REVISED STAGE II REPORT, DECEMBER 2009

Environment Management Plan for the Geo Thermal Zone of the Tansa River Basin

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CHAPTER 4 INTRODUCTION TO STAGE 2

4.1 Introduction

The villages of Akloli, Ganeshpuri and Vajreshwari are historic centers of religious tourism centered around the thermal springs and temples.

In the 1960's with the emergence of the temple trusts was the beginning of tourism activity in the villages, leading to a shift in their overall economy from being a primarily agrarian to a tourism based economy. The villages have seen drastic changes in ownership patterns with religious trusts buying up large tracts of agricultural lands converting them to non-agricultural use. It is seen from Table 4.5, 4.6, 4.7 that over the last three decades, there has been a decline in the percentage of population involved in agriculture while that involved in other activities has increased. The rapid mushrooming of tourism related activities has led to rampant and unregulated developmental activity in the region. The complete lack of any regulatory framework for development has led to several conflicts and pressures within the area such as over burdening of physical and social infrastructure and uncontrolled urban sprawl and a rise in informal activities. These developments pose a threat as these villages lie on the banks of the Tansa river basin, with unique environmental features such as thermal springs, with forests rich in biodiversity, hilly areas, streams, and fertile agricultural lands in the flood plains that are significant as resources for local communities and economies.

MMRDA as per the regional plan of 1996-2011 has proposed a Recreation and Tourism Development Zone here to protect the unique thermal springs, natural landscape and sacred sites. This is stated in the regulations 15.7.2 and 15.7.3 in the regional plan. Furthermore, activities and development in these zones are also regulated as per 15.7.4, 15.7.5 and 15.7.6. To achieve the above, a plan needs to be prepared as mentioned in regulation 15.7.4. However, a development plan has not been prepared for the RTDZ. In 2003, an attempt to create a development plan for the zone was made by the Collector of Thane District which was unfinished. This was initiated to attract grants from the Maharashtra Tourism Department, which had invited plans for the development of Cultural Tourism, Pilgrimage Circuits, Rural Tourism, Eco-Tourism, etc. The present study is clearly focused on understanding the impact of the tourism related activities on the environment of the RTDZ so as to form guidelines for its protection. In this way it is the first step towards informing the development plan.

Aim:

Thus, the aim of the study, as mentioned in the earlier phase, is to prepare an environment management plan to mitigate or control the impacts of tourism related development within this zone.

4.2. Rationale for the Delineation of the Study Area

The RTDZ as proposed by the MMRDA essentially included the three villages of Vajreshwari, Akloli, and Ganeshpuri. These being religious centers had a sudden surge in related economic activities giving rise to unregulated development. The effect of these activities was also observed in the neighbouring villages of Nimbavli, Usgaon and Bhivali. This determined the focused area of interest around which the study developed. Environmental systems are continuous systems and therefore the study had to understand the larger systems within which the Core Zone lay. Considering the environmental sensitivity of the region and the unregulated growth of tourism the study was divided into first studying the larger environmental system then into the micro-level study of the focus area.

4.2.1 Delineation of the Tansa River Basin

In the first phase of the study the Tansa River Basin consisting of an area of 902 sq. kms was delineated and studied to understand the environmental systems of the region. The river basin consists of the upper catchments, the floodplains and the estuarine region near the mouth, At all these levels there are different activities and developments that would have an impact on the larger region, for example, the building of dams or reservoirs, industries, tourism activities would affect areas downstream.

4.2.2 Revised Delineation of Core Zone

The Core Zone as mentioned earlier, which initially consisted of the three villages in the RTDZ has been expanded to include the villages of Bhiwali, Usgaon, and Nimbavli on the basis of expansion of religious tourism related activities, or presence of thermal springs[1]. The Core Zone has now been re- delineated comprising of the six villages of Vajreshwari, Akloli, Ganeshpuri, Nimbavli, Usgaon and Bhivalli. Of these Akloli, Vajreshwari, Ganeshpuri and lie in Bhiwandi Taluka, while Nimbavli lies in Wada. Of the six villages, only Nimbavli lies outside the Mumbai Metropolitan Region boundary

(Refer Fig 4.1)

4.2.3. Delineation of Influence Zone

In the first phase of the study the Influence Zone was identified as the immediate watershed area of the Core Zone. This was established in the first phase of the study of the Tansa River Basin. This is an area of 122 sq. kms. comprising of the watershed of the Core Zone, including the forests, streams and rivers, and villages that lie within the watershed area of the Core Zone. The Critical Focus Area includes the villages of *Vadghar,Ambode, Kalambhai and Saiwan in the Vasai Taluka; Medhe, Nimbavli, Gorad, Kelthan, Lohape, Chamble ,Nandani Gaigotha, Ambarbhui, Kalambhon in Wada taluka and Bhiwali,Usgaon, Ganeshpuri, Vajreshwari, Akloli* and *Mahalunge* in the Bhiwandi taluka. (Fig4.1)

The relationships between the environmental systems within the watershed Influence Zone and the activities in the Core Zone are as follows:

- The resources within the Influence Zone upon which the tourism activity is dependent - Any alterations in the catchments areas of the Tansa River will affect the quality and quantity of water in the rivers and streams. Catchments areas are important for ground water recharge and the source regions where streams originate. Tourism and other activities in the Core Zone are dependent on water supply and ground water.

- The population within the Core Zone is also dependent on other resources in the Influence Zone -The forests, water systems and other natural habitats are also highly productive ecological systems significant for biodiversity and an important resource for local communities. They form resources of water for domestic use and economic activities such as agriculture, fishing and tourism.

- The impacts of tourism activity on the environmental systems in the Influence Zone **-** Streams, rivers and their riparian zones form continuous natural ecological systems which are habitats, support biological communities and perform ecological functions and services. The forests and natural vegetation in these watersheds, decrease the rate of run-off, allow percolation, and function as water banks recharging underground flows. Environmental features in the Influence Zone are significant and sensitive to developments in the Core Zone. Development activities within the Core Zone such as encroachments and building activities in the flood plains and sensitive areas, activities which cause erosion, deforestation and pollution will also have an impact on the ecology in the Influence Zone.

The Influence Zone was delineated as the area surrounding the Core Zone which affects and is in turn affected by the activities within the Core Zone.

[1] Bhiwali was included within the Core Zone as it was observed that there was an expansion of activities related to the large religious trusts into the village. Nimbavli was included on the basis of the presence of thermal springs and some amount of tourism related to these on festival days. Furthermore, Usgaon was added as it belongs to the group panchayat of Ganeshpuri which lies within the proposed RTDZ.

4.3. Methodology of the Study

As mentioned in the first phase, the study intends to approach the above concern by exploring the relationship between the environmental resources of the region and the economic activities/livelihoods of people in this region. It recognizes that some of the activities are closely linked to the environmental resources of the region in sustainable ways while other activities which might have been introduced over time might have exploited the existing resources to have a negative effect on the environment. Thus these two aspects will be studied to locate the issues and concerns. This is the method adopted to conduct this study.

This part of the study has had to also rely heavily on surveys which have been carried on by other government or academic agencies. The table below details out the various methods used to acquire information on various aspects of the project.

Methods Adopted / Data Collected	Agencies Interacted / Sources referred	Information Procured
Secondary Sources of Data		
1. Meeting Agencies who have data on this area for various aspects		
Land Use	Land Revenue Officer, Talathi	CTS maps for the Influence Zone, showing boundaries of forest, gaothans, water bodies including ponds and major streams.
Forest Management	Thane District Forest Officer	Dis The Management plan for Forest project division Thane and the Preliminary working plan Report for the Thane Forest division, Thane.
Streams and water resources	Gram Panchayat Offices, Irrigation Department (Office of Dristict collector, Panchyat Samiti)	List of project of irrigation projects in the region.
Critical Slopes	Topographical Maps of the Survey of India, from the Geography Department , Mumbai University, MMRDA	Topographical maps of 1972.
Thermal Springs	Dept. of Earth Sciences Indian Institute of Technology	Identification of thermal springs in the Core Zone *Geothermal Atlas of India*, Geological Survey of India, Special Publication, 1991.
Institutional Framework	Block Development offices, Bhiwandi and wada talukas, District collectors office, Thane	Agencies, responsibilities, funding mechanisms, projects and capacities.
Infrastructure : Water	Primary Health Centre, Panchayat Office, Supervisor, Akloli Water Supply,	Information on water quality for the year 2009-2010, Number of taps, wells, hours of water supply. Quantity of water supplied per day.
Infrastructure : Solid Waste	Panchayat Office	Capacity and infrastructure for solid waste management. Solid waste dumping sites.
Infrastructure: Sewage	Panchayat Office	Percentage Coverage of septic tank in the villages
Infrastructure: Storm Water	Panchayat Office	Location of gutter
Land Ownership	Talathi office	CTS number-wise ownerships. However information on plots having non –agricultural permits was not provided to the study group.
Agriculture Activity	Census, Agriculture Deptartment, (Talathi Office, District collector's office)	cropping Patterns, yield, types of crops grown,
Land cover	This was done by analysis of Google Earth Satellite Imagery	Analysis of satellite remote sensed data to generate maps. Extent of areas with vegetation cover, agricultural lands, barren lands.
Water resources and identification of watersheds	Site surveys and Interviews	Activities along the watershed, Associations and use.
Socio Economic Data	Census Office Block Statistical Office, Thane	District Census for the years 1981, 1991, 2001.

Brick kiln activity		
Ground Water Data	District Ground Water Control Board, Thane	Ground water levels for the last fifteen years, and ground water pollution data.
Flooding	District Disaster Management Cell, Collector, Thane district	Areas prone to occasional and regular flooding.
2. Exploring secondary sources on these aspects		
	Google Earth	Satellite images which have been captured and joined.
Bio-diversity	*Human disturbance and forest diversity in the Tansa, Valley, India, Biodiversity and Conservation*, Kluwer Academic Publishers, 2003. *District Gazetteer, Thane District*	Biodiversity index and stresses on biodiversity in the region.
Ground Water Discharge rates	International Geological Congress, 2008 http://www.cprm.gov.br/33IGC/1350823.html	Constationo Fallice on " *Ground water conditions in hard volcanic rock of Maharashtra State, Western India*"
Global, National and Regional Environmental Policies affecting this region.	Draft Regional Plan, MMRDA	
3. Photographic Documentation of Site		
Broad Activities and Land use		Photographs of brick kilns, sand dredging, tourism related activities, industry related activities.
Ecological Features		
Flora and Fauna		Photographic documentation of types of vegetation
Environmental Conflicts		
4. *On Site interviews meetings and surveys*		
Building Use	Site Survey	Function housed in each buildings
Traffic Patterns	Site Survey	Traffic Surveys on peak and Normal days
Tourism Activity	Site Survey	Capacities of Hotels and restaurants,
Watershed Characteristics	Site Survey	Activities along the streams. Interview with farmers on the uses of the watersheds.

Table 4. 1. Methodology of Study

4.4 Scope and Limitations

The study as elaborated in the scope has three parts to it for which the methods adopted for each part would be to collect data from secondary and primary sources, leading to an analysis. The final part of the study would us the analysis to suggest recommendations. The data collection would primarily be done through secondary sources, photographic documentation and meeting with stakeholders.

Given the scope of this study, it neither might be possible to carry on detailed sample testing,
Certain sensitive data such as extent of stone quarrying, non agricultural permits in the villages of the Core Zone time series data on conversion of agricultural land were difficult to obtain.

- Geo-Thermal springs- This part of the study was carried through a visual survey of the hot springs features on site.
- Forests, natural ecosystems This was done by analysis of remote sensed satellite imagery, a bio-diversity study of the Tansa River Basin conducted by Radha Veach , David Lee, And Tom Philippi and site observations, and forest conservation. The Management plan for Forest project division Thane and the Preliminary working plan Report for the Thane Forest division, Thane.
- Areas with critical slopes. Critical slopes were established through a slope analysis of topographical sheets.

4.5 Structure of the Study

The second phase of the study is at two scales-
The first part focuses on documenting the environmental features and systems in the Influence Zone, and documents stresses on these.

The second part focuses primarily on the Core Zone; understands the present nature of tourism and its effects and relationships on the land use, ownership, demography, movement networks, infrastructure, the local economy and the environment. It also understands the institutional structures present for the area of interest and their role and responsibility in protecting the environment.

CHAPTER 5 DOCUMENTATION OF INFLUENCE ZONE

5.1. Detailed Study and Documentation of the Influence Zone.

As mentioned earlier, the Critical Focus Area includes the villages of *Vadghar,Ambode, Kalambhai and Saiwan in the Vasai Taluka; Medhe, Nimbavli, Gorad, Kelthan, Lohape, Chamble ,Nandani Gaigotha, Ambarbhui, Kalambhon in Wada taluka and Bhiwali, Usgaon, Ganeshpuri, Vajreshwari, Akloli* and *Mahalunge* in the Bhiwandi taluka (*Fig.5.1*). The State Highway SH40 *Shirsad Ambadi Road* running west-east connects these areas with NH8 and NH34. The villages are connected to each other and the highways by a network of Zilla Parishad roads. The hills and peaks within this area are the Usgaon Hills and Ghotara Peak, Mandagni Peak, Murumba and Ghori Dongar, Belchatep and Devdongri, Tapovan Hill and parts of Dhamni and Kala. There are fourteen streams within the area that originate in the hilly areas and flow into the Tansa River. Two of these have been dammed forming the two large man-made lakes of *Usgaon* and *Lohape*.

Documenting environmental features and identifying stresses.

The first step towards preparing guidelines for protecting the environment of the Core Zone of tourism activity is the identification and documentation of the environmental features within the Influence Zone. And further, identifying the stresses the following features were studied.

- Geo-Thermal springs
- Forests, natural ecosystems
- Areas with critical slopes.
- Water resources and watersheds

These features were first understood in terms of their significance, the concerns were identified and the nature of stress was understood.

For identifying the threats to various environmental resources in the Influence Zone, the broad land use was identified in terms of the locations of settlements, forests and land under agricultural use. Activities and land uses that were observed to presently and potentially cause stresses on the environment were identified.

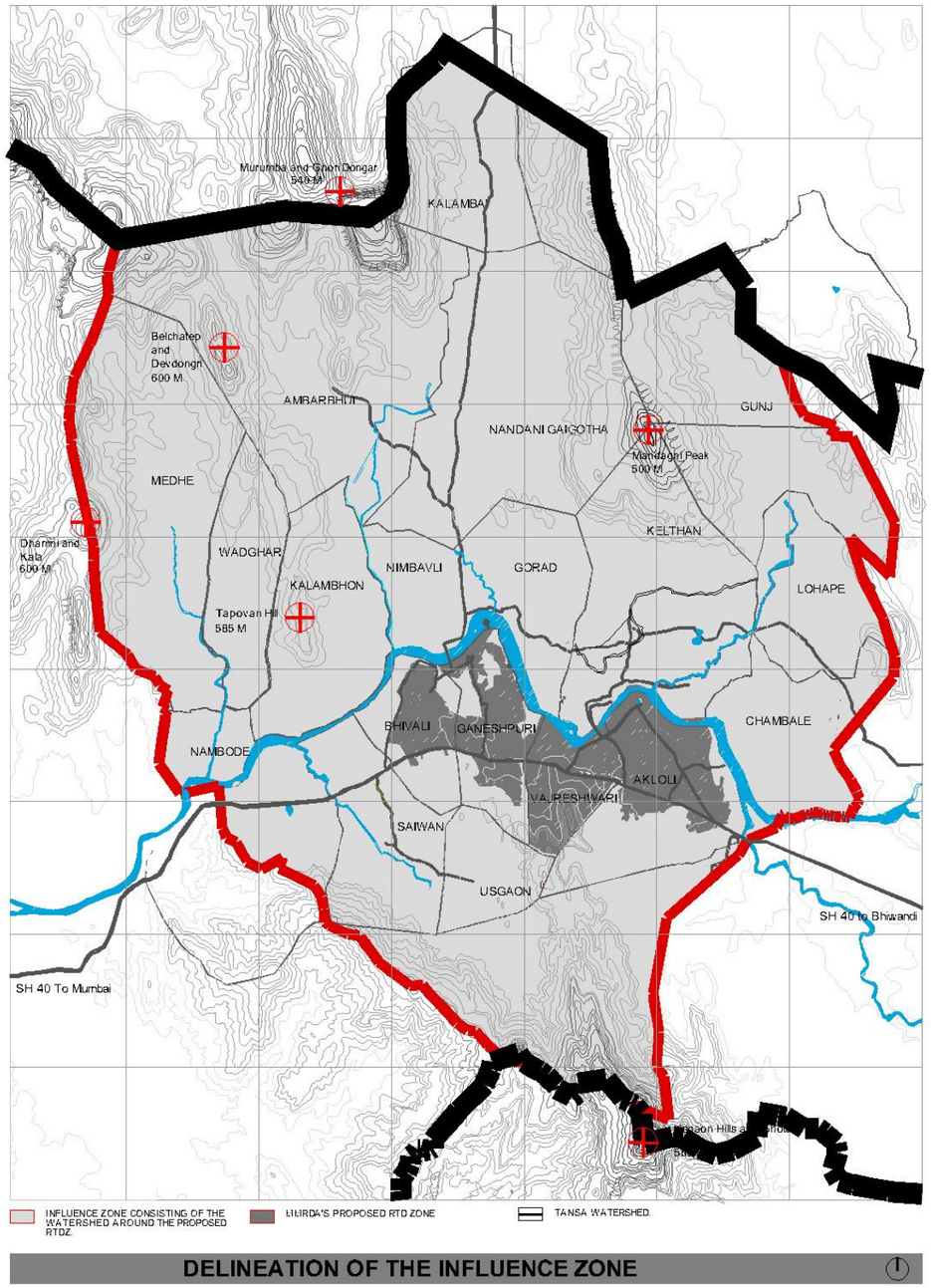


Fig 5.1 Delineation of the Influence Zone

5.1.1 Geo-Thermal resources- Thermal springs

Within the Influence Zone, several clusters of thermal springs were identified on the banks of Tansa River at Akloli, Ganeshpuri and Nimbavli. There are a total of 26 springs that have been inventoried. *(Refer Plates 5.1 to 5.3)*

Description and Significance

The thermal springs within the region have long historical associations with the communities and the temples. They are used for bathing purposes and attract tourists for religious and recreational purposes. There has so far been some commercial exploitation of these in a few places with the building of resorts, shacks that offer tourists facilities and food. Besides these springs, interviews with locals within Ganeshpuri and Nimbavli, reveal that bore wells struck within these villages yield hot water in places. These criteria that were framed primarily to document these springs were based on their significance for the community as well as the nature of the public access that they presently enjoy. Form this three criteria emerged – association/usage, ownership and maintenance.

Two primary concentrations of activity with regards to the thermal springs were identified in the region. These occur along the Tansa River in two clusters identified in the study as Cluster A at Ganeshpuri and Cluster B at Akloli.Cluster A of three thermal springs within the Nityanand temple compound and 7 thermal springs that lie within the river bed. Cluster B consists of two thermal springs in the Ram Mandir compound and 7 in the river bed and 5 at Nimbavli on the northern Bank of the Tansa river. *(Plate 5.1*)

Identifying Concerns:

To identify the nature of these systems and the stresses that they are under we identified three criteria through which to look at the 26 springs inventoried by the team. They are:

Association / Usage- The springs are primarily associated with religious and recreational/ therapeutic uses. Certain springs are also used by local communities for domestic purposes such as bathing.

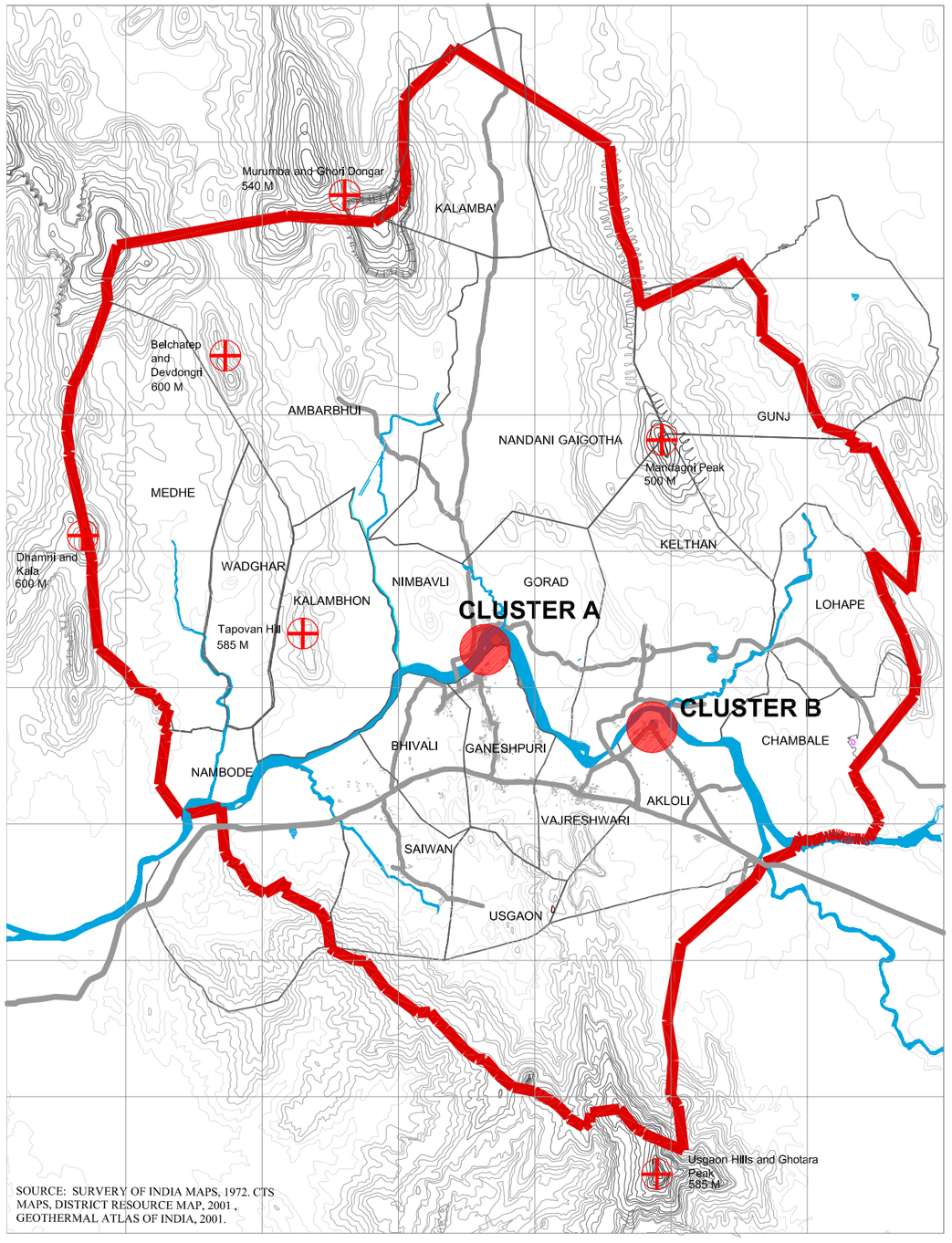
Ownership- Some springs lie within lands owned by Government, some by religious trusts and others lie within private properties with varying levels of access to the general public.

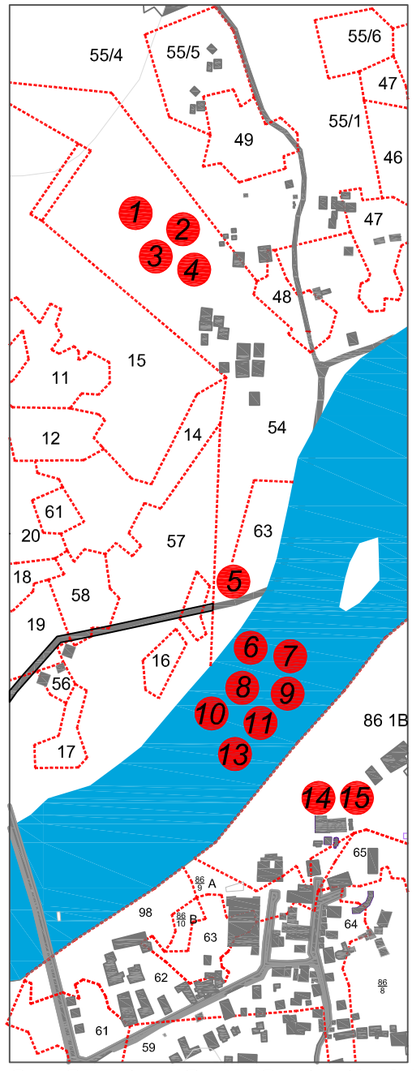
Maintenance- The maintenance of these springs is carried out by local panchayats and the others are maintained privately. The level of maintenance of these springs and their surroundings is dependent on the ownership and the capacities of the bodies that maintain them.

Based on these 3 patterns emerged. These were:

Case 1- Thermal springs or kunds owned by government agencies used for recreational tourism
Case 2- Thermal springs and kunds owned by private trusts and used for religious tourism
Case 3- Thermal springs or kunds under private ownership exploited for commercial purposes

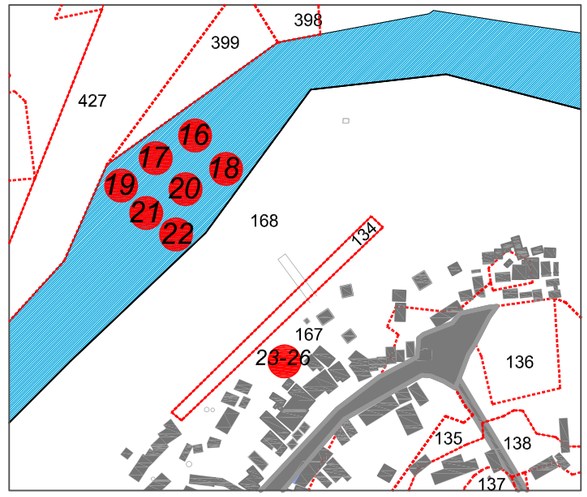
What follows is an analysis of the 26 springs identified based upon ownership patterns, usage and maintenance. The stresses acting on each of these springs were also identified. (*Plate no 5.1 – 5.3*)





CLUSTER A (GANESHPURI,NIMBAVLI)

00 50 100 M 200 M



CLUSTER B (AKLOLI)

00 50 100 M 200 M

LEGEND:

- INFLUENCE ZONE
- ROADS
- VILLAGE BOUNDARY
- CTS BOUNDARY
- MOUNTAIN PEAKS
- THERMAL SPRINGS
- RIVER

INFLUENCE ZONE : GEOTHERMAL RESOURCES : THERMAL SPRINGS

00 01 02 04 08 KM

INVENTORY OF THERMAL SPRINGS WITHIN THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN

The following observations on the condition assesment are based on fieldwork. These readings are on the possible threats to the *kunds* or geo-thermal springs through mapping the relationship of human activity and ownership:with the environmental resource base.

CASE ONE: THERMAL SPRING/ KUNDS OWNED BY GOVERNMENT AGENCY WHICH FORM PART OF RECREATION SPOTS

NO	SURVEY NO	VILLAGE	NAME; LOCATION	OWNERSHIP	USE	MAINTENANCE	STRESSES	IMAGE
05	54	*GANESHPURI*	*AGNI KUND* Within the bed of the *Tansa* river	*Ganeshpuri Grampanchayat*	Unused due to high water temperatures and submerged during monsoon.	None	The spring lying within the public unprotected site of the river has been tampered with . A pipe has been attached to it to tap hot water for commercial purposes and then abandoned.	
06-13	57	*GANESHPURI*	*KUNDS* WITHIN THE BED OF THE *TANSA* RIVER	Ganeshpuri Grampanchayat	Unused due to high water temperatures	None	None. They are virtually undistured as they are inaccessible for use and submerged for most of the year.	***Agni kund, Ganeshpuri extreme temperatures render this spring unusable*** 
16-22	168	*AKLOLI*	*SURYAKUND* BED OF THE TANSA RIVER	Akloli Grampanchayat	Recreation spot for tourists; picnickers	There is an informal system of maintenance. the kunds are cleaned by the owners of the commercial shacks.	The kunds built in brick and concrete, within the river bed, have damaged the natural vegetation, and habitats. Use of soap in the springs is not restricted. The dirty water from the spring enters and mixes with river water. Locals report than on peak tourist days, the water within the kunds is unsuitable for bathing for a few hours due to too much load and accumulation of human waste. Unhygienic conditions around the kunds, due to dumping of solid waste.	 ***Surya kund, informal shacks constructed at the river edge, Akloli***

INVENTORY OF THERMAL SPRINGS WITHIN THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN

CASE TWO: THERMAL SPRING/ KUNDS OWNED BY PRIVATE TRUSTS USED FOR RELIGIOUS TOURISM

NO	SURVEY NO	VILLAGE	NAME; LOCATION	OWNERSHIP	USE	MAINTENANCE	STRESSES	IMAGE
01-04	54	*GANESHPURI*	*ANSUYA KUND*	PRIVATE; SHRI ANSUYA TRUST, NIMBAVLI	Primarily used by local villagers for bathing. separate kunds have been reserved ed for men and women. it is also a recreation spot for tourists; picnickers especially on festival days	The panchayat has put up boards restricting the use of the kund for men. no regular cleaning or maintenance of the kunds is however done.  ***The two Kunds in Nimbavli unused due to very high temperatures***	The kunds are used for bathing by local villagers on a regular basis. The use of soap is unrestricted and the waste water enters into nearby stream. There is also the accumulation of discarded plastic wrappers, on a daily basis around the kund. The surroundings of the kund being improperly drained there is accumulation of water in stangant pools making the surroundings unhygienic. Although the kunds lie within private lands, they have a historical association of public use by local villagers. They are however not protected as public assets.	 ***Ansuya Kunds, Nimbavli***
15	86	*GANESHPURI*	*BHIMESHWAR KUND*	TRUST SHRI BHIMBESHWAR NITYANAND TRUST	Religious Tourism	The trust maintains the kunds, and regularly cleans them.	The kunds are in private ownership with public access but are not protected as public assets.	(Photography within the temple complex is not permitted, hence no images could be presented)
23-26	134	*AKLOLI*	*RAM KUND*	TRUST SHRI RAM MANDIR TRUST	Religious Tourism	The trust maintains the kunds, and regularly cleans them.	The kunds are in private ownership with public access but are not protected as public assets.	 ***Kunds in the Ram Mandir, Akloli***

CASE THREE: THERMAL SPRING/ KUNDS UNDER PRIVATE OWNERSHIP EXPLOITED FOR COMMERCIAL PURPOSES

NO	SURVEY NO	VILLAGE	NAME; LOCATION	OWNERSHIP	USE	MAINTENANCE	STRESSES	IMAGE
14	86	*GANESHPURI*	*DR KOTHAWLA*	PRIVATE DR KOTHAWALAS HEALTH SPA	Commerical exploitation spa treatments	The kunds are maintained by the private owner.	The kunds have been completely privatised with exclusive and charged access to only the clients of the resort.	(Photography of the kunds was not permitted in the resort.)

Stresses

From the above study, the following threats and stresses on the thermal springs were identified.

a. Pollution

The kunds are used for bathing purposes by locals and tourists and have no regulations and controls for use. The use of soap and detergents for bathing and the disposal of solid waste around the kunds, especially those along the river bed, are observed to be a regular practice. Waste water from the kunds enters the rivers and streams directly thus polluting them. There are no studies existing which determine the quality of the water, and these need to be urgently carried out to estimate the extent of the damage. *(Plate 5.1 – 5.3)*

b. Insensitive interventions

The enclosures, walls and landscaping around these kunds have been created through various private initiatives without any guidelines. The use of impermeable materials within the river bed leads to a damage to the river ecology. There are no provisions for drainage in places and stagnation of waste water lead to unhygienic conditions around the kunds. *(Plate 5.1- 5.3)*

c. Privatization

As pointed out in Part 1, the thermal springs are public assets. Thus they need to be in the public domain. As observed on site many of these springs lie on private land have been used historically as public amenities. There are currently no regulations that protect these assets and thus these systems face the possibility of being converted into purely private assets and to get exploited for commercial purposes. This phenomenon has already been observed in some cases like Kothawala springs.

Kunds lying on public land as in the case of Agni kund have been insensitively damaged through attempts to exploit them for private commercial purposes where a pipe has been attached to the kund to tap it for hot water and has subsequently been abandoned.

The thermal springs are unique environmental features of this area and have to be protected as public assets and made accessible to the larger public. *(Plate 5.1- 5.3)*

d. Lack of Maintenance

The kunds lying on public land have no designated bodies for their regular maintenance and cleaning. They tend to accumulate waste water, garbage in their surroundings. There is an informal system employed for cleaning and maintaining the kunds on public lands by local groups such as the shopkeepers who benefit from the tourism activity which is not reliable or regular.

In the absence of a more systematic system of maintenance it has been seen that the condition of publicly accessible kunds is deteriorating. The kunds lying within private lands that have temple trusts or exploited for commercial purposes are maintained and cleaned by the related interest groups such as shopkeepers or temple trusts. *(Plate 5.1- 5.3)*

5.1.2 Forests

Description and Significance

The forests within the region are an important resource, for biomass, fuel, water, major and minor forest produce especially for the tribal communities that subsist on these resources. They are also significant as they represent, according to some studies, “the largest remaining expanse of western subtropical hill forest in the Konkan region” (See box 1). The forests are also areas of origin of the first order streams that feed into the Tansa.

Biodiversity of Forests within the Influence Zone *(Refer Plate no. 5.4. and Table 5.1)* **-**The areas having the highest levels of biodiversity in the Influence Zone of the study area have been identified based on the biodiversity study. Plant diversity was sampled in forest patches of approximately 4–30 km.The species richness or biodiversity of each forest fragment was indicated by the total number of observed species. These areas are located mainly within the reserved forests. The Usgaon hills have the highest species diversity with a biodiversity index of 107. The adjoining table *(Table 5.1)* gives the number of species and the biodiversity index at various locations within the Influence Zone.

Box 1

A bio-diversity study[2] titled the *Human disturbance and forest diversity in the Tansa Valley*, India by Radha Veach, David Lee and Tom Phillipi establishes the significance of forests in the region. The report states that the “*this region may well represent the largest remaining expanse of western subtropical hill forest in the Konkan*”. *The study establishes that despite a history of exploitation and substantial reduction in biomass from firewood collecting, set fires and illicit tree felling, considerable plant diversity remains in the area. According to the study the bio-diversity in the semi green forest of Tungar Hill is the highest in the region with 150 species. In the whole of Tansa Valley the total number of species that this study recorded was around 181. The Tungar hill itself had 24 species which are unique to this location. As the study observes” Other mesic[3] species characteristics of hill forests were also found in neighboring peaks like Mahuli, Takmak, and Ghotara. “. Some of the species like the G. kokanensis are native to the region. Given its proximity to Mumbai and the densely populated suburban corridor on the Western Railway north to Virar, the continuing existence of such a rich and extensive forest is truly remarkable, and it deserves preservation.”*

Sr. No	Stations		No of Species	Biodiversity Index
1	Belchatep and Devdongri	Trees	63	79
		Lianas	06	
		Shrubs	10	
2	Murumba and Ghori Dongar	Trees	77	93
		Lianas	10	
		Shrubs	06	
3	Mandagani Peak	Trees	78	93
		Lianas	05	
		Shrubs	10	
4	Mandagni Peak Base	Trees	59	68
		Lianas	05	
		Shrubs	04	
5	Tapovan Hill	Trees	60	69
		Lianas	04	
		Shrubs	05	
6	Usgaon Hills and Ghotara Peak	Trees	86	107
		Lianas	08	
		Shrubs	04	

Table 5.1 Biodiversity index at various locations in the Influence Zone
Source: RADHA VEACH1, DAVID LEE2,3, and TOM PHILIPPI2 Human disturbance and forest diversity in the Tansa Valley, India Biodiversity and Conservation 12: 1051–1072, 2003. 2003 Kluwer Academic Publishers. Printed in the Netherlands*

[2] Refer Annexure One of Stage One of the report for a detailed list of species and their economic exploitation.
[3] A mesic habitat is a type of habitat with a moderate or well-balanced supply of moisture,

Identifying Concerns

Forests areas and natural ecosystems are stressed due to certain activities causing deforestation, loss of vegetation, biodiversity, erosion due to increased runoff and a reduction in ground water recharge.

The main causes of biotic interference identified within the forests are due to

1. Illicit Cutting and exploitation of forests.
2. Fires
3. Grazing
4. Stone Quarrying
5. Brick Kilns

1. Illicit cutting and exploitation of forests:

Fig 5.2 Photographs in Ganeshpuri Reserve Forest

A bio-diversity study of *Human disturbance and forest diversity in the Tansa Valley, India* by Radha Veach, David Lee and Tom Phillipi mapped the disturbances in forest diversity at different locations within the Tansa valley. It noted the exploitation of the forest by the principal users, primarily of the Warli Tribe.

By far the single most important item collected was firewood, which dramatically reduced forest biomass within 2 km of villages. The report states that, “All of the sites were subject to this pressure on their margins, but some contained areas that were more protected because of isolation.”

Forests adjacent to Usgaon and Kelthan villages were dramatically different compared to more isolated ones nearby, like the hills above Usgaon and those at the base of Mandagni Peak. Intense exploitation for firewood and timber dramatically reduced the biomass in these areas, and also reduced diversity.

The only large trees close to the villages are those with a particular value for the villagers, e.g. fruit. Yet, considerable diversity of hacked and stunted plants persisted, even within 500 m of these villages. Woody plant diversity is surprisingly high near the villages but mainly comprising of species which are extremely resilient and resistant to repeated lopping for firewood, fires and browsing by animals.

Firewood collecting activities drop rapidly beyond 2 km, but other products are gathered throughout the forests.

2. Forest fires:

Fig 5.3 Burnt slopes within the study area near Ganeshpuri

Fire is an additional human impact in these forests, mostly near villages, through the burning up of slopes for considerable distances.[4]Fires cause extensive damage to the regeneration by killing the young seedlings. The scorching heat produces hollowness in saplings and poles. Substantial damage also occurs due to fire as they tend to accelerate soil erosion and site degradation by destroying the soil cover as well as the humus as a result of which there is less moisture absorption and more run off. These fires are harmful to tree growth and regeneration. Damage is also caused to the soil by way of destruction of leaf litter which inhibits the formation of humus.

(Source- Through site surveys and Preliminary working plan report for Thane forest Division, Thane)

11

[4] RADHA VEACH1, DAVID LEE2,3,* and TOM PHILIPPI2 Human disturbance and forest diversity in the Tansa Valley, India *Biodiversity and Conservation* 12: 1051–1072, 2003. 2003 *Kluwer Academic Publishers. Printed in the Netherlands*

3. Grazing:

Fig 5.4 Natural regeneration of vegetation is affected due to grazing near Ambode.

Forests in this area are also subjected to pressure of grazing. Grazing affects natural regeneration. Constant trampling and browsing not only destroys the young seedlings and coppices, but the constant hardening of the soil and complete absence of humus hinders the germination of seeds and prevents the growth and establishment of recruits.

The process of soil erosion is accelerated due to over grazing. The effects of overgrazing are environmentally hazardous as it leads to the degradation of sites. In the process green cover in the forest floor is lost leading to the loosening of top soil and boulders, which are finally carried off the site by subsequent runoff.

(Source- Preliminary working plan report for Thane Forest Division, Thane)

5. Stone Quarrying:

Fig 5.5 Stone quarry.

The quarrying was observed at the lower slopes and peripheries of the reserve forests.

Stone quarrying disturbs the natural vegetation and slopes along the immediate edges of forests. Quarrying activity could result in severe erosion, and a danger of landslides.

The licensing authority which rested previously with the Revenue Officer has been transferred to the local Talati who has a better knowledge and control over the extent of quarrying that can be permitted within the region. Previously the lack of direct control and corruption led to an unchecked proliferation of quarrying activities in the villages of the influence area. *(Refer Plate no. 5.5)*

6. Brick kilns:

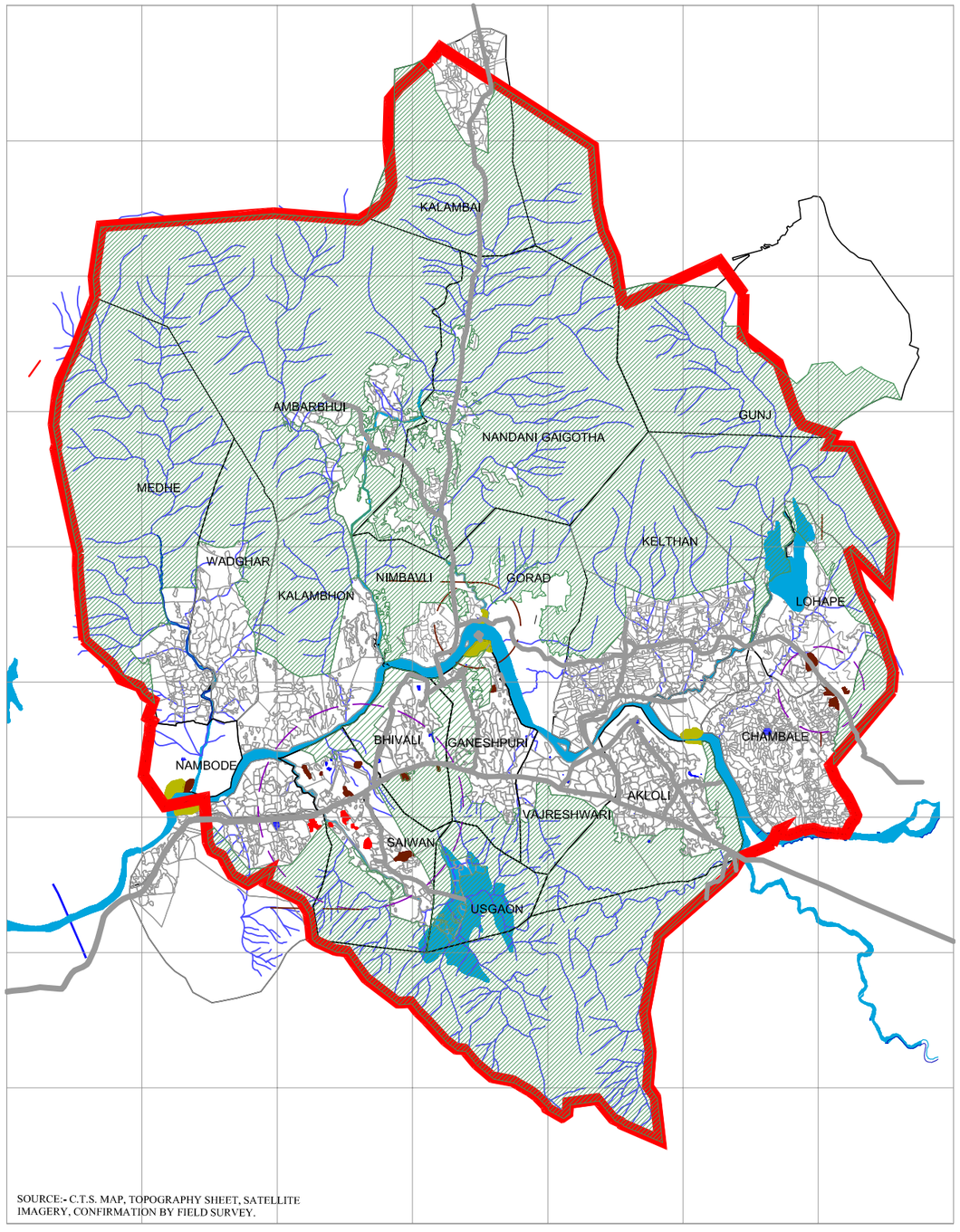
Fig 5.6 Soil removal in the forest at Ganeshpuri.

Soil for brick kilns is quarried from forested areas and areas having natural vegetation cover leading to deforestation and soil erosion.

Stresses

a. Human disturbance around peripheries of forests

It can be seen that much of the above described activities pose a threat to the biodiversity of the forests of the region. Complete absence of the natural regeneration and reduction in diversity of species is quite likely to have serious repercussions, ecologically and environmentally. However, much of the above activity is deeply connected with the livelihood of the different farming and tribal communities within the area. These include the collection of firewood, grazing, rab burning, etc. It is seen therefore that the peripheral zone, 2 kilometers into the forest around settlements is most vulnerable to human disturbance. (*Plate 5.6)* It is evident that these activities can be harmful to the forests if completely unregulated. Therefore some guidelines need to be established. However, any proposal to address the issue of protecting the forests has to acknowledge the connections of these activities to the sustenance of the livelihood of local communities.



SOURCE:- C.T.S. MAP, TOPOGRAPHY SHEET, SATELLITE IMAGERY, CONFIRMATION BY FIELD SURVEY.

Disruption of natural vegetation and slopes due to quarrying

Erosion & destabilization of the river banks & destruction of habitat due to sand dredging

The stone quarries were located through talathi records and confirmed by site surveys and satellite imagery. In Usgaon the quarries formed ditches in the flat rocky areas, while in Lohape, the quarries occur at the base of the hillslopes and disrupt the natural vegetaion and slopes.
Through the study it was found that there were several quarry sites within the Influence Zone that had no mention within the Talathi records .
The study also found that there is primarily only manual sand dredging within the study area, that occurs at the natural bends in the river.

LEGEND:

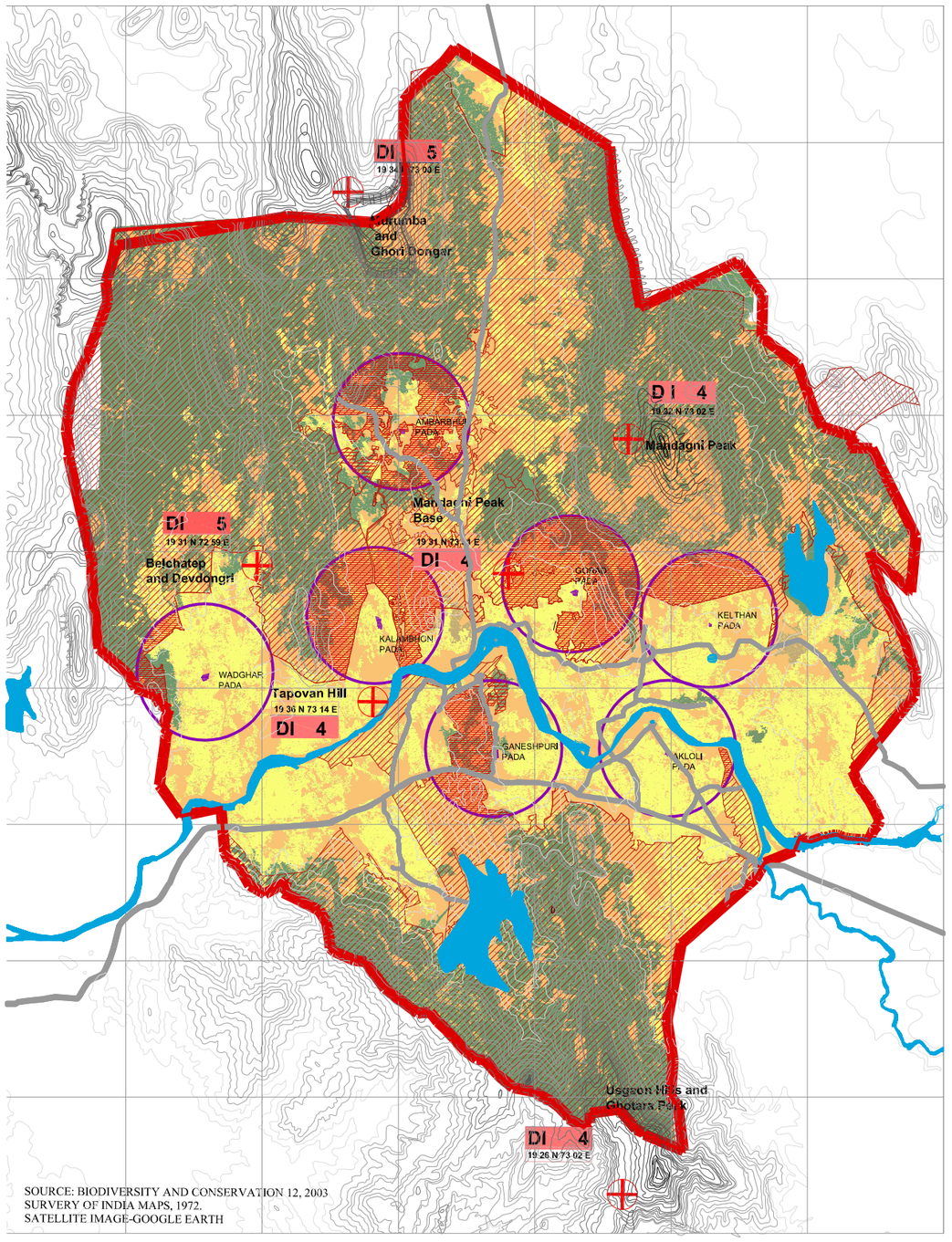
- TANSA RIVER / STUDY AREA
- ROADS
- FOREST (CTS BOUNDARY)
- INFLUENCE ZONE BOUNDARY
- VILLAGE CTS BOUNDARY
- STONE QUARRY - REGULATED (DESIGNATED AS UCH IN TALATHI RECORDS)
- SAND DREDGING
- STONE QUARRY - UNREGULATED (NOT DESIGNNATED AS SUCH IN TALATHI RECORDS)

INFLUENCE ZONE: FORESTS : STONE QUARRYING AND SAND DREDGING

00 01 02 04 08 KM

5.5

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in



Forest fires due to burning of fields and slopes

Deforestation resulting in denuded slopes

Grazing and browsing

Illicit felling of timber

DISTURBANCE INDEX
As per on Human Disturbance and Forest diversity in the Tansa Valley
The degree of forest disturbance at each site was ranked on a scale of increasing disturbance from 1 to 10, where 1 would be a forest of closed canopy, no evidence of timber cutting or extraction of minor forest products, with a canopy 20-25 m high, 5 would be occasional stumps of cut trees, evidence of frequent exploitation of minor forest products and a partly open canopy, and 10 would be no standing trees and numerous shrubs.

The map indicates the forest cover observed in the satellite image overlayed with the forest ownership boundaries and locations of adivasi padas as per the CTS maps.
A circle of 2 km radius around each pada has been marked. This circle is overlayed on the forest boundaries and the densely shaded area indicate the peripheral zones of forests, which are most vulnerable to human disturbance.

LEGEND:

- PONDS AND TANKS
- LAKES
- RIVERS
- FOREST AND VEGETATION COVER
- INFLUENCE AREA BOUNDARY
- AGRICULTURAL LAND
- ADIVASI PADAS
- BARREN LAND
- 2 KM RADIUS AROUND PADAS
- FOREST AREAS WITHIN 2 KM RADIUS AROUND PADAS THAT ARE VULNERABLE TO HUMAN DISTURBANCE
- LAND UNDER FOREST OWNERSHIP
- DI DISTURBANCE INDEX

INFLUENCE ZONE: FORESTS : DISTURBANCE

00 01 02 04 08 KM

5.6

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

5.1.3 Riverine Ecosystems

Description and Significance

The Tansa Rivers and its tributaries are riparian ecosystems. Through their characteristics of flood and flow these systems maintain a stream flow, attenuate floods, replenish and recycle nutrients, recharge ground water. Bank vegetation and in stream habitats are breeding areas for various species. Riparian zones[5] shade and regulate the temperature of the stream and act as biological filters. Riparian habitats are specialised habitats. *(Refer Plate 5.7)* The riparian zone along the streams has been approximated to 5 metres on either side, and that along the river to 10 metres on either side.

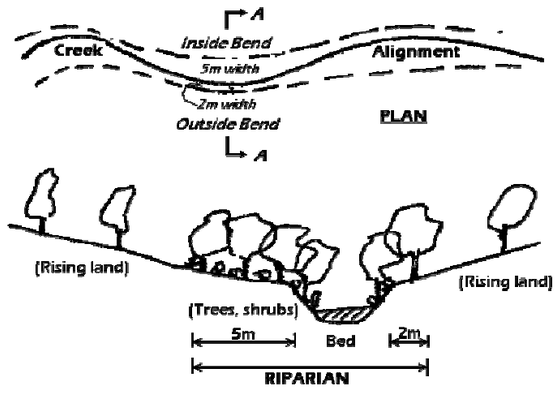
Fig 5.7 in- stream habitats observed at Ganeshpuri. Fig 5.8. Riparian habitats observed at Ganeshpuri

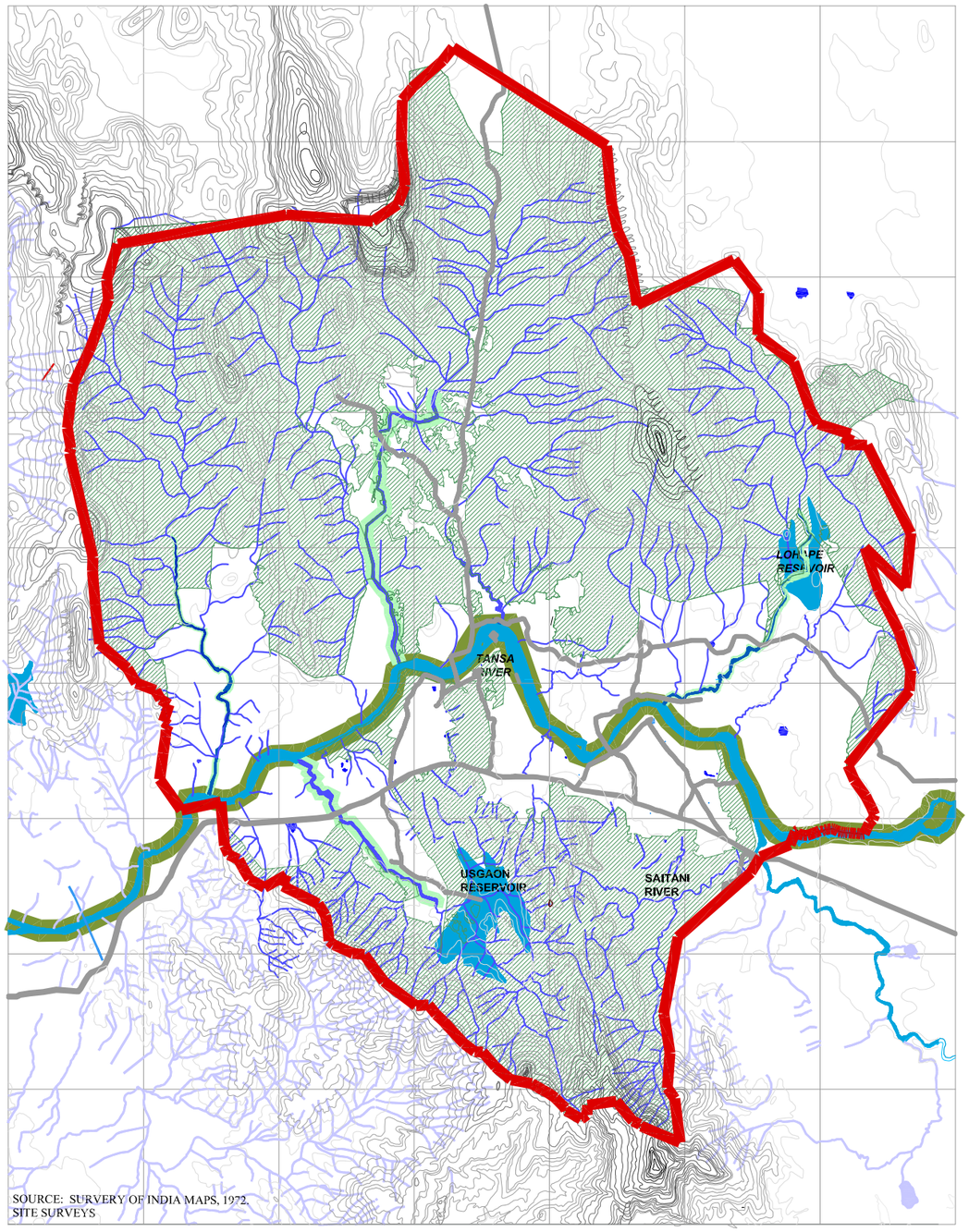
Stresses

a. Threat to riverine habitat

It is seen that along the riverine systems there has been activity like sand dredging that threatens the habitat of these ecosystems.

[5] A riparian zone or riparian area is the interface between land and a stream. Plant communities along the river margins are called riparian vegetation, characterized by hydrophilic plants. Riparian zones occur in many forms including grassland, woodland, wetland or even non-vegetative. In some regions the terms riparian woodland, riparian forest, riparian buffer zone, or riparian strip are used to characterize a riparian zone. The bed of the street with its in-stream vegetation, the often-steep banks, and a short distance on top of the banks, are included in this definition.Depending on the alignment of the creek, the width of bank-top varies from only 2m on the outside of the bend to 4-5m, or more, on the inside bend.





Riparian vegetation

Riparian vegetation

Instream Habitats

Instream Habitats

The drawing indicates a belt of natural riparian vegetation along either side of the smaller streams and the river observed from site visits as being approximately 5 metres wide on either side of the smaller streams and 10 metres wide along undisturbed banks of the Tansa River. While within the riverbed as seen from the photographs above are instream habitats.

LEGEND:

- RIPARIAN ZONES ALONG MAJOR RIVERS
- RIPARIAN ZONES ALONG STREAMS
- INFLUENCE AREA
- STREAMS WITHIN CFA
- TANSA RIVER
- STREAMS OUTSIDE CFA
- LAND UNDER FOREST OWNERSHIP

INFLUENCE ZONE : RIVERINE ECOSYSTEMS

00 01 02 04 08 KM

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

5.1.4 Areas with critical slopes

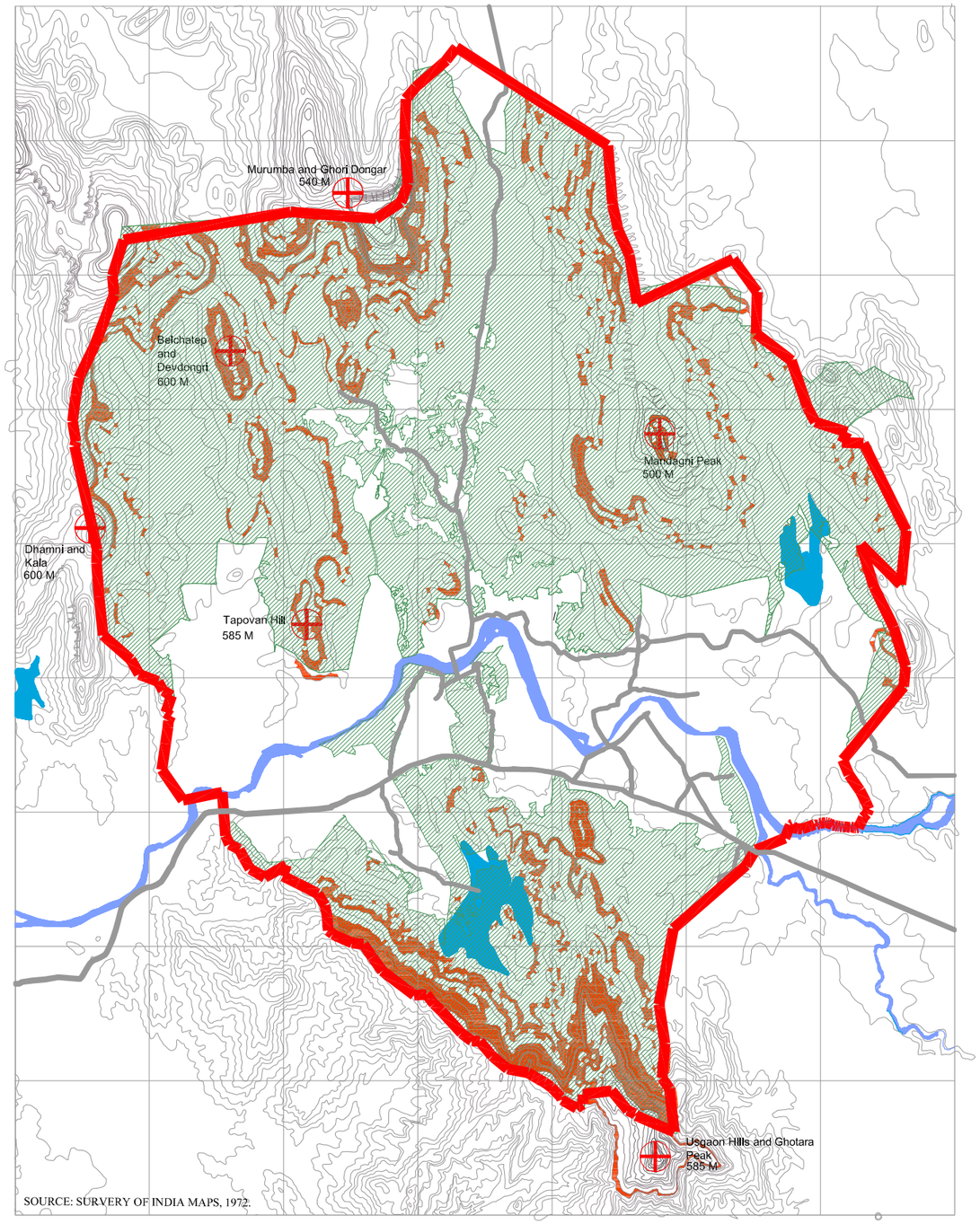
Description and Significance

The hill chains form the catchments areas of streams, rivers, reservoirs and ponds. The ridges, and hilly areas are critical for recharging groundwater and vegetation cover in hilly areas is also important for flood control. (*Plate 5.8*)

Stresses

a. Threats of erosion to steep slopes

Certain areas have steep slopes which are more vulnerable and prone to erosion due to the higher velocity of runoff. These areas are also under threat due to landslides. It is important that these areas remain covered with natural vegetation and forest cover. A slope map was generated demarcating areas having slopes greater than 20 degrees to identify areas which are unsuitable for development and need to be covered with natural vegetation/ forest. (*Refer Plate no. 5.8*)



Dissected hills

Steep/ moderately steep slopes

The slope map of the CFA was generated by demarcating area having slopes greater than 20%. These areas are defined as areas having steep slopes prone to erosion and are vulnerable to landslides.As seen in the map, all of the steep slopes within the Influence Zone lie within the areas under forest ownership and protection.

LEGEND:

LAKES
RIVERS
AREA UNDER FOREST OWNERSHIP
SLOPES >20 DEGREES
TANSA RIVER
CRITICAL FOCUS AREA BOUNDARY
ROADS

INFLUENCE ZONE: CRITICAL SLOPES

00 01 02 04 08 KM

5.8

5.1.5 Water resources and Identification of Watersheds

Description and Significance

Streams, rivers, ground water, wells, lakes, reservoirs, tanks, ponds and talaos, are sources of water in the region. These are environmental resources which provide water for drinking and domestic use. These are usually public or common property resources used by local communities and villages. They also sustain livelihoods or have an important economic value to local communities by supporting activities such as agriculture, fishing and tourism. The river and stream systems deposit silt and sediment in the floodplain areas, and support agricultural activity and settlements.

Streams, rivers and freshwater wetlands and ponds are also ecological habitats which support aquatic and riparian flora and fauna and help in maintaining the microclimate. The catchments areas and recharge zones of these water resources are critical as the affect the quality and quantity of water available. Some areas which are the source regions of the areas of origin of first order streams are very sensitive. The riparian zone of rivers and streams stores water and recharges the river during the dry season. Village ponds and percolation tanks store the floods and release them in the dry months.

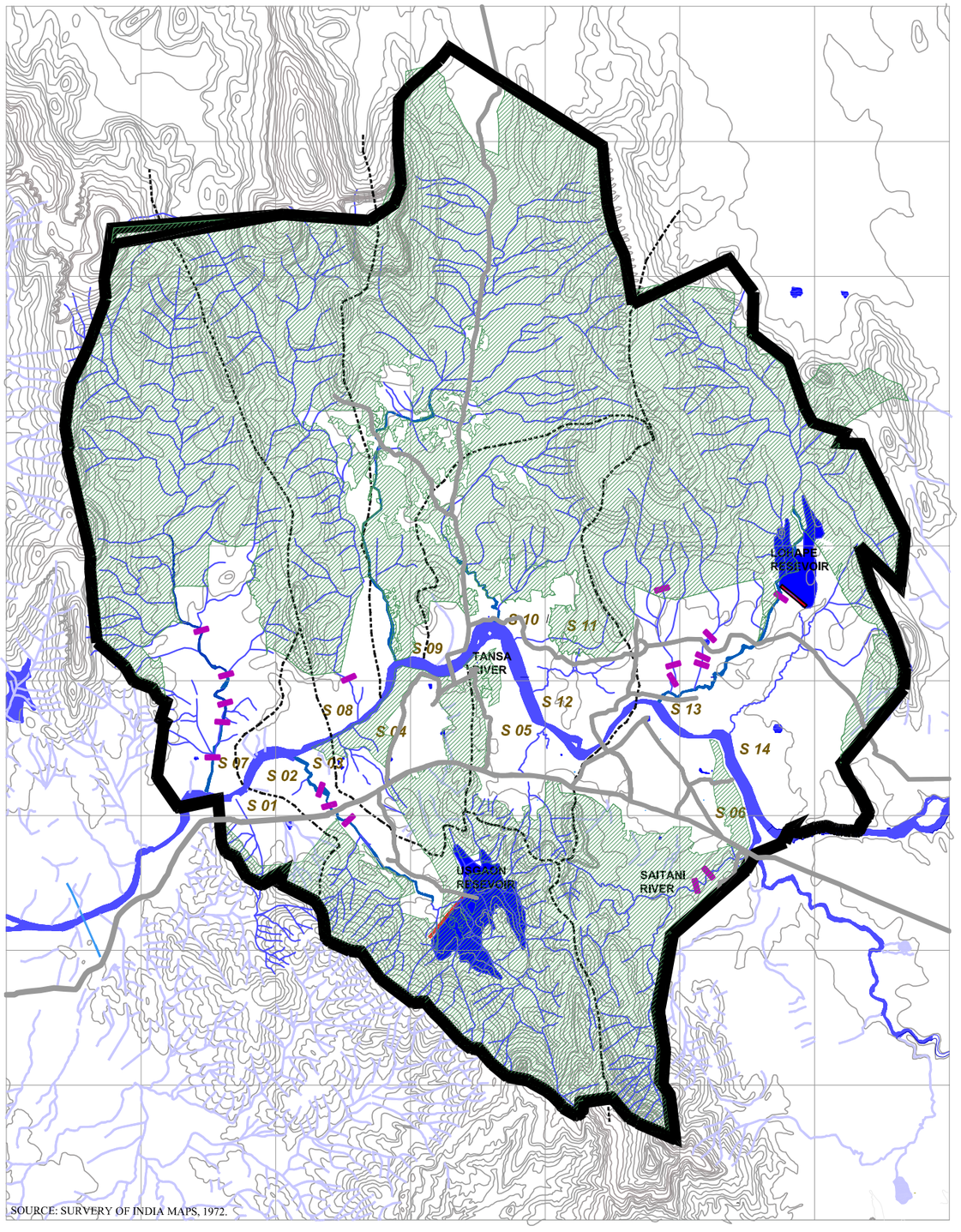
Identification of Watersheds

Any activity within the catchments areas would have an impact on these resources. It was therefore necessary to demarcate and study the catchment areas of these water resources and to identify the stresses these systems face. A systematic study of the water resources and their watershed areas was undertaken.

The streams and rivers in the watershed area within the Influence Zone were studied according to the following characteristics. *(Refer Plate 5.9 to 5.14)*

- The sources
- Gram panchayats traversed by each stream,
- Existing stream lengths,
- The Land use / Activities within the catchment area of each stream to highlight present conditions, like the forest and vegetation cover in the catchment, presence of riparian vegetation,
- Whether the stream is perennial or seasonal,
- The number of dams, check dams and canals present along its length and
- The present use of these watersheds
- Stresses that these are under.

Apart from these streams there are two manmade reservoirs, Usgaon and Lohape which are formed by the construction of dams on two of the major streams. In some gaothan there are ponds and water bodies used by local communities for basic needs and livelihoods. These natural and manmade water bodies were identified and studied. This part of the study helped in the identification of key aspects such as the basic opportunities that these systems provide for the economic needs and sustenance of local communities and the environmental threats these systems face.



Flow during the monsoons

Streams used for activities such as bathing and washing

Checkdam retaining water for use during the drier season

Water from checkdam pumped for irrigation and domestic purposes

Dry steam bed in summer

Certain activities within the stream bed cause water pollution

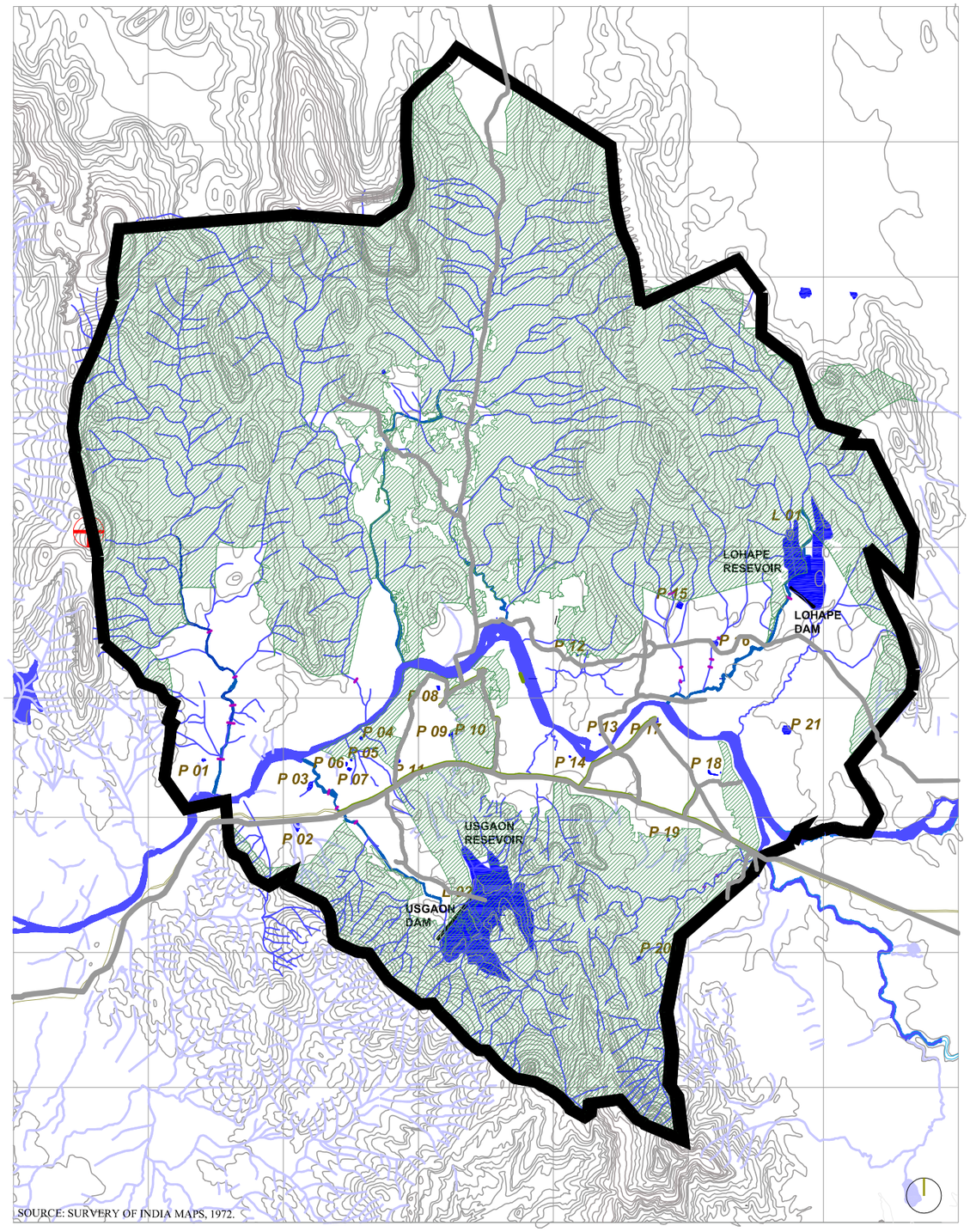
14 major and minor streams which flow into the Tansa river and their water sheds were identified in the CFA. The hydrological system comprises of 1st and 2nd order streams which feed the Tansa river. The catchment areas vary from small to medium/large areas. The table on the following table does a condition assesment of each of these streams.

LEGEND:

- INFLUENCE AREA
- WATERSHED BOUNDARIES
- DAMS
- CHECKDAMS
- STREAMS OUTSIDE CFA
- LAKES AND PONDS
- TANSA RIVER
- STREAMS WITHIN CFA
- AREA UNDER FOREST

INFLUENCE ZONE: WATER RESOURCES :STREAMS AND WATER SHEDS

00 01 02 04 08KM



Lohape Dam provides water to the villages of Nimbavli, Kelthan, Gorad for irrigation

Lohape Lake used for fishing by the villagers of the neighbouring adivasi village of Lohape

Usgaon Dam provides water to the Virar Nagar Palika, the Gurudev Aashram the villages of Usgaon and Bhivalli for irrigation.

Overflow from Usgaon Dam is channelized and used for irrigation to grow paddy and vegetables

Farmers desilting the pond bed to provide fertile soil to their farms.Small ponds in the region dry up after the rains.These ponds are used for fishing and other domestic purposes by the villagers

There are two large lakes in the Critical Focus Area. Usgaon and Lohape. Besides these there are smaller ponds in almost every village. These provide water for the sustainance and livelihood of local communities .

INFLUENCE AREA
RIDGE LINES
DAMS
CHECKDAMS
STREAMS OUTSIDE CFA
LAKES AND PONDS
TANSA RIVER
STREAMS WITHIN CFA
AREA UNDER FOREST

00 01 02 04 08KM

INFLUENCE ZONE: WATER RESOURCES :PONDS AND LAKES

5.10

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

NO	VILLAGE SURVEY NO	SOURCE; ELEVATION; VILLAGE	STREAM LENGTH AND CATCHMENT AREA	DESCRIPTION	PERRENIAL/NON PERRENIAL	PRESENCE OF DAMS OR CHECKDAMS	USE BY LOCAL COMMUNITIES	STRESSES
S1		**Usgaon Hills and Ghotara Peak** ***585 M*** ***SHIRAVLI***	**Stream length:** 2.85 kms **Catchment area:** 1.87 sq.kms	The stream passes through reserved forest and open scrub land. It has a small catchment area.	 *Non perrenial*	 *No checkdams*	The watershed area of the stream is small and it completely dries up during summer. There is no system of check dams or provision for irrigation. Stream water is used for washing and domestic purposes.	The stream does not have a large catchment area with forest cover. Degradation of natural vegetation in the catchment and destruction of stream bank riparian vegetation results in drying up of the streams during the dry season.
S 2	97,68,95, 119,11, NALA,86, 112,76,129A, 129C,129	**Usgaon Hills and Ghotara Peak** ***585 M*** ***SHIRAVLI USGAON***	**Stream length:** 7.85 kms **Catchment area:** 16.36 sq.kms	The stream has a large catchment of first order streams and passes through reserved forest, agricultural lands and open scrub land before it flows into the Tansa river .	 *The stream has been dammed near Usgaon and therfore retains water during summer.*	 *There are 3 checkdams downstream of the reservoir, used for fishing snd other purposes*	The Usgaon dam has been constructed on the stream near the village of Usgaon. The reservoir supplies water to the municipality Virar and to Gurudev ashram. The Usgaon lake is also used for fishing by villages nearby. A fishing cooperative has been formed. Water from the reservoir is released during summer months. Several check dams have been constructed downstream. The water in these in these used for agriulture, fishing, bathing, washing and other domestic purposes.	There is deforestation in the catchment. Construction of large reservoir has affected the natural hydrological system and resulted in the dessication stream channel. Large amounts of water are consumed by municipalities and private trusts.
S 3	22,26,99,130C, 130A,36,38,41	**Usgaon Hills and Ghotara Peak** ***585 M*** ***USGAON***	**Stream length:** 0.32 kms **Catchment area:** 0.93 sq.kms	The stream passes through open scrub land.	 *Non perrenial*	 *No checkdams*	The watershed area of the stream is small and it completely dries up during summer. There is no system of check dams or provision for irrigation. Stream water is used for washing and domestic purposes.	The stream does not have a large catchment area with forest cover. Degradation of natural vegetation in the catchment and destruction of stream bank riparian vegetation has resulted in the drying up of the streams during the dry season.
S 4	PRO FOREST AREA, 52A/47, 46/A, 46A/6	**Usgaon Hills and Ghotara Peak** ***585 M*** ***BHIWALI***	**Stream length:** 0.46 kms **Catchment area:** 0.042 sq.kms	The stream passes through agricultural and grasslands and has a small catchment area.	 *Non perrenial*	 *No checkdams*	The watershed area of the stream is small and it completely dries up during summer. There is no system of check dams or provision for irrigation. Stream water is used for washing and domestic purposes.	The stream does not have a large catchment area with forest cover. Degradation of natural vegetation in the catchment and destruction of stream bank riparian vegetation results in the drying up of the stream during summer

NO	VILLAGE SURVEY NO	SOURCE; ELEVATION; VILLAGE	STREAM LENGTH AND CATCHMENT AREA	DESCRIPTION	PERRENIAL/NON PERRENIAL	PRESENCE OF DAMS OR CHECKDAMS	USE BY LOCAL COMMUNITIES	STRESSES
S 9	52, W11, 42, PRO FOREST 65, 4 11/4	**Murumba and Ghori Dongar; Mandagni Peak** ***540 M; 500 M*** ***NIMBAVLI, NANDANI GAIGOTHA, PIMPAROLI***	**Stream length:** 9.73 kms **Catchment area:** 9.87 sq kms	The stream passes through reserved forest,grassland and agricultural lands and has a large catchment area	 *Non perrenial*	 *No checkdams*	The stream is used for agriulture, fishing, bathing, washing and other domestic purposes during and after the monsoons but is completely dry in summer.	Deforestation in the catchment areas and loss of riparian vegetation is responsible for reduced ground water levels and affects the duraction for which the stream flows after the monsoons.
S10	54, $\frac{55}{7}$, $\frac{55}{8}$, $\frac{55}{9}$ 64, $\frac{55}{2}$, 53, 11, 61, 12	**Mandagni Peak** ***500 M*** ***GORAD, KELTAN***	**Stream length:** 10.04 kms **Catchment area:** 14.27 sq.kms	The ansuya and agni kunds are located along this stream. The stream passes through reserved forest, grassland and agricultural land with a medium sized catchment area.			The stream is used for agriculture, fishing, bathing, washing and other domestic purposes.	Settlements along the stream and tourists (contact points) visiting the kunds discharge solid waste and chemical substances like soap, detergent etc which is detrimental. The vegetation along these stretches is disturbed.
S11		**Mandagni Peak Base** ***500 M*** ***GORAD***	**Stream length:** 0.83 kms **Catchment area:** 3.94 sq.kms	The stream passes through grassland and agricultural lands and has a very small catchment area	 *Non perrenial*	 *No checkdams*	Adivasi padas located along the stream use it as a domestic source of water. Various activities like fishing, rice cultivation and grazing occur along the length of the stream.	Deforestation in the catchment areas and loss of riparian vegetation is responsible for reduced ground water levels and affects the duraction for which the stream flows after the monsoons.
S12		**Murumba and Ghori Dongar;** ***500 M*** ***GORAD, KELTAN***	**Stream length:** 1.78 kms **Catchment area:** 13.72 sq.kms	The stream passes through reserved forests and agricultural lands from the Mandagni peak base to converge into the Tansa at Gorad. The stream has a medium sized catchment area.	 *Non perrenial*	 *No checkdams*	Stream water is used for agriculture fishing and other domestic purposes.	Deforestation in the catchment areas and loss of riparian vegetation is responsible for reduced ground water levels and affects the duraction for which the stream flows after the monsoons.

NO	VILLAGE SURVEY NO	SOURCE; ELEVATION; VILLAGE	STREAM LENGTH AND CATCHMENT AREA	DESCRIPTION	PERRENIAL/NON PERRENIAL	PRESENCE OF DAMS OR CHECKDAMS	USE BY LOCAL COMMUNITIES	STRESSES
S5	87/10,$\frac{87}{11}$PAI, 10,7,x, y,9,x,11	**Usgaon Hills and Ghotara Peak** ***585 M*** ***GANESHPURI, USGAON***	**Stream length:** 5.7 kms **Catchment area:** 0.732 sq.kms	The stream passes through reserved forests, agricultural and open scrub land.The stream has a medium sized catchment area of first order streams which feed the Tansa river.	 *Non perrenial*	 *No checkdams*	There are no check dams and the stream dries up in summer.	Loss of riparian vegetation and natural vegetation cover in the catchment has affected the duration for which the stram has flowing water.
S 6	PRO FOREST AREA, 52A/47, 46/A, 46A/6	**Usgaon Hills and Ghotara Peak** ***585 M*** ***AKLOLI, MAHALUNGE***	**Stream length:** 6.19 kms **Catchment area:** 4.34 sq.kms	The Saitani river emerges from the Usgaon Hills and passes through reserved forest agricultural and open scrub land before it flows into the Tansa river. It has a large catchment area.	 *Non perrenial*	 *Number of checkdams- 2*	A well has been constructed within the river bed with checkdams both upstream and downstream at a distance of 100 mts. Ground water levels in certain areas where waterharvesting techniques have been used are high and some wells have water till the end of summer. A percolation tank with an earthen retaining wall has been constructed near a village along the river bed to store water for domestic use and will also be used for fishing.	It was established through interviews with local villagers that the stream was earlier perennial.The forest cover in the catchment has considerably reduced affecting ground water recharge and retention resulting in the drying up of the streams in the catchment.
S 7		**Takmak Fort Mountain Dhamni and Kala** ***609 M; 300 M*** ***AMBODE, MEDHE, VADGHAR***	**Stream length:** 8.37 kms **Catchment area:** 17.00 sq.kms	The stream passes through reserved forest and agricultural land. The stream has a large catchment area of first order streams.	 *Non perrenial*	 *Number of checkdams- 5*	Check dams have been constructed along the stream. This water is used for agriulture fishing and other domestic purposes. Water in the check dams does not last till the end of summer. The ground water levels in the surrounding villages also goes down considerably and most of the wells are dry. Villages have to depend on tanker water transported from other areas for domestic use. There was a proposal for construction of a dam in the catchment but it has not been implemented as forest land would be submerged.	Deforestation in the catchment areas is responsible for reduced ground water levels in the watershed.
S 8		**Murumba and Ghori Dongar; Mandagni Peak** ***540 M; 500 M*** ***NIMBAVLI, NANDANI GAIGOTHA, PIMPAROLI***	**Stream length:** 9.73 kms **Catchment area:** 9.87 sq kms	The stream passes through reserved forest, grassland and agricultural. The stream has a large catchment area of first order streams.	 *Non perrenial*	 *Number of checkdams- 1*	Check dams have been constructed along the stream. Water in the check dams does not last till the end of summer. The ground water levels in the surrounding villages also goes down considerably and most of the wells are dry.	Deforestation in the catchment areas is responsible for reduced ground water levels in the watershed

NO	VILLAGE SURVEY NO	SOURCE; ELEVATION; VILLAGE	STREAM LENGTH AND CATCHMENT AREA	DESCRIPTION	PERRENIAL/NON PERRENIAL	PRESENCE OF DAMS OR CHECKDAMS	USE BY LOCAL COMMUNITIES	STRESSES
S13		**Mandagni Peak** **500 M** **KELTHAN, LOHAPE, GUNJ**	**Stream length:** 8.15 kms **Catchment area:** 0.15 sq kms	The stream passes through teak plantations in the reserved forests, agricultural and grassland to converge into the Tansa at Keltan. The stream has a large catchment area	 *The stream has been dammed near Lohape and therfore retains water during summer.*	 *This stream has been dammed forming the Lohape reservoir. Number of checkdams- 7*	The Lohape dam has been constructed on the stream near the village of Lohape. The reservoir supplies water to villages of Nevalpada, Kelthan, Gorad and Nimbavali which now can grow two crops in a year.The Lohape lake is also used for fishing by the adhivasi village of Lohape located upstream. A fishing cooperative has been formed and the reservoir provides a yield of 50-100 kgs of fish per day. Water from the reservoir is released during summer months. Several check dams have been constructed downstream. The water in these in these is used for agriulture, fishing, bathing, washing and other domestic purposes. Lohape village has high ground water levels due to its proximity to the reservoir. It does not receive water for irrigation being located upstream from the reservoir and has only one main paddy crop during the monsoons. Other crops such as tur, vaal etc are grown after the rains for local consumption.	Natural vegetation cover in these catchment has reduced due to deforestation, change in landuse within the catchment quarries and grazing. The construction of a road across the catchment and the diversion of water towards villages in towards the west has affected ground water levels in downstream villages. Some of these villages which earlier had water for twelve months in a year now can grow only one crop during the monsoons.
S14		**Mandagni Peak** **500 M** **CHAMBALE, LOHAPE**	**Stream length:** 4.07 kms **Catchment area:** 0.47 sq kms	The stream passes through teak plantations in the reserved forests, agricultural lands to converge into the Tansa at between Keltan and Chambale. The stream has a medium catchment area	 *Non perrennial.*	 *No checkdams.*		

NO	VILLAGE SURVEY NO	SOURCE; ELEVATION; VILLAGE	STREAM LENGTH AND CATCHMENT AREA	DESCRIPTION	PERRENIAL/NON PERRENIAL	PRESENCE OF DAMS OR CHECKDAMS	USE BY LOCAL COMMUNITIES	STRESSES
S13		**Mandagni Peak** **500 M** **KELTHAN, LOHAPE, GUNJ**	**Stream length:** 8.15 kms **Catchment area:** 0.15 sq kms	The stream passes through teak plantations in the reserved forests, agricultural and grassland to converge into the Tansa at Keltan. The stream has a large catchment area	 *The stream has been dammed near Lohape and therfore retains water during summer.*	 *This stream has been dammed forming the Lohape reservoir. Number of checkdams- 7*	The Lohape dam has been constructed on the stream near the village of Lohape. The reservoir supplies water to villages of Nevalpada, Kelthan, Gorad and Nimbavali which now can grow two crops in a year.The Lohape lake is also used for fishing by the adhivasi village of Lohape located upstream. A fishing cooperative has been formed and the reservoir provides a yield of 50-100 kgs of fish per day. Water from the reservoir is released during summer months. Several check dams have been constructed downstream. The water in these in these is used for agriulture, fishing, bathing, washing and other domestic purposes. Lohape village has high ground water levels due to its proximity to the reservoir. It does not receive water for irrigation being located upstream from the reservoir and has only one main paddy crop during the monsoons. Other crops such as tur, vaal etc are grown after the rains for local consumption.	Natural vegetation cover in these catchment has reduced due to deforestation, change in landuse within the catchment quarries and grazing. The construction of a road across the catchment and the diversion of water towards villages in towards the west has affected ground water levels in downstream villages. Some of these villages which earlier had water for twelve months in a year now can grow only one crop during the monsoons.
S14		**Mandagni Peak** **500 M** **CHAMBALE, LOHAPE**	**Stream length:** 4.07 kms **Catchment area:** 0.47 sq kms	The stream passes through teak plantations in the reserved forests, agricultural lands to converge into the Tansa at between Keltan and Chambale. The stream has a medium catchment area	 *Non perrennial.*	 *No checkdams.*		

Identifying Concerns

Deforestation in catchments areas:

In the previous section, it was established that the water retention capacity of the forests has greatly reduced, due to deforestation. This deforestation in the upper catchment areas, has affected the natural hydrological system and is the main cause of reduced ground water level as observed during surveys detailed above *(Refer Plate no. 5.9 to 5.14).* During interviews on site farmers reported that many streams which were earlier perennial are dry after the monsoon and winter season. Smaller streams dry up soon after the monsoon, but even larger streams with large catchment areas do not have flowing water till the end of summer.

Large dams and reservoirs:

Interviews with farmers on site also revealed that the construction of large dams and reservoirs like Usgaon and Lohape in upper parts of the catchment area causes the desiccation of stream channels and destruction of the natural hydrological system *(Refer Plate no 5.9 to 5.14).* Smaller check dams are constructed downstream of the reservoirs ensuring that water is retained in streams till the end of summer. Diversion of water to cities and private institutions lead to reduced ground water levels. Water supply in some of the downstream villages, which were earlier naturally irrigated by these streams, has also reduced.

Sand Dredging Activities

Although the stretch of the creek edge from Vasai to Shirsad Phata shows rampant sand dredging within the delineated Influence Zone the activity is comparatively considerably reduced. There is no machine dredging within this area. However manual sand dredging occurs at a smaller scale along certain bends on the river.

Insensitive construction blocking natural storm water drainage channels

The natural streams traverse through lands of varied ownerships**,** belonging to Forest Department, private and trust land. The third order streams/ larger rivers that run through villages are mostly public. However, the first and second order streams that pass through private land are susceptible to be being constructed over and destroyed. Since there are no guidelines for the protection of natural storm water channels that flow through private properties, there have been several instances of construction of roads, buildings and compound walls, over natural storm water channels resulting in flooding due to blockage of natural drains. In some cases construction activities have led to flattening of natural terrain due to construction of large buildings and landscaped gardens on sloping sites.

Other Activities

The reservoirs, lakes, natural ponds and checkdams provide fish which is used both for domestic consumption as well as to supplement the income of the local villagers.

As water supply to the villages is irregular to non-existent domestic activities such as washing of clothes and bathing in streams by local villagers takes place using soap and detergents. There are no systems that separate the thus polluted water from the main water system. This leads to the pollution of the river.

Stresses

a. Ground Water Reduction

Activities such as deforestation and the construction of large dams have reduced the ground water levels in the region.

b. Pollution of river

Lack of adequate sanitation facilities and also discharge of untreated effluents into streams and rivers is a cause of pollution.

c. Loss of Riverine Ecology due to sand dredging,

This is an activity which causes harm to the riverine ecology especially the edges of rivers and its surrounding vegetation. The dumping of sand on the edges, results in the loss of riverine vegetation

Removal of sand from the edges and banks of the river increases the rate of erosion along the banks of the river. Removal of vegetation in the riparian zone along the edges of the stream affects the hydrological system leading to desiccation of the channel.

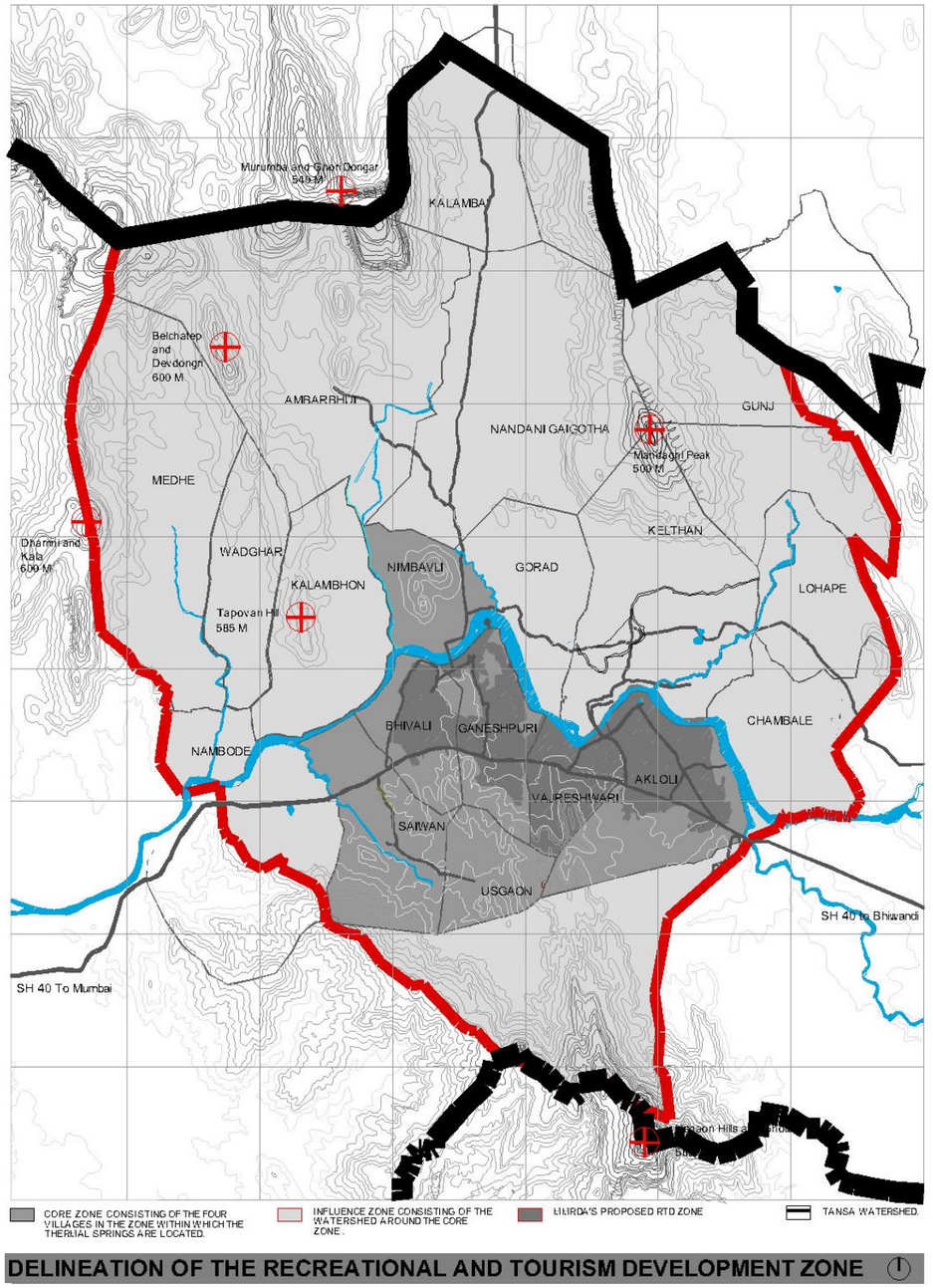


Fig 6.1 Villages in the Core Zone

CHAPTER 6 DOCUMENTATION OF THE CORE ZONE

6.1. Detailed Study of the Core Zone

The Core Zone comprises of the villages of Vajreshwari, Akloli, Ganeshpuri, Usgaon, Nimbavli and Bhiwali. (Refer Fig 6.1).

To understand the issues related to development, in the Core Zone, the following aspects were studied in detail

1. Land use and Building use: This part of the study details the existing land use and building use of the area and identifies the stress due to conflicting uses. It also looks at the stress which is generated on the environmental resources of the RTDZ.
2. Ownership Patterns – This part details the existing ownership to understand the emerging pattern in the area and its effect on the creation of the RTDZ as well as on the environment.
3. Demography and economic activities- In this part of the study the demographic data has been studied over three decades to understand the nature of the shifts in economic activities that the population is undergoing. The predominant economic activities which comprise of tourism, farming, brick kilns and sand – dredging have been studied in detail to understand their relationships as well as understand the impact of these of these on the environmental system.
4. Infrastructure – Existing systems of water supply, sewerage, solid waste collection and disposal have been studied to understand their effectiveness as well as their ability to meet present demands and projected future demands due to tourism driven urbanization.
5. Traffic - Traffic characteristic as well as the present nature of the infrastructure have been studied to understand the gaps as well as its impact on the environment.
6. Existing Institutional Framework :This part of the study understands the institutional structures present for the area of interest identifying gaps and capacities of institutions and their role and responsibility in protecting the environment

The characteristics of the RTDZ were understood through the study of these aspects. Issues and concerns related to the following were identified.

6.1.1 Landuse and Building Use

The existing detailed land use map has been prepared from detailed site observations and talathi records. *(Refer Plate no.6.1)*. Almost half of the land lies within forest, the rest in agricultural lands, and a small portion not more than two percent of the total village land lies within the gaothan or settlement areas. The existing building use map was prepared through site surveys *(Refer plate no. 6.2 to 6.4)* and it was observed that the main temple complexes become cores for a mixture of institutional and commercial activities, while the resorts occur scattered along access roads and river fronts. The older gaothans form dense residential clusters.

By overlaying the building use map over the designated land use map, it was observed that land under agricultural use has been used for building resorts, hotels and other residential facilities for tourists. In Akloli along the main roads outside the gaothan several large resorts and new religious trust complexes with residential facilities have come up (*Refer plate no 6.2 to 6.4*).

From the building use plan it is also seen that the settlement around the kunds with shops and lodges has come up in response to the tourism activity, and there has been construction of resorts and lodges within the unprotected flood plain of the river. Akloli has the 4 resorts and 10 hotels, while Ganeshpuri has 2 resorts and 12 hotels Vajreshwari has 9 hotels.

From overlaying the satellite image with the land use map it was observed that areas having natural vegetation/ or forest cover have been landscaped, converted to lawns, dormitories and recreational spaces for exclusive trust use (*Refer Plate no.6.6*).In Ganeshpuri, especially, the transformation of agricultural lands has been taking place, as the Siddhapeeth Trust, a private trust, has been acquiring large tracts of land. Most new resorts, have extensive landscaping, and paved areas swimming pools. In several cases along the river resorts have encroached into the river edge and built compound walls and steps.

Issues:

a. Conversion of agricultural land without a development plan:

In the absence of a development plan, conversion of agricultural land use to tourism related uses such as resorts and hotels puts additional pressures on infrastructure. The establishment of several new religious trusts in the area surrounding the existing temples and hot springs has resulted in the conversion of agricultural land which once acquired by religious trusts is converted into complexes that contain temples and/ or residential facilities for pilgrims. There is no regulation in place to control such activities. This puts an additional pressure on water supply and sewage systems as well as on ground water. (The impact on infrastructure is discussed in the following chapter) (*Refer Plate 6.5*).

b. Threat to forest lands, Destruction of natural vegetation / forest:

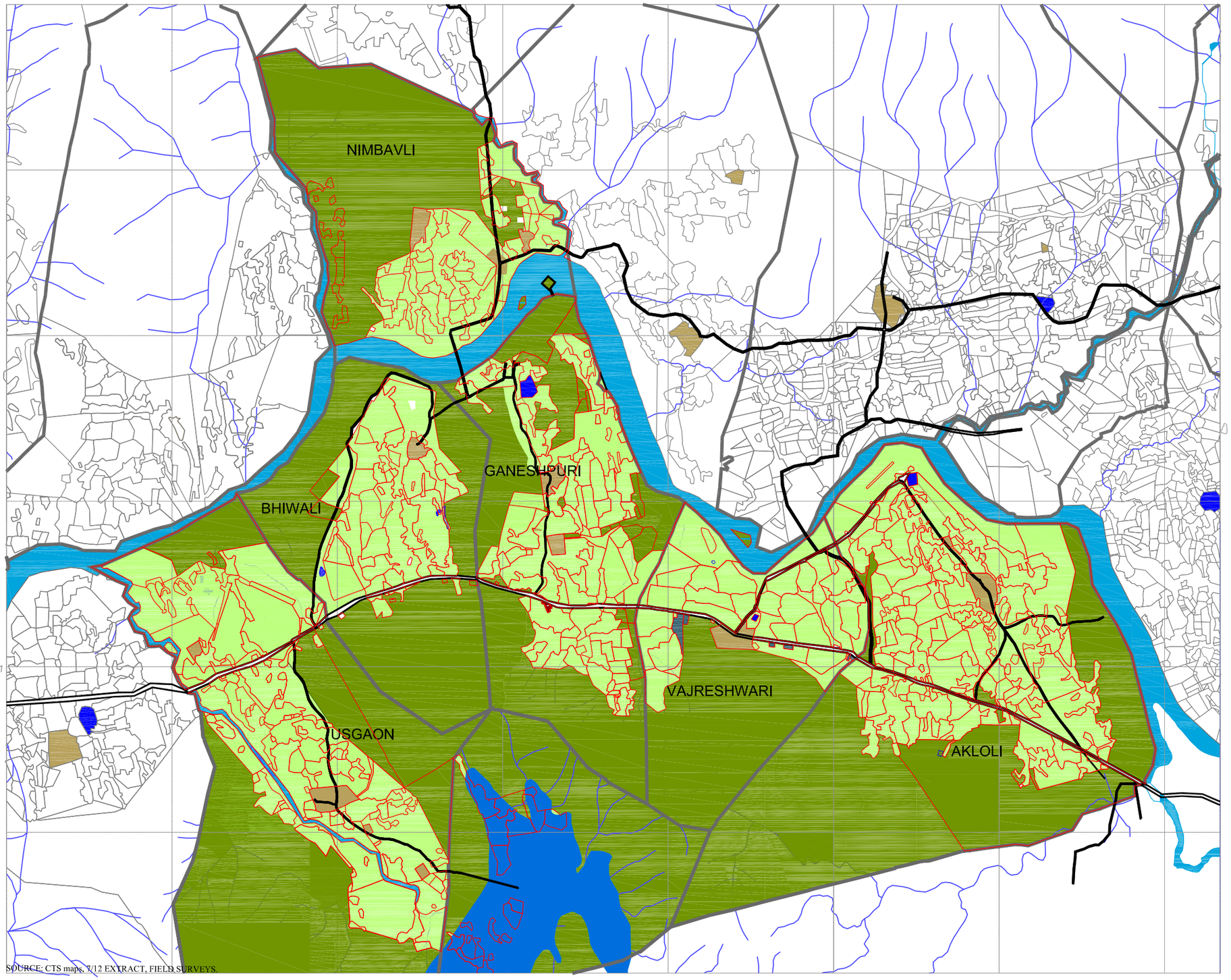
Areas of natural vegetation and designated as forest lands, are being converted to extensive landscaped gardens. They replace the natural vegetation, require large quantities of water for their maintenance and modify the natural contours. (*Refer Plate 6.6*)

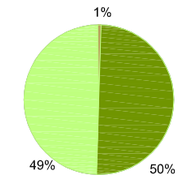
c. No adequate regulations and controls for the building of resorts, hotels, shops, etc.

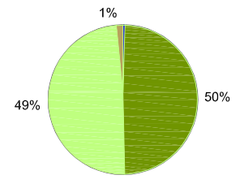
New typologies of resorts with large landscaped and paved areas with swimming pools and manicured gardens have been thriving in the RTDZ. There are no regulations to control, percentages of concretized surfaces, paved areas, to ensure less run off and erosion. The replacement of the permeable soil cover with concrete and paved surfaces reduces ground water percolation, increases the quantity and volume of runoff and causes erosion in other areas where excess storm water is diverted.

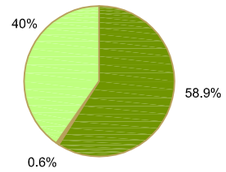
d. Privatization of thermal springs

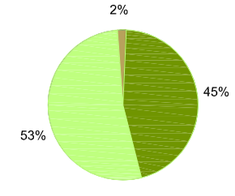
The thermal springs as seen in the previous section are susceptible to privatization as they are as yet not protected as common or public environmental assets.

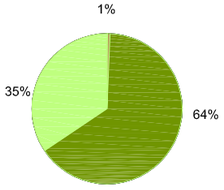


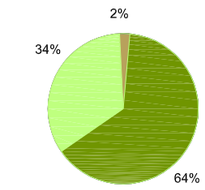












SOURCE: CTS maps, 7/12 EXTRACT, FIELD SURVEYS.

The map was prepared from revenue maps and Talati records to understand the generalised land use in the villages of the RTZ.
It indicates the lands under settlements within the villages, land under forests and agricultural lands.

LEGEND:

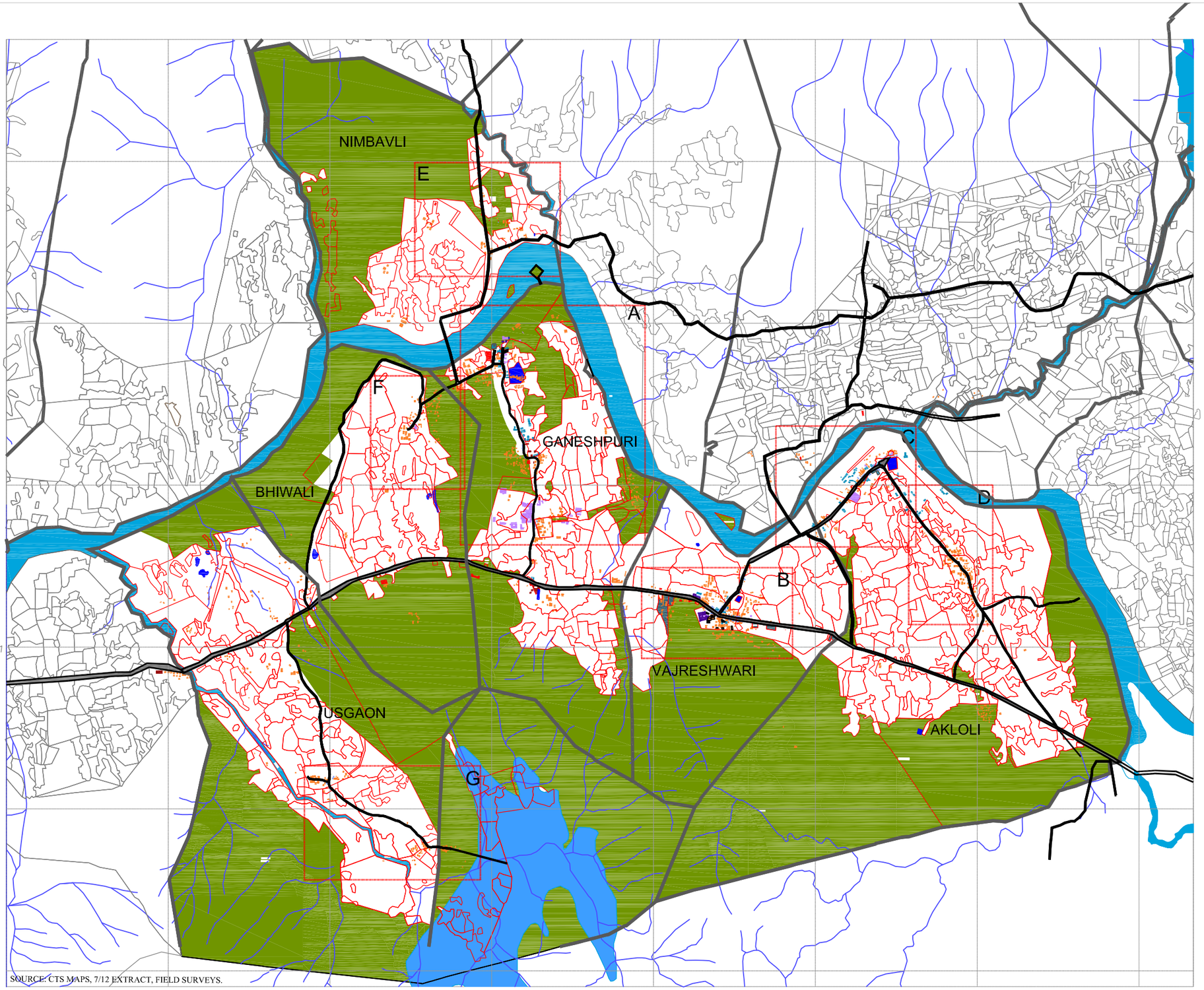
- FOREST
- AGRICULTURAL LAND
- SETTLEMENT
- TANSA RIVER
- GRAM PANCHAYAT BOUNDARY
- CTS BOUNDARIES
- LAKES

CORE ZONE : DESIGNATED LANDUSE

0 200 500 1000 M

6.1

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in



The built use map was prepared by overlaying the CTS maps and satellite images , and a visual survey and inventory on site.

LEGEND :

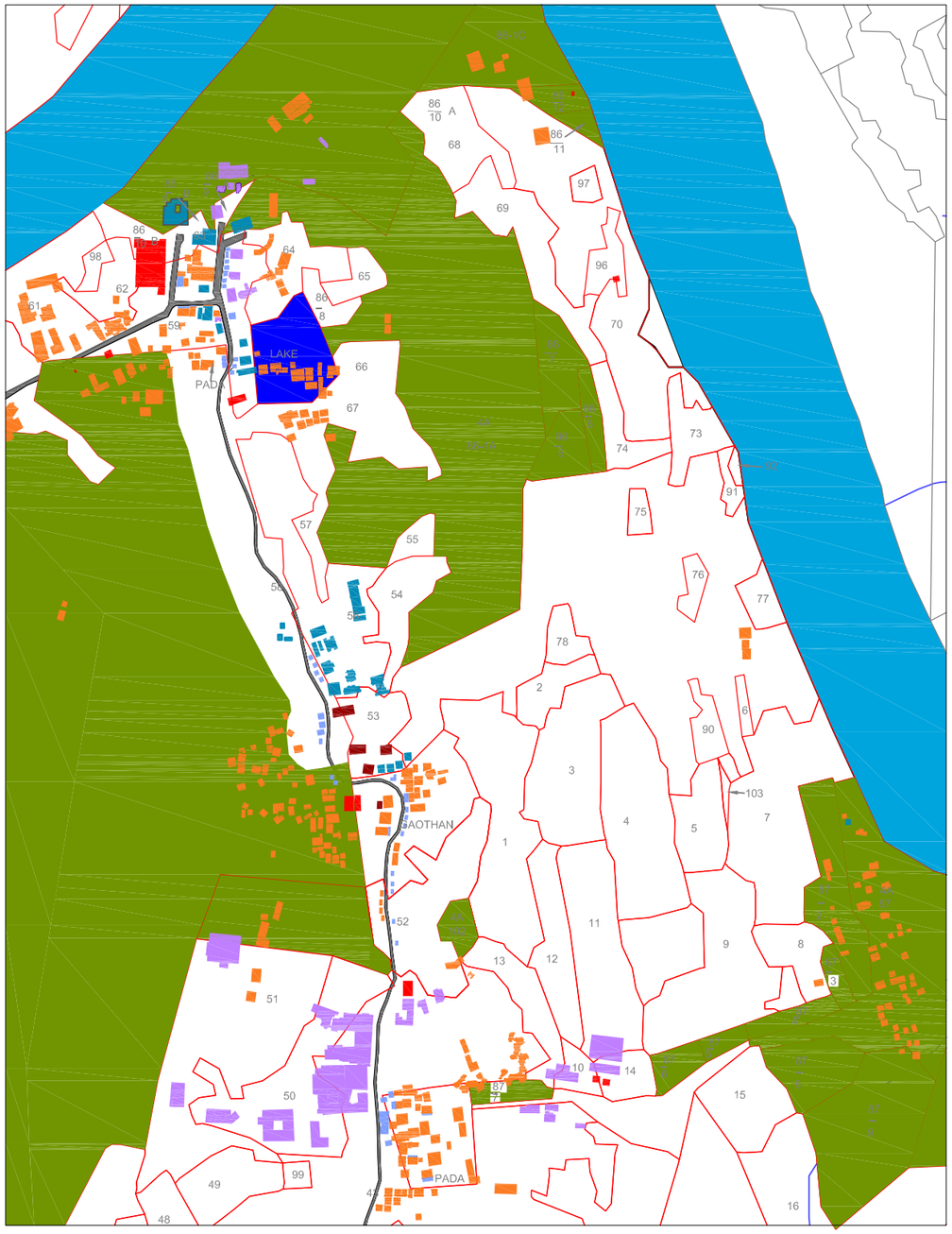
- RESIDENTIAL
- COMMERCIAL
- TEMPLES, TRUSTS AND TRUST RELATED BUILDINGS
- RESORTS /LODGES
- ABANDONED LODGES
- PUBLIC AMENITIES
- INDUSTRY
- FOREST AREA
- TANSA RIVER
- STREAMS
- WATER BODIES
- CTS BOUNDARIES
- VILLAGE BOUNDARIES

CORE ZONE : BUILDING USE

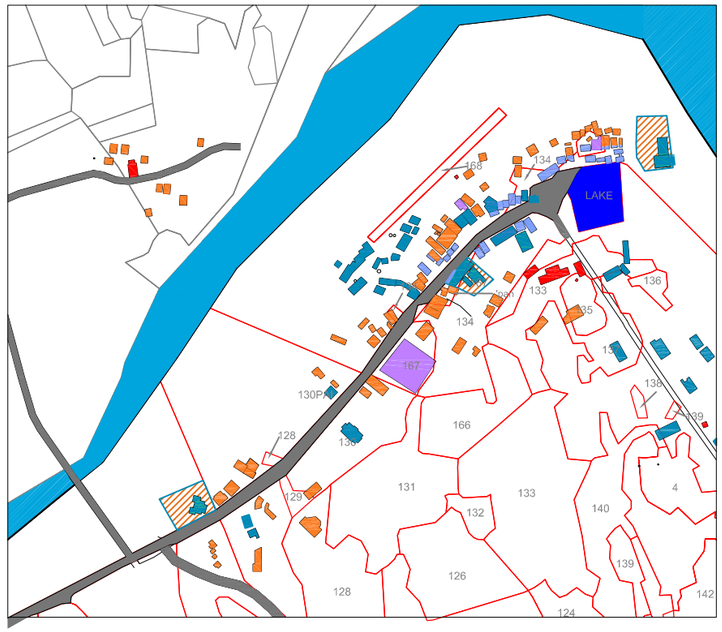
0 200 500 1000 M

6.2

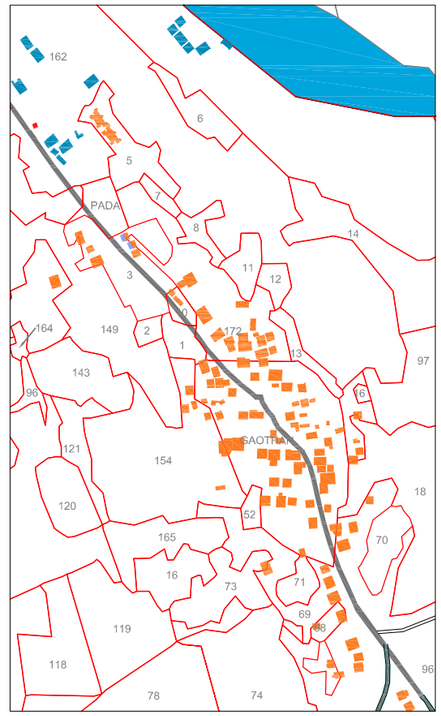
A -GANESHPURI



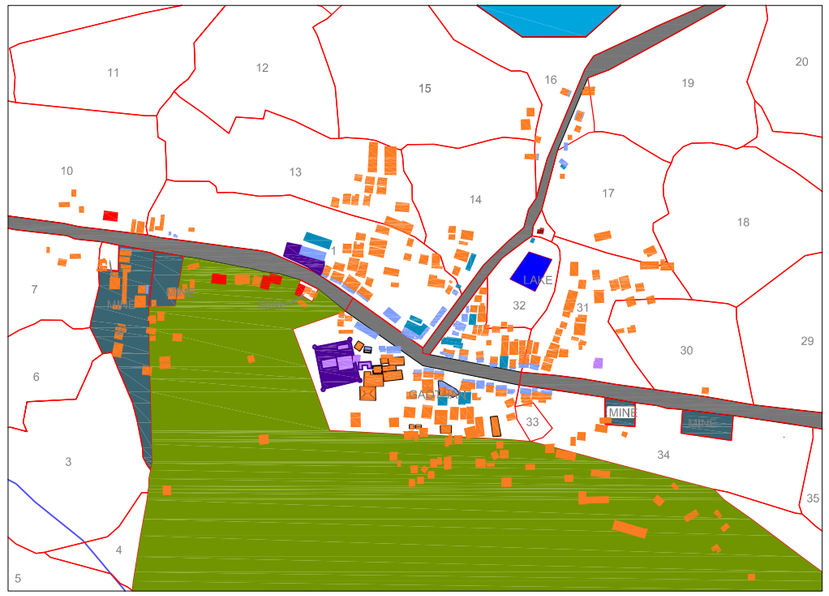
C-AKLOLI



D-AKLOLI GAOTHAN



B-VAJRESHWARI



The three villages of Akloli, Vajreshwari and Ganeshpuri show the influence of tourism related activity as shops and other commercial establishments cluster around the main accesses to the tourism centres, ashrams, temples and thermal springs. In Akloli, where the road moves along the river edge, temporary shacks , hotels and resorts are seen to encroach into the river bed.

LEGEND:

- RESIDENTIAL
- COMMERCIAL
- TEMPLES, TRUSTS AND TRUST RELATED BUILDINGS
- RESORTS /LODGES
- ABANDONED LODGES
- PUBLIC AMENITIES
- INDUSTRY
- FOREST AREA
- TANSA RIVER
- STREAMS
- WATER BODIES
- CTS BOUNDARIES
- VILLAGE BOUNDARIES

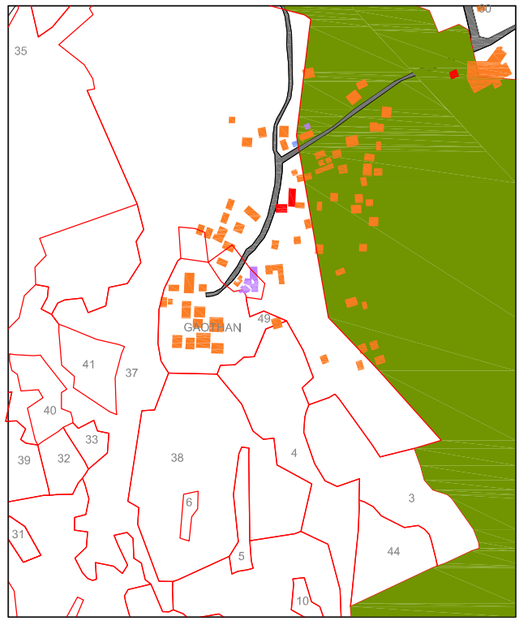
CORE ZONE : BUILDING USE PATTERNS

0 200 500 1000 M

6.3

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

F-BHIWALI



E-NIMBAVLI

G-USGAON

The villages iwithin the Core Zone in the immediate vicinty of the proposed RTDZ are primarily agrarian, with little or no commercial activity.The built forms are mainly concentrated in the small compact gaothans with agricultural langs around and tribal settlements of temporary reed structures are seen at forest edges.

LEGEND:

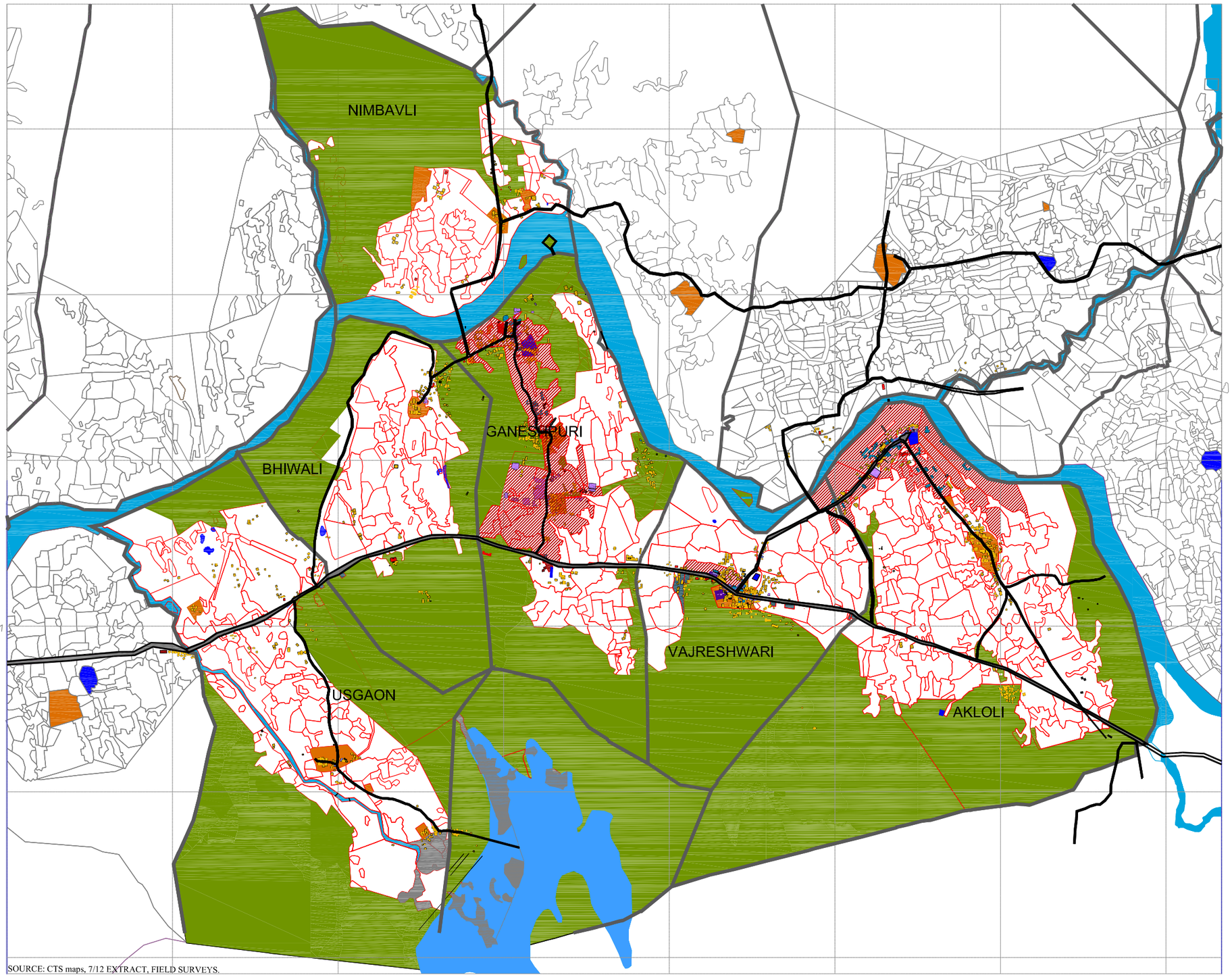
- RESIDENTIAL
- COMMERCIAL
- TEMPLES, TRUSTS AND TRUST RELATED BUILDINGS
- RESORTS /LODGES
- ABANDONED LODGES
- PUBLIC AMENITIES
- INDUSTRY
- FOREST AREA
- TANSA RIVER
- STREAMS
- WATER BODIES
- CTS BOUNDARIES
- VILLAGE BOUNDARIES

CORE ZONE : BUILDING USEPATTERNS

0 200 500 1000 M

6.4

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI- 400069, website:www.krvia.ac.in



SOURCE: CTS maps, 7/12 EXTRACT, FIELD SURVEYS.

The building use map overlayed on the designated landuse map indicates the extent of tranformation of agricultural lands in the villages of the core zone into non-agricultural and tourism related activities (resorts, lodges,ashrams) as seen in the maps above. The hatched area indicates the transformed agricultural lands.

LEGEND:

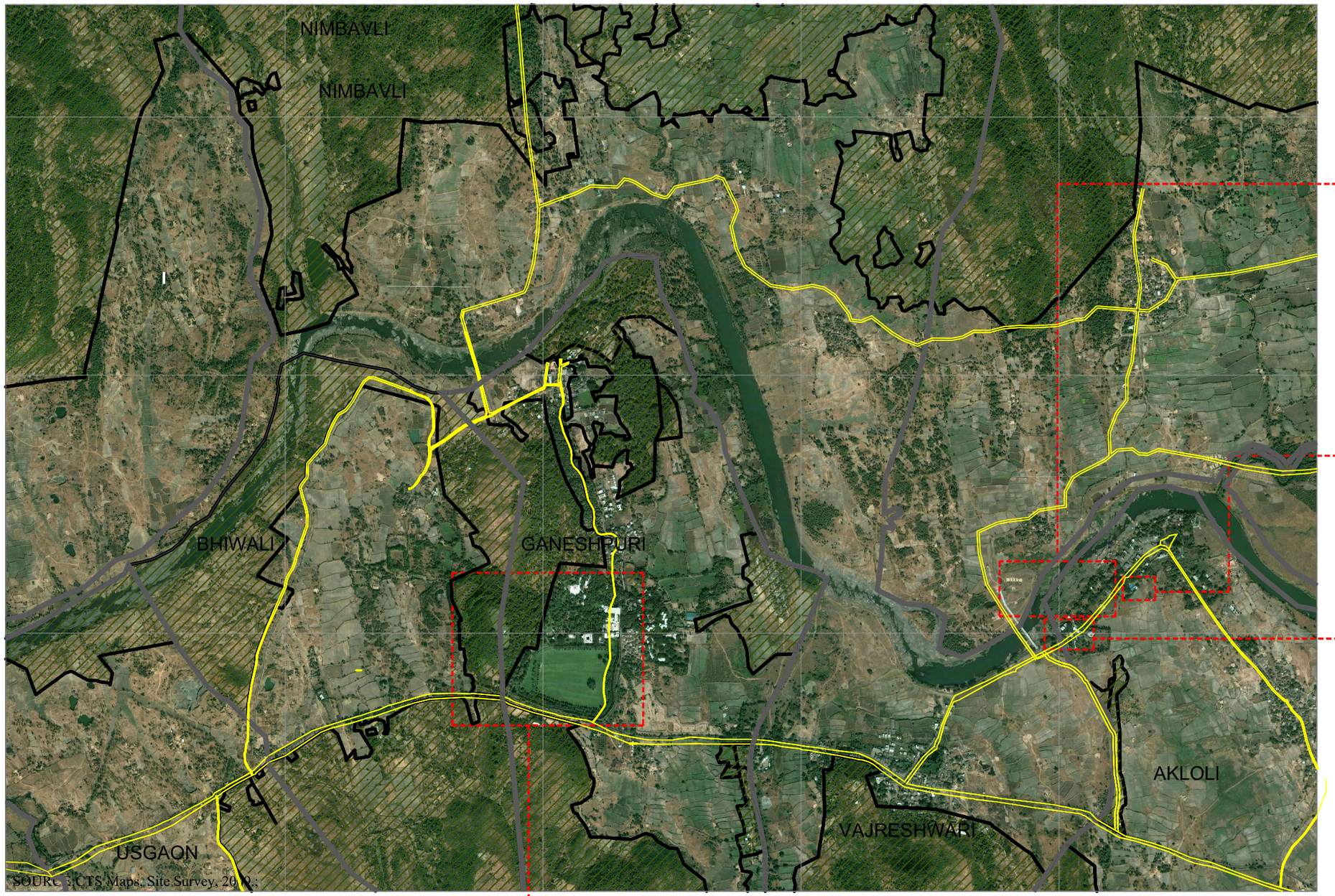
- FOREST
- AGRICULTURAL LAND
- TRANSFORMED AGRICULTURAL LAND
- SETTLEMENT(GAOTHAN/PADA)
- GRAM PANCHAYAT BOUNDARY
- TANSA RIVER
- CTS BOUNDARIES
- LAND UNDER USE OF DAM
- LAKES
- PONDS
- CORE ZONE BOUNDARY
- RESIDENTIAL AREA
- TEMPLE /ASHRAMS
- COMMERCIAL AREAS
- RESORTS /LODGES
- ABANDONED LODGES
- PUBLIC AMENITIES
- INDUSTRY

CORE ZONE : TRANSFORMATION OF LAND USE

0 200 500 1000 M

6.5

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL-KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in



SOURCE : CTS Maps, Site Survey, 2009.

Encroachment of shacks into the river bed destroying natural edge vegetation.The floodplain of the river has not been determined and protected leading to development in these areas and annual flooding at Akloli.

Pavan resort at akloli with swimming pools and water park. This emerging typology of resorts is of concern as, their large paved,areas and gardens if unregulated increase runoff and erosion.

Construction of walls within the river bed.The floodplain of the river has not been determined and protected.

Areas within the forest converted to landscaped gardens, replacing natural vegetation, requiring large quantities of water and modifying natural contours, and drainage patterns.

The map was prepared by overlaying the forest ownership boundaries on a satellite image of the RTDZ

LEGEND:

ROADS

LAND UNDER FOREST OWNERSHIP

CORE ZONE : STRESSES RELATED TO BUILDING ACTIVITY

0 200 500 1000 M

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

6.1.2 Ownership Pattern

The map indicating ownership (*Refer Plate no 6.7*) indicates that large tracts of land within the Core area villages lie with the Forest Department and land belonging to local farmers. Besides this there are smaller Panchayat owned lands under gaothan areas, land belonging to the religious trusts and that owned by individual entrepreneurs who own the resorts and other residential facilities to house the tourists and the devotees.

There is a transformation in ownership that is occurring in this region with the trust and devotees acquiring a large amount of land from the villagers. This is clearly visible from the following drawing *(Refer plate no 6.7)* which shows the amount of land that these trusts own. Some of the trust land which presently is not presently being utilized by the Trust is rented out to the local farmers for agricultural purposes.

There has been an unusual trend in the change of ownership in the village of Ganeshpuri. Almost 36 % of the land has been acquired by the Gurudev Siddhapeeth Trust in recent years, replacing agricultural land, and cordoning off large tracts of land. As seen from *Plate 6.5*, there has been a large scale transformation of agricultural lands into non agricultural use within Ganeshpuri in the last five decade. With the Forest Department owning almost 42% of the land, only 18% of the total land of the village is still in private and Gram Panchayat control**.** The Trust has also in the last ten years acquired land within the adjoining village of Bhiwali.

The Vajreshwari Yogini Devi Trust has had a historical relationship with the villagers, who have been tenants on the land and acquired rights to it. There has been minimal change in ownership in Vajreshwari through the years. However, development and opportunities for entrepreneurship and growth are still controlled by the Trust as any development within Vajreshwari requires an NOC from the Trust as the legal owners of land.

Within Akloli, almost 91% of the land is in private hands, and the area has transformed dramatically, where locals have taken maximum opportunities for entrepreneurship offered by tourist activity by setting up of hotels and resorts.

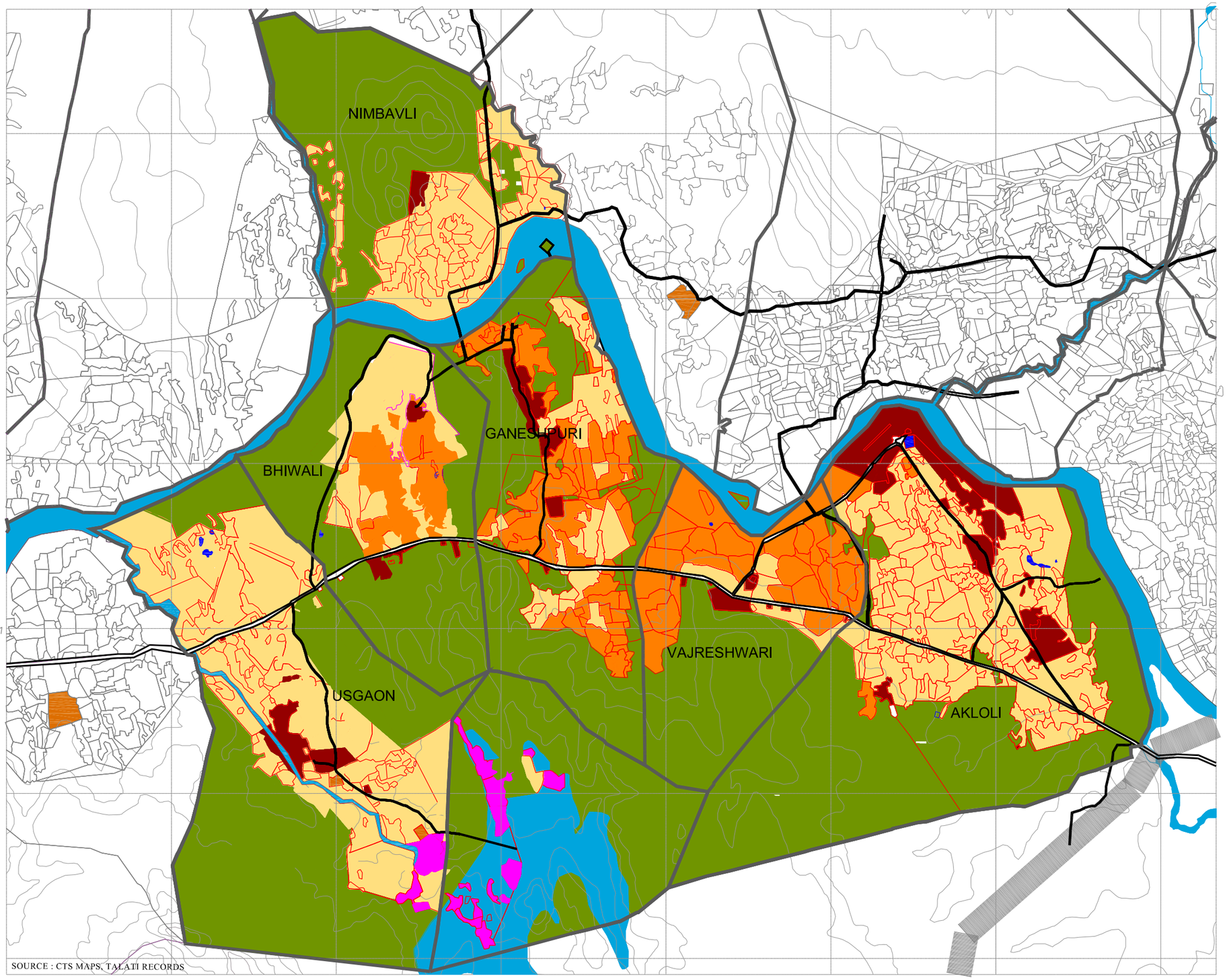
Issues

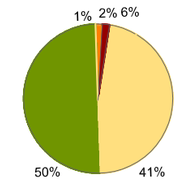
a. Private ownership of environmental assets:

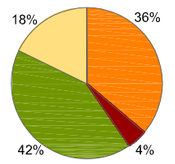
The private trusts as seen are in possession of vast tracts of land. Some of these lands have within them environmental assets such as the geothermal springs. The possession of these geo-thermal springs with these trusts poses a threat of tampering with these assets.

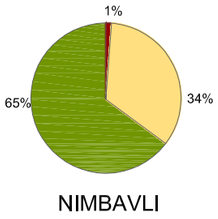
b. Large scale accumulation of agricultural land by private trusts

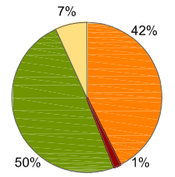
The large scale accumulation of land by private trusts here is a threat as over time it may lead to gated communities with exclusive access to a few. It might defeat the idea of the RTDZ being used by the masses.

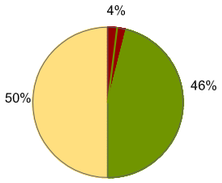


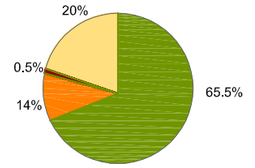












SOURCE : CTS MAPS, TALATI RECORDS

The map was prepared from CTS maps and Talathi records.The predominant owners within the RTZ are the forest department, various religious trusts and private owners.
In the past ten years, land within Ganeshpuri as well as bhiwali has seen a change in ownership from private to Trusts that are expanding into the adjacent areas.

LEGEND:

- PRIVATE
- TRUST
- STATE GOVERNMENT
- FOREST
- EXECUTIVE ENGINEER (IRRIGATION DEPT.) STATE GOVT.
- VILLAGE BOUNDARY
- ROADS

CORE ZONE: OWNERSHIP

0 200 500 1000 M

6.7

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

6.1.3. Demography and Economic Activities

6.1.3.1 Demography

The demographic profiles of the six villages of the Core one are shown in the *Table 6.1*

VILLAGE NAMES	Population 1981	Population 1991		Population 2001	
		In Nos.	Decadal Growth in %	In Nos.	Decadal Growth in %
Akloli	1811	2075	14.58	2700	30.12
Vajreshwari	1361	1642	20.65	2335	42.2
Ganeshpuri	2780	3886	39.78	3197	-17.73
Nimbavli	379	425	12.14	687	61.65
Usgaon	781	958	22.66	2374	60.33
Bhiwali	726	797	9.78	1196	50.06

Table 6.1Demographic data of the villages of the RTDZ for the last three decades. Source: Census of India, 2001, 1991, 1981

The decadal growth observed in the villages of Akloli, Vajreshwari, Nimbavali, Usgaon and Bhiwali is high. It is because of high migration into these villages by the people who work in the tourism industry as well as the trust. It is observed that within the five villages, Ganeshpuri has shown a negative growth and migration outwards in the past ten years. This is mainly due to the transformation of the village into a zone controlled and owned by the trusts. The local villagers sell their land and move further north. There is a change in the social landscape of the village as the Trust with its international networks attracts foreign nationals and devotees who now occupy the guest houses that have proliferated over what was once the village land. Ganeshpuri is transforming into an area mostly inhabited by the transitory floating population of visitors and guests of the Trust.

There is also a large proportion of tribal population within the villages which is to a large extent dependent on the natural resources for its sustenance as indicated in the *Table 6.2* below.

VILLAGE NAMES	Community patterns		
	General	Scheduled Caste	Scheduled Tribes (percentage)
Akloli	1597	99	1004 (37.18 %)
Vajreshwari	1544	172	619(26.5%)
Ganeshpuri	2090	178	929(29.05%)
Nimbavli	147	0	540 (78.6%)
Usgaon	1080	0	1294 (54.5%)
Bhiwali	341	15	840 (70.23%)

Table 6.2 Tribal Population in the villages of the RTDZ. Source: Census of India, 2001

There is a high percentage of scheduled tribe population within the panchayats of Nimbavli, Usgaon, Bhiwali and Akloli. The adivasi tribes are mainly engaged in firewood and food gathering while some are involved in cultivation in the forests. They also form the labor for agriculture along with the brick kiln and sand dredging industries. They are also involved in small scale fishing within the river and in Usgaon within the reservoir. The tribal populations live mostly in the adivasi padas that lie within the forests.

VILLAGE NAMES	Predominant Work Patterns								
	Cultivators	Agricultural	Household Industry	Others	Total working population	Percentage of cultivators to total working	Percentage of agricultural workers to total population	Percentage of workers in household industries	Percentage of population in other work
Akloli	333	386	32	608	1359	24.50	28.40	2.35	44.74
Vajreshwari	33	147	2	608	790	4.18	18.61	0.25	76.96
Ganeshpuri	72	151	12	901	1136	6.34	13.29	1.06	79.31
Nimbavli	112	62	2	263	439	25.51	14.12	0.46	59.91
Usgaon	411	218	2	244	875	46.97	24.91	0.23	27.8
Bhiwali	56	208	5	105	374	14.97	55.61	1.34	28.07

Table 6.3 Work patterns observed in the villages of the RTDZ. Source: Census of India, 2001

VILLAGE NAMES	Predominant Work Patterns										
	Cultivators	Agricultural	Household Industry	Others	marginal	non workers	Total main workers	Percentage of cultivators to total working	Percentage of agricultural workers to total population	Percentage of workers in household industries	Percentage of population in other work
Akloli	210	198	42	313	314	998	763	27.5	26.0	5.50	11.14
Vajreshwari	36	199	10	328	2	1067	573	6.3	34.7	1.7	23.21
Ganeshpuri	70	216	10	1217	12	2361	1513	4.6	14.3	0.7	21.94
Nimbavli	20	139	2	10	7	242	171	11.7	81.3	1.2	1.17
Usgaon	248	251	0	19	0	440	518	47.9	48.5	0.0	0.97
Bhiwali	52	91	9	114	1	530	266	19.5	34.2	3.4	18.80

Table 6.4 Work patterns observed in the villages of the RTDZ. Source: Census of India, 1991

VILLAGE NAMES	Predominant Work Patterns										
	Culti-vators	Agricul tural	House-hold Industry	Others	margi nal	non workers	Total main workers	Percentage of cultivators to total main workers	Percentage of agricultural workers to total main workers	Percentage of workers in household industries to total main workers	Percentage of population in other work tro total main workers
Akloli	208	206	2	231	67	1097	647	32.15	31.8	0.31	35.7
Vajreshwari	45	176	109	177	18	836	507	8.88	34.7	21.50	34.9
Ganeshpuri	106	134	40	690	126	1683	970	10.93	13.8	4.12	71.1
Nimbavli	47	103	1	24	0	204	175	26.86	58.9	0.57	13.7
Usgaon	212	260	0	7	5	297	479	44.26	54.3	0.00	1.5
Bhiwali	64	127	1	57	20	457	249	25.70	51.0	0.40	22.9

Table 6.5 Work Patterns observed in the villages of the RTDZ. Source: Census of India, 1981

It is observed form *Tables 6.3 to 6.5* that in Akloli and Nimbavli 40-50% of the population is involved in agriculture while the rest are predominantly involved in other service related industries such as tourism in Akloli. Ganeshpuri and Vajreshwari have a very low percentage of persons who cultivate their own land, as within Ganeshpuri most farmers have sold their land to the trust, while in Vajreshwari most agricultural land belongs to the Trust. As is clearly seen from the statistics almost 75-80% of the population within these two villages is involved in work other than farming as the villagers are increasingly getting involved in the service industry primarily related to tourism.

Moreover through the years the percentage population involved as cultivators is decreasing especially in the villages of Akloli, Vajreshwari and Gansehpuri. In Usgaon it is surprisingly risen as there has been water provided for irrigation due to the Usgaon dam. Some pockets of Usgaon are actually multicrop areas.

Issues

a. Increasing migration due to the tourism industry

It has been observed that there has been migration of population form outside these villages, excepting Ganeshpuri, due to labor required by the tourism industry as well as by the religious trusts. These increases which in some of these villages are substantial have put a load on the existing infrastructure.

b. Decrease in population involved in agriculture.

Over the decade there has been a decrease in population involved in agriculture as seen in the census. The census also indicated that there has been an increase in other activities which probably could indicate an increase in activities related to tourism. This has been corroborated through interviews with villagers especially in the villages of Ganeshpuri and Vajreshwari. This could be of concern as tourism industry in most cases, through the world, has had a negative impact on community's dependant on agrarian economies.

c. Increase in floating population

It has been observed that the nature of tourism development in villages such as Ganeshpuri there has been an out migration where the local residential population is being replaced by a transitory floating population, with the land and the economic benefits of tourism being largely appropriated by the Religious Trust.

d. A large percentage of tribal population

These villages have a large amount of tribal population who are not empowered as compared to the rest. There have limited right over the forest land as well as forest produce where they are largely located. As a result they are often left any developmental projects initiated in these villages.

Predominant Economic Activities in the region.

The main economic activities within this area are agriculture (in the form of rice farming, brick kilns) and tourism related to the hot springs, temples and religious institutions. In the following section the study would identify the issues related to these activities in the region.

6.1.3.2 Agrarian Activity

Agriculture:

As seen from the land use map most of the land is used for agriculture. The primary crop in the villages within the Core Zone is rice. *Table 6.9* indicates the patterns of farming within the villages. The *Tables 6.6, 6.7 and 6.8* below shows the proportion of irrigated and unirrigated agricultural lands indicating the lack of irrigation facilities**.**

VILLAGE NAME	Total Irrigated Land	Un-irrigated Land (ha)	Cultivable Waste Land (ha)	Area not available for cultivation (ha)	Total area	Area under forest	Area under cultivation
Nimbavli	0	86.89	3.33	15.73	235	128.37	90.9
Usgaon	0	161.9	0	33.66	1218	1022.83	161.51
Bhiwali	0	72.43	0	18.15	229	138.72	72.13
Ganeshpuri	0	138.5	0	39.82	288	109.31	138.87
Vajreshwari	0	84.31	0	20.46	186	81.65	83.89
Akaloli	0	204.43	0.21	40.8	476	230.99	204.21

Table 6.6 Details of land under agriculture Source: Land records, Census. 2001

VILLAGE NAME	Total Irrigated Land	Un-irrigated Land(ha)	Cultivable Waste Land(ha)	Area not available for cultivation(ha)	Total area(ha)	Area under forest	Area under cultivation
Nimbavli	0	86.89	3.83	15.73	234.82	128.37	90.72
Usgaon	0	161.9	0	33.66	1218.38	1022.83	161.89
Bhiwali	0	89.55	0	23.12	229.3	116.63	89.55
Ganeshpuri	0	138.5	0	39.82	287.63	109.31	138.5
Vajreshwari	0	84.31	0	20.46	186.42	81.65	84.31
Akaloli	0	204.23	32.7	8.51	476.43	230.99	236.93

Table 6.7 Details of land under agriculture Source: Land records, Census, 1991

VILLAGE NAME	Total Irrigated Land	Un-irrigated Land(ha)	Cultivable Waste Land(ha)	Area not available for cultivation(ha)	Total area(ha)	Area under forest	Area under cultivation
Nimbavli	0	47	42	18	235	128	89
Usgaon	(GC) 20	160.79	0	14.7	1218.39	1022	181.69
Bhiwali	(GC)5	72.43	0	3.16	229.31	198.72	27.43
Ganeshpuri	0	138.5	0	39.82	287.63	109.31	138.5
Vajreshwari	0	84.31	0	20.46	186.42	81.65	84.31
Akaloli	0	203.45	0	41.79	476.23	230.99	203.45

Table 6.8 Details of land under agriculture Source: Land records, Census, 1981

From the table it is very evident that cultivable land has remained more or less constant over the last three decades. The pattern of agriculture is predominantly rain fed rice farming and this allows for a single crop during the four months of monsoon. However, although the region is traversed by several rivers that support agricultural activity along their fertile flood plains, a lack of irrigation infrastructure results in a largely mono-crop pattern of cultivation as seen from the table below. There are some attempt made at the tehsil level to improve the irrigation system by constructing small check dams along the watersheds of the Tansa river. This has led to the monocrop areas becoming multicrop area. In these area apart from rice, pluses (like urad, moong, gram, beans, chawli and toor) groundnuts, sesame, onions are grown. However the yields do depend on the intensity of the monsoons.

VILLAGE NAME	Crops grown	Quantities (20 Quintals per crop per hectare for rice)	Mono crop/ Multi crop
Nimbavli	Rice	1800 quintals riceapprox per year	Monocrop (100%)
Usgaon	Rice	3238 quintals rice approx per year	Monocrop (71.4%) Multicrop (28%)
Bhiwali	Rice	1791 quintals rice approx per year	Monocrop (100%)
Ganeshpuri	Primarily rice and vegetables	2770 quintals rice approx per year.	Monocrop (100%)
Vajreshwari	Rice	1680 quintals rice approx per year	Monocrop (100%)
Akaloli	Rice	4720 quintals rice approx per year	Monocrop (100%)

Table 6.9 Crop grown in the villages of the RTDZ Source- Land records, Talathi Offices and Agriculture Department, Collector's office..

There are other efforts being made to improve the irrigation system. For example, in Akloli, where there is only one crop a year currently, the proposal for the canal that will supply water to the village from Bhatsa for irrigation during the dry months is underway. In Bhiwali the canal that allowed for two crops in a year needs repairs and for the past five years the village has seen only a single crop a year. In Usgaon the overflow from the dam provides certain areas with water in the dry seasons allowing for two crops to be grown annually.

The average land holding in among cultivation in this region is around 1.5 to 2 hectare which is considered medium size land holding. Within the forest areas, through the woodland cultivation scheme, a certain amount of rice farming occurs, the rights of which are allotted or decided upon by the Village Forest Management Committee. In a few places, through the Block Development Office of the Agriculture Department, horticulture schemes have been successful, in the form of mango orchards.

Brick Kilns:

The pressures of urbanization in the region and the proximity to the huge amount of construction activity in the areas of Vasai and Wada have resulted in the growth of the number of brick kilns in the Tansa watershed region. Presently due to poor irrigation, and the presence of un-irrigated fallow land pockets, farmers are forced to supplement their income by renting out their land to brick manufacturers.[6]

The kilns are compelled to use fly ash from the Dahanu thermal power plant or any other company as per the regulations of the Maharashtra Pollution Control Board. However, through interviews on site it was observed top soil from agricultural lands and soil from nearby hillsides is also used for making bricks. The heat from the kilns also causes desiccation of the soil making cultivation difficult.

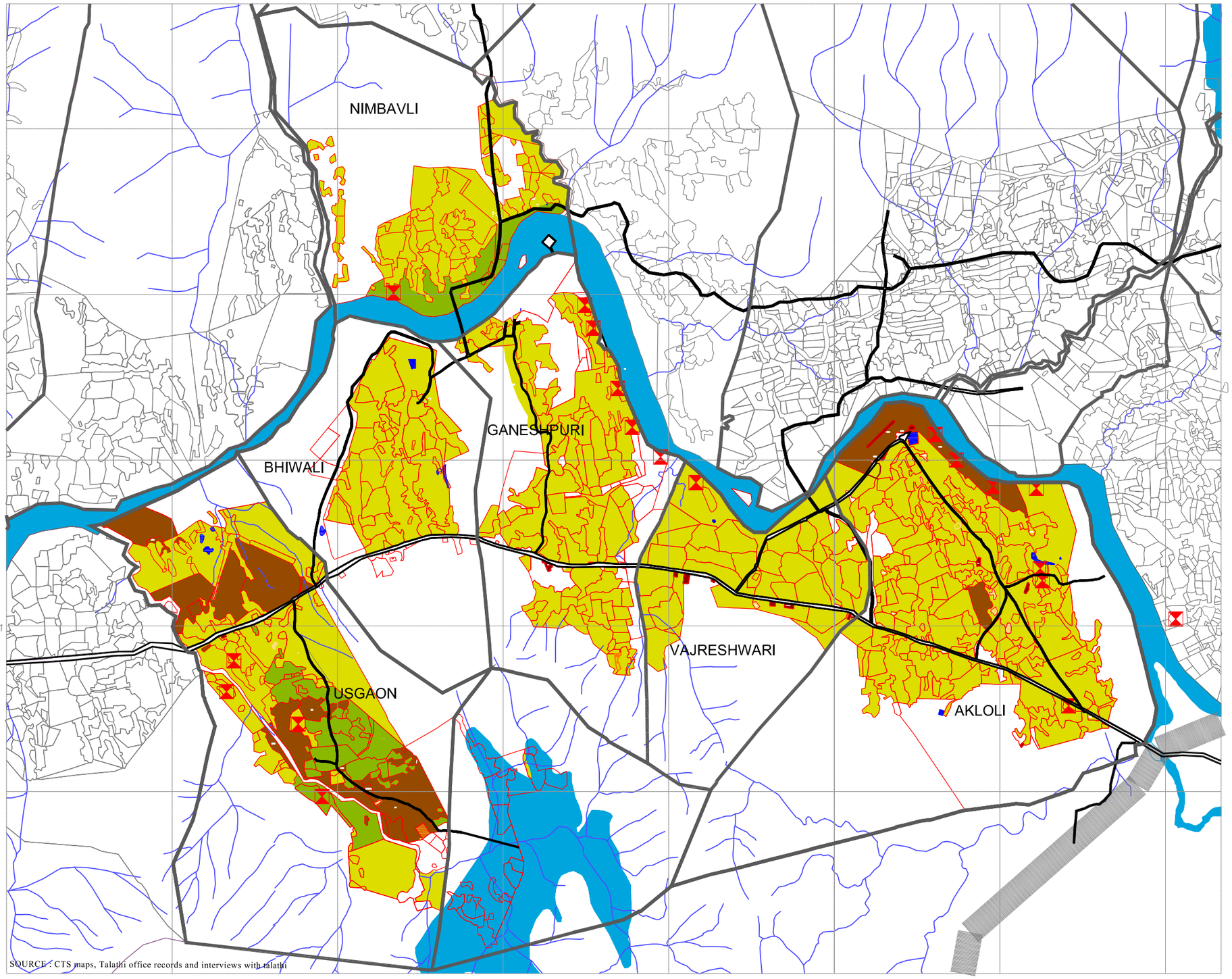
The brick making industry is regulated at the local level by the Talati who charges a ten percent fee for the license issued to the brick kiln owners, an additional fee of 25 percent of the license fee is paid to the Gram Panchayat. A temporary Non-Agricultural permit is issued to the farmer for carrying brick making or storage activity.

However, there is a large amount of unregulated and illegal brick making activity that occurs due to poor monitoring mechanisms**.** *Refer plate no 6.8* indicating patterns of agriculture and location of brick kilns.

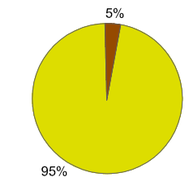
Brick Kiln					Rice Cultivation				Brick Kiln		
Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.
Landowners		Farmers give their fallow lands to the brick manufacturerfor a small rent. It is seen that most of the farmers give their cultivable land for brick kiln activity as the profit is three time that of agriculture in the absence of irrigation.									
Brick Kiln Contractors		Most of the brick kiln contractors are not local. They belong to the Vasai Virar subregion and Mira Bhyander.									
Talati		Before setting the brick kiln the contractor has to obtain the requisite permissions from the talathi. The licence fee is 10% of the production. The contractor has also to obtain a temporary Non-Agricultural use permit (NA) of the land before setting up the kiln. The NA is done by the talati office. The talathi has to pay a part of this as royalty to the farmer.									
Grampanchyat		The grampanchyat gets 25% of the licence fee.									
Labour		Most of the labour involved in the brick kilns are fronm the Katkari community. They get paid Rs. 80 per day.									
Capital		The contactors get a loan against their property or gold or for mortage against their valuables to generate the capital.									
Raw Material		The soil is brought from different sites for making the bricks. The contractors have to pay a royalty to the landlord for the use of the soil. As per government norms flyash is compulsory for the manufacture of bricks. Based upon the contractors invests and produces the brick as per requirements.									
Storage		The contractor also has to obtain a temporary NA for the land used for storage.									
Marketing		The contractors appoint agents for selling the bricks. The agent advises the contractors about the market requirements of the bricks. Based upon that the contractor invests and produces the brick as per the market requirements.									
Profits		Cost/ Price – Rs 1600 per 1000 bricks Selling Price – Rs. 2750/ Rs 3000 per 1000 brick									

Table 6.10 Details of the manufacture of brick kilns. Source: Site Surveys and Interviews

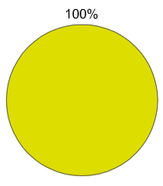
[6] It has been observed that most of this industry is controlled by outsiders and only a small portion of the profit is passed on to the local landowners as rent (Rs. 2000-3000 per year), while the informal katkari adivasi labour engaged are also paid very low wages.



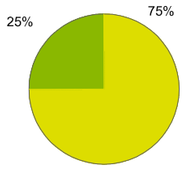
SOURCE : CTS maps, Talathi office records and interviews with talathi



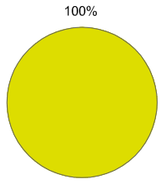
AKLOLI



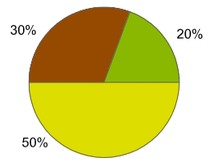
GANESHPURI



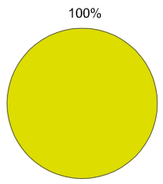
NIMBAVLI



VAJRESHWARI



USGAON



BHIWALI

The five villages composed of Nimbavli, Bhiwali, Vajreshwari, Ganeshpuri and Akloli is primarily one crop a year.This is because there is a lack of irrigation facilities during the dry season. Farmers use the land, and topsoil especially around the edges of rivers and streams to set up brick kilns to supplement their income during the dry months.
Parts of Usgaon have multi-crops as the land gets irrigated by the overflow of the dam.

LEGEND:

- ONE CROP (annually)
- TWO CROPS (annually)
- FALLOW
- BRICK KILNS
- VILLAGE BOUNDARY
- CTS BOUNDARIES
- CORE ZONE BOUNDARY
- STREAMS
- RIVERS
- WATER BODIES
- ROADS

CORE ZONE: MAP OF AGRICULTURAL ACTIVITY SHOWING BRICK KILNS

0 200 500 1000 M

6.8

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL-KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI-400069, website:www.krvia.ac.in

6.1.3.3 Tourism

Tourism in these villages is of two types; religious and recreational.

Religious Tourism

As mentioned earlier the region has numerous historical thermal springs and temples that attract pilgrims. The places of historical and religious significance in the delineated zone are the Vajreshwari temple, the Swami Nityanand temple and the Bhimeshwar Mahadeo Temple at Akloli; and the Swami Muktanand Samadhi at Ganeshpuri. The area has also seen the development of several new religious trusts with residential facilities for pilgrims. Each of these temples has their own religious cycles, which are annual, monthly and weekly in nature where thousands of pilgrims visit these places. The thermal springs that lie on the southern side of the river in Ganeshpuri Akloli and on northern side at Nimbavli also attracts tourists.

Over the years, several religious trusts within the area have been expanding and acquiring large tracts of land within villages of Ganeshpuri, Akloli, Vajreshwari and Bhiwali.

Recreational Tourism

There are two kinds of recreational tourism within in the region- a) tourism related to weekend picnickers and b) that is related to nature tourism within the forest areas. The Shirsad Ambadi road has seen the development of holiday resorts all along the length. These cater to the weekend tourists from Mumbai and provide residential and recreational facilities such as swimming pools. The Usgaon reservoir also attracts a small number of tourists.

The forests in the region, waterfalls and peaks attract a number of tourists who come for nature related tourism.

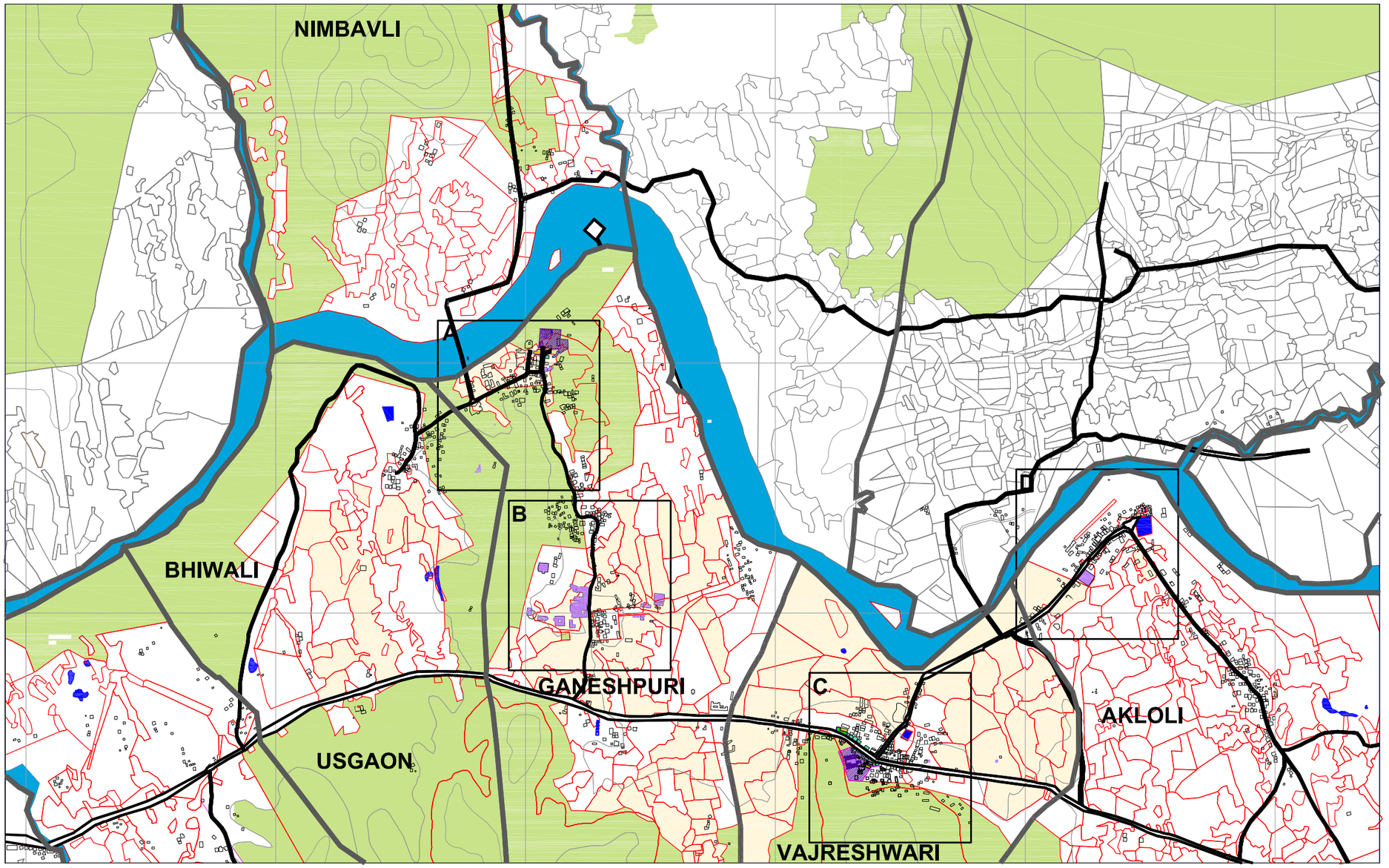
The Recreation and Tourism Zone or Core Zone for the study has been delineated, in the earlier part of the study, as comprising of the six villages of Akloli, Vajreshwari, Ganeshpuri, Nimbavli and Usgaon. The tourism activity, existing infrastructure and facilities and peak loads in these villages due to tourism have been detailed below:

Facilities related to Religious Tourism: Temples and religious institutions *(Refer Plate no. 6.9 and 6.10)*

Facilities related to Religious Tourism have been listed in the following *Table 6.11*. The peak loads that they generate during festivals associated with these religious institutions have also been indicated.

	Name of Temple / Ownership	Affiliations and major activities	Related tourism activity
Vajresh-wari	Vajreshwari Temple/ Vajreshwari Temple Trust	The temple is dedicated to the Goddess Vajreshwari made by Chimmaji Appa. Maintenance of temple premises. Safeguarding trust land. Revenue collection from the tenants. Basic medical and education facility. Basic accommodation for pilgrims.	The temple is frequented most during Diwali, Guru Purmina, Navratri, Christmas, etc. Also people visit the temple on Tuesdays, Sunday & all public holidays. In the month of April a 'mela' is held in the Vajreshwari village.
	Vitthal Rakhumai Mandir, / Privately owned	The presiding god is Vitthal.	
	Hanuman Temple/ Privately Owned		
Akloli	Shankar temple/ privately owned		
Ganesh-puri	Gurudev Siddhapeth Trust	Followers / disciples of GuruMai Chidvilasananda who is the follower of Swami Muktananda Meditation Health care Education of Yoga	The temple is frequented most during Guru Purmina and Diwali. Also people visit the temple on Tuesdays, Sunday and all public holidays
	Shri Bhimdev Nityanand Trust	Followers of Bhagwan Bhimdev Nityanand Baba Meditation Health care Education of Yoga	
Nimbavli	-	-	-
Usgaon	-	-	-

Table 6.11Religious institutions and their affiliation in RTZ Source: Interviews and surveys on site



The map indicates religious institutions and their influence areas in the RTZ.The map indicates the extent and influence of religious tourism related activities within the core zone.As is seen from the map, shops and other commercial establishments cluster around the temple to service the tourists. And large tracts of land (seen in pale yellow) in Ganeshpuri and Vajreshwari lie in the ownership of religious Trusts. The map was prepared by combining CTS maps, satellite maps, visual surveys and interviews.

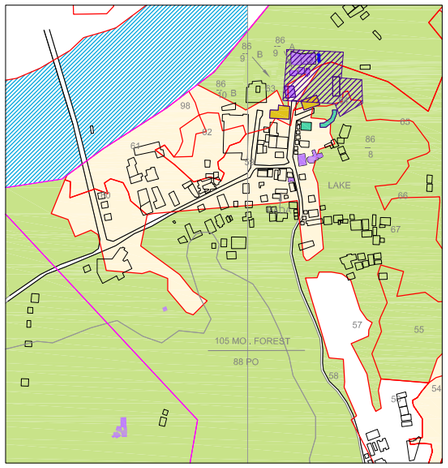
LEGEND:

- TEMPLE
- TEMPLE TRUST OWNERSHIP LAND
- TEMPLE TRUST OWNED LODGE
- SHOPS AND OTHER COMMERCIAL ESTABLISHMENTS
- PARKING
- FOREST AREA
- TANSA RIVER
- CTS BOUNDARIES
- WATER BODIES
- VILLAGE BOUNDARIES

CORE ZONE: RELIGIOUS TOURISM

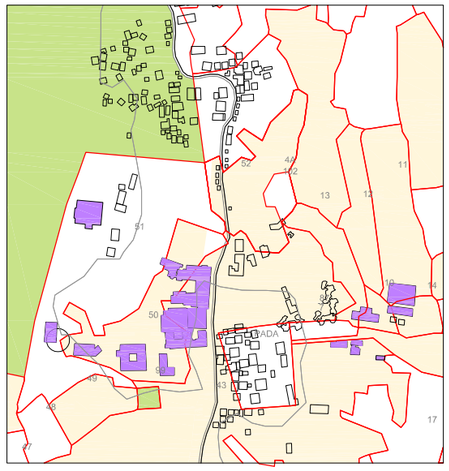
0 200 500 1000 M

GANESHPURI



A: NITYANAND TRUST COMPLEX

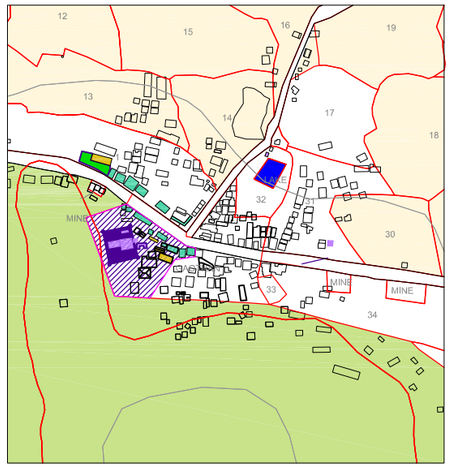
The Nityanand trust complex contains the temple and thermal springs, as well as a lodge that accomodates the pilgrims during Gurupoornima and Mahashivratri which are the peak seasons. There is also a large parking area with temple related shops selling flowers and other items. The complex also has public toilets.
All of the areas , including the toilets, thermal springs and temple and excepting the lodge, administrative and residential areas are accessible to the public free of charge.



B: GURUDEV SIDDHAPEETH TRUST COMPLEX

The Gurudev Siddhapeeth Trust Complex is an extensive guarded and walled complex with facilities for meditation, yoga, large lawns and landscaped areas and residences for the ashrams followers.
The temple near the entrance is the only freely accessible to the public without the permission of the officials.

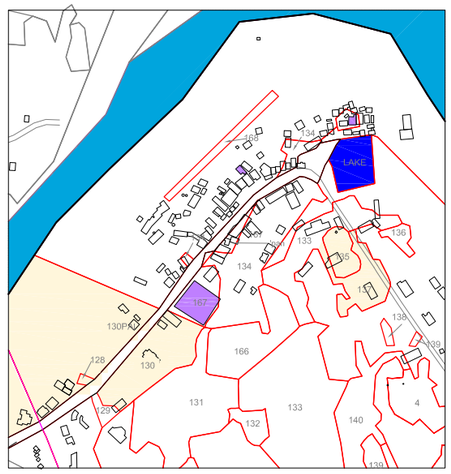
VAJRESHWARI



C: VAJRESHWARI TRUST COMPLEX

The Vajreshwari trust complex, is made up of the temple, lodges and shops related to the trust and temple and a large parking area within the premises that is used by pilgrims.

AKLOLI



D: AKLOLI

There are several smaller trusts within Akloli, the Ram Mandir Trust manages the temple and the thermal springs that lie within the temple complex, as well as two large trusts with residential facilities.

LEGEND:

- LODGE — TOTAL NUMBER IN THE RTZ - 26
- RESORT — TOTAL NUMBER IN THE RTZ : 4
- HOTEL — TOTAL NUMBER IN THE RTZ - 7
- LODGE BELONGING TO TEMPLE TRUST - 2
- FOREST AREA
- TANSA RIVER
- WATER BODIES
- CTS BOUNDARIES
- VILLAGE BOUNDARIES

CORE ZONE: RELIGIOUS TOURISM

0 200 500 1000 M

6.10

	Festivals	No Of Visitors
January	Makar Sankranti	6000
February	Holi	10000
March	Maha Shivratri	20,000
April	Vasant Navratra, Ram Navmi, Hanuman Jayanti.	18,000 14,000 6,000
May	Baba Muktanandji Jayanti, Akshyay Trithia, Swami Nityanand Bhagwan Murti Pran Prathista	12,000 14,000 16,000
July	Guru Purnima	20,000
August	Bhagwan Nityanand Mahasamadhi Divas, Independence Day, Divya Diksha Divas, Rakshabandhan. Janmashtmi.	10,000 10,000 6000 2000 16,000
Sep	Rudra Abhishek, Gnash Chaturthi, Pitru Paksha Shradh.	14,000 8,000 12,000
Oct	Navratri, Dusshera, Durga Puja, Shri Dattajayanti, Diwali.	20,000 16,000 6,000 14,000 16,000

Table 6.12 No. of visitors during Festivals held in the RTDZ

The above *Table 6.12* indicates the peak seasons and loads during peak seasons, the highest load being on Maha Shivratri Gurupoornima and Navratri of about 15-20000 pilgrims, as established from our study.

Tourism Infrastructure: *(Refer Plate no 6.11 and 6.12)*

In the following *Table 6.14*, the tourist population during festivals and normal days has been determined through interviews with the Gram Panchayat and each hotel and resort has been analyzed regarding capacity and occupancy.

	Numbers of resorts (number of beds)	Number of religious staying facilities (number of beds)	Numbers of hotels (number of beds)	Unregulated staying facilities at homes. (number of beds)
Vajreshwari	0	0	9(214)	0
Akloli	4(130)	0	10(234)	(75)
Ganeshpuri	2(18)	(250)	12(276)	0
Nimbavli	0	0	0	0
Usgaon	0	0	0	0

Table 4.15 No of resorts, religious staying facility and hotel in RTZ. Source: Interviews and surveys on site

	Lodging Tourists on a normal day / weekends	Daily Tourists on a normal day/ weekends	Lodging tourist max on a peak day	Daily Tourist on a peak religious day
Vajreshwari	40 / 60 approx.	150- 300	200 approx	15000 - 20,000
Akloli	40 / 80 approx	200 - 500	450 approx	15000 - 20,000
Ganeshpuri	100 / 200approx	150 - 300	672 approx	15000 - 20,000
Nimbavli	-	-	-	-
Usgaon	-	-	-	-

Table 6.14 No. of tourist availing of lodging facilities on a normal and peak days.

Religious tourism which is predominant in this precinct has led to the mushrooming of hotel, resorts and even unregulated lodges and staying facilities in the villages. Most of these hotels and resorts are not shown in the Gram Panchayat records. Through the interviews it has been established that most hotels do not belong to the local populace and instead belong to people who live in Mumbai. In addition there are also religious trusts with residential facilities, sanatoriums and old age homes.

There has been the growth of shops and restaurants (*Table 6.15)* which serve tourists who come to visit the temples and the hot springs. Some of the shops have been started by the local populace. There is also the growth of informal shacks along the river edge that cater to tourists who visit the hot springs.

Village names	Shops	Restaurants	Temporary shacks
Vajreshwari	52	20	0
Akloli	30	10	15
Ganeshpuri	50	9	0
Nimbavli	2	0	1
Usgaon	3	0	1

Table 6.15No of commercial establishments in RTZ Source: Interviews and surveys on site

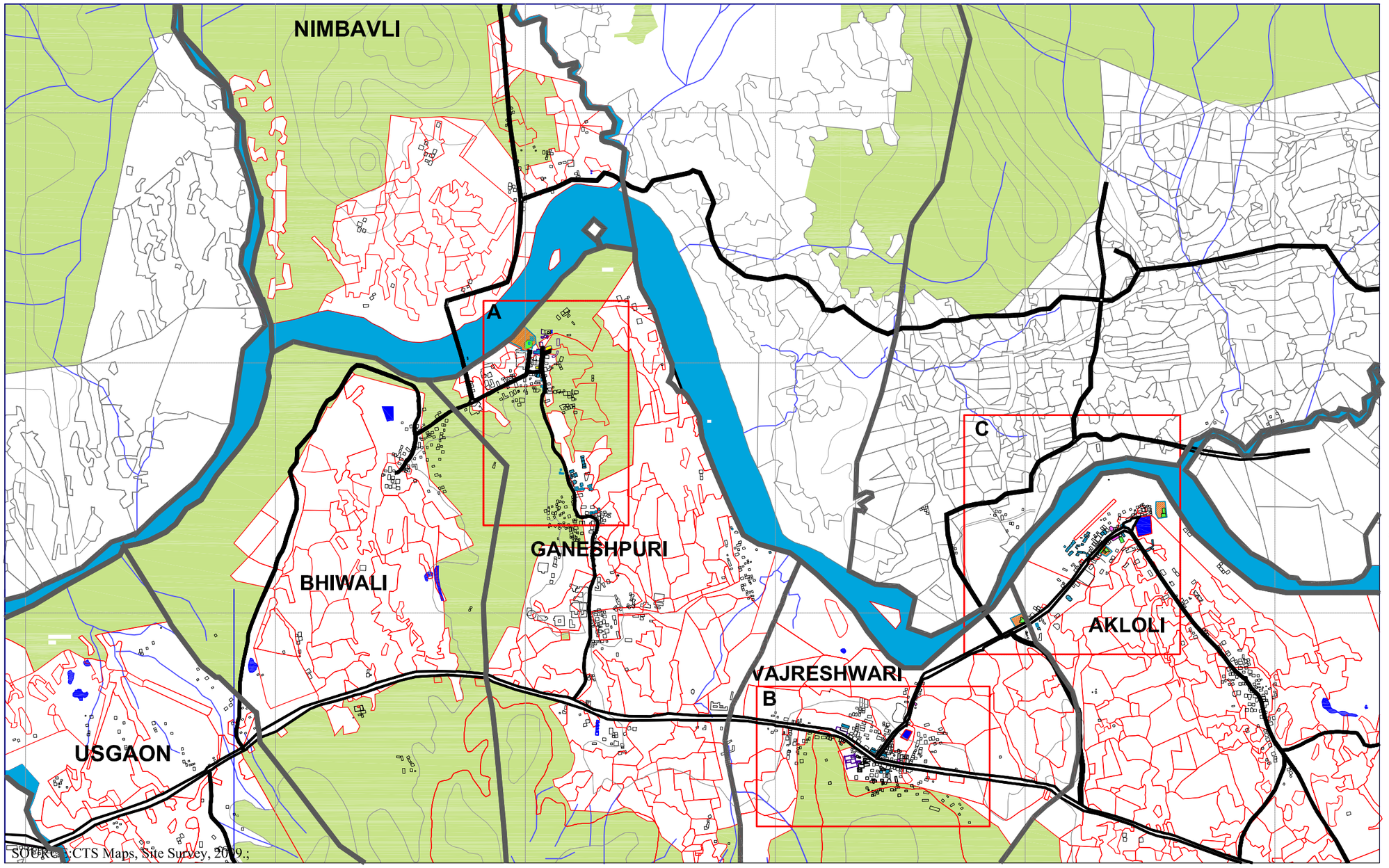
Through the study it is observed that In Vajreshwari, as all the land is owned by the Vajreshwari Yogini Trust, which controls all development and construction within the village, there have been no recent developments of resorts. However there are a number of them seen in Akloli. Also, residents of the villages in the periphery of the temple have set up lodges and restaurants in response to the demand created by pilgrims to the temple.

In Akloli there has been uncontrolled development and encroachment around the tourist areas of the thermal springs in the form of temporary shacks, in the form of tea stalls and temporary changing rooms. Facilities for tourists such as changing rooms and bathing facilities and public toilets, especially for women, are inadequate. The nature of tourism in Akloli is not only religious, but mostly recreational with the resorts serving as weekend getaways. This can be observed from the greater number of private resorts.

In Ganeshpuri, the shops and staying facilities are primarily controlled by the various trusts in the village. The nature of tourism in Ganeshpuri is different as mostly pilgrims associated with the trusts. Nimbavli despite the presence of thermal springs has very little tourism activity that is a spillover from the main destinations of Akloli, Ganeshpuri and Vajreshwari and no resorts or lodges.

In the absence of a comprehensive plan for provision of infrastructure and facilities for tourism, the kind of unregulated and informal development which damages environmentally sensitive areas such as the river edges and puts pressure on infrastructure is likely to continue.

Interviews with local villagers and the trusts have indicated a decline in the influx of tourist population due to deterioration in the facilities available for tourists, leading to a loss of economic opportunities for the local population.



SOURCE : CTS Maps, Site Survey, 2009.;

INVENTORY OF HOTELS, RESORTS AND LODGES

NAME	NO. OF ROOMS	STAFF
AKLOLI VILLAGE		
1. HOTEL RIVERSIDE RESORT	18	6
2. MANISHA GUEST HOUSE	6	1
3. MUKUND PALACE HOTEL	18	3
4. AKASH GUEST HOUSE	16	4
5. VIJAYA HOTEL	7	3
6. BHARATI NIVAS	16	4
7. NITYA POOJA LODGE	8	17
8. PAVAN RESORT	19	24
9. INFORMAL SHACKS	75	–
10. AMI PARK LODGE	10	4
11. GAJANAN HAPPY HOME	20	2
12. PANDIT NEHRU SANITORIUM	15	3
13. TANSA RESORT	13	4
14. MAHENDRA LODGE (IN AKLOLI	16	3
VAJRESHWARI VILLAGE		
14. HOTEL GOLDEN PALACE	4	2
15. HOTEL KONKAN DARBAR	8	4
16. BHARAT GUEST HOUSE	15	3
17. MATOSHRI GUEST HOUSE	20	4
18. VIJAY PALACE HOTEL	–	–
19. GAURAV LODGE	10	3
20. RAJ LODGE	12	3
21. HOTEL SADGURU LODGE	10	2
22. SHITAL LODGE	28	4
GANESHPURI VILLAGE		
23. LODGE	15	6
24. LODGE	8	3
25. LODGE	18	6
26. LODGE	12	4
27. LODGE	18	10
28. LODGE	12	4
29. SUNNY LODGE	6	2
30. GEETA LODGE	5	3
31. TRIMURTI LODGE	8	3
32. MADHU NIVAS	6	6
33. HOTEL RAMESH BHUVAN	8	4
34. HOTEL SAMADHAN	14	5
35. SHRI NITYANAND SANSTHA LODGE	125	80
36. KOTHAWALA BATH AND HEALTH RESORT	9	9

TOTAL STAFF : 248

The additional number of migrant population involved in the informal commercial shacks around Akloli is not known.

The map was prepared to understand tourism related infrastructureand capacities in the three villages. The map is also an indicator of patterns of tourism activity in the three villages, where Akloli has some resorts and has more recreational tourism related infrastructure, Ganeshpuri has almost only religious tourism related lodges and a single resort,Vajreshwari has very few lodges and hotels.

LEGEND :

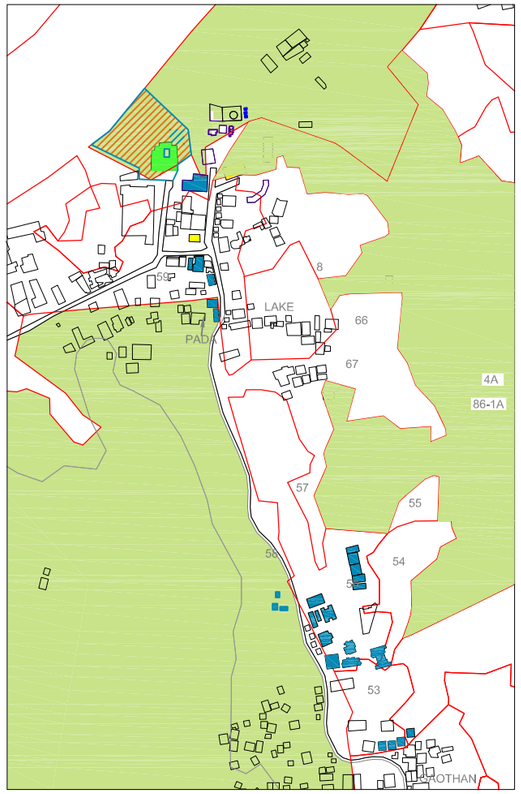
- LODGE — TOTAL NUMBER IN THE RTZ - 26
- RESORT — TOTAL NUMBER IN THE RTZ : 4
- HOTEL — TOTAL NUMBER IN THE RTZ - 7
- LODGE BELONGING TO TEMPLE TRUST - 2
- FOREST AREA
- TANSA RIVER
- WATER BODIES
- CTS BOUNDARIES
- VILLAGE BOUNDARIES

CORE ZONE: TOURISM INFRASTRUCTURE

0 200 500 1000 M

6.11

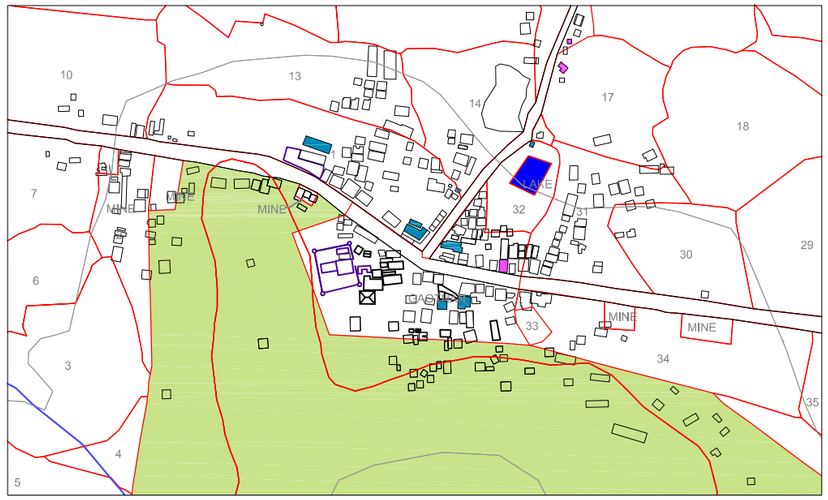
A-GANESHPURI



Ganeshpuri has 8 staying facilities that have more than 10 rooms, and no resorts. There are 7 smaller staying facilities with less than 10 beds including one small resort that is a health resort around thermal springs.
The lodge belonging to the Trust has 125 rooms.

TOTAL NO. OF ROOMS- 264

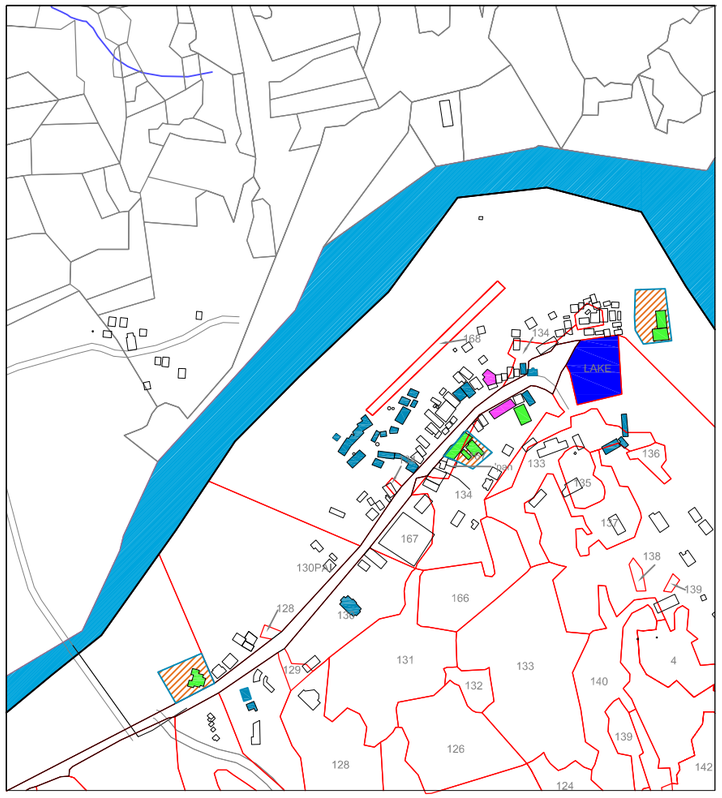
B-VAJRESHWARI



Vajreshwari has 4 staying facilities that have more than 10 rooms, and no resorts.
There are 5 smaller hotels which have 10 and less than 10 beds.

TOTAL NO. OF ROOMS- 107

C-AKLOLI



Akloli has 9 staying facilities that have more than 10 rooms, including 3 resorts which have landscaped areas and one that has a swimming pool. There is a large hotel that is also proposed at the river edge for which large steps (ghats) have been created.
There are three smaller lodges and hotels which have 10 and less than 10 beds.

TOTAL NO. OF ROOMS- 257

LEGEND:

- LODGE — TOTAL NUMBER IN THE RTZ - 26
- RESORT — TOTAL NUMBER IN THE RTZ : 4
- HOTEL — TOTAL NUMBER IN THE RTZ - 7
- LODGE BELONGING TO TEMPLE TRUST - 2
- FOREST AREA
- TANSA RIVER
- WATER BODIES
- VILLAGE BOUNDARIES
- CTS BOUNDARIES

CORE ZONE: TOURISM INFRASTRUCTURE

0 200 500 M

ENVIROMENT MANAGEMENT PLAN FOR THE GEO-THERMAL ZONE OF THE TANSA RIVER BASIN, 2008, DESIGN CELL- KAMLA RAHEJA VIDYANIDHI INSTITUTE FOR ARCHITECTURE AND ENVIRONMENTAL STUDIES, JUHU SCHEME, VIDYANIDHI MARG, JUHU SCHEME, MUMBAI - 400069, website:www.krvia.ac.in

Issues related to economic activities

a. Occupational shifts from agriculture

Approximately 35% of the working population in the villages in the Core Zone is dependant on agriculture. As discussed earlier the primary reason for a single crop in this area (as well as the entire river basin) is due to a lack of irrigation facilities and heavy reliance on rain water, which cannot be stored. Due to the meager availability of water resources in the winter and summer months we observe a occupational shift towards brick kilns, stone quarrying, tourism etc. which have led to increased pressures on the environmental resources.

b. Lack of local participation in the tourist economy

There has been limited participation by the local community in the tourism economy. Most of the resorts and hotels belong to people from Mumbai. Only some of the shops near religious precincts belong to the local populace. This is a disturbing phenomenon in the absence of a strong agricultural base and pressure on land created due to tourism related activities. Local farmer are easily persuaded to sell of their land in such circumstances.

c. Encroachments due to tourism:

There has also been an increase in formal and informal commercial activities around the precincts that cater to the pilgrims. The growth of informal commercial activities which arise to serve the tourist near the hot springs at Akloli encroach on the river bed creating environmental disturbances

d. Implications of changes in land use and ownership patterns due to the growth of tourism:

The implications of changes in land use, ownership patterns and the corresponding increase in construction activity as a result of tourism has been discussed in detail in section 6.1.1.

e. Impacts on infrastructure due to tourism activity:

To evaluate carrying capacity and the impact of population load on present infrastructure due to tourism a detailed evaluation of existing infrastructure systems such as water supply, solid waste, sewage disposal and transport infrastructure has been carried out in the following sections.

6.1.4 Existing Infrastructure

This study undertakes a situation analysis and evaluation of the existing physical infrastructure in the Core Zone.
The management and improvement of infrastructure systems that impact the environment is a critical part of preparing the environment management plan.

The following systems of infrastructure were evaluated especially for their impact on the environment.

- Water supply
- Solid Waste
- Sewage disposal
- Storm water drainage
- Power

6.1.4.1. Water Supply

The dependencies on local natural water sources, such as rivers and ground water, loads on these, must be understood so that their conservation and improvement can be integrated into the environment management plan. The primary sources of domestic water supply for the villages (Ganeshpuri Vajreshwari and Akloli only) are the existing piped water supply system tapped directly from the river at Akloli or from (bore) wells. The water quality testing is under the Water supply department of the Panchayat Samiti. However, maintenance of sources of water including the pumping station, filtration tank and water reservoirs is done by the Water Supply Department of the Thane Collectorate. After the reservoirs the distribution system is maintained by the Gram Panchyat. The existing piped water system laid out in the 1960's is old and dilapidated and is inadequate for present needs and critical parts of the system like the water treatment plant are non-functional. Water supply by this piped system to the villages is only for a maximum of two hours a day on normal days

The *Table 6.16* below lists the sources of water supply for the villages in the Core Zone.

Village Name	Pada	Population	Govt. wells	Pvt. Wells	Stand posts	Hand pumps	Tapped water supply	Other	Notes
Vajreshwari		2965	9	0	2	1	1		Taps are leaking, water purification irregular
	Vajreshwari Colony	157	1	0	0	0	0	0	
Ganeshpuri	Ganeshpuri	785	1	0	0	1	1	0	
	Gandhi Pada	456	0	1	0	0	1	0	Irregular water purification. Well to be repaired.
	Amrai	304	0	0	0	1	1	0	
	Gaondevi	183	1	0	0	0	1	0	
	Nityanand Colony	591	0	0	0	0	1	0	
	Dalekar Pada	113	1	0	0	0	1	0	Well to be repaired
Bhiwali		539	1	0	0	0	0	0	
Usgaon		544	2	0	0	2	0	0	Rusted Piping in the well and water from the fields enters the well.
	Usgaon Bandhara	412	1	0	0	0	0	0	
	Tobhravi era	613	2	0	0	0	0	0	
	Dahagaon Colony	116	0	0	0	0	0	0	
Ganesh-Puri		71	1	0	0	1	0	1	Ditch dug in river bed for drinking water. Parapet and inner piping of the well not repaired water enters the well.
Kamdi-pada		32	1	0	0	0	0	0	
Adaye pada		34	-	-	-	0	0	1	
Mokashipada		35	-	-	-	0	0	1	
Vishake pada		163	2	-	-	1	0	0	
Akloli									
	Akloli Kund	923	1	0	0	0	1	0	
	Akloli Colony	770	0	0	0	0	1	0	
	Akloli Pendhari pada	386	0	0	0	2	0	1	

Table 6.16 Sources of water supply in villages of RTZ Source: Primary Health Centre- Water Quality Tests for 2008-2009

The total water supply for the villages from the Akloli water plant is at .6 mld per day. The water pumped form these sources are stored in stroge tanks of capacity : Akloli (50000 litres), Vajreshwari (100000 litres) Ganeshpuri(50000 litres).From the other sources like the wells, hand pump the quantity of water pumped has been reducing through the years due to depletion of ground water. As per a study done by Constationo Fallice on " *Ground water conditions in hard volcanic rock of Maharashtra State, Western India*" the yield of these wells can vary from more that 1000 litres/hr (good) to 500 litres/ hr (poor). It depends on the depth of the bore well. According to the study It is a government practice not to install bore wells in this region more than 120 ft deep. These wells can yield water anywhere from 800 litres to 150 litre per hour.

However several wells that are sources of drinking water need regular maintenance and repair, and are often in bad conditions causing water from fields to enter and pollute the well water, or the pipes used to pump water from the well are rusted and cause the water to turn red with rust. Due to increase in tourism loads it has been observed that there is an exploitation of ground water resource by the tourist lodges leading to further depletion of ground water

resources e.g. Akloli. The tapping of ground water for swimming pools and other tourism purposes is as yet unregulated.

The river water, from local accounts, seems to deteriorate during the dry months and during monsoon. In May 2009 it was seen that only 5 out of 11 sources of water had water suitable for drinking. *(Source- Primary Health Centre- Water Quality Tests for 2008-2009)* In June there were severe shortages with the river being dry due to lack of rainfall.

The water from infrastructure projects like Usgaon Dam that have been built in this area is provided to the Municipal Councils of Vasai – Virar and to the Gurudev Siddhapeeth Trust located in the RTD Zone. However, this water does not reach the locals within the villages. The need to provide water for domestic as well as tourism consumption has been identified as a priority by the representatives in the Gram Panchayats. On the other hand, the representatives also have forcefully voiced their concern over the water quality due to non treatment of water which is supplied as tapped water by the Zilla Parishad.

The water requirement for tourists as well as for the residential population is estimated as below:

Villages Names	Present resident popu-lation	Present tourist population lodging during peak period	Present tourist population visiting during peak period	Standards Litres / day/ person. 70 lcpd for resident/lodging population.	Estimated water requirement for floating population at 15 lcpd
Ganeshpuri	3197	672	20000	0. 27 mld	0.3 mld
Akloli	2700	450		0.22 mld	
Vajreshwari	2335	200		0.17 mld	
Nimbavli	687	-		0.05 mld	
Usgaon	1536	-		0.107 mld	
Bhivalli	1196	-		0.083 mld	
TOTAL				1.647 mld	0.3 mld
GRAND TOTAL					1.947 mld

Table 6.17 Water requirement for the residents as well as floating population of the Core Zone

Issues related to water supply

a. Inadequate water supply for resident population

The existing daily water supply is 0.6 mld per day through the piped water source. The other sources are not so dependable due to depletion in the ground water table. Thus currently there is a shortfall of 1.1 mld per day as per standards for the requirement of the present residential population of the villages.

b. Inadequate water supply for tourist population

There three types of tourists – daily tourists, tourists who stay in the lodges for a short or long period and tourists who visit during special occasions or festivals like the Gurupurnima. The activities of tourism create the maximum amount of pressure on the water supply which the present piped water system is not able to handle. On peak days due to pressure of tourist requirement the shortfall of water supply increases to 1.5 mld.

Quality of water

The quality of water especially form the ground sources as well as the river have not been consistent through the year and have not been found suitable as per tests done by the *Primary Health Centre, Vajreshwari*.

c. Depleting ground water resources

The ground water use in this region is unregulated. Especially with the new resorts and hotel which are coming up in the RTDZ there has been a exploitation of this in the region.

6.1.4.2. Solid Waste

The quantity of solid waste produced on normal days and days of peak tourist load, the systems for solid waste disposal, have to be understood for their impact on the environment. The development of tourism in the RT Zone has become a concern as it has led to changes in the type of solid waste generated and an increase in the quantity of solid waste generation. The solid waste generated on a normal day and a peak day has been calculated in the table below:

	Present population	SW generated @ (0.25 kg/person/day)	Floating Population & solid waste generated during peak period	Systems adopted in each villages for solid waste disposal
			15000 x .1 kg /per person/day. = 1500 kg	The solid waste collection is carried out by the employees of the Panchayat. The garbage is burnt at spots within each village. In the monsoon months it is directly dumped into the river or in pits at the rivers edge leading to pollution.
Ganeshpuri (*Residents*)	3197	800		
Daily Tourists				
Lodging tourists	672	168		
Akloli (*Residents*)	2700	675		
Daily Tourists				
Lodging tourists	450	112.5		
Vajreshwari(*Residents*)	2335	583.75		
Daily Tourists				
Lodging tourists	200	50		
Nimbavli (*Residents*)	687	171.75		
Daily Tourists				
Lodging tourists				
Usgaon (*Residents*)	1536	384		
Daily Tourists				
Lodging tourists				
Bhivalli (*Residents*)	1196	299		
Daily Tourists				
Lodging tourists				
TOTAL		3244 kg.	1500 kg.	4744 kg.

Table 6.18 Quantity of garbage generation in the village of RTZ.

Due to the tourism activities, the type of waste generated has changed from rural organic wastes to urban inorganic wastes. This has increased the pressure on the rural local bodies to manage solid waste. Presently, the solid waste that is generated is inappropriately strewn at various locations in each village. The present practice of the Gram Panchayats is to hire a tractor for solid waste collection on a weekly basis. At the time of collection or disposal the practice of segregating waste is not followed.

In the absence of infrastructure and space to dispose the solid waste, the garbage including plastic is burned at various unregulated sites in the villages. The collected waste is some time disposed near the river bed or on an accessible land in the jurisdiction of the Gram Panchayat. The mixing of solid waste with river water or dumping at inappropriate locations such as talavs could create health or environmental hazards in the future. (*Refer Plate no. 4.27* for existing solid waste disposal sites) Disposal of solid waste generated during peak seasons also puts severe pressure on the Gram Panchayat's capacities, with solid waste accumulating in the areas around the temples and hot springs. On normal days, the village produces very small amounts of inorganic waste but during the peak season tourism generates considerable of plastic waste which pollutes the surrounding environment, including streams, river and water bodies.

6.2 Non-degradable waste at Akloli disposed by tourists.

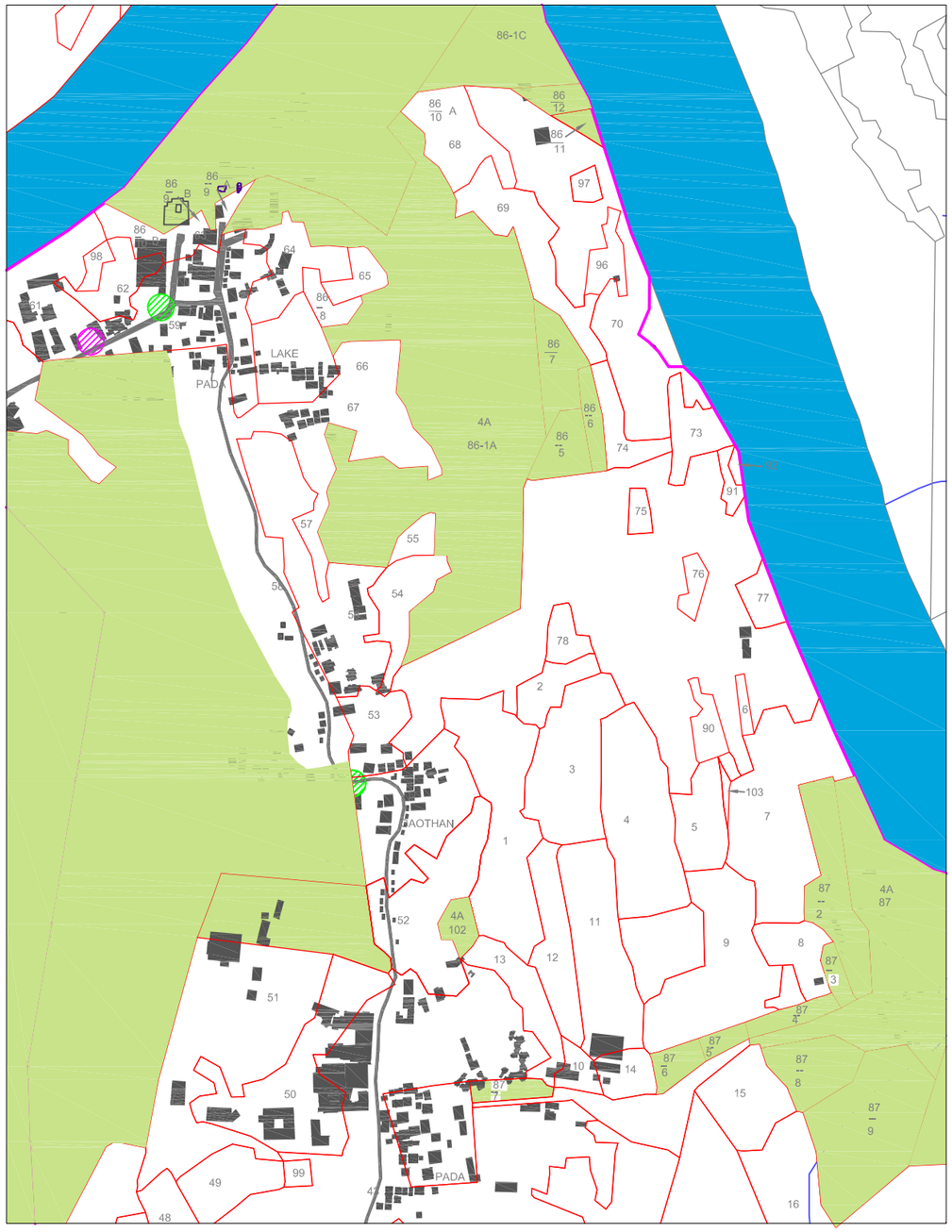
6.3 Solid waste disposed at the edge of the river

Issues regarding solid waste

a. Lack of an organized system for solid waste

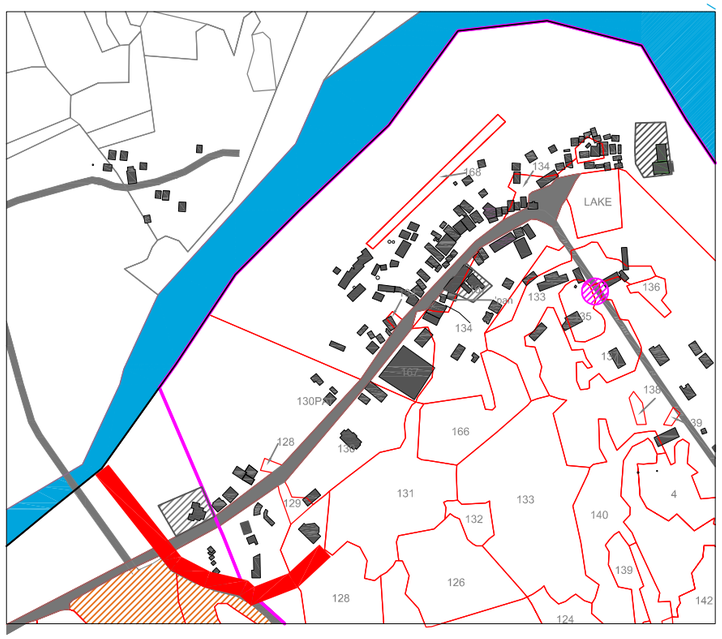
It is evident form above observation that there is a lack of any organized system of solid waste in the RTDZ which can handle the nature and quantity of waste generated. This is leading to the damage of existing environmental assets in the RTDZ.

A -GANESHPURI



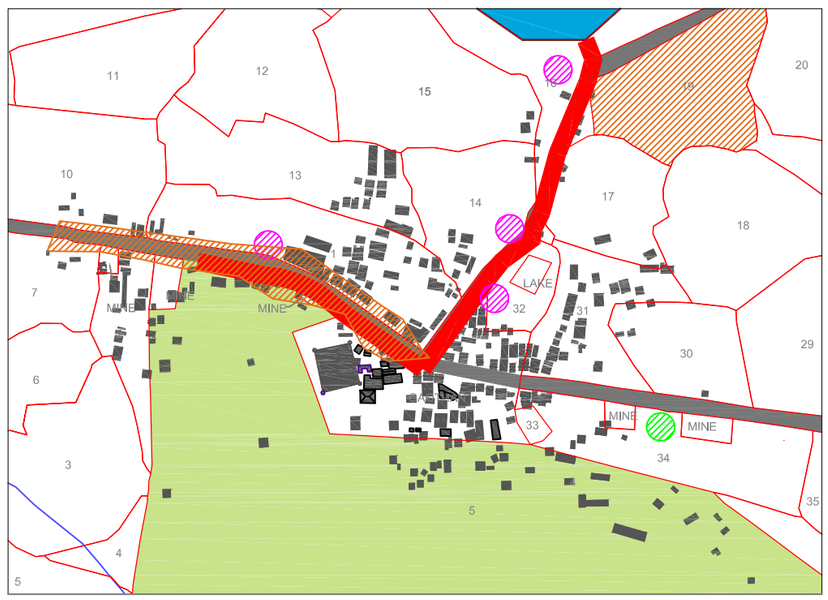
Solid waste is disposed at the edge of the forest in front of the bus depot, and is usually burned at the place of colection or buried in a ditch during monsoon.

C-AKLOLI



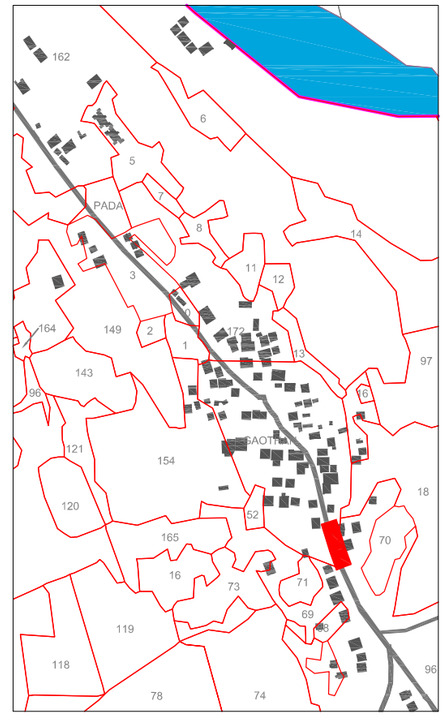
The area around the storm water at the edge of Akloli and Vajreshwari drain sees a lot of picknickers in the nearby fields, who litter the fields with non-degradable thermocol plates and cups that enter into the river through the drain.

B-VAJRESHWARI



Although Vajreshwari has comparatively more dustbins on peak days, after weekends and on festival days the area around the temple and near the river is littered with plastic and paper waste from tourists.

D-AKLOLI GAOTHAN



The gaothan in Akloli being a primarily agrarian residential settlement generates very little inorganic solid waste, no open sites of garbage accumulation were observed, and there were no GP dustbins in the area.

LEGEND:

- BUILDINGS
- OPEN GARBAGE DISPOSAL SITE
- AREAS THAT ARE LITTERED WITH GARBAGE FROM TOURISTS ON PEAK DAYS
- DUST BINS
- FOREST AREA
- TANSA RIVER
- STREAMS
- WATER BODIES
- CTS BOUNDARIES
- VILLAGE BOUNDARIES
- STORM WATER DRAIN

CORE ZONE : SOLID WASTE DISPOSAL (*refer map 6.2 for key map*)

0 200 500 1000 M

6.13

6.1.4.3. Sewage disposal

The primary mode of sewage disposal in the villages of the Recreation and Tourism Zone is a decentralized system of septic tanks and soak pits. Akloli with 70-80% of the village households being provided with toilets and septic tanks has been awarded a rural sanitation award**.** However, from the table below it is seen that in the reminder of the villages, there is a lack of sanitation facilities, and at most times, the sewage is directly pumped into the river**.** Despite the rural sanitation award, in Akloli itself, it has been observed that at some points, the Panchayat has built sewers that dispose untreated sewage directly into the river. (*Refer Plate 6.13* for location of solid waste disposal sites)

Village names	Systems adopted by residents.	Systems adopted by hotels	Systems adopted by public toilets
Ganeshpuri	Septic tank (46 %)		
Akloli	Septic tank (70-80% approx)	Septic tank (100%)	Septic tank (100%) Soak pits dug on the edge of the river
Vajreshwari	Septic tank (55%)	Septic tank (100%)	Septic tank (100%)
Nimbavli	Septic tank (5%)	-	-
Usgaon	Septic tank (0%)	-	-
Bhivalli	Septic tank (0%)	-	-

Table 6.19 Percentage of coverage of sanitation systems present in the villages of the RTDZ
Source: Gram Panchayats, Akloli, Vajreshwari, Nimbavli, Ganeshpuri, 2009.

Fig. 6.4 Sewage disposal into river at Akloli upstream from the main tourism areas around the kunds

Fig. 6.5 Water being pumped directly from the river, just a few metres away from a sewage disposal pipe at Akloli.

The disposal of sewage directly into the river poses a health hazard to villagers who use water directly from the river for domestic purposes as well as for tourists.

Issues regarding the sewerage system

a. Lack of a sewage system adopted by residential and commercial establishment

Though a system of the septic tank has been adopted by many residential and commercial establishments in the villages it has yet to have a total coverage within the RTDZ.

b. Threat to existing environmental system

The system of dumping untreated sewerage into the river is a threat.

6.1.4.4. Storm Water Drainage

Storm water drains have been constructed along a few roads by the Gram Panchayat at critical points. This was primarily observed on the village roads and built by the Gram Panchayat. The Zilla Parishad roads do not have any storm water drains. Most of these roads have culverts to allow the natural streams to flow through. Most of the villages have ponds that act as collectors of excess storm water.

The existing storm water channels have been blocked by the building of compound walls, causing flooding and water logging around adjoining houses.

Fig No. 6.6 Siltation in existing storm water drains in RTDZ at Akloli.

Siltation in existing storm water drains at places due to inadequate staff and lack of maintenance by the Gram Panchayat.

Fig No. 6.7 Garbage mixing into existing storm water drains at Vajreshwari.

At places, solid waste enters the storm water drain that leads directly into the river leading to pollution of river water. (*Refer Plate 6.14* for location of storm water drains)

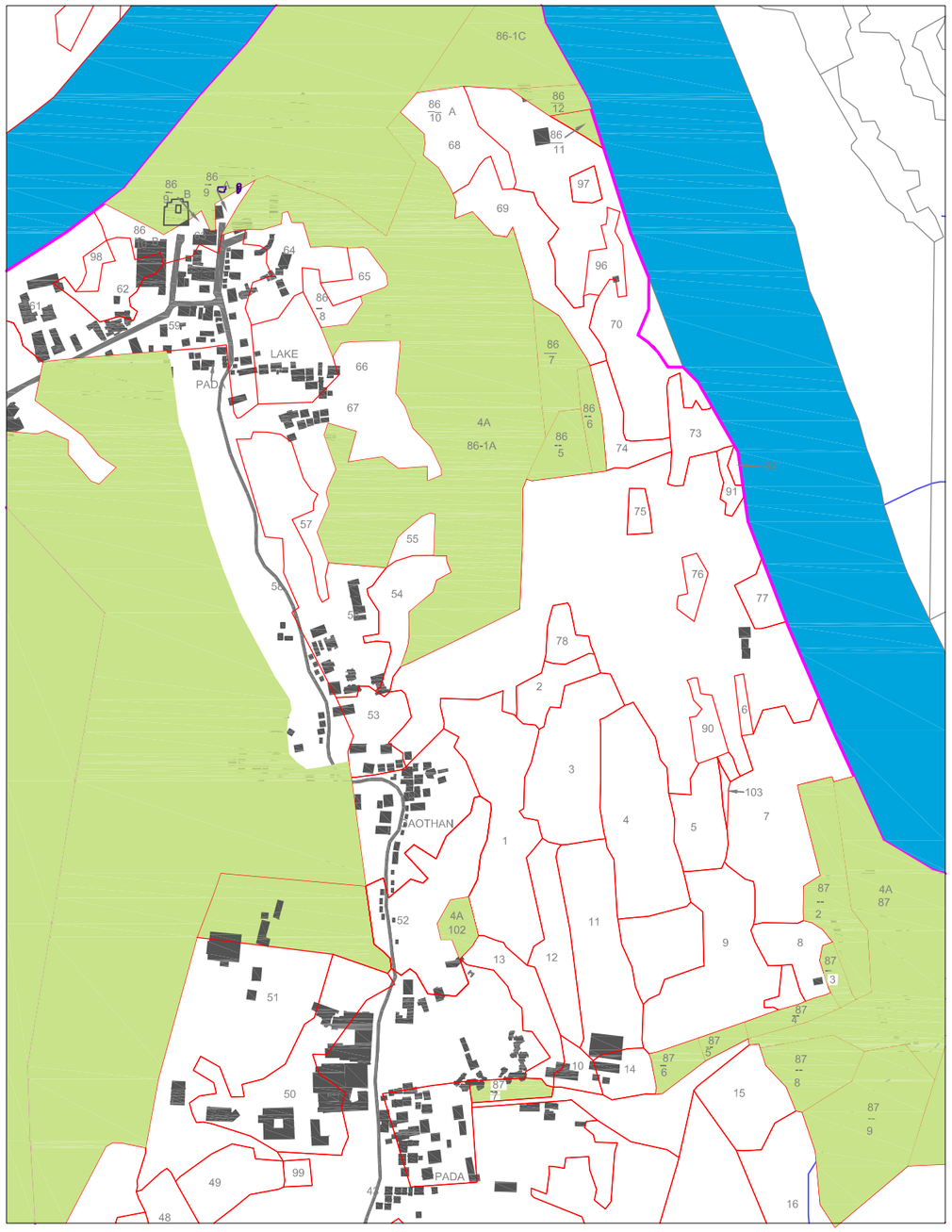
Fig No. 4.16 Water logging after rains in the RTDZ at Akloli.

Issues

a. Lack of an integrated system for storm water

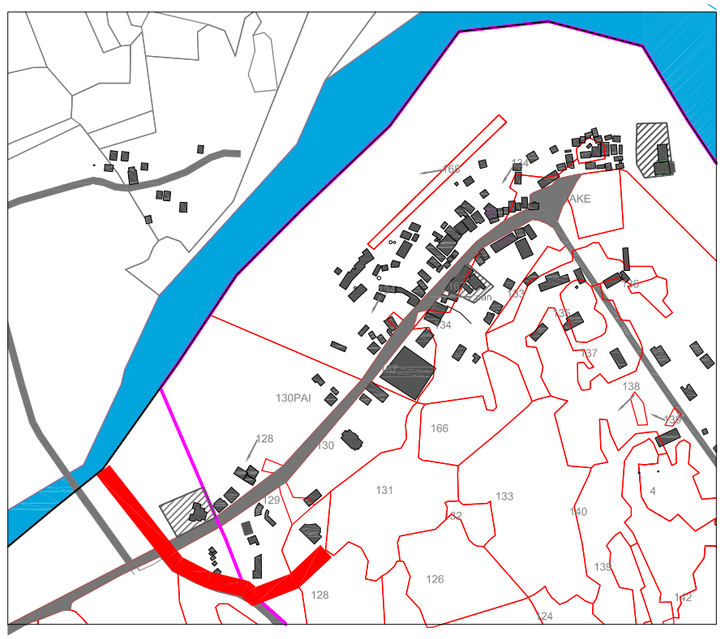
The present localized solutions are not sufficient to ensure adequate drainage. Due to a lack of integrated and planned storm water drainage systems, the blockage of existing natural drainage channels results in water logging.

A -GANESHPURI



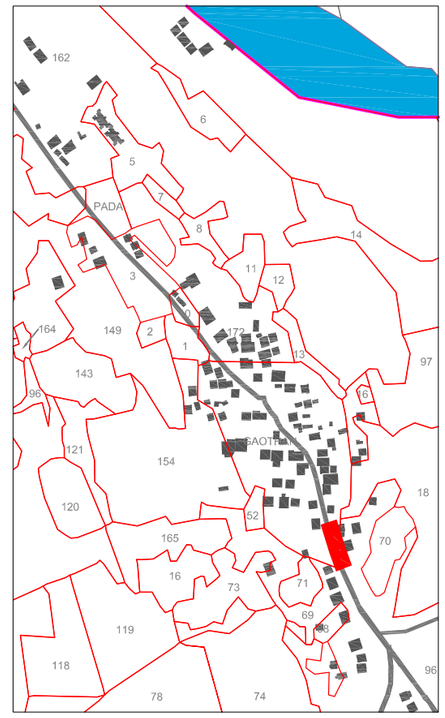
In Ganeshpuri there are no storm water drains.The report prepared by the Ganeshpuri panchayat for the year 2008 states that there is flooding during monsoon due to which some village roads are submerged.

C-AKLOLI



The area around the storm water drain sees a lot of picknickers in the nearby fields, who litter the fields with non-degradable thermocol plates and cups that enter into the river through the drain.

D-AKLOLI GAOTHAN



Gutters built by the Panchayat at Akloli cover a short distance of road in the gaothan, but are however silted over and in need of regular maintenance.

B-VAJRESHWARI

There are gutters built along the main roads leading to the temple and the river at Vajreshwari.

LEGEND:

BUILDINGS
FOREST AREA
TANSA RIVER
STREAMS
WATER BODIES
CTS BOUNDARIES
VILLAGE BOUNDARIES
STORM WATER DRAIN

CORE ZONE : STORM WATER DRAINAGE *(refer map 6.2 for key map)*

0 200 500 1000 M

6.14

6.1.5. Existing Movement Patterns and Infrastructure

Hierarchy of Movement

The Shirsad-Ambadi Road which is a part of State Highway 40 being a major link between the industrial areas of Wada and onwards to Nashik and Mumbai, sees heavy truck traffic through the day, however it is a narrow (09-M wide)two-lane road with fast moving through traffic. This is also the main connector between the villages of the proposed RTZ and Mumbai.

The next level of roads connects the villages to the state highway and to each other. These are poorly maintained in parts. The internal village roads are a combination of mud as well as cement paved tracks maintained by the Gram Panchayat*. (Refer Plate no.6. 15, 6.16 and 6.17)*

Traffic load in normal and peak seasons

A detailed study of traffic load was carried out on normal days and during a day in the peak season. Two observation points were established at the entrance to Ganeshpuri and at Akloli at the Vajreshwari temple junction, and manual traffic counts were carried out at various points during the day. The peak day study was carried out to ascertain traffic problems during festival seasons. It was carried on 18th July 2008 on Gurupurnima when thousands of devotees visit the Nityanand Samadhi at Ganeshpuri, and there is a spillover of these activities to Vajreshwari and Akloli. While on a peak day there was almost uniformly continuous traffic entering throughout the day into the evening. The study revealed that traffic congestion due to inadequate parking and road widths are severe during peak loads.

On the normal day the study was carried out in the morning at 9:00 am and evening at 5p.m. These are peaks observed in the morning and the evening on the normal day. We see that while there might be very little difference between the PCU counts on a peak days as compared to a normal day, the total amount of vehicles entering on a peak day far exceeds that on normal days, as the number of vehicles at any given time on peak days is high, compared to that for a normal day when they have only peak hours when the traffic is more. Also during the peak time the number of vehicles entering Vajreshwari increases. For pedestrian traffic during festival times such as on Gurupurnima and Maha Shivratri, there is a large influx of tourists of about 15-20,000 persons. *(Refer Table 6.14)*

Vajreshwari Station Point		**Ganeshpuri Station Point**	
Peak		**Peak**	
4-5 pm	511	4-5 pm	516
7-8 am	222	7-8 am	404
Off		**Off**	
5-6 pm	774	5-6 pm	705
9-10 am	755	9-10 am	742

Table 6.20 Passenger Car Unit counts established at the station points from the following tables

Vajreshwari Station Point - Peak

Timing	Cars	Ricks (big)	Ricks (small)	Two wheelers	Bus ST	Bus private	Tempos	Trucks	Jeeps	Tonga
7.45 -8.45 am to V	11		18	21	6		3	1	11	
From V	9	1	21	68	3	1	2	3	15	
11.15am - 12.15pm to V	55	11	70	133	12	4	7	9	23	
From V	40	8	45	90	9	1	4	12	17	
4-5 pm to V	23	6	40	77	11	4	3	6	26	
From V	40	3	80	60	12	2	6	3	33	

Off season

Timing	Car	Rickshaw	Bike	Cycle	Bus	Tempos	Trucks	Jeeps	Tonga
9.51 – 10.51 am to V	41	53	128	22	11		31		2
From V	40	49	140	22	30		87		2
5.15 -6.15 pm to V	23	47	125	27	8		53		1
From V	52	64	112	15	39		84		1

Table 6.21 Peak and Off season Counts established at Vajreshwari for various modes

Ganeshpuri Station Point - Peak

Timing	Cars	Rick (big)	Rick (small)	Two wheelers	Bus st	Bus pvt.	Tempos	Trucks	Jeeps	Tonga
7.45-8.45 am to G	34	1	41	110	5	1	2	3	20	
From G	30	2	39	84	4		1	1	26	
11.15am-12.15pm to G	41	8	52	103	10			1	15	
From G	36	3	59	112	10	2	3		25	
4-5 pm to G	33	1	48	90	11	2		1	37	
From G	35	3	64	98	12	1		1	26	

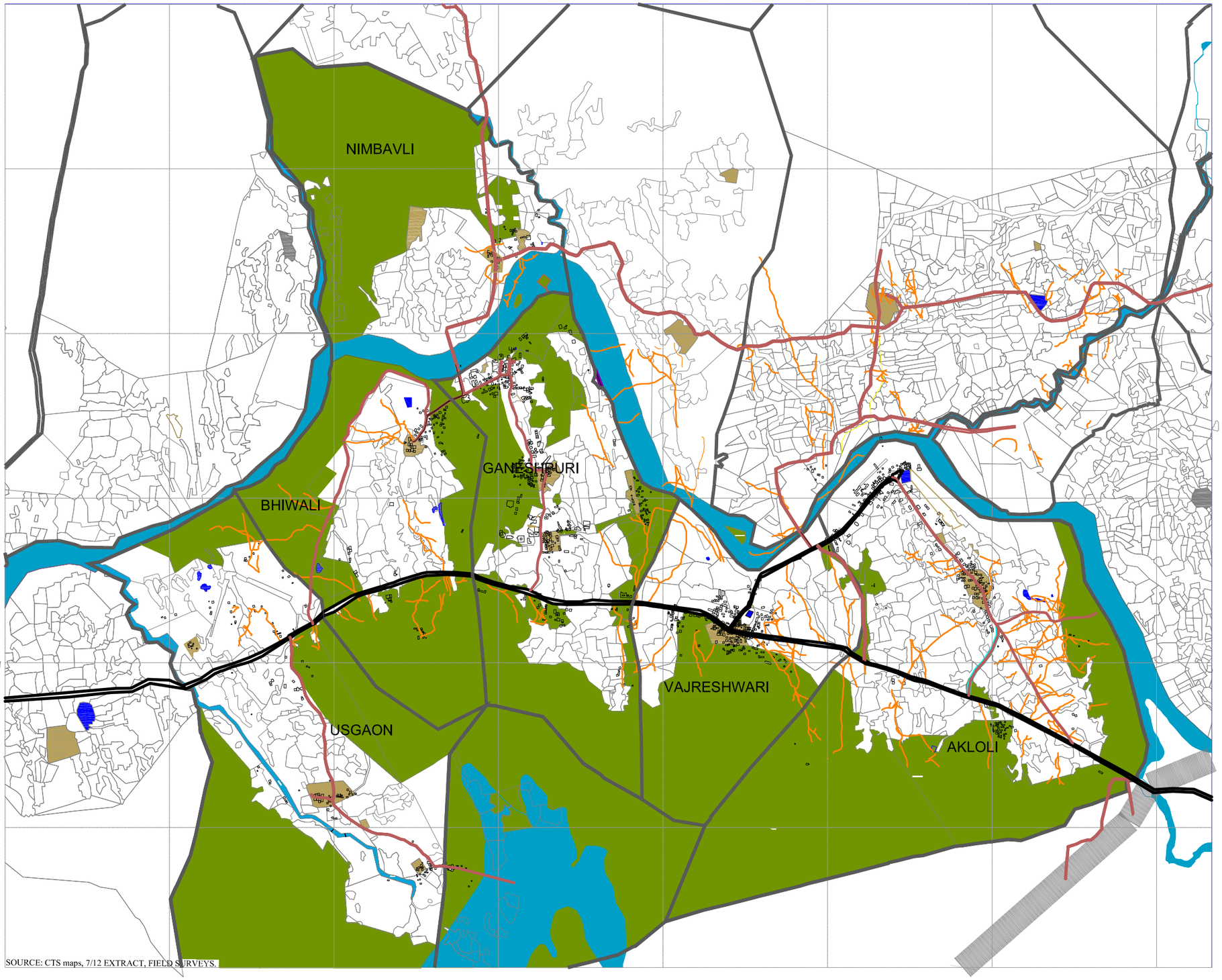
Off season

Timing	Cars	Rickshaw	Bike	Cycle	Bus	Tempos	Truck	Jeep	Tonga
5.15-6.15 pm to V	31	48	99	9	12		43		
To highway	57	64	97	12	14		27		
9.51-10.51 am to V	37	53	127	22	19	10	29		1
To Highway	45	49	110	25	33	11	81		1

Table 6.22 Peak and Off season Counts established at Ganeshpuri for various modes

Parking Infrastructure

There are separate designated parking areas in Vajreshwari and Akloli, however in Ganeshpuri the parking area is around the temple complex is insufficient which results in cars and buses being parked all along the internal roads. The parking areas at Vajreshwari and Akloli are also insufficient during festival days as cars are parked along the river within the flood plain in Akloli and along the SH40 in front of the Vajreshwari temple.



SOURCE: CTS maps, 7/12 EXTRACT, FIELD SURVEYS.

STATE HIGHWAY
The state highway SH40 of width 9 M is the main arterial road that connects the RTDZ with the state outside. The gram panchayat roads branch out from this highway road.

ZP ROADS
The ZP roads, of an average of 31/2 m wide built by the Zilla Parishad connect the various gram panchayats within the RTDZ. These are mostly tarred roads without electrification.

GP ROADS
The GP roads are or tarred/paved roads of a maximum of 3 m width. They run within all the Gram Panchayats. besides these there are kutcha roads all through the RTZ that lead to fields, smaller padas etc.

STATE HIGHWAY

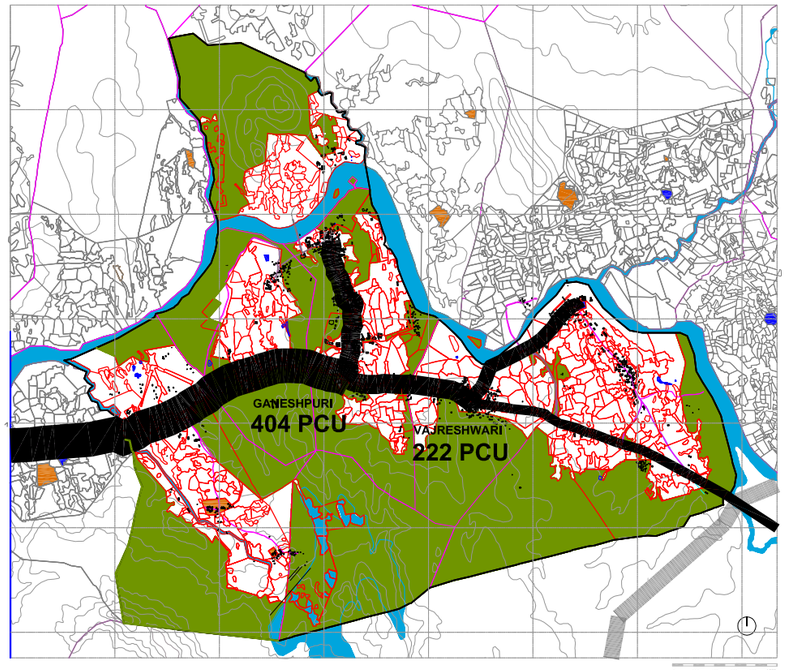
ZP ROADS (BETWEEN GRAMPANCHAYATS)

(KACHCHA ROADS
- WITHIN GRAM PANCHAYATS)

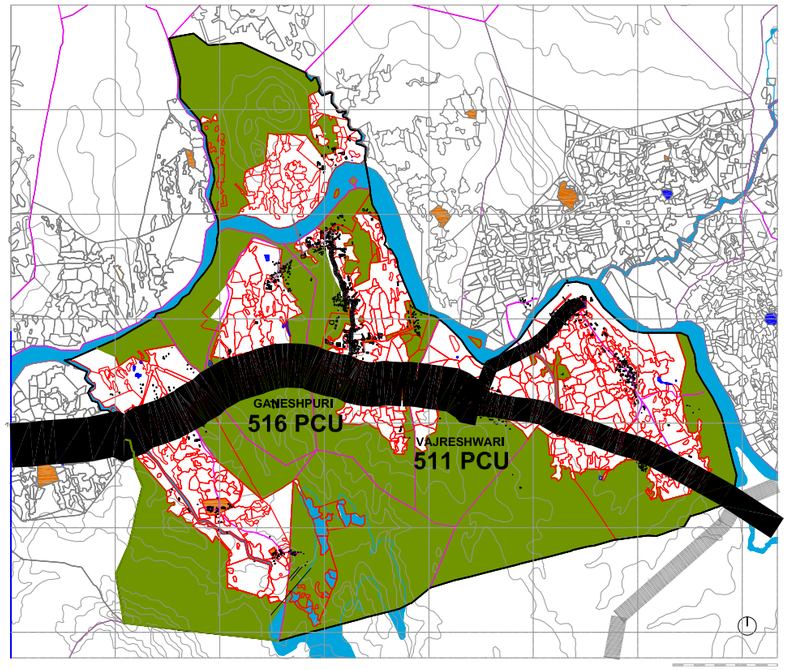
CORE ZONE: EXISTING MOVEMENT- HIERARCHY OF ROADS

0 200 500 1000 M

6.15

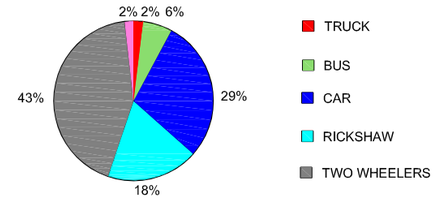


Peak season PCU count , morning 7-8 am.

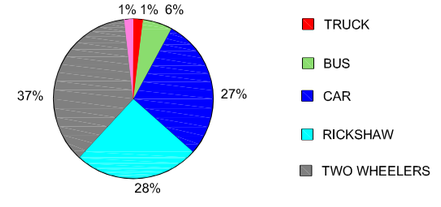


Peak season PCU count , evening 4-5 pm

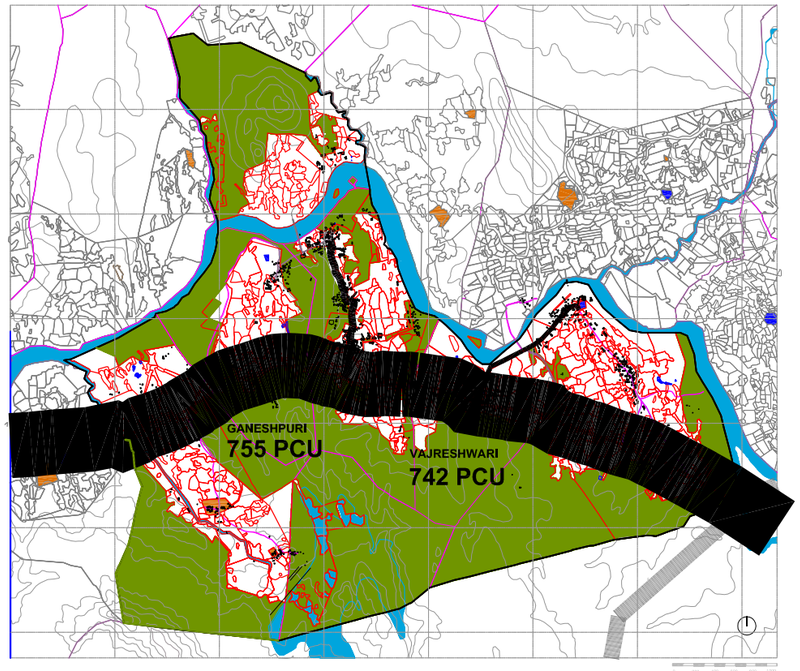
MODAL SPLIT (BAR CHARTS)



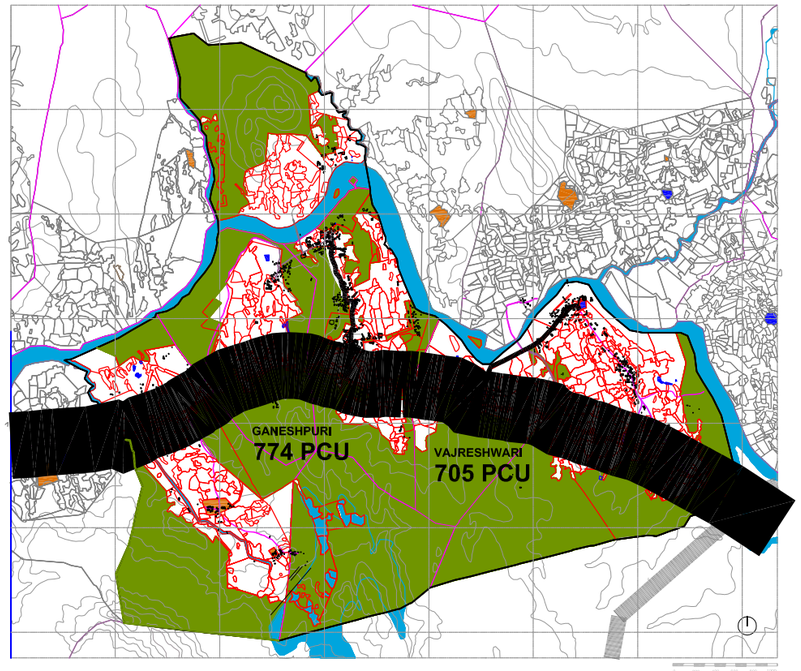
GANESHPURI Peak season, morning 7-8 am.



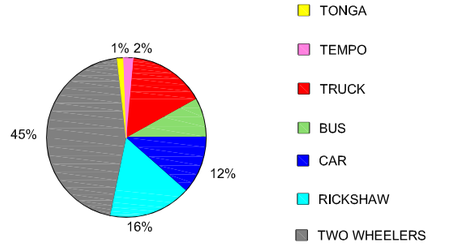
VAJRESHWARI Peak season, evening 4-5 pm



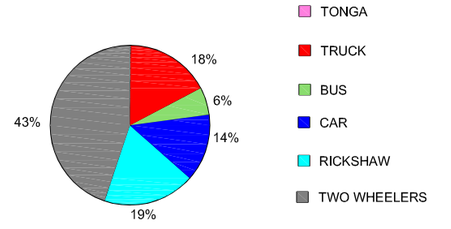
Off season PCU count, morning 9-10 am



Off season PCU count, evening 5-6 pm

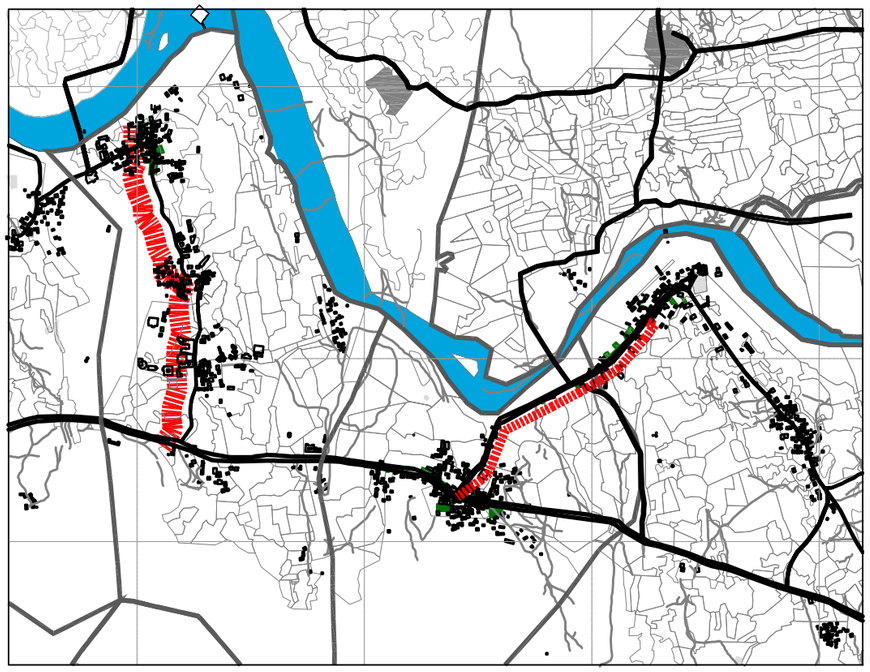


GANESHPURI off season, morning 9-10 am

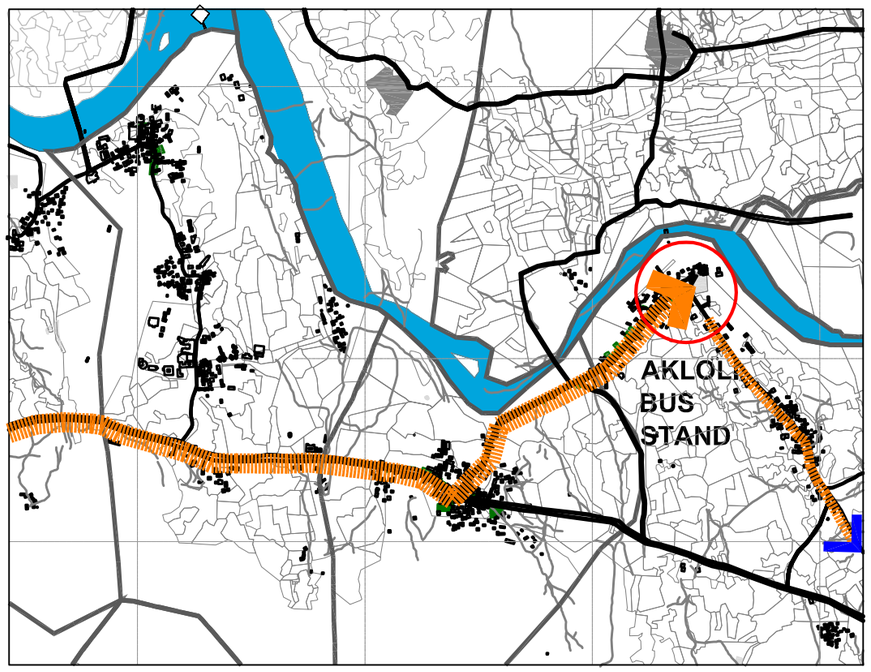


VAJRESHWARI Off season, evening 5-6 pm

The PCU counts for peak and off season morning and evening times and the corresponding modal split have been indicated on this sheet

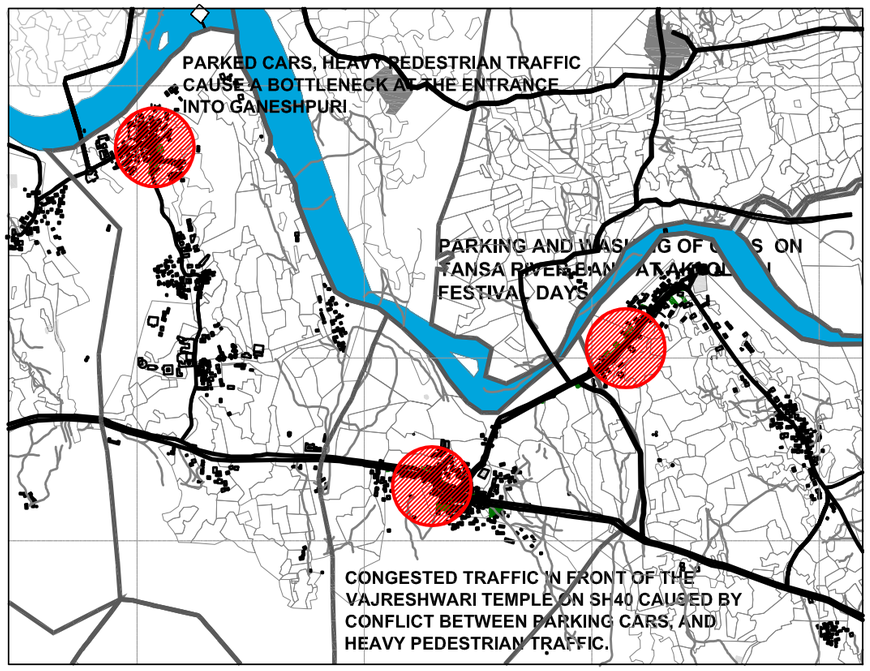


Heavy pedestrian movement on festival days

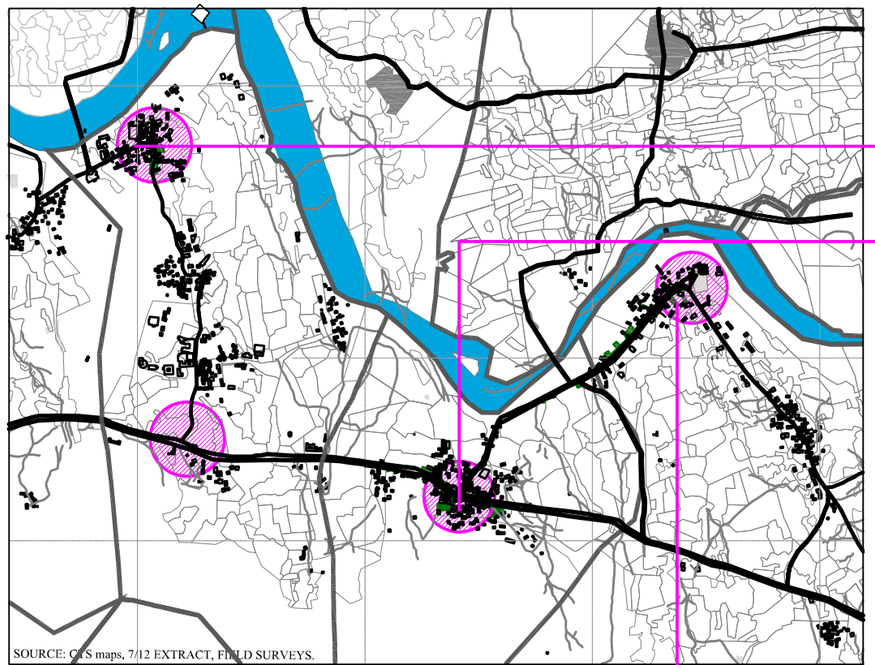


Diverted bus route on peak days

A major bottleneck occurs at the entrance near the Bus Station where visitors are dropped off where turning and stopping vehicles create traffic jams. At the peak hours on Gurupoornima at 10:30 am, this conditioned worsened and it was observed that the State Transport buses were unable to enter Ganeshpuri, and villagers and devotees alike had to walk up the 1.5 kilometers to Ganeshpuri temple.



Parking spaces on peak days



Congestion points

The access to parking facility at Vajreshwari temple is on the hill slopes and is accesses by a narrow inclined road that makes for difficult and slow traffic, causing congestion at the temple junction. Several private parking facilities are provided by the nearby villagers for which they charge a parking fee.

Within Akloli, during festival season, cars are parked directly on the river bed and in the fields, and washed in the river.

LEGEND:

- ROADS
- KACHCHA ROADS
- HEAVY PEDESTRIAN MOVEMENT ON FESTIVAL DAYS
- DIVERTED BUS ROUTE ON PEAK DAYS
- CONGESTION POINTS
- PARKING SPACES ON PEAK DAYS

CORE ZONE: EXISTING MOVEMENT-TRAFFIC CONGESTION ON PEAK DAYS

0 200 500 1000 M

Public Transport Infrastructure

There are auto stands located around the bus stands at Akloli and Ganeshpuri in undesignated areas along the road. The autos provide for mainly internal transport to nearby main junctions on a sharing basis. 10 seater auto rickshaws form the major mode of transport between the adjacent villages for the locals.

State Transport buses ply between the bus stations at Ganeshpuri and Akloli to all the major bus depots within the region connecting the area to the urban areas of Mumbai, Vasai and Wada.

The main state transport bus stops are at Alkoli and Ganeshpuri with a major stop being Vajreshwari. The main destinations are from Akloli and Vajreshwari with 12 buses a day, Kudus with 3 buses a day and Khambala with 3 buses a day.

The main destinations from Ganeshpuri are Vasai with 16 buses a day, Navghar with 12 buses a day, Nallasopara with 9 buses, Arnala with 15 buses a day, Vajreshwari with 12 buses a day and Bhiwandi with 15 buses a day.

The Bus service being infrequent, most of the local trips and trips to Vada, Bhiwandi and Vasai have to be made through a combination of several modes such as the 10 seater autos, autos and ST buses.

On weekends and peak days, the bus frequency from nearby towns such as Vasai is insufficient to handle the demand, leading to long waits for tourists and overloaded buses.

AKLOLI	
Destination	Time
Gorha	6.35,
Vajreshwari, Vasai	6.50, 7.15, 8.20, 9.00, 9.25, 11.00, 11.30, 12.30, 13.15, 14.10, 19.00, 21.30.
Jawhar	7.35, 9.45.
Ghodmal	8.00.
Kandli	8.30, 14.30.
Kudus	9.25, 15.35, 16.05.
Sinner	9.15.
Khambala	10.30, 13.50, 18.30.
Kowadi	12.20.
Ambadi	12.50, 15.05.
Aavthe	16.30.
Palsai	18.00
Chambala	19.30

Table 6.23 Public transport Frequency to different villages from Akloli ST Bus depot.

Issues and in relation to movement infrastructure:

a. Congestion on peak days *(Refer plate no.6.17)*

On festival days, the number of vehicles entering the village overloads the road and parking infrastructure. As observed in the following plates, there are bottlenecks and congestion points at the major junctions of Ganeshpuri and Vajreshwari. At the ST stand junction in Ganeshpuri due to parked cars all along the main road, cars are forced to take a turn at the junction creating congestion. The ST buses cannot enter Ganeshpuri at all during these times and pilgrims have to walk to the temple complex from SH40.The congestion is worsened by insufficient road widths and spillovers of commercial activities onto the roads near tourism spots such as the temples and the kunds. In the event of fire or medical emergencies it would be impossible for a fire truck or other emergency vehicles to enter the villages during peak hours on festival days.

b. Inadequate Parking spaces on peak days

During peak times the parking spaces for private cars as wells as for auto-rickshaws are inadequate. It leads to parking on the streets as well as near the river bank.

c. Lack of safe pedestrian zones

Especially in peak festival season the pedestrian have to compete with the vehicles and auto which freely enter the precinct creating chaos and congestion.

6.1.6. Existing Institutional Framework

There exists a complex network of institutions in the area. The area is under jurisdiction of not only the local bodies but also of the State and Central Government bodies. *Plate no. 6.18* indicates the hierarchies of institutions at local, state and central levels. In this chapter the capacities of these institute, the function they are involved in visa vis the RTDZ need to be understood. Also their involvement with the environment will be studied in detail. The various institution at the local, state and central level are as follows:

Gram Panchayats (GP):

At the bottom of the Pyramid exists the Gram Panchayats (GP) governing the 'Gaothans' or the villages. The GPs are autonomous institutions having the power to govern in an exclusive area of jurisdiction. They have the power to levy, collect and appropriate suitable local taxes. In the RT Zone the GPs are collect property tax (Ghar Patti), water charges, etc. Water, solid waste sewage disposal and street lighting are managed by the GPs. The GP are also authorized to prepare the development plan for the village with participation of the local people and communities. *Table 6.24* maps the functions, tax collections, project implemented and proposed, staffing capacities of the Gram Panchayats of the RTDZ villages.

From the *Table* 4.25 it is evident that some of these Gram Panchayats like Akloli are very proactive and are efficient in performing their basic duties. It has the capacities to initiate and implement projects. However some like Nimbavali are smaller in size and cannot match the other Gram Panchayat in their capacities. It has been observed that due to lack of dumping grounds and proper sewage treatment plants, most of the waste generated by these gram panchayats in the RTDZ goes untreated. This has been dealt with in detail in the section on infrastructure. Some of the Gram Panchayats like Akloli have done commendable work in rural sanitation. However, barring a few, it has been observed that for most of the Gram Panchayats protecting environmental assets is a low priority.

INSTITUTIONAL FRAMEWORK FOR THE RTDZ

LOCAL LEVEL

VILLAGE PANCHAYAT

(VILLAGE / GRAM PANCHAYAT)

-Power to levy, collect and appropriate suitable local taxes
-Implements the development schemes of the village

- AKLOLI
- VAGRESHWARI
- BHIWALI
- USGAON
- GANESHPURI
- NIMBAVLI

PANCHAYAT SAMITI (TALUKA / TEHSHIL)

-Works for the villages of the Tehsil or Taluka
-It's the link between the Gram Panchayat and the district administration

ZILLA PARISHAD (DISTRICT / ZILLA)

Look after the administration of the rural area of the district

- BHIVANDI TALUKA
- WADA TALUKA
- VASAI TALUKA

STATE LEVEL

Grants for Projects ← MLA

CENTRAL LEVEL

MP → *Grants for Projects*

GOVERNANCE FRAMEWORK

MAHARASHTRA STATE FOREST DEPARTMENT (MSFD)

looks after the forest areas and governs the resources of the forest

MINISTRY OF ENVIRONMENT AND FOREST (MOEF)

MUMBAI METROPOLITAN REGIONAL AUTHORITY (MMRDA)

- its part of the planning area
- it can make policies for the whole region, some of which can impact the area

VASAI
BHIVANDI
WADA TALUKA

MAHARASHTRA STATE ROAD TRANSPORT CORPORATION (MSRTC)

- builds roads which can impact the area

MINISTRY OF RURAL DEVELOPMENT

- task of accelerating the socio-economic development of rural India

- Swarnjayanti Gram Swarozgar Yojana (SGSY)
- Pradhan Mantri Gramdoya Yojana (PMGSY)
- Swajal Dhara (Drinking Water Project)
- Rural Housing (RH)
- Sampoorna Gramin Rozgar Yojana (SGRY)

MAHARASHTRA POLLUTION CONTROL BOARD (MPCB)

monitors the pollution in the tansa river (trb)

MAHARASHTRA STATE TOURISM AND CULTURE DEPARTMENT

-has potential for making tourism schemes, and policies for the state tourism can affect the area

MAHARASHTRA JAL PRADHI KARAN (MJP)

- makes the plans to augment the domestic water schemes for the area

LEGISLATIVE

Grants for Projects ↓

EXECUTIVE

THANE DISTRICT COLLECTORATE

Grants for Projects ←

- DEPARTMENTS OF AGRICULTURE
- DEPARTMENTS OF INDUSTRIES
- DIASATER MITIGATION
- IRRIGATION DEPARTMENT
- LAND RECORDS
- RURAL DEVELOPMENT DEPARTMENT
- PUBLIC WELFARE
- TRIBAL WELFARE DEPARTMENT

GOVERNING BODIES

	Sources of Tax Collection by Grampanchyats	Amount of revenues generation per annum approx	Functions of Gram Panchyat	Systems Adopted and effectivity	Type of Projects	Estimated project Expenditures	Amount Spent in Projects	Present status of projects	No of Staff available	Expertise of Staff	Ability to initiate/prepare DP
Ganeshpuri	Ghar Patti tax Diva Patti Arogya Tax	10,00,000	Maintenance and Provision of basic services of gram panchyat roads, storm water drainage, street lighting, water supply. Solid waste collection and disposal is only carried on by Akloli gram panchayat	Road maintenance of GP roads is not adequate in most cases. Also some of the GP road are untarred and are in bad condition. Excepting Akoli sewage treatment facilities are not adequate in other villages	Housing under the Indira Aawas Yojna where each house is given Rs. 28000.		Central grants routed through the district Collectorate	Recently completed for 2008, Proposals for 2009	17	1Sarpanch + 1 Upsarpanch + 13 elected members + 1 Clerks + 1 Caretaker	
					Savings scheme under the Mahila Bachatgad Sanstha			Recently completed for 2008, Proposals for 2009			
Usgoan					Sub – Centre to Vajreshwari PHC		Grants Received from Zilla Parishad	Inaugration in July,2009			
					Housing under the Indira Aawas Yojna where each house is given Rs. 28000.		Central grants routed through the district Collectorate	Recently completed for 2008, Proposals for 2009			
					Savings scheme under the Mahila Bachatgad Sanstha			Recently completed for 2008, Proposals for 2009			
Bhivalli					Housing under the Indira Aawas Yojna where each house is given Rs. 28000.		Central grants routed through the district Collectorate	Recently completed for 2008, Proposals for 2009			
					Savings scheme under the Mahila Bachatgad Sanstha			Recently completed for 2008, Proposals for 2009			
Nimbavli	Ghar Patti tax Diva Patti	1,00,000			Jalswaraj Yojna	Rs. 40,00,000 – 60,00,000	Funded by World Bank		11	1Sarpanch + 1 Upsarpanch + 5 elected members + 1 Clerks + 1 Caretaker	
					Housing under the Indira Aawas Yojna where each house is given Rs. 28000.	Rs. 28,000 received in yr 2008.	Central grants routed through the district Collectorate	Recently completed for 2008, Proposals for 2009			
					Savings scheme under the Mahila Bachatgad Sanstha			Recently completed for 2008, Proposals for 2009			

	Sources of Tax Collection by Grampanchyats	Amount of revenues generation per annum approx	Functions of Gram Panchyat	Systems Adopted and effectivity	Type of Projects	Estimated project Expenditures	Amount Spent in Projects	Present status of projects	No of Staff available	Expertise of Staff	Ability to initiate/prepare DP
Akloli	Ghar Patti tax Diva Patti, Arogya Tax Water tax	3,00,000	Same as above	Same as above	Primary School initiated by Gram Panchayat	Rs. 6,00,000	Grants received from Zilla Parishad	Recently Completed	11	1Sarpanch + 1 Upsarpanch + 5 elected members + 2 Clerks	Akloli has initiated the preparation of a Development Plan in the year ?
					Proposal for riverfront ghats development		Gram Panchayat approached Zilla Parishad for grants	Proposed			
					Housing under the Indira Aawas Yojna where each house is given Rs. 28000.		Central grants routed through the district Collectorate	Recently completed for 2008, Proposals for 2009			
					Savings scheme under the Mahila Bachatgad Sanstha	5 Bachatgads		Recently completed for 2008, Proposals for 2009			
Vajreshwari	Ghar Patti tax Diva Patti, Arogya Tax Water tax	4,00,000			Projects done under the Gramin Rojgar Yojna				15	1Sarpanch + 1 Upsarpanch + 9 elected members + 1 Clerks + 1 Caretaker	
					Swacchata Abhiyan	Receive cleaning materials and equipments					
					Digging Borewells under Dashalaksha Viheer Yojna						
					Housing under the Rajiv Gandhi Niwas Yojna						
					Savings Schemes under the Daridray Reshekhaleel Bachat Gatanna Arya Sahasya						
					Loan schemes given to BPL in groups of 5-20 families to start small scale industries under the Swarna Jayanti Gram Yojgaar Yojna	Rs. 25,000–1,25,000 for a group with a maximum of Rs. 10,000 per family					
					Housing under the Indira Aawas Yojna where each house is given Rs. 28000.		Central grants routed through the district Collectorate	Recently completed for 2008, Proposals for 2009			
					Savings scheme under the Mahila Bachatgad Sanstha			Recently completed for 2008, Proposals for 2009			

Table 6.24 : Study of the grampanchyat capacities. Source: Interviews at Gram Panchayat Offices, Akloli, Ganeshpuri, Vajreshwai, Nimbavli, 2009.

Office of the Tahsildar:

The Core Zone falls in a region which is being governed by 3 Tahsils; namely, Bhiwandi Tahsil, Vada Tahsil and Vasai Tahsil. The tahsil office is headed by the 'Tahsildar', who is also the custodian of all the land records for his jurisdiction. The Tahsil offices prepare Micro-level Development Plans for the entire Tahsil Area. They also channelise flow of grants-in-aid to the villages from the State Grants or Central Government Schemes. The *Table 6.25* lists down the type of projects being implemented by the Panchayat Samati

Areas of concern	Type of Projects being Implemented	Specific Projects in RTDZ
Minor Irrigation projects	The irrigation department of the Panchayat Samiti are involved in the consctruction of numerous check dams in the influence area.	
Infrastructure Augmentation – Roads, Toilets, Garbage,	The Construction Department in the Panchayat Samiti has suggested projects for the augmentation of roads, provision of toilets and garbage bins and construction of ghats along river bank for Akloli, Vajreshwari and Ganeshpuri. Drawings and proposal for each is shown in *Plate no 4.33*	Projects mentioned are specific to the RTDZ
Water Supply Augmentations	For the three villages of Akloli, Vajreshwari and Ganeshpuri the Panchayat Samiti is considering a proposal to augment the water supply by tapping the ground water.	Projects mentioned are specific to the RTDZ

*Table 6.25 Projects initiated by the Panchayat Samiti*Source: Panchayat Samiti, Wada and Bhiwandi, 2009

Thane District Collectorate:

The office is empowered to formulate rules and regulations regarding land-use and building construction in the region. The implementation and monitoring of the DP is also in the purview of Thane Collectorate. The Collectorate issues the licenses for the sand-dredging, quarrying and brick kiln activities in the region. The Collectorate offices are Departments for Agriculture, Departments for Industries, Disaster Mitigation, Irrigation Department, Income Tax Office, Land records, Rural Development Department, Public Welfare, Tribal Welfare Departments, etc. The implementation and monitoring of all the Central and State Government Schemes is managed at the Collector's office. It would be important to map the function of each of these Department, the schemes they implement so as to understand their implication on the RTZ.

	Projects currently implemented	Projects specific to RTDZ
Departments for Agriculture	1. Subsidized availability of seeds, fertilizers, farming equipments to farners. 2. Education to farmers on new methods of farming. 3. Donation upto Rs. 25000 to saving groups in villages to implement minor irrigation projects. 4. National level projects routed through zilla parishad for implementation of bio-gas projects by each family where each is given financial assistance upto Rs. 4000.	All the projects mentioned are applicable to farmers in the RTDZ
Irrigation Department	The department is involved in the construction of minor dams in the scale of 100 ha and more.	There is no specific project proposed for the RTDZ.
Rural Water Supply Department	Improvement of existing piped water supply system in these villages	
Rural Development Department		
Public Welfare		
Tribal Welfare Departments	The Tribal welfare department coordinates with the all the other department in the areas mentioned below: Welfare of Backward Classes- The main schemes focus towards education at various levels. Rural Water Supply- Dugwell, bore-well and pipe water schemes where 90% of financial assistance is given to beneficiaries. Health –The programs focus towards disease eradication, provision of meals and medicines, and strengthening of medical institutions. Education – Provision of elementary, secondary and adult education programs. Power Development – Electrification and non conventional energy resources. Roads Development - Irrigation – Provision of new roads Animal Husbandary - Control of diseases, construction of veterinary dispensaries, and livestock development. Fisheries – Fish seed production, fish farming in impounded water, development of fisheries co-operatives. Soil-Conservation – Contour/graded bunding with vegetative bunds, terracing, contour vegetative key lines, nala bunding, brushwood dams, earthen structure with vegetative bunds, loose boulder structures, gabion structures, diversion bandharas, underground bandharas, livecheck dams, farm ponds.	

*Table 6.26 Project initiated by the different department of the Thane Collectarate.*Source: Thane Collectorate

Mumbai Metropolitan Regional Authority (MMRDA):

The MMRDA is the Regional Planning Authority for the RTD Zone and only has a policy level function in this zone. The MMRDA is the authority which has designated this region as a Tourism Development Zone and framed broad development regulation for this zone. The MMRDA has funds to implement projects on heritage, environment through its Heritage and Environment Cell. The MMRDA also provides for funds to strengthen rural roads in the MMR region.

Forest Institutional Framework:

The forest governance is done at only two levels: (i) Centre – Ministry of Environment & Forests, and (ii) State – Maharashtra State Forest Department (MSFD). The Area under study has a Protected Forest Area and the Tungar Wildlife Sanctuary, both under the jurisdiction of the MSFD. The MOEFs role here is only at the policy, regulations and national forest schemes level.

Presently, at the local level, the responsibility of monitoring of the forest rests with the Range Forest Officers (RFO). The RFOs police the quarrying and sand dredging activities in the area, along with ensuring / safeguarding the bio-diversity of the Forests.

The Conservator of Forest, Forest Division is also headquartered in Thane. The Division office is responsible for monitoring and safeguarding of the forests, the Development and management plans for the Protected and Reserve Forests of the zone. The auction for sale of commercial rights for timber products, fuelwood, fodder, etc and also non-timber produce is conducted here.

The National Forest Policy 1988 states that it is difficult to manage forest at both the state and central level. There has to be devolution of powers to the locals as they often depend on the forests for their daily needs. The locals are also dependant on the forests for their livelihoods and thus it is essential to educate them about importance of conservation of forests. For this rationale the Policy states that a 'Joint Forest Management Committee' should be formed at the village level with 1 member each from every family in the village. The Working Committee should be on a rotational basis for a year, and ought to prepare the micro-level plans for the forests in their regions. In the villages of the RTDZ there is no such Joint management forest committee which leads to the over exploitation of the forest resources.

Maharashtra State Tourism & Culture Department:

The Tourism Department of the State Government is the body formulating the Tourism policy for the entire state of Maharashtra on the guidelines framed by the National Tourism Policy 2002. Monitoring, research, planning of any tourism related event and activities within the state are taken care off by the State Tourism Department. In the Maharashtra State Tourism Policy 2006, Action Plan for next 5 years focuses on the development of Cultural Tourism, Pilgrimage Circuits, Rural Tourism, Eco-Tourism, etc. The Policy also states that the same should be done through Public-Private partnership. Under this policy the Thane Collectorate had taken step to initiate a tourism development plan for the RTDZ in 2003. However this exercise was not carried further.

The Maharashtra Tourism Development Corporation Ltd. (MTDC) is a state owned public sector unit responsible for the development of the hospitality industry across the state. The MTDC owns rest houses, resorts and hotels across the state. The MTDC owns only one guest house in Akloli for the purpose of religious tourism.

Maharashtra Pollution Control Board (MPCB):

The MPCB has Field Offices situated in Thane and further Thane has 4 zones, i.e. Thane I, Thane II, Tarapur I and Tarapur II. This body has only a monitoring role and does not get involved in the implementation of projects. They do monitor the pollution in the Tansa River Basin at a few locations. There does not exist any local body managing the environment control agency at the local level.

Maharashtra State Road Transport Corporation (MSRTC):

MSRTC provides intercity and interstate bus services in Maharashtra and provide public transport infrastructure for the RTDZ to the rest of the region. The natures of connectivity that they provide have been detailed in the section on transport studies. Over the years the MSRTC has invested in developing the bus-stand in Akloli.

Issues

Through the study of the existing institutional frame work there are certain issues which need to be highlighted.

a. Disjunct between agencies which plan, prepare policies for the RTDZ and the local bodies

The present agencies in the RTDZ are either involved in managing the day today activity of the RTDZ, or plan for the region or prepare policy framework which would affect the region. For managing the routine activity of the gram panchayats the local agencies like the gram pantheist, zilla parishad, are making a reasonable attempt, though a lot of work needs to be done in augmenting water supply or create an effective system for waste management. However planning for the region and integrating the work of the local bodies has not met with any success. There seems to a complete disjunct between agencies which plan, prepare policies and the local bodies.

b. Lack of vertical integration between agencies e.g. in the dept. of irrigation

There is a lack of integration between agencies especially in the area of irrigation where the different scale of irrigation projects like the irrigation projects handled by the irrigation department of the collectorate office are not coordinated by the smaller scale projects handled by the panchyat samiti office.

c. Complete absence of local level participation in protection of environmental assets

There is no attempt to encourage local level participation in the management of environmental assets. In the case of forest though there is a framework in place to allow the participation of local bodies in forest management, no such attempt have been made for this region. The following *Plate 6.19* evaluates the existing institutional frameworks and shortfalls with respect to environmental management of the various environmental resources of the Core Zone.

d. Absence of any agency to control and regulate tourism activity in the region

There is no single agency which controls, regulates or monitors the tourism activity in the region.

CRITICAL ENVIRONMENTAL ASSETS

FORESTS

Forest (Conservation) Act (1972), The Wild Life (Protection) Act (1980),
Forest Policy of India (1988, Environment Protection Act (1986)

MINISTRY OF FORESTS, WILDLIFE AN D ENVIRONMENT

- FOREST CONSERVATION
  - Research & Training
  - Survey & Utilisation
  - Policy
  - Fire Protection
  - EAB
  - Forest Conservation
- WILDLIFE
  - Heritage & Parks
  - Wildlife Projects
  - Central Zoo Authority
- NATIONAL AFFORESTATION & ECO - DEV BOARD

National Afforestation Programme (NAP)

- Integrated Afforestation & Eco - Development Projects Scheme (IAEPS)
- Association of Scheduled Tribes and Rural Poor in Regeneration of Degraded Forests (ASTRP) *100% Centrally sponsored schemes*
- Conservation and Development of Non-Timber Forest Produce including Medicinal Plants Scheme (NTFP)
- Area Oriented Fuel Wood and Fodder Projects Scheme (AOFFPS)

REGIONAL DIVISIONS

STATE FOREST DEPARTMENT

- PRINCIPAL SECRETARY
- PRINCIPAL CHIEF CONSERVATOR OF FORESTS
- ADD. PRINCIPAL CHIEF CONSERVATOR OF FORESTS
- CHIEF CONSERVATOR OF FORESTS
- CONSERVATOR OF FORESTS
- DY. CONSERVATOR OF FORESTS
- DIVISIONAL FOREST OFFICERS
- ASSISTANT CONSERVATOR OF FORESTS
- ASSISTANT CONSERVATOR OF FORESTS
- RANGE FOREST OFFICERS
- FORESTERS
- FOREST GUARDS

Chairman

Mem Sec & CEO

FOREST DEVELOPMENT AGENCY

Excecutive Body

Ex-officio Members

District Development Officer,
District level Officers of agriculture, Rural Development,
Animal Husbandry,
Soil Conservation,
Tribal Welfare,
Industries, Public Health & Engineering, and Education Department

ADM/AC to be nominated by DC/DM

1 non-official representative to be nominated by the apex Institutional framework of Panchayats.

15 nominees from the JFMCs, to include minimum of 7 women.

General Body

Presidents of JFMC General Bodies, not more than 50 to be nominated by Chairperson on rotational basis for 1 year of which 20 would be women representatives.

If women chairpersons are not available, women representatives will be drawn from the Officers of members of the General Bodies of JFMCs.

One non-official representative to be ADM/AC nominated by the apex institutional framework of Panchayats.

Range Forest Officers

JOINT FOREST MANAGEMENT COMMITTEE

For Participatory Forest Management and assured usufruct benefits to the protecting community over forestlands

VILLAGE FOREST MANAGEMENT COMMITTEE

Although the importance of these linkages has been recognised, they have either not been established or strengthened. Development of these linkages through capacity building progammes and implementation of critical projects that could lead to afforestation needs to be undertaken on a priority basis

RIVERS AND WATER SHEDS

Coastal Regulation Zone

NATIONAL COASTAL ZONE MANAGEMENT AUTHORITY

- Dept. of Environment
- Impact assessment (MOEF)
- Min. of Urban Affairs
- MInistry of Tourism
- Min. of Agriculture
- Min. of Surface Transport
- Cent. Inst. of Oceanography
- Cent. Marine Research Inst.
- Center for Earth Sciences
- Experts

MAHARASHTRA COASTAL ZONE MANAGEMENT AUTHORITY

- Dept. of Environment
- Dept. of Rev. & Forests
- Urban Dev. Dept.
- Experts

Within the existing institutional and policy framework there exists no protection for the rivers but at the district level work is being done by the irrigation department to construct dams on these river for agricultural purposes

Similarly at the local level there is work done to build check dams on these streams so that they provide water for agriculture.

GROUND WATER

Water Act (1974), Air Act (1981)

MINISTRY OF WATER RESOURCES

CENTRAL GROUND WATER BOARD

- Survey and Monitoring
- Sustainable Management
- training & Technology
- Exploratory Drilling

- REGIONAL OFFICES
- DVISIONAL OFFICES
- STATE UNIT OFFICES

The existing institutional set-up surveys and monitors gorund water at the national and state level. However, the district, urban and rural plans have never been integrated with these surveys and analysis.

This has led to piece meal projects of augmenting water supply.

GEOTHERMAL ZONE & HOT SPRINGS

MINISTRY OF MINES

GEOLOGICAL SURVEY OF INDIA

The Geological Survey of India maps and monitors hot springs in this region.

- Survey and Monitoring
- training & Technology
- Exploration

- REGIONAL OFFICES
- DVISIONAL OFFICES
- STATE UNIT OFFICES

There is no local level framework to protect these hotdprings. However there are plans prepared by the Panshayat Samiti to enclose these hot springs by constructing concrete/ stine beds

CENTRAL GOVERNMENT LEVEL AGENCIES

STATE LEVEL AGENCIES

DISTRICT LEVEL AGENCIES

LOCAL GOVERNMENT LEVEL AGENCIES

EXISTING INSTITUTIONAL FRAMEWORKS FOR MANAGING ENVIRONMENTAL ASSETS

CHAPTER 7 EMERGING ISSUES AND STRATEGIES

There are three set of parameters the study has been able to establish. One is the regions rich environmental assets (forests, watersheds and geo-thermal springs), actors and agencies who play an important role in the RTDZ and the existence of the tourism and agrarian economies. These relationships and link to each of these identified aspects need to the understood to establish the concerns which this region faces. These are the local population composed of farmers and tribal who are primarily involved in the agrarian economy. Then there are the powerful group of the religious trusts, hotel owners and migrant worker who play an important role in the tourism economy. The farmers and tribal who are involved in the agrarian economy are not so well of as agriculture is not so strong in this region. Consequently they do not have any economic surplus which they can invest to participate in the tourism economy. However these are the group who understand and have a positive relationship with the local environment better than the other group composed of the religious trusts, hotel owners or the migrant workers. The relationship of the religious trust to the geothermal springs is not so constructive. The attempt by them is to make these spring exclusive and accessible to their own devotees. Thus as long as we are not able to encourage local participation in the economy as well as create institutional framework to allow them to participate in safeguarding in the environment, the development driven by tourism would not be sustainable. (*Plate 7.1* explains the relationship between the three parameters established through the study)

Thus the major concerns arising out of this study recapitulated as below :

- The stresses which are being experienced by the environmental assets in the Influence Zone pose are a threat to the ground water system, geo-thermal springs, and bio-diversity in the RTDZ. This in turn is a threat to the rich history, heritage and ambience of the RTDZ for which tourist activity have flourished in this region.

- The other area of concern is the negative impacts of tourism due to unregulated building activities, encroachments in environmentally sensitive areas, uninhibited accumulation of land by vested interest, unorganized traffic systems and lack of infrastructure.

- Agriculture not being economically lucrative has led to no surplus with the local population who have consequently no participation in the tourism economy. Often they end up selling their agricultural land for non agricultural purposes like the opening of resorts and hotels.

- Absolutely no local level institutional frameworks available for addressing issues of environment or tourism.

RELATION SHIP OF LOCAL ACTORS AND AGENCIES WITH PREDOMINANT ECONOMY AND ENVIRONMENTAL RESOURCES

FORESTS

The local community primarily comprising of the tribal population has a strong dependence on the forests of the area.

RIVERS AND WATERSHEDS

THERMAL SPRINGS

ENVIRONMENTAL ASSETS

Local governments have done considerable work on watershed management by building small check dams. However they play no active role in the protecting the forests or the thermal springs

The religious Trusts often implicitly restrict public access and use of the thermal springs that lie on their lands through building enclosures and surveillance.

AGRICULTURAL LABOURER

TRIBALS

CULTIVATORS

LOCAL GOVERNMENTS

HOTEL OWNERS

RELIGIOUS TRUSTS

MIGRANTS IN THE TOURISM INDUSTRY

The local community are primarily involved in the agrarian economy and play a negligible role in the tourism economy.

Although local governments are working towards strengthening the agricultural economy more investments into infrastructure need to be made to make it economically viable.

IMMEDIATE ACTORS AND AGENCIES

AGRARIAN ECONOMY

The agrarian economy suffers from a lack of investments into irrigation and related infrastructure.

TOURISM ECONOMY

The Tourism driven economy in this region has led to pressure on agricultural lands in area; these being used for non agricultural purposes.

PREDOMINANT ECONOMIES

From the above study we need to form a set of strategies to address the above issues which are of concern. They need to be a set of recommendation for creating policy frameworks, identifying a set of projects and creating a possible institutional framework which needs to be detailed for the influence area and the RTDZ. The areas where the above strategies need to be framed are:

- Management and Protection of Environmental Assets in the Influence Zone
    1. Protection of hot-springs
    2. Watershed management and restoration plans
    3. Augmentation of forest protection especially in fringe areas.
- Regulation and Control of Activities arising out of Tourism
    1. Additional controls on zoning
    2. Augmentation of existing building regulations
    3. Traffic Management Plan
- Augmentation of existing infrastructure- water, solid waste, sanitation and storm water.
- Augmentation of the agrarian economy.
- Prioritizing Activities identified in the earlier sections
- Creating an institutional framework.

The part three of this study would detail the above recommendations.