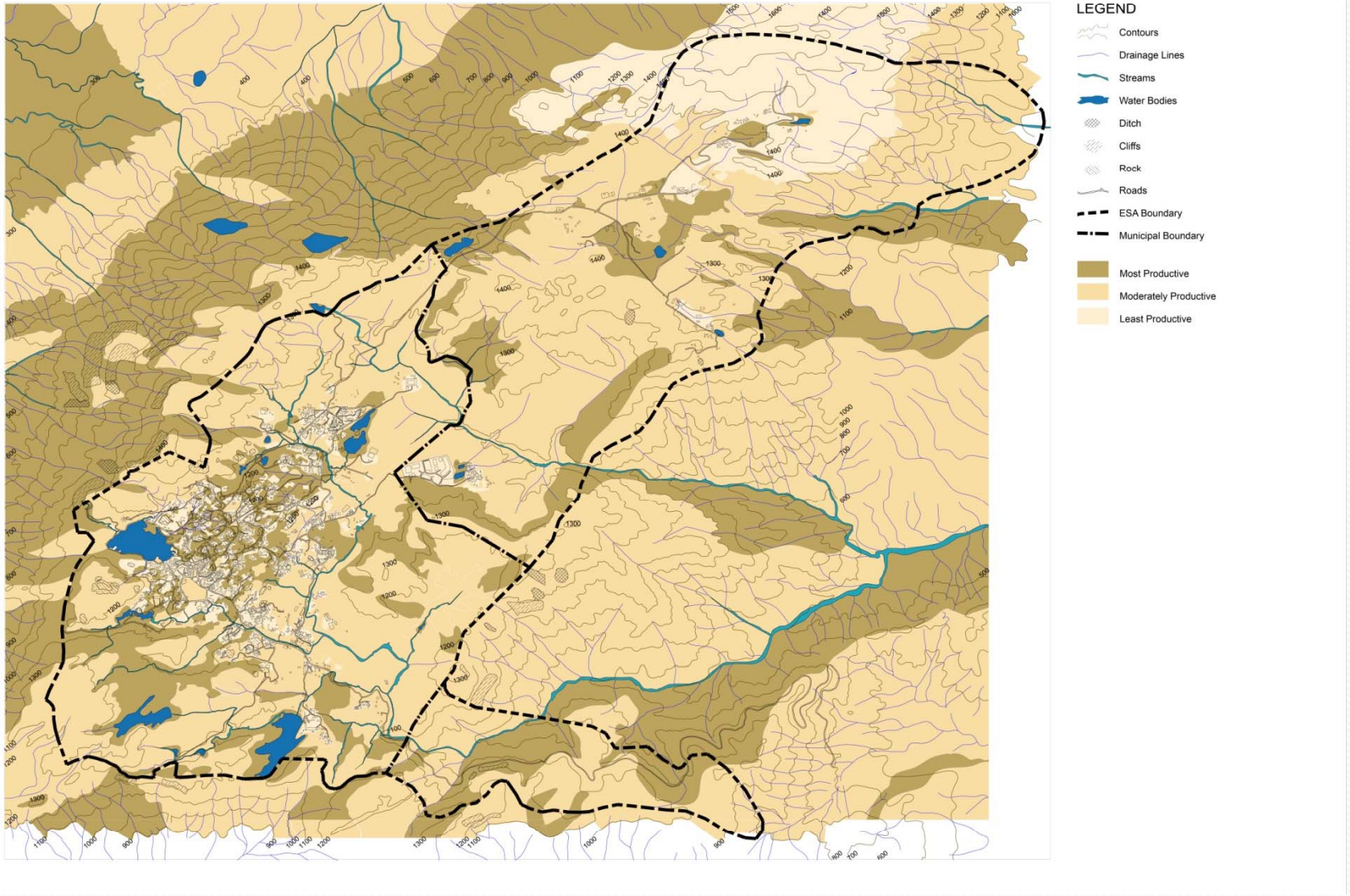
LEVEL OF STUDY	AREA (sq.km)	POPULATION	DENSITY (p/sq.km)
ECO-SENSITIVE AREA	72.82	24,349	334
MOUNT ABU MUNCIPAL AREA	21.41	22,045	1035


BASELINE DATA
eco-sensitive
zone

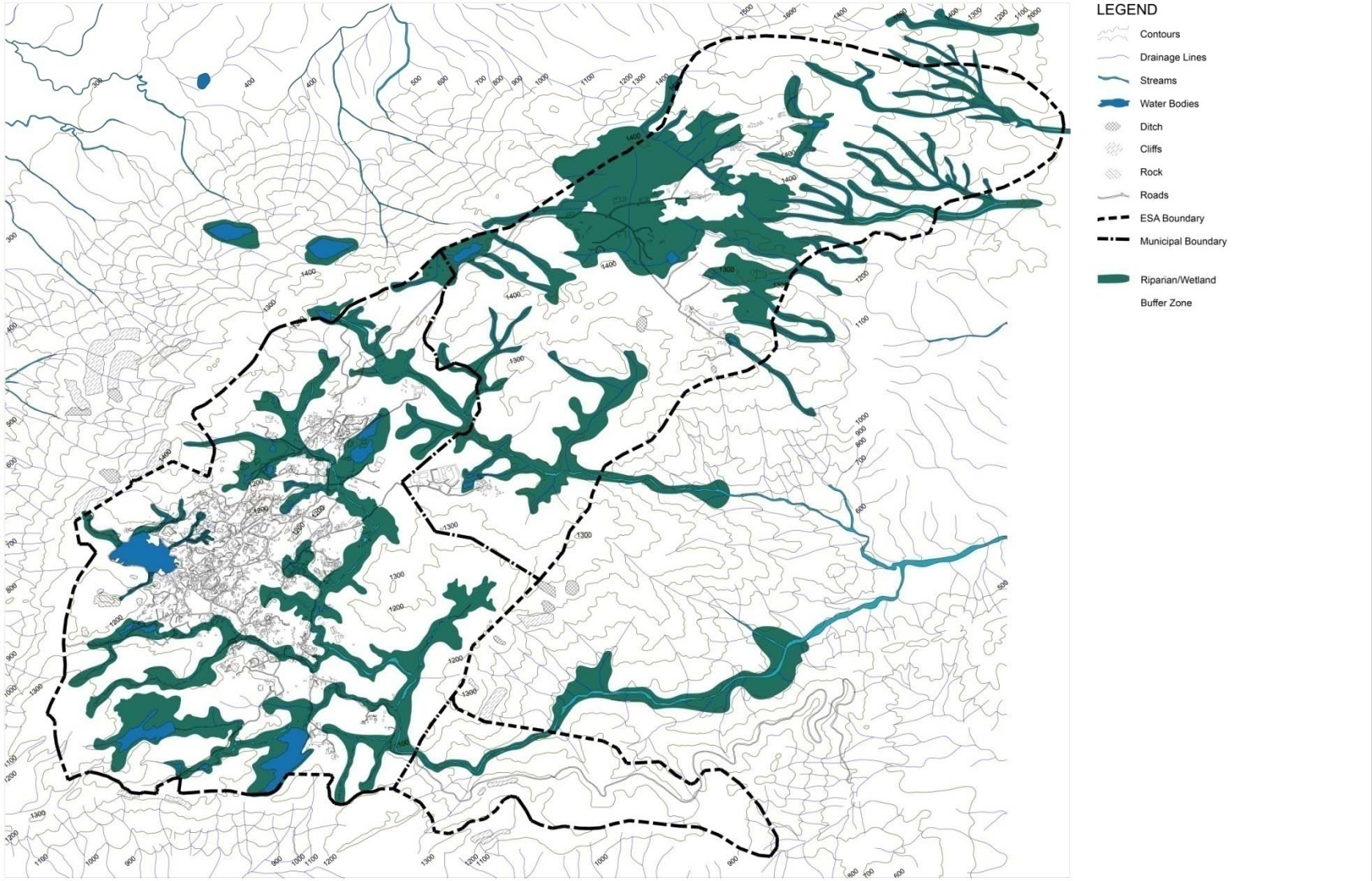
ESA REGION: SLOPE



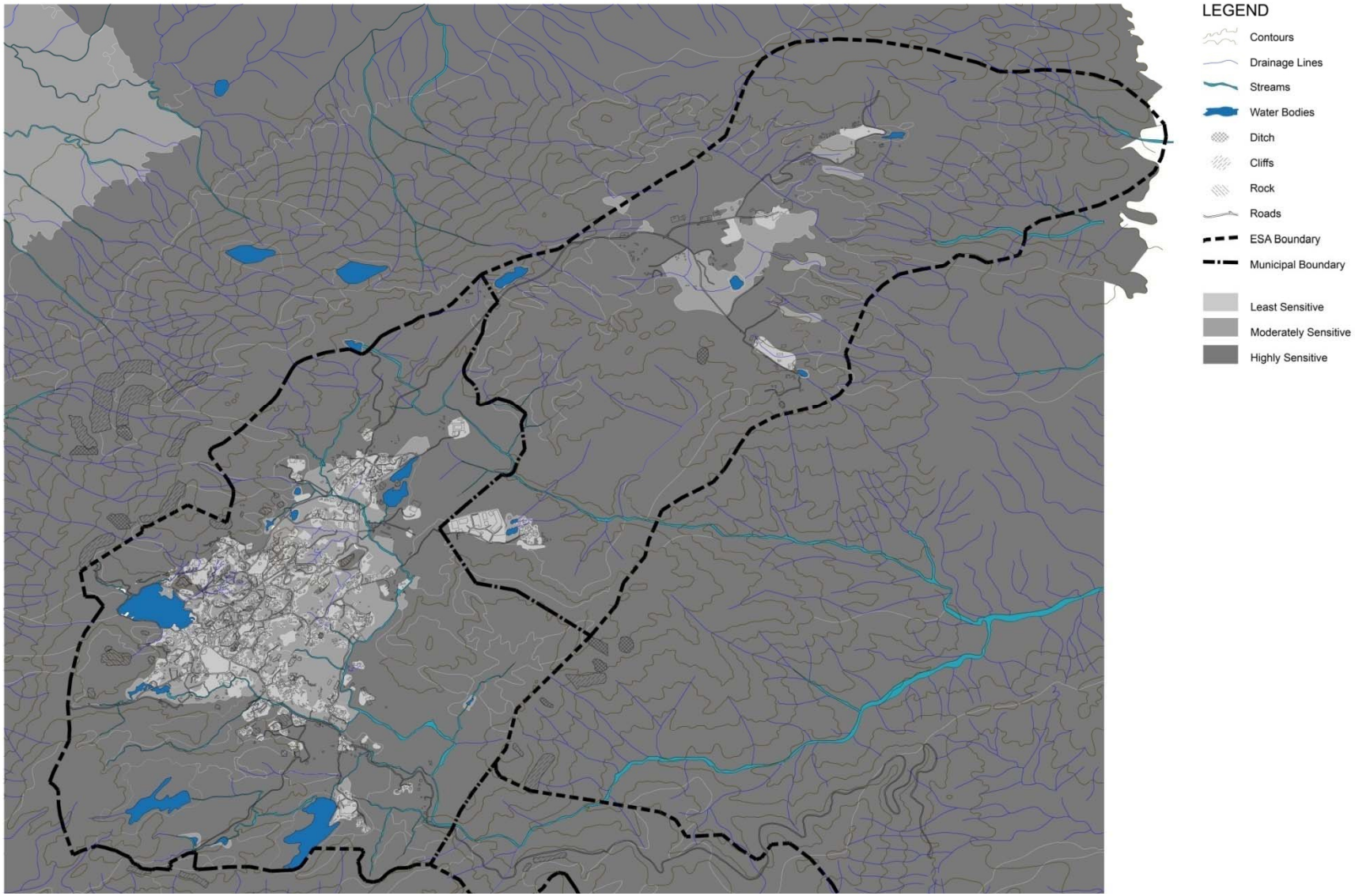
ESA REGION:SOIL



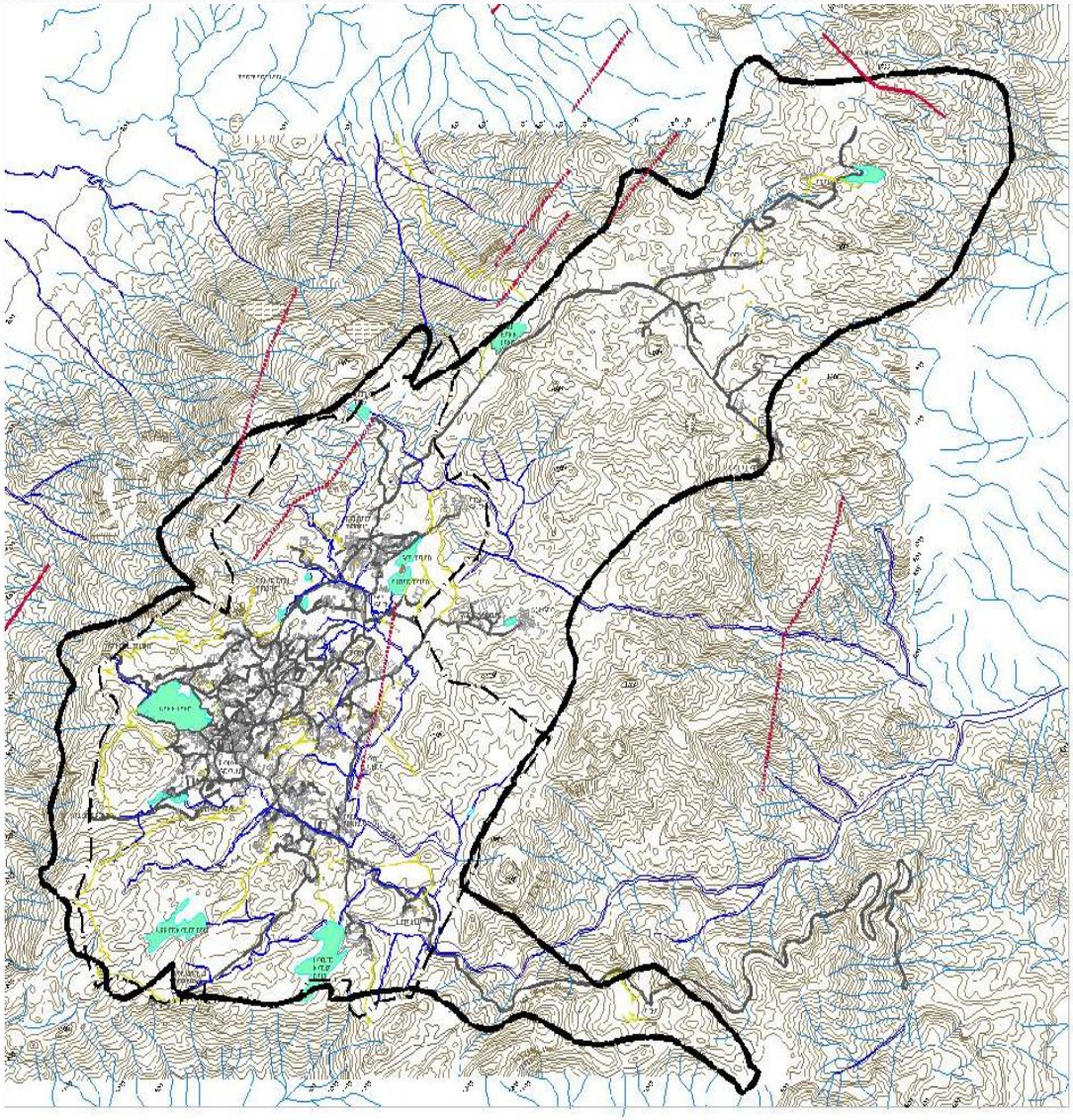
ESA REGION:WATER RIPARIAN BUFFER



WILDLIFE HABITAT SENSTIVITY



ESA REGION: SEISMICITY



MAP OF E.S.A SHOWING THE FAULT LINES 1 30000

SEISMIC ACTIVITY & FAULT LINES

- Some 8 fault lines of varying intensity are found in and around the E.S.A.
- Mount Abu falls in Zone 3 - Moderate Seismic activity.
- No year passes without a vibration or two. fortunately the shocks are very light and there is no record of a really destructive one.
- The region reflects noticeable past seismic activity.
- Earthquake occurred in the year 1825, 1848, 22nd Dec1875, 15th Dec 1882, 4th April1905 & 1969.

LAT. (°E)	LONG. (°N)	YEAR	MAGNITUDE
24.40	72.70	1848	6.0
24.76	72.54	1969	5.5

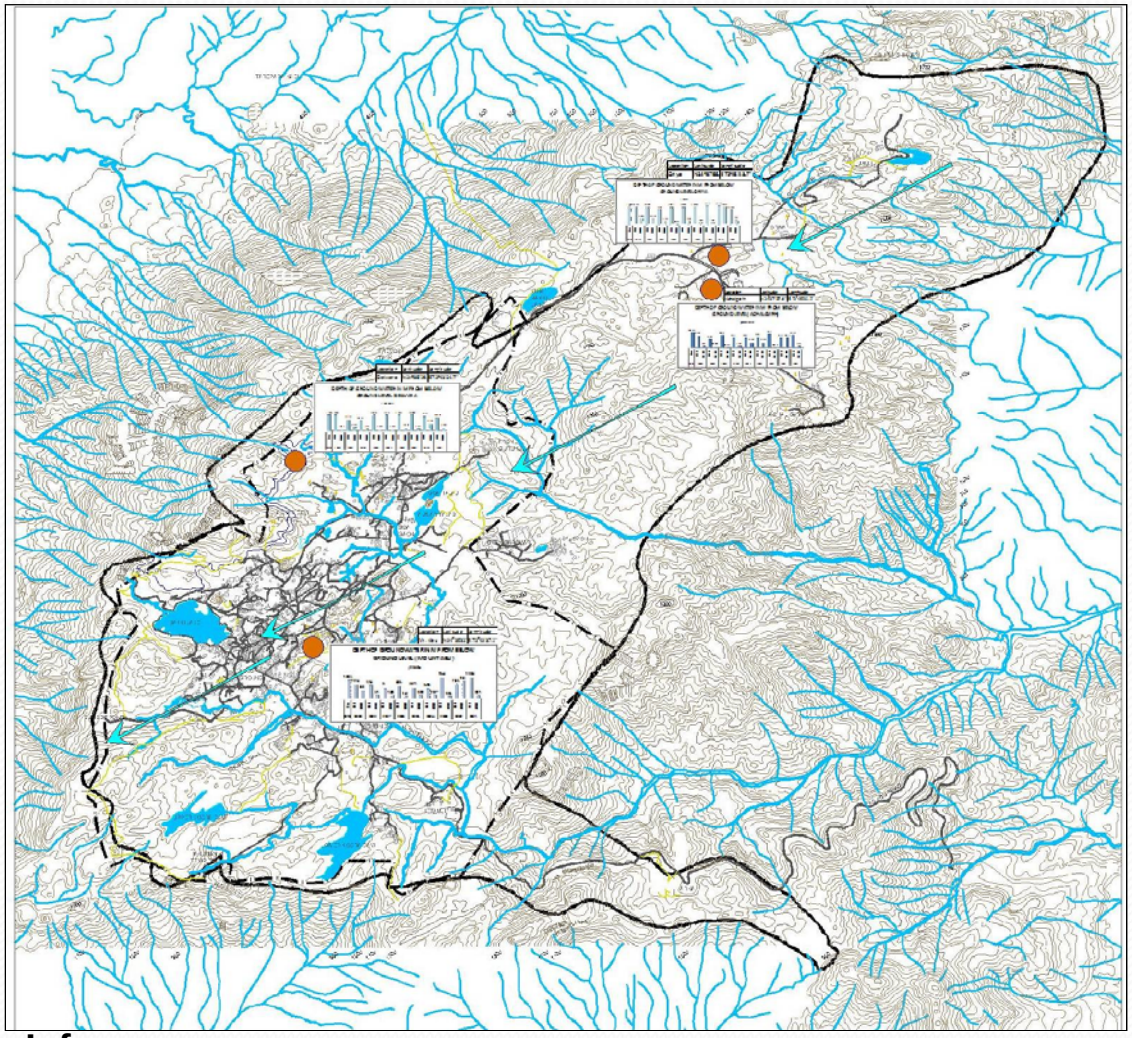
Source: Probabilistic Assessment of Earthquake Hazard in Gujarat & Adjoining Region of India.

LEGEND

- FAULT LINES
- ECO-SENSITIVE ZONE BOUNDARY
- MUNICIPAL BOUNDARY
- BUILDINGS
- ROADS
- PATHWAYS

NORTH

ESA REGION: GEO HYDROLOGY



Fluoride: Ground water of Mount Abu has fluoride constituent above permissible limit. Due to presence of granite rock the region is rich in fluoride content.

Nitrate: Ground water of Mount Abu has Nitrate constituent above permissible limit .

Salinity: Fresh to medium salinity ground water is available in Mount Abu. The Electric conductivity of is less in ground water i.e 2000 us/cm. It has less total dissolve solid. Minimum value of EC has been observed as 380 us/cm in village Achalgarh.

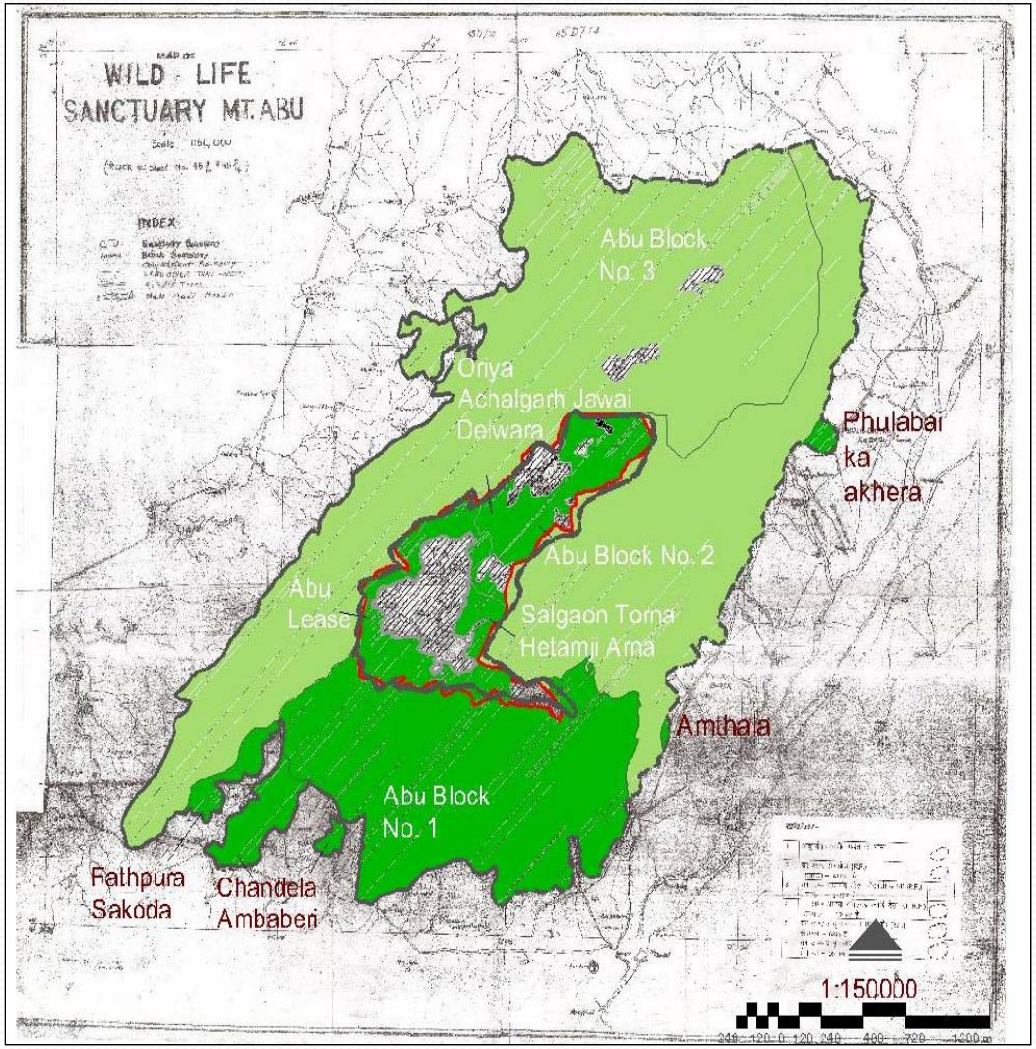
Hardness: Ground water of this region has medium to low range of hardness usually less than 600 mg/l.

Inferences:

There is problem of high fluoride content in ground water.

~~The area has less potential for ground water.~~

ESA REGION: FLORA



INTRODUCTION

- Forest of the sanctuary – Group 7 'Sub Tropical Broad Leafed Hill Forests' (Champion & Seth).
- Forests are part of Wildlife Sanctuary (notified area-113.7 sq km)
- Area under the jurisdiction of Deputy Conservator of Forests – 326.14 sq km.
  - Protected Forests – 222.13 sq km
  - Reserved Forests – 104.01 sq km
- Flora belong to 112 families, 449 genera, 820 species

RARE & ENDEMIC SPECIES

Dicliptera abuensis, Carvia colloseeys, Ischaemun kingii, Conbolvaluesblateri ceropergia, etc

RED DATA SHEET IUCN

Anogrissius sereicia, Begonia tricocarpa, Crotolaria filipe, Indigofera constrata

MEDICINAL PLANTS

Markanganis akaikara, Salammisri, Safed Musli, etc

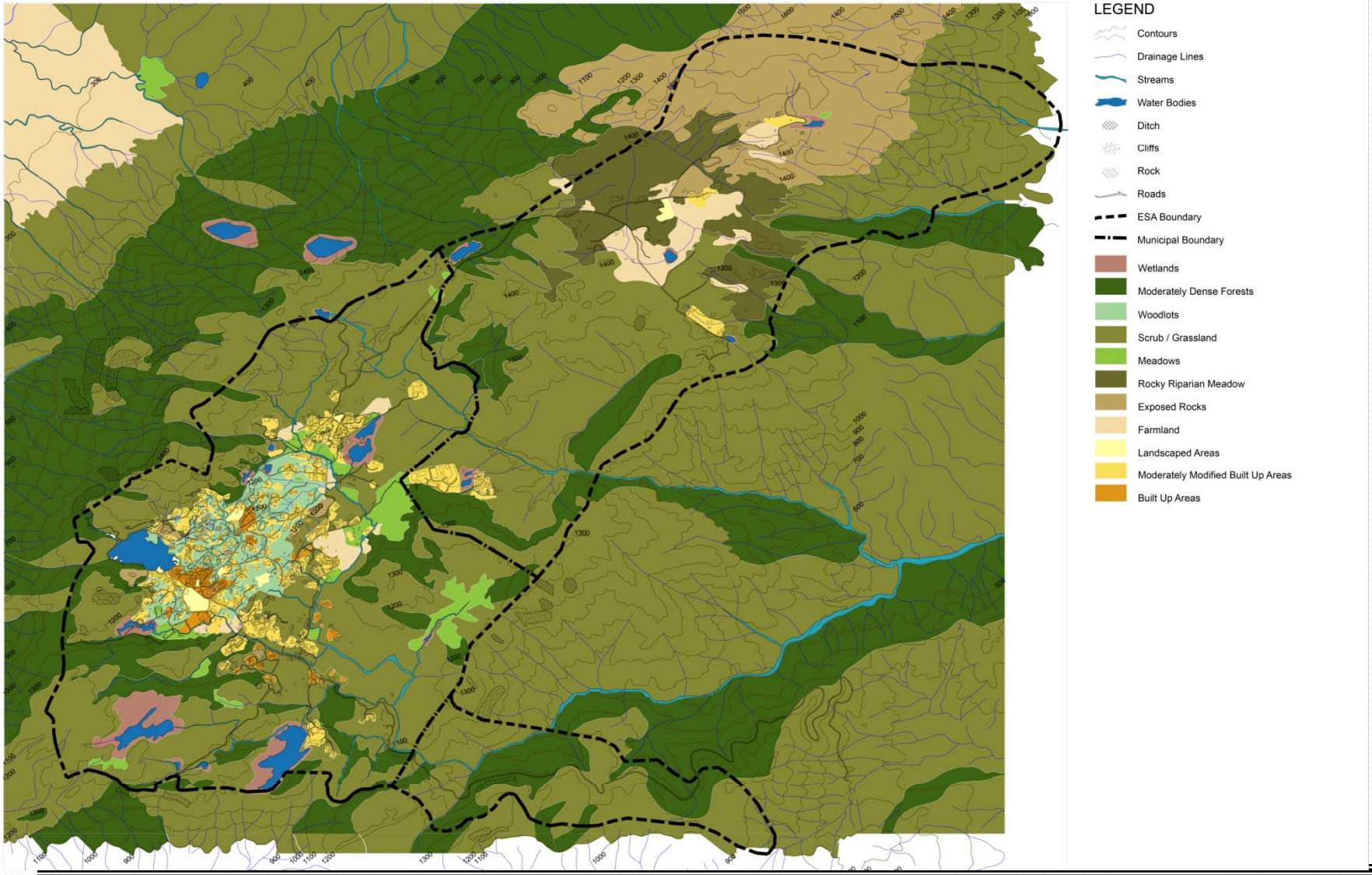
PREDOMINANT SPECIES

Anogeisnus pendula, Anogeisnus latifolia, Anogeinies sericea, Bosivelia serrata, Lannea coromondelica, Butia monosperma, Bamboo, etc

INVASIVE SPECIES

Lantana camera, Parthenium hysterophorus, Prosopis juliflora

ESA REGION: VEGETATION PATTERN



ESA REGION: COMPOSITE SUITABILITY