

SMART APPROACHES FOR INTEGRATED URBAN WATER MANAGEMENT: INTERLINKING LAKES OF AHMEDABAD

PRESENTED BY:

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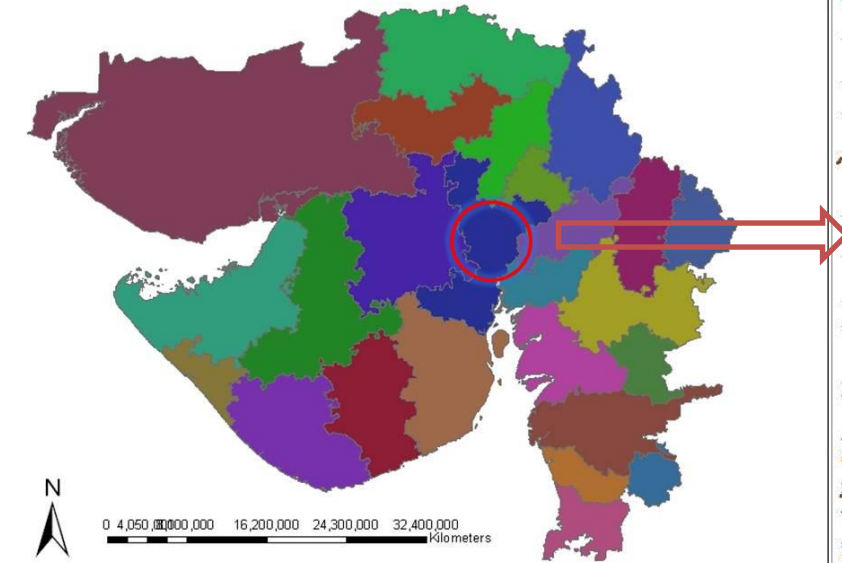
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INTRODUCTION

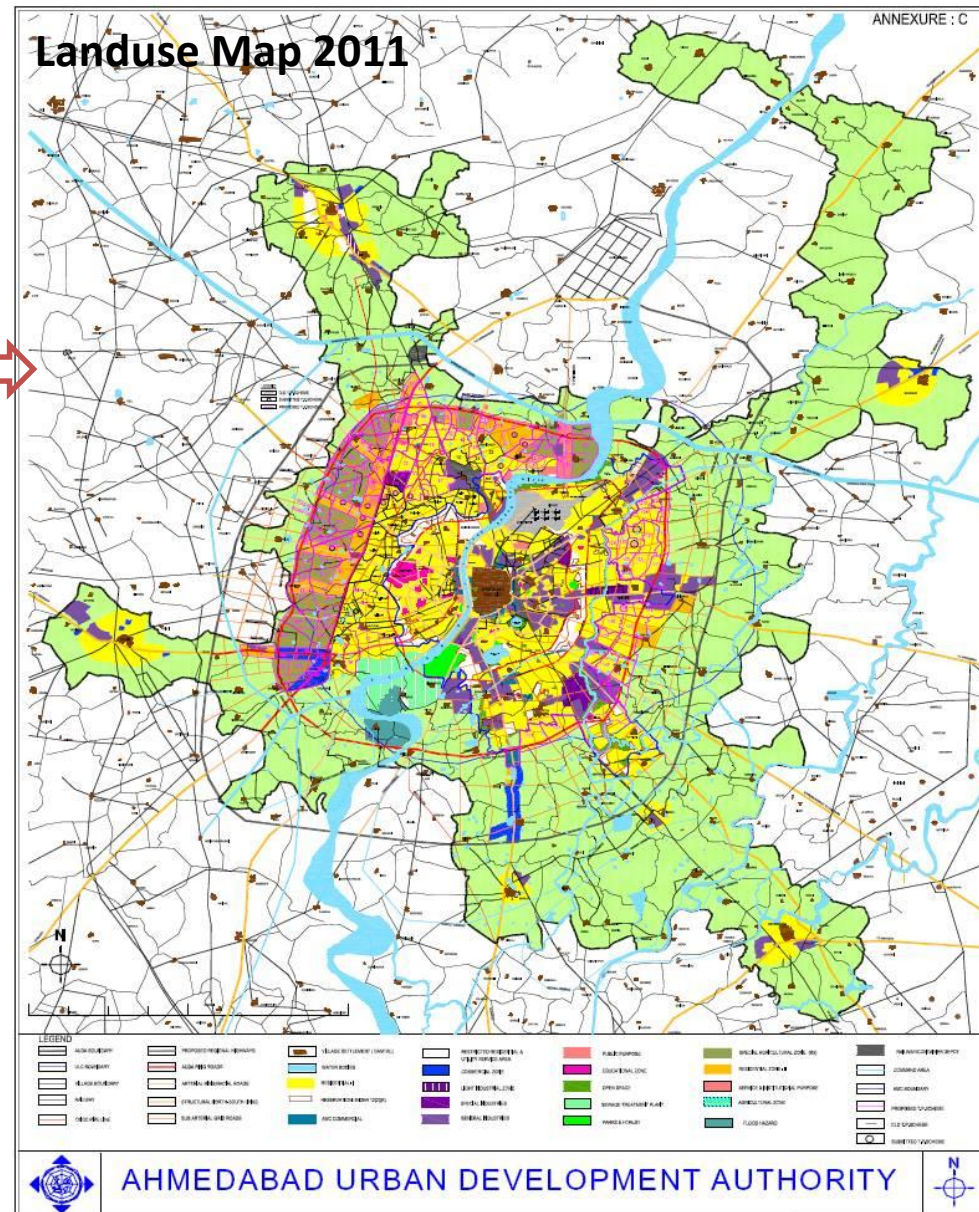
- Cities are gifted with innumerable water bodies, but due to **urbanization & lack of concern for the natural resources**, these assets are getting **depleted**. Many have been **shrunk in size** due to encroachment by slum & urban settlement & many are getting **polluted** due to discharge of sewage & industrial waste.
- Due to construction activity like **roads & buildings, natural drainage gets blocked & leads to water logging & flooding**.
- **Excessive paved areas** in the city also leads to **less percolation** of water.
- Rain water which is a source of fresh water is not harvested in lakes which **inhibits ground water recharge**.
- Further due to increase in population there is over extraction of ground water which leads to **depletion of water table**.
- This created awareness among ULBs, followed by lake restoration, conservation and management strategies and interlinking of lakes.
- Instead of manually connecting one lake with the other i.e. interlinking, the approach should be to **trace natural drainage and analyze watershed**.
- How far these practices are successful in fulfilling the purpose of restoration needs to be evaluated. Also, there is a **need of appropriate land management**.
- **This study tried to evaluate existing situation of lake restoration, finding loopholes and proposing strategies and guidelines for integrated redevelopment of lakes.**

STUDY AREA - AHMEDABAD

GUJARAT STATE



- Location: 23°00" N to 23°30" N latitude and 72°00"E to 72°35" E longitude.
- AMC area = 190.84 sq km
- AUDA area = 1330.08 sq km



Source: CDP, Ahmedabad

AIM OF THE STUDY:

Smart Approaches for interlinking lakes of Ahmedabad.

OBJECTIVES:

- To check the long term viability of integration of lakes through watershed analysis.
- Proposing strategies and guidelines for integrated redevelopment of lake and its periphery.

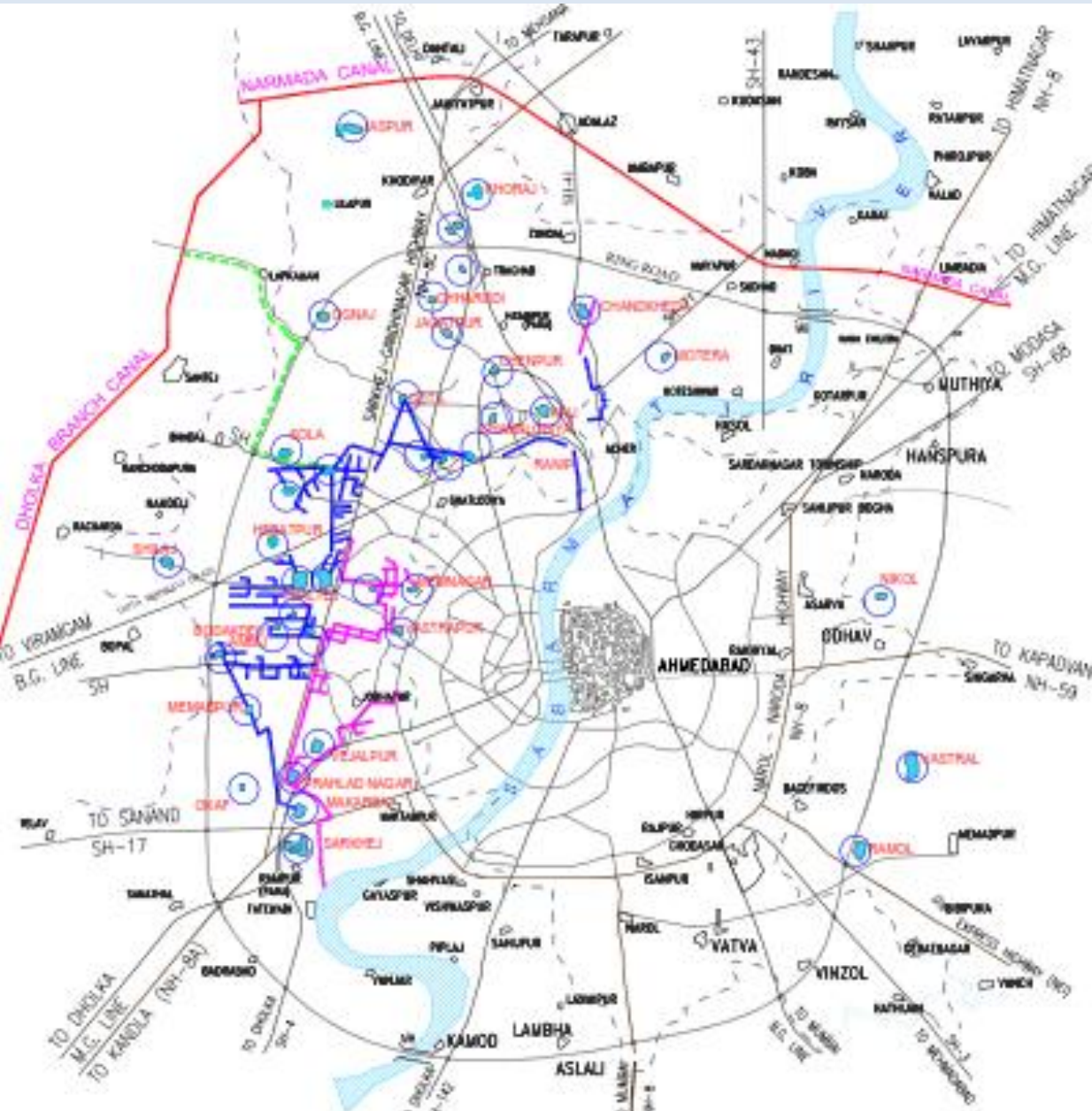
LIMITATION:

Only primary drainage lines (streams) considered for study.

ONGOING EFFORTS FOR INTERLINKING LAKES

- **Gujarat HC delivered a judgement in Aug, 2002 on** a group of PILs demanding revival of Ahmedabad lakes, and requires Government authorities to notify all lakes in the State and protect them.
- **In 2003, Interlinking of lakes initiative started** which was conceptualized by Ahmedabad Urban Development Authority (AUDA) and Ahmedabad Municipal Corporation (AMC) .
- **Total 72 lakes are** notified as urban lakes and identified as strategic storm water networking and covered under interlinking project. The project has two components:
 - **Related development project outside lake area:** *Provision of sewage system, laying rain water line in the catchment area, diverting rain water to the lake, recharging from Narmada canal system, rehabilitation and relocation of the slum dwellers, widening of roads and developing new linkage with rest of the city.*
 - **Development project within lake area:** *Desilting and excavation of lake for achieving better percolation, percolation of bore-well at the bottom surface of lake, land reclamation adjoining the lake, development of amusement park, garden, parking, hawkers zone and community spaces.*
- **Interlinking of lakes is a partnership project between local and national government, with 70% funds from JNNURM. By 2011, it was expected to link all the water bodies.**

ONGOING EFFORTS FOR INTERLINKING LAKES



- Total 41 lakes are connected with storm water drains, slum relocation, greening, linking with Narmada Canal at a cost of Rs.190 crores (2011).
- However, there is only technical interlinking & no integration involved.

KANKARIA LAKE:

Restoration and Lake front Development work completed in 2008.

Lake front development planned with walkways, food courts, entertainment facilities, gardens and landscaping.

Won honors:

- 'Best Practices to Improve the Living Environment' in 2012
- AMC has given special award 'Lee Kuan Yew World City Prize 2012' for Kankaria lake front development.

REVIEW OF EXISTING RESTORATION REGULATION

1. NATIONAL BUILDING CODE OF INDIA

Part 3: Development Control Rules and General Building Requirements

Section 11.6.2: Water body should be protected by ensuring that **no permanent/ temporary construction development takes place around it up to a distance of 50 mt. from the edge of the water body and the same shall be suitably landscaped.** Further, the public shall have easy access to the water body.

2. GENERAL DEVELOPMENT CONTROL REGULATION OF AHMEDABAD

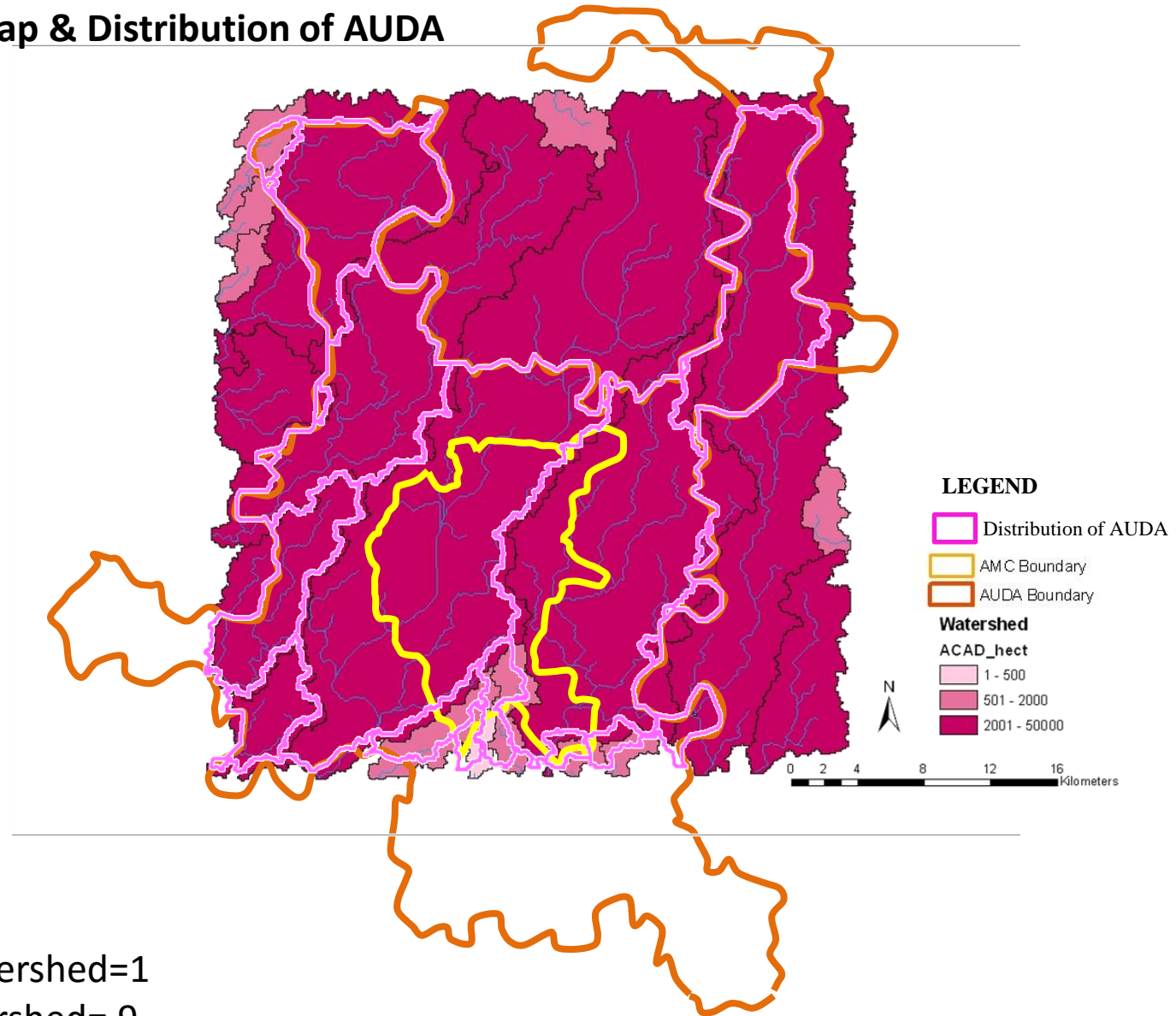
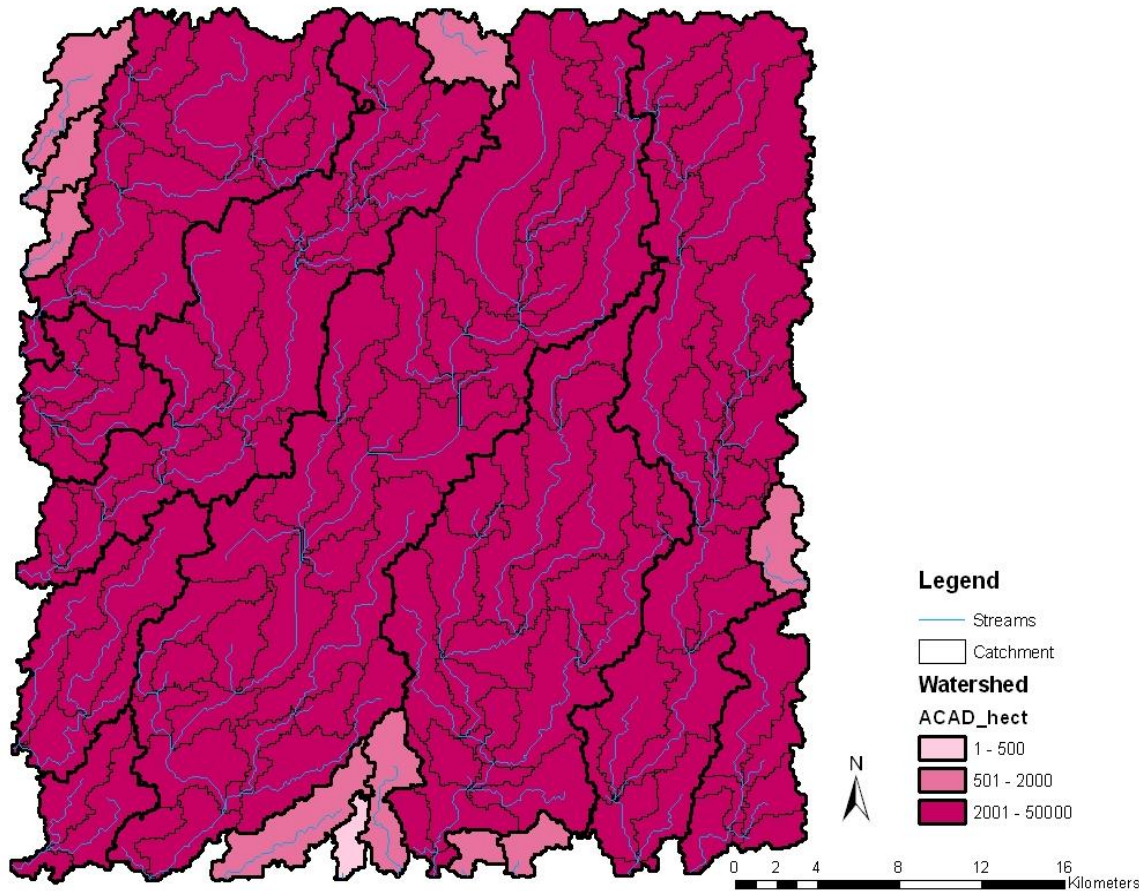
Section 14: Distance from Water Course

- 1. *Where there is no river embankment:*** **No development** whatsoever, whether by filling or otherwise shall be carried out **within 30 Mts.** from the boundary of the bank of the river.
- 2. *Where there is a river embankment:*** **No development** within **15 mt.** or such distance as may be prescribed under any other general or specific orders of Government and appropriate Authority whichever is more, from river.
- 3.** In case of **kans, nala, canal, talav, lake, water-bodies etc. it shall be 9 Mts.**

Provided that where a water course passes through a low lying land without any well defined bank, the applicant may be permitted by the competent Authority to restrict or direct the water courses to an alignment and cross section determined by the competent Authority.

ANALYSIS – WATERSHED MAP OF AHMEDABAD

Watershed Map & Distribution of AUDA



CLASSIFICATION:

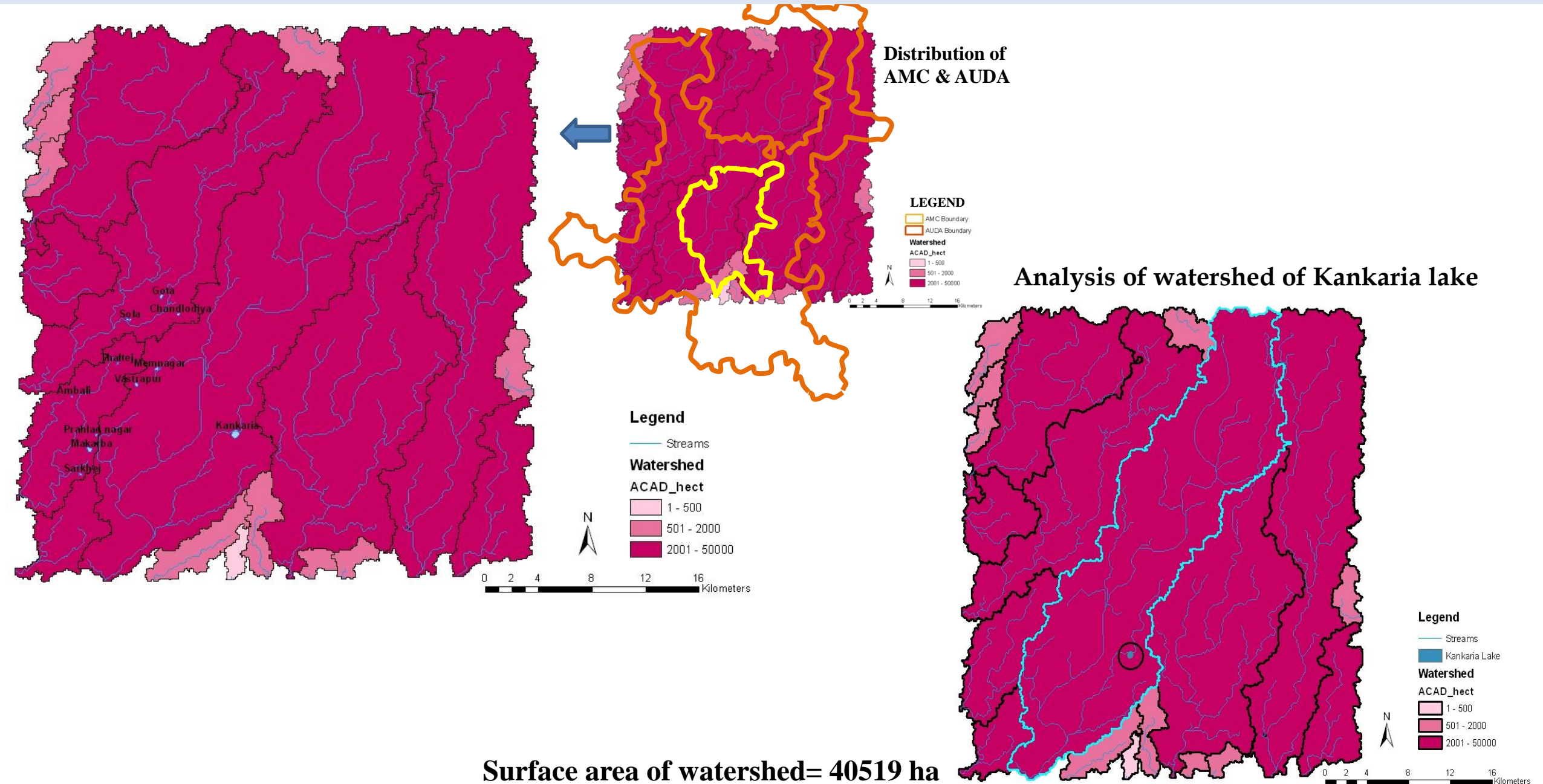
1. Micro-watershed= 1-500 Ha
2. Mini-watershed= 501-2000 Ha
3. Large watershed= greater than 2001 Ha

NUMBER:

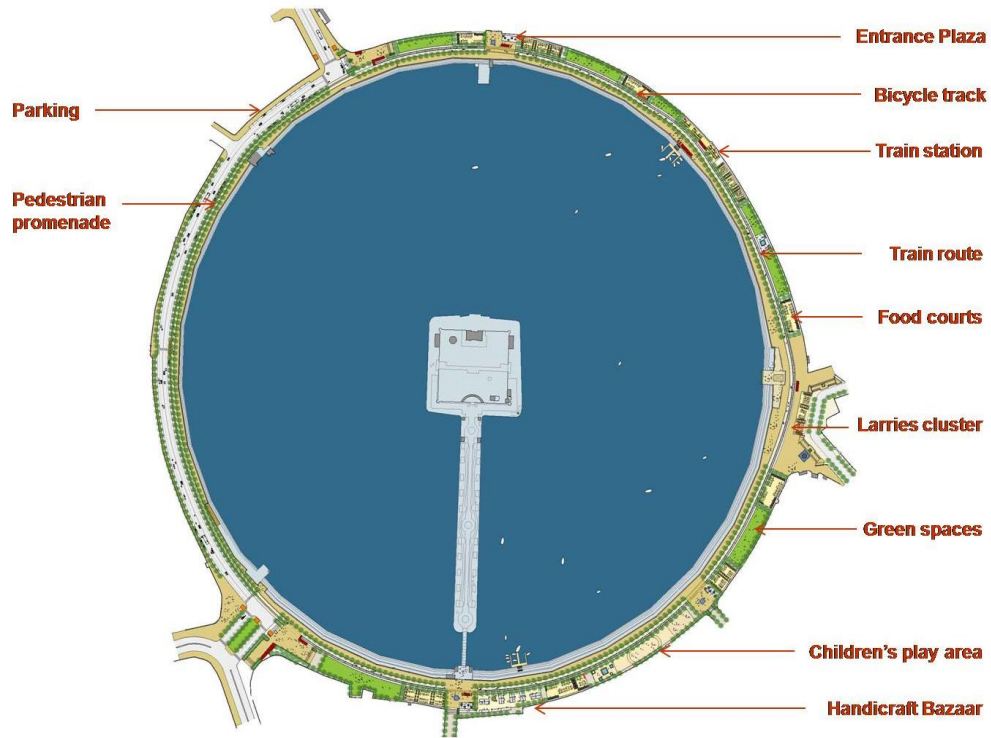
- Micro-watershed=1
- Mini-watershed= 9
- Large watershed= 9

• Watershed Map covers 90% of AUDA area

LAKES RESTORED & IN PROCESS OF RESTORATION



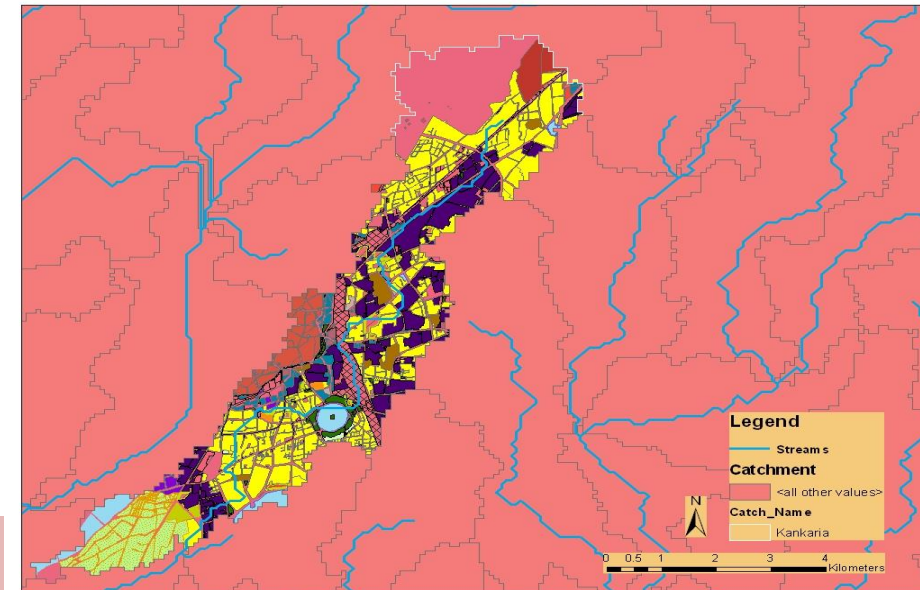
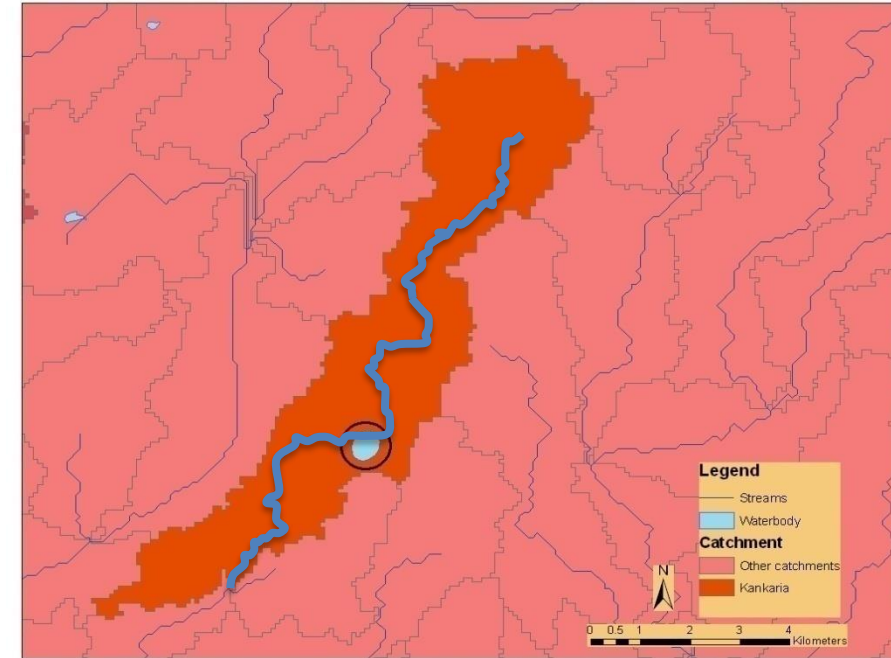
WATERSHED OF RESTORED KANAKARIA LAKE



Kankaria Lake front Redevelopment Master Plan

Source: www.egovamc.com

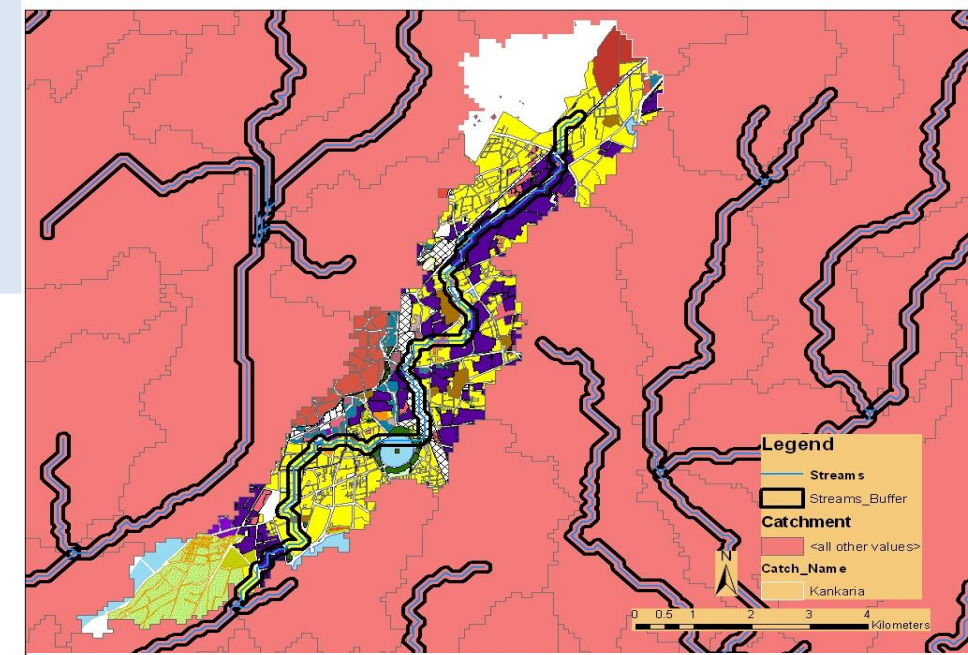
- Length of stream: 15.3 km
- Surface area of lake: 27.4 Ha
- Catchment area of stream: 2985.6 Ha
- No. of TP schemes: 14



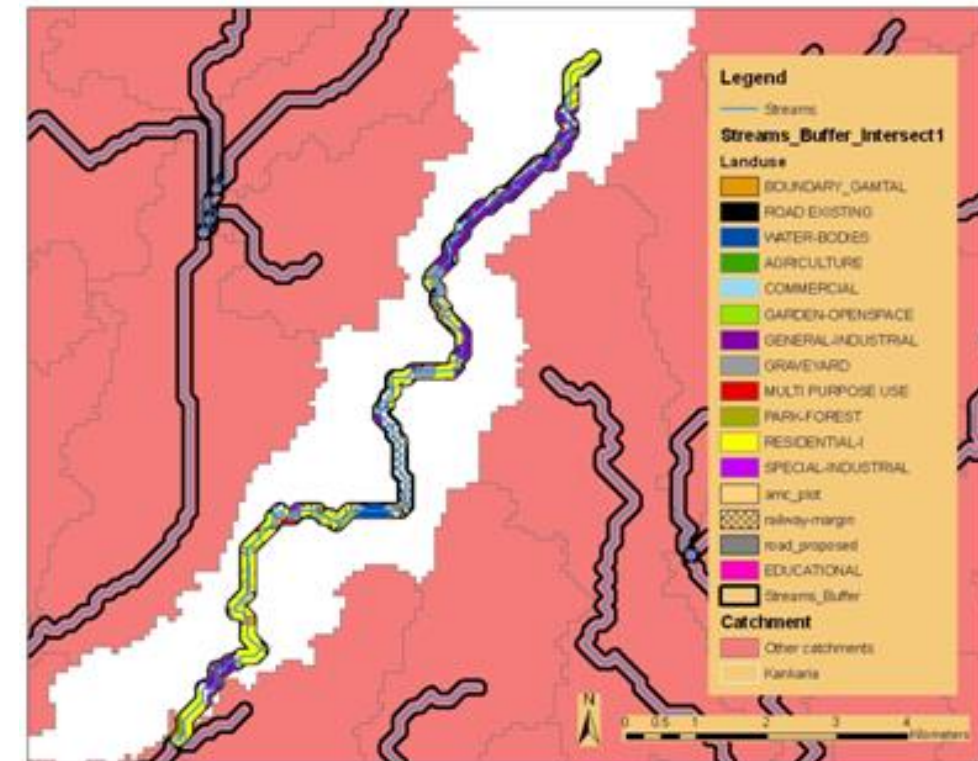
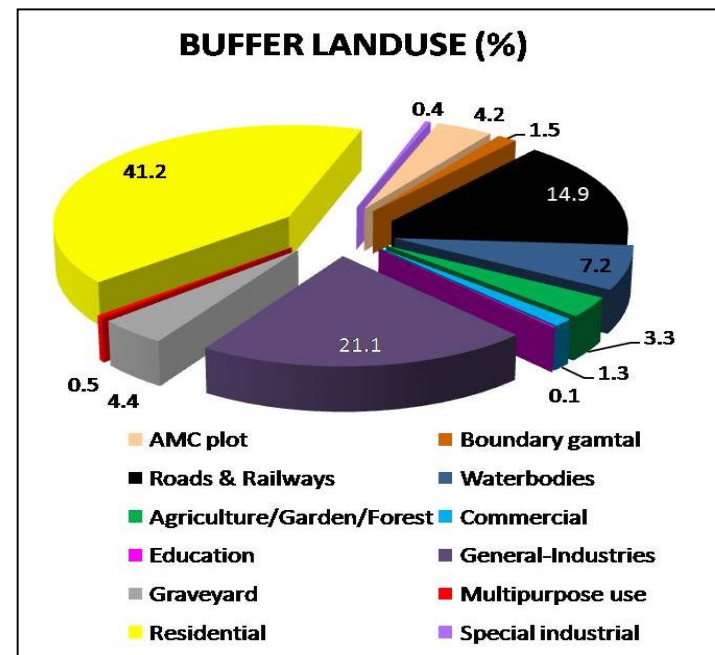
LANDUSE MAP 2011 ALONG WITH WATERSHED MAP

LAND USE COMPOSITION OF STREAM BUFFER ALONG THE LAKE

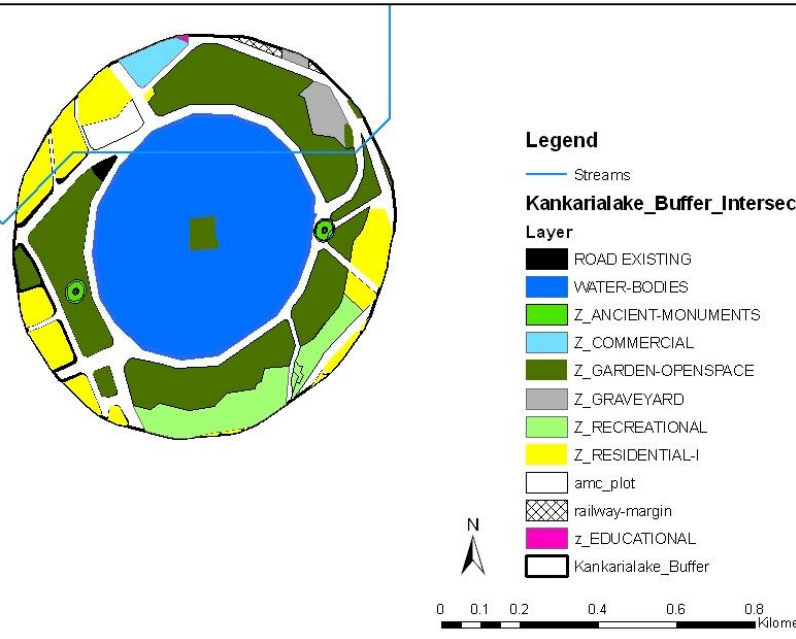
Buffer of 100 mt. on either side of stream



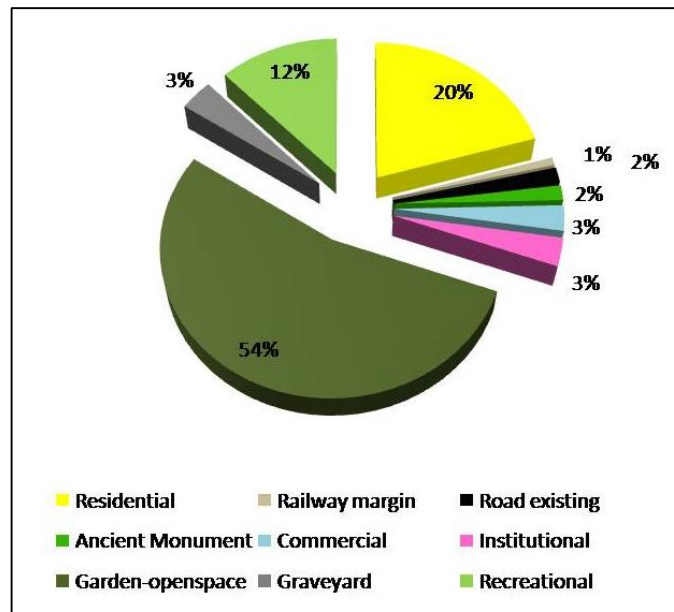
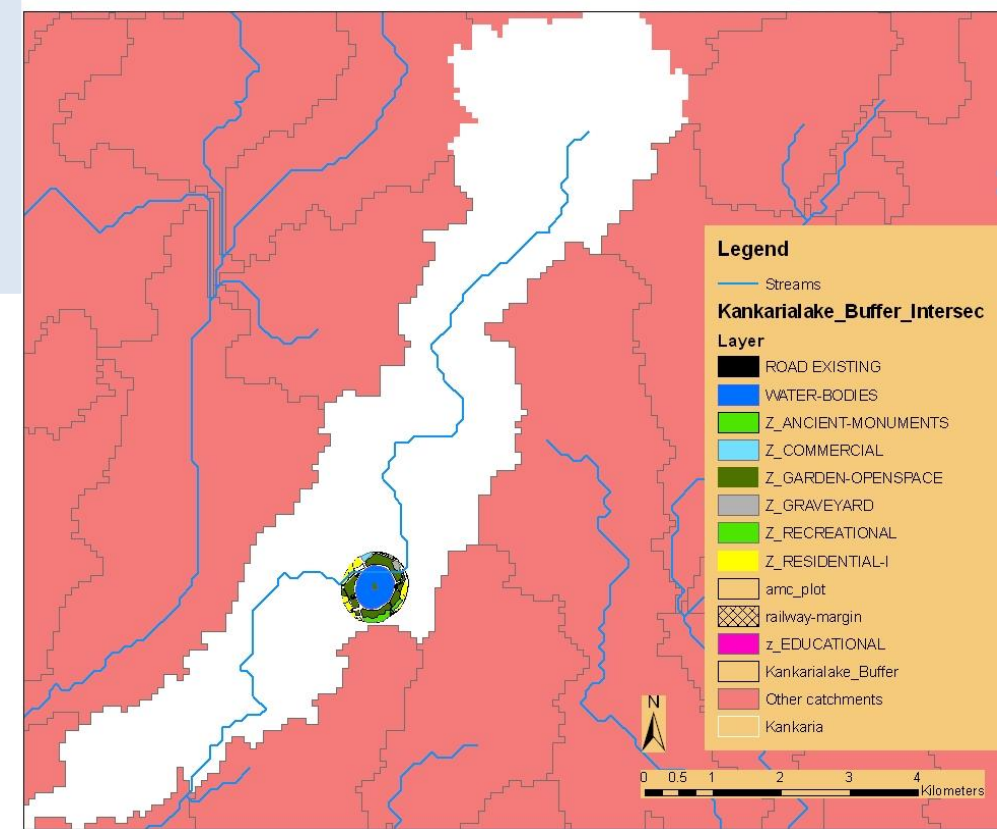
LANDUSE	TOTAL AREA (Ha)	TOTAL AREA (%)
AMC plot	13.0	4.2
Boundary gamtal	4.6	1.5
Roads & Railways	46.3	14.9
Waterbodies	22.2	7.2
Agriculture/Garden/Forest	10.2	3.3
Commercial	4.1	1.3
Education	0.4	0.1
General-Industries	65.4	21.1
Graveyard	13.6	4.4
Multipurpose use	1.5	0.5
Residential	128.0	41.2
Special industrial	1.3	0.4
TOTAL	310.4	



LAND USE COMPOSITION OF STREAM BUFFER ALONG THE LAKE



Buffer of 200 mt. on either side of stream



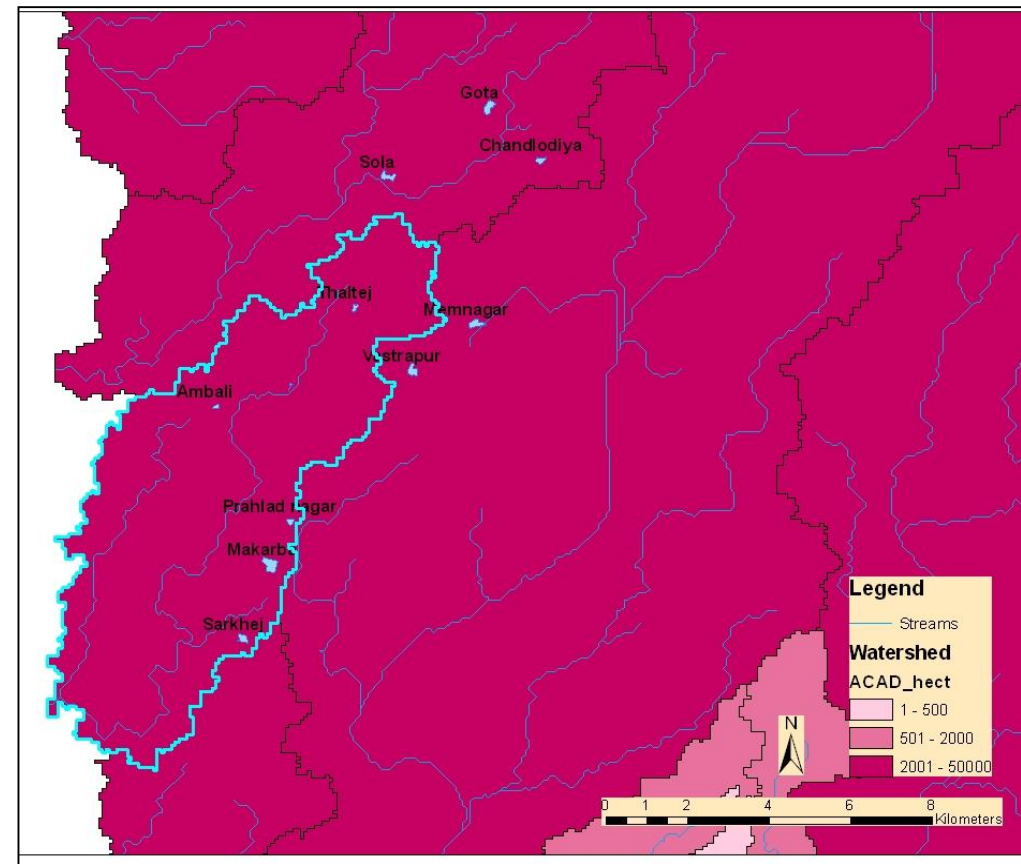
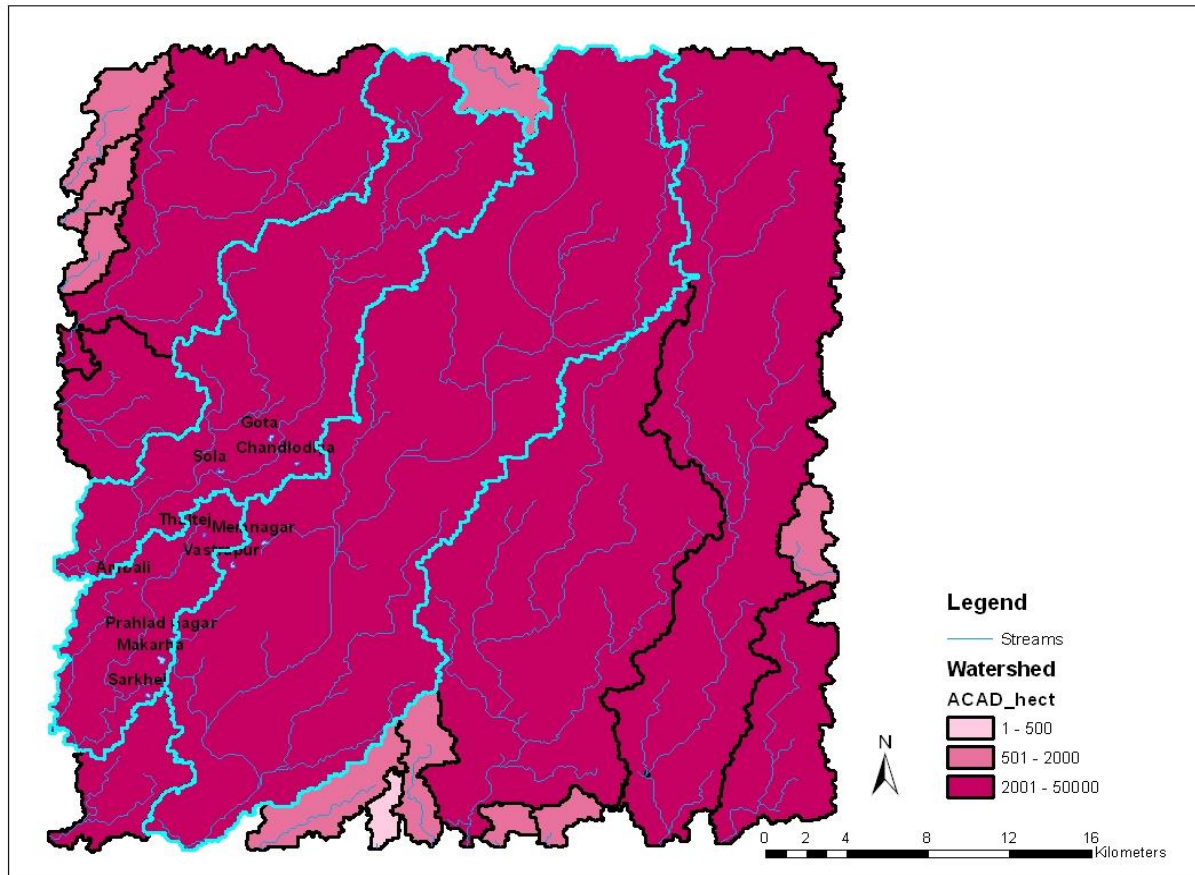
LANDUSE	TOTAL AREA (Ha)	TOTAL AREA (%)
Residential	7.7	20
Railway margin	0.3	1
Road existing	0.6	2
Ancient Monument	0.6	2
Commercial	1.1	3
Institutional	1.2	3
Garden- open space	20.3	54
Graveyard	1.3	3
Recreational	4.6	12
TOTAL	37.7	

INFERENCES

Impact on lake due to restoration of stream:

- Restoration of stream can lead to increase in quantity of water in lake.
- Green cover around the stream will increase percolation of water in ground, hence ground water level will increase & flooding will be reduced.
- There are guidelines such as National Building Code of India and General Development Control Regulation (GD CR) which converse about No Development Zone around nalla (stream) but its implementation is not seen.
- Although, lake and its surrounding area in the case of Kankaria lake is restored but no work is done to restore its stream & surrounding landuse.

WATERSHED MAP OF 10 INTERLINKED LAKES OF AUDA

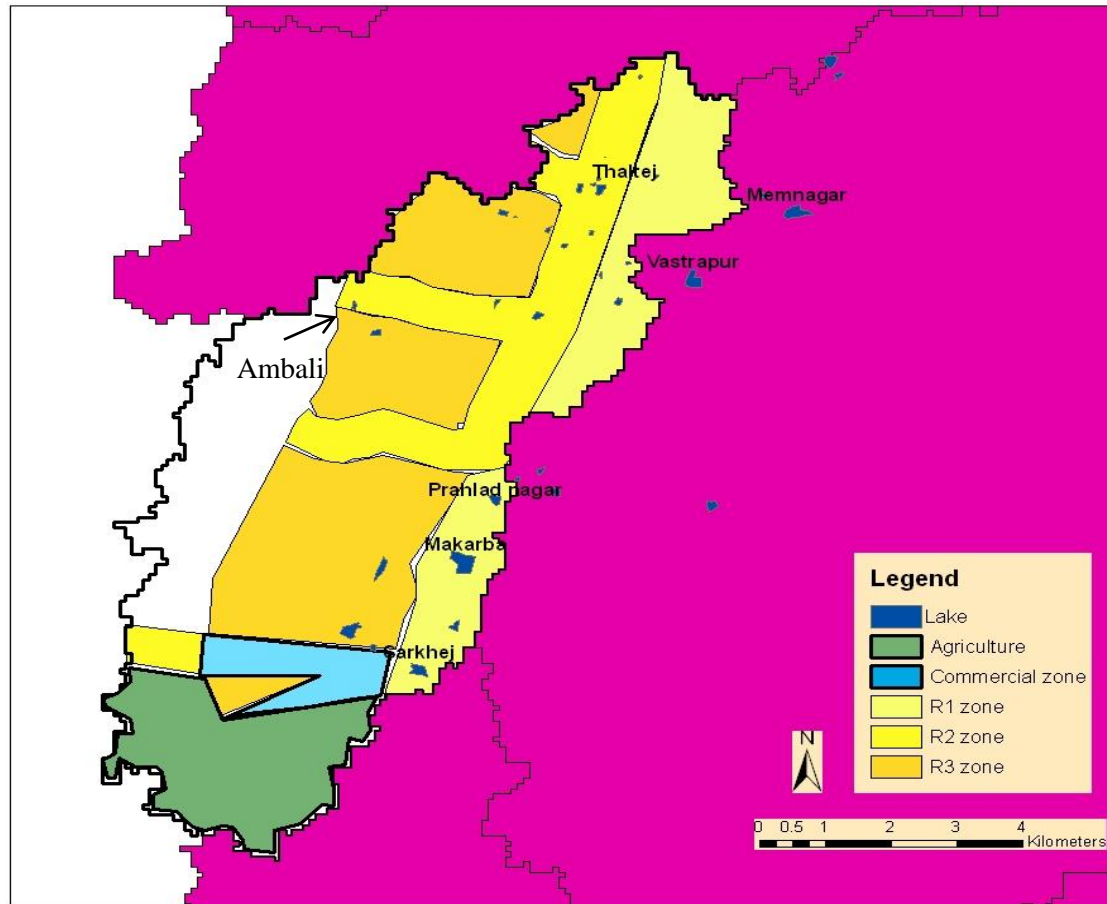


Selected watershed for detail study

REASON:

- TP Schemes partly developed & implemented
- Surface Area= 5958 Ha

WATERSHED MAP WITH TP PLOT LAYOUT

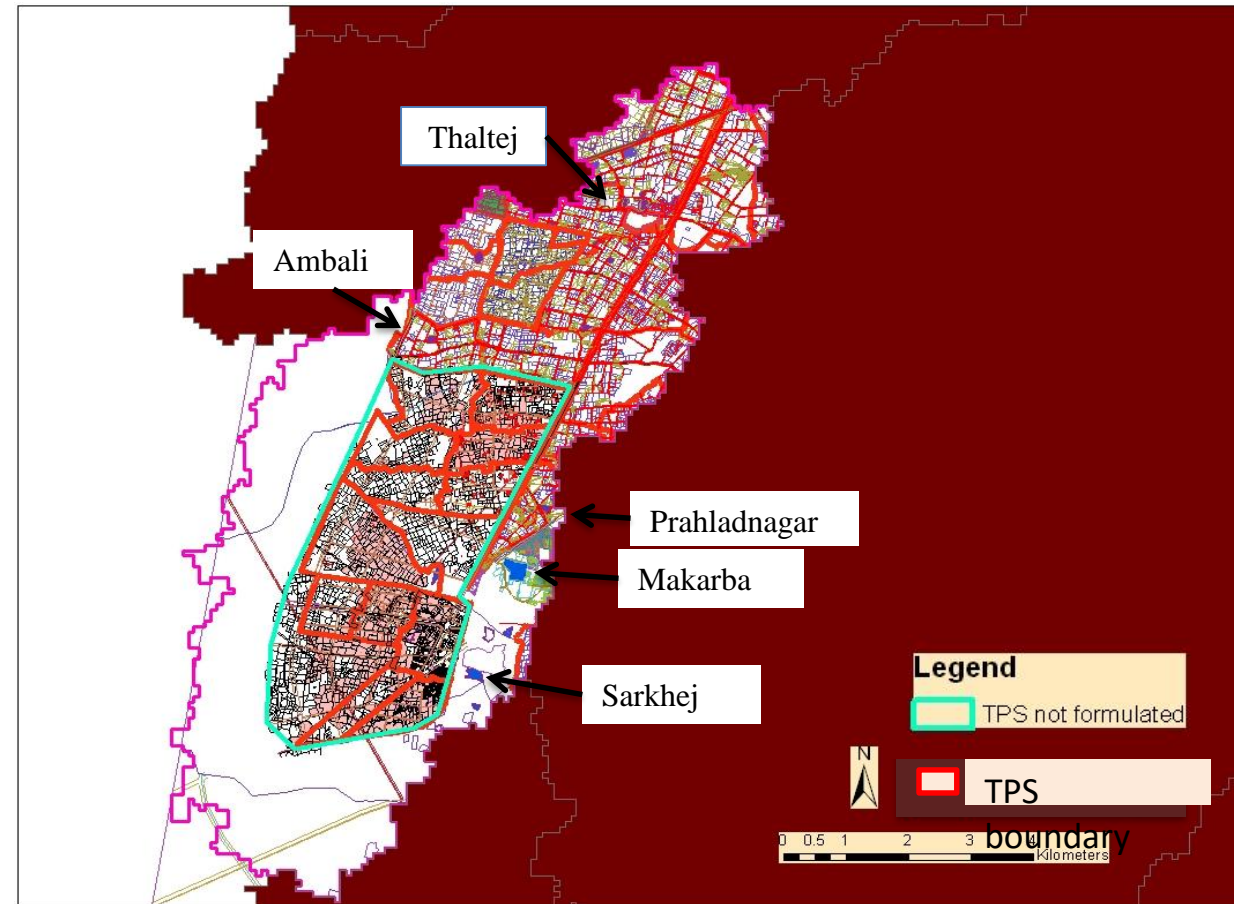


FSI :

R1= 1.8

R2= 1.2

R3= 0.3

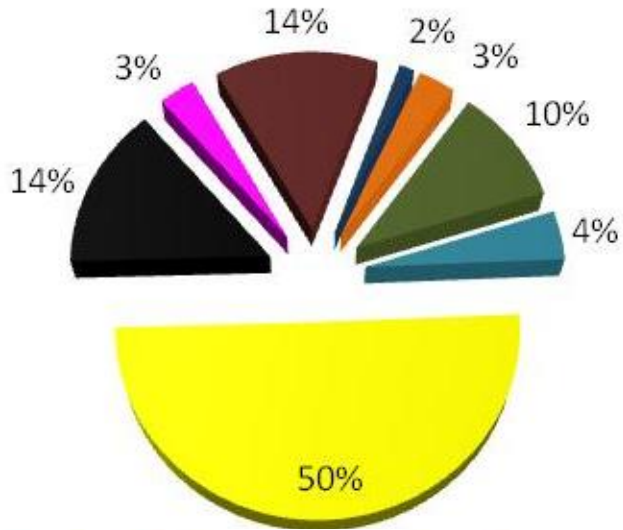


Status of TP schemes in selected watershed

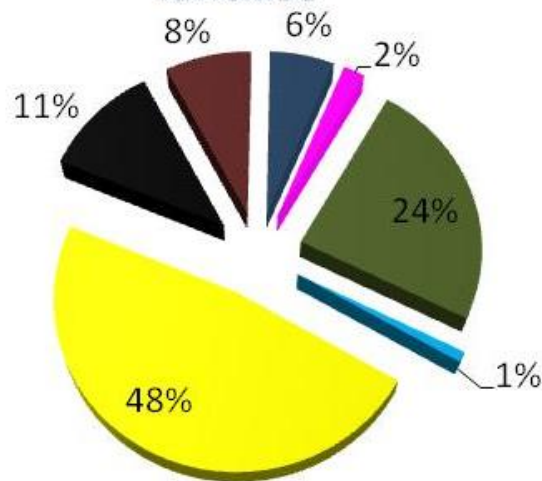
- Thaltej & Prahladnagar Lake is taken for land use analysis.

CONCLUSION

Thaltej stream landuse



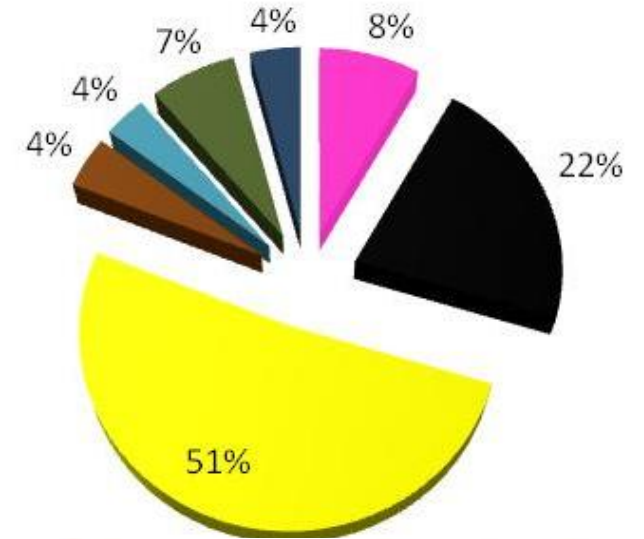
Thaltej lake consolidated surrounding landuse



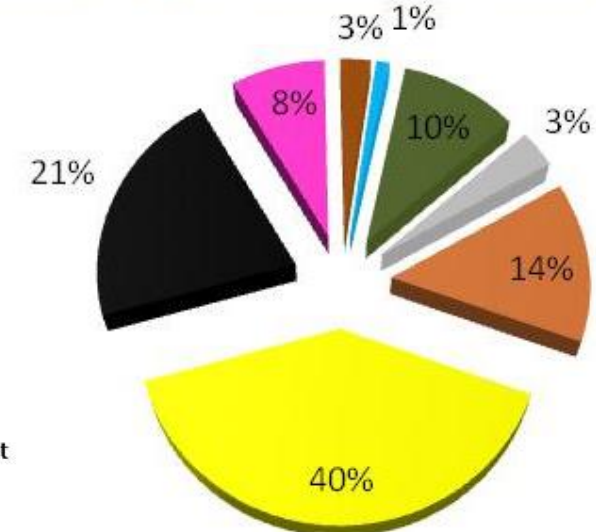
COMPARATIVE CHARTS

- Analysis results that major composition of landuse comprises of residential plots.
- Land use should majorly comprise of Green spaces, Recreational and Institutions.

Prahladnagar stream landuse



Prahladnagar lake surrounding landuse

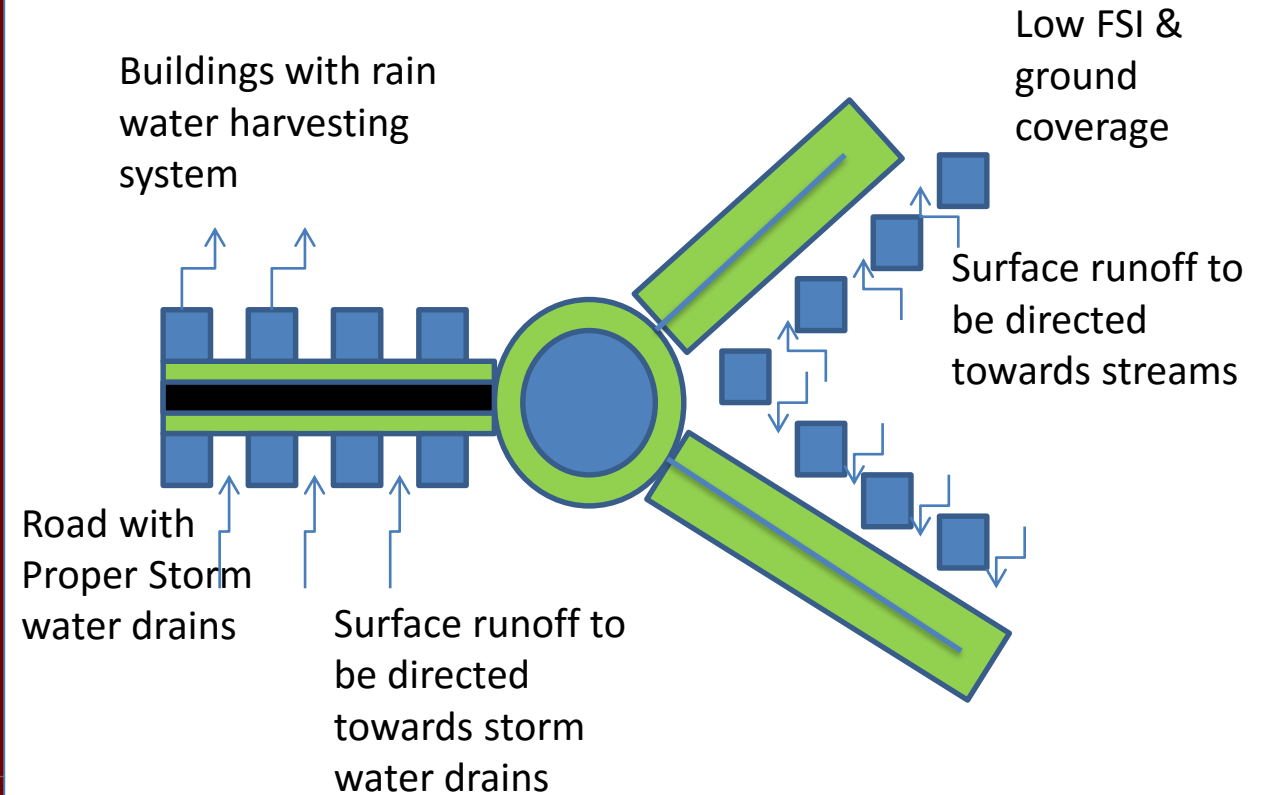
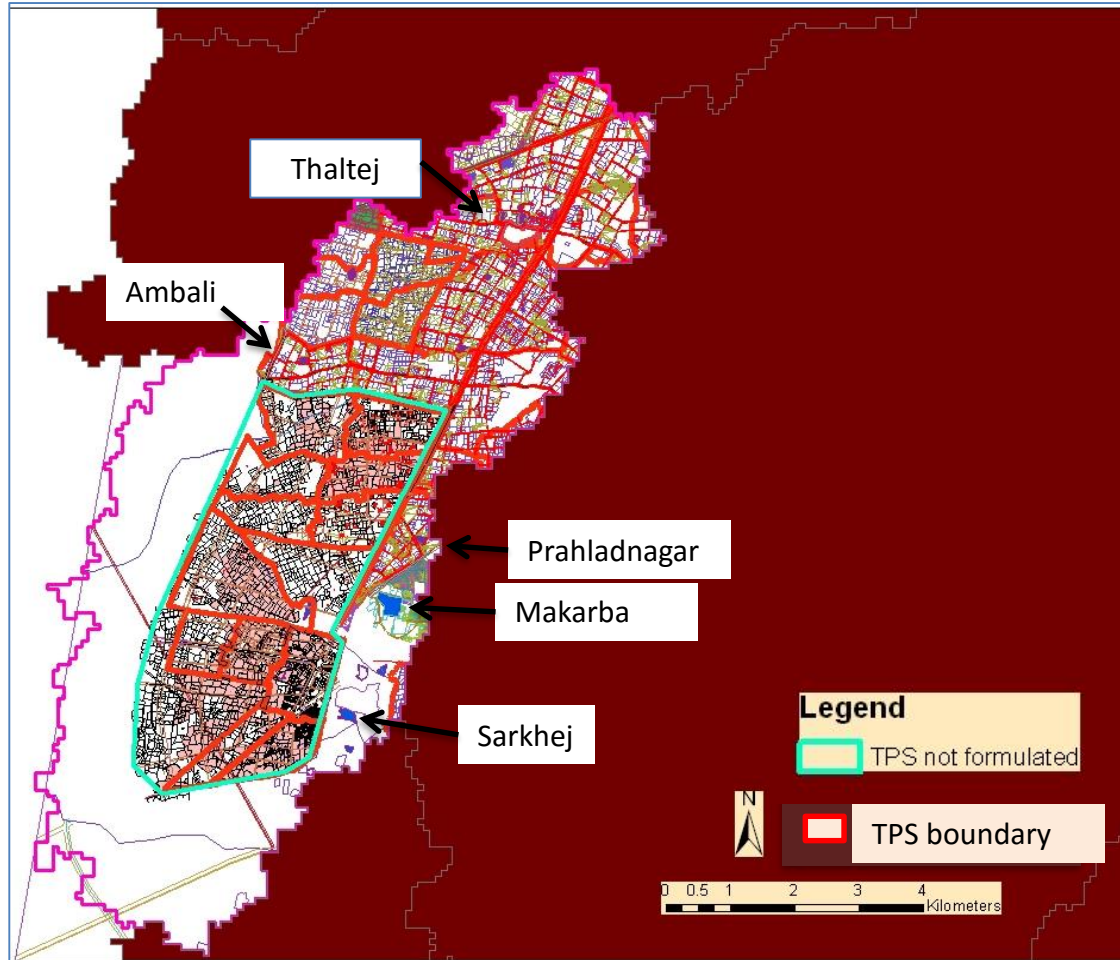


CONCEPT PLAN

• TPS is the best tool used for land management & controlled development.

- ❑ AREAS WHERE TP SCHEMES HAVE NOT BEEN FORMULATED
- ❑ AREAS WHERE TP SCHEMES HAVE BEEN FORMULATED BUT NOT IMPLEMENTED

I. FOR AREAS WHERE TP SCHEMES HAVE NOT BEEN FORMULATED



II. AREAS WHERE TP SCHEMES HAVE BEEN FORMULATED BUT NOT IMPLEMENTED

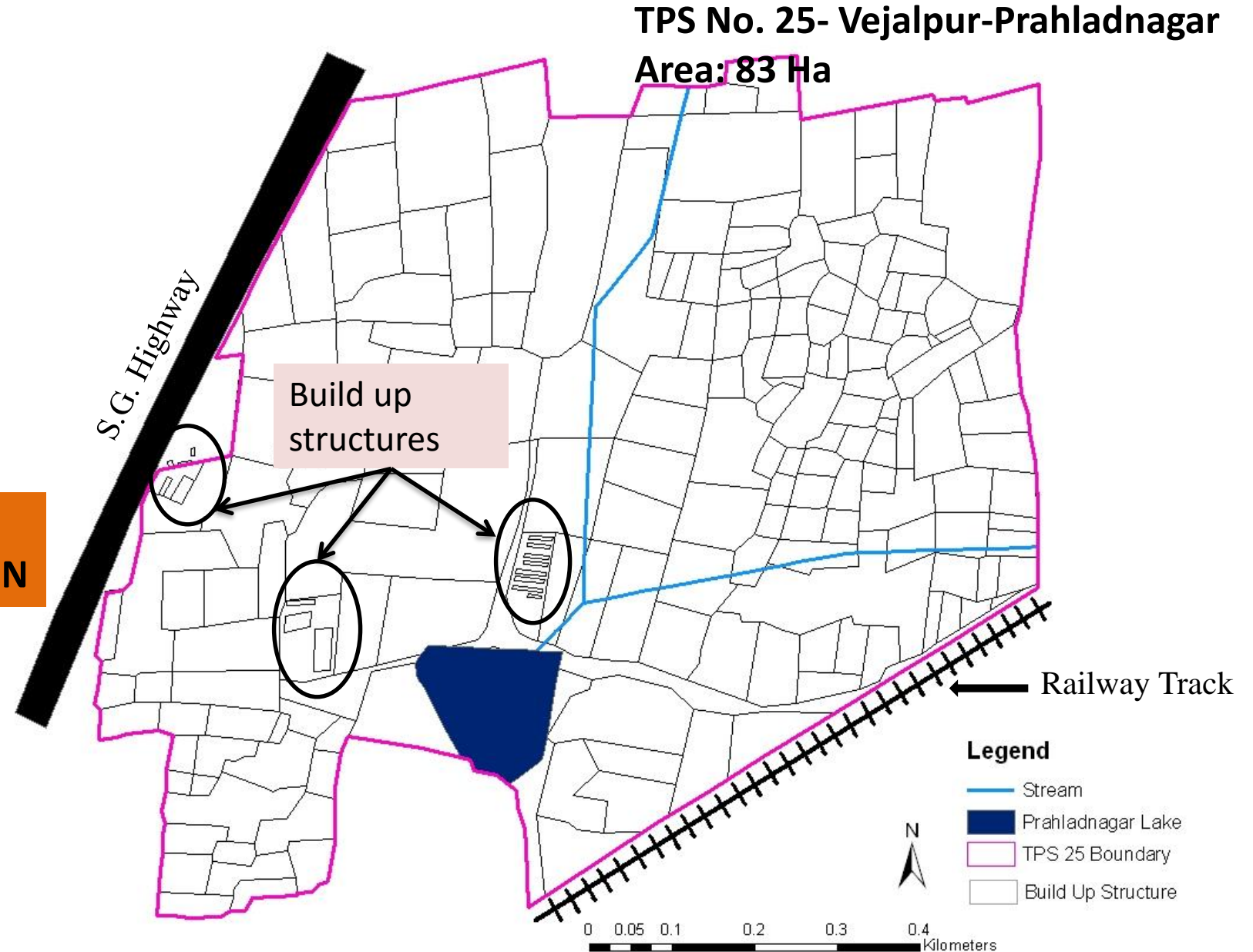
TP Scheme Design Steps involved:

Status of all the TP Schemes of selected watershed

Selection of TP Scheme which is Draft sanctioned

Design of TP Scheme

AREA OF INTERVENTION



LAND USE COMPOSITION

MAXIMUM % OF LAND TAKEN FOR PUBLIC USE UNDER GTPUD ACT, SECTION 30 (3)j

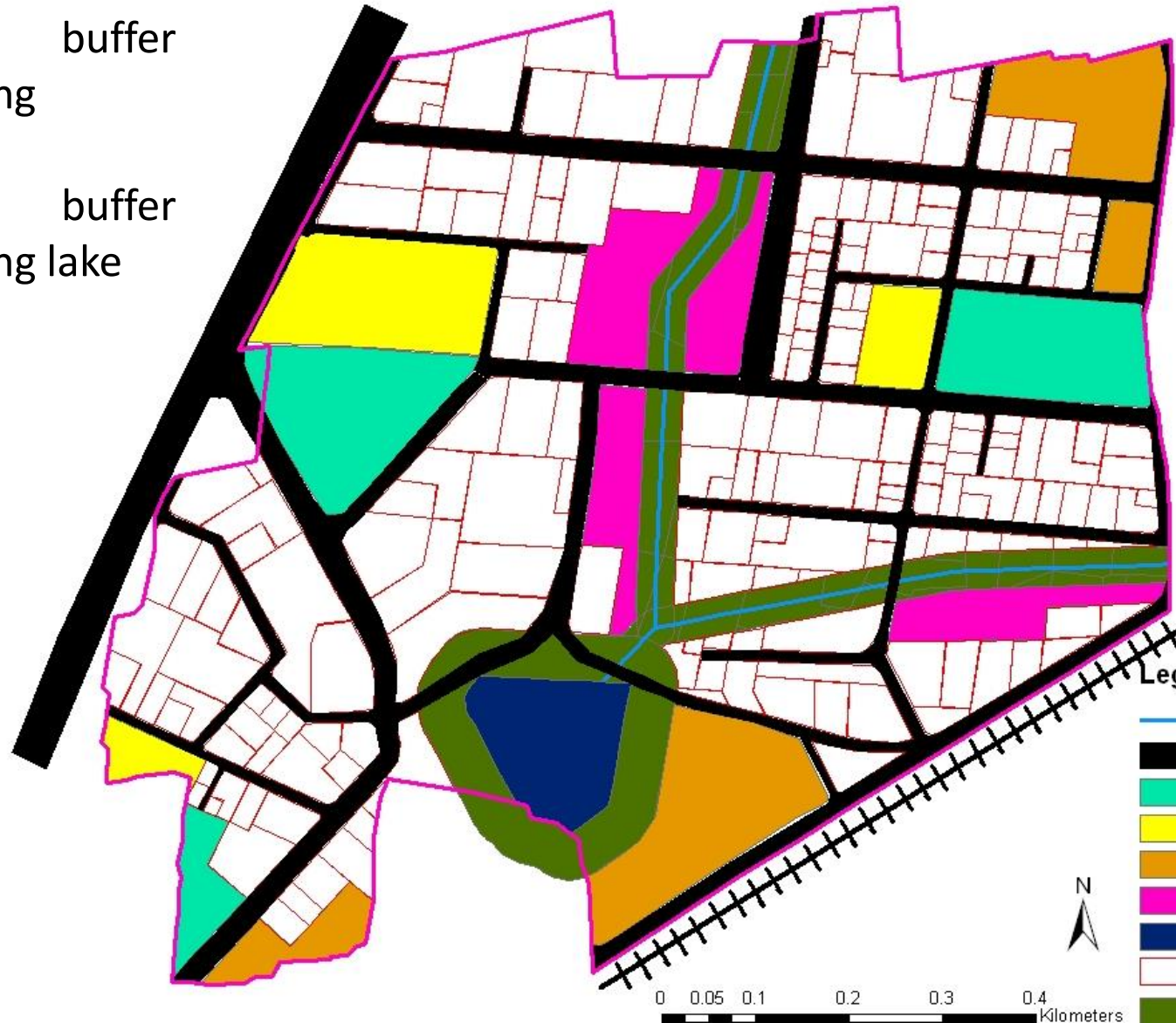
LAND USE	%
E.W.S	10 %
Roads	15%
Parks, Playground & open space	5%
Social infrastructure like School dispensary	5%
Sale for appropriate authority for residential & commercial	15%
Total	50%

SUGGESTED % OF LAND FOR PUBLIC USE

LANDUSE	Total %	Total Area(ha)
EWS	7.3	6
Roads	12.7	10.5
Parks, Playground & Open Space	10	8.3
Institutions/ Schools	5	4.18
Sale for Residential & Commercial	5	4.18
Total	40	33.2

FINAL TP SCHEME DESIGN – WATERSHED ANALYSIS

- 20 mt. buffer surrounding stream
- 50 mt. buffer surrounding lake



LAND USE	Total %	Total Area(ha)
EWSH	7.3	6
Roads	12.7	10.5
Parks, OS, Gardens	10	8.3
Institutions/ Schools	5	4.18
Sale for Residential & Commercial	5	4.18
Total	40	33.2

Legend

- Stream
- Road
- Commercial
- Residential
- EWSH
- Institutional/School
- Prahladnagar Lake
- FP Boundary
- Parks/Green cover

PROPOSED GUIDELINES

1. Streams should be given importance while laying TP Schemes.
2. Out of 40% land taken from the owner for amenities in TP Schemes,
 - At least **5%** land should be taken as buffer if only stream is present.
 - At least **10%** should be taken if stream along with lake is present.
3. There should be **low FSI and ground coverage** for plots lying along the stream and lake.
4. Around **5 mt.** of mandatory margin should be left towards the stream as green cover for final plots directly abutting the stream.
5. **20-25 mt.** offset should be left along the stream under TP Schemes.
6. **Interlinking of lakes** can be done if streams are restored along with the lakes.
7. There should be a **network of green cover and storm water drains**.
8. **Contours** should not be disturbed while laying road network.
9. Materials which increase **ground water percolation** should be used as pavements.
10. Stream buffer should be made **pedestrianized**.
11. **Rainwater harvesting system** should also be made mandatory for every plot.
12. Roads should have proper **storm water drain pipes** which leads to lake or stream.
13. Buildings should be laid such that surface runoff gets directed towards lake or stream without flooding.
14. For TP Schemes which are already implemented, a review of lake surrounding and stream should be done and checked out for any possibility of laying offsets.
 - **Conducive & Non-conducive areas should be identified and an offset of 20-25m should be laid for every non-conducive plot.**

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THANK YOU !!!!!

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