

LAND USE

4.1 INTRODUCTION

In the entire gamut of activities of development planning land use planning forms a vital component, as it is on to it that various activities of human subsistence adheres on to. Land forms the essential canvas for the activities of man in any settlement. The suitability of the land for these functions varies greatly over the world. Landscape units, as natural resources units, have dynamism of their own, but human influences affect this dynamism to a great extent, in space and time. The qualities of the land for one or more functions may be improved (for instance, through erosion control measures), but more often than not the land has been or is being degraded by human action. Present trends in land use amply suggest the existence of collisions between the desires of the human population and natural ecological processes. This makes it imperative to assign uses to it in the most judicious manner so that its most productive and sustainable use is assigned to it.

In the light of the above discussions it is evident that for any physical development planning, it is imperative to comprehend the linkages existing between different components of urban environment. This entails collection of data on varied aspects of urban environment, converting them into useful information and linking it to various administrative, planning/hierarchical units. Hence it is necessary to have a spatio-temporal database on land in the control area. This database should include the amount of land available and its tenure; the quality, potential productivity and suitability of the land; the level of technology used to exploit the land resources, the population density, and the needs and standards of living of the people. Each of these factors interacts with the others. To meet these requirements, land use planning aspects of development plan includes the following:

1. *An updated Base map*
2. *Existing Land Use Map*
3. *Growth directions*
4. *Land Suitability analysis to guide new development in the plan period*

In the case of SMKMC, as it involves the planning for an existing city rather than on clean slate for a new town, it is necessary to have a updated base map and existing land use map to minimize planning blights. This would ensure that no citizen's land is put in distress. The ELU also gives an opportunity to understand people's requirements. It enables the planner to be not only realistic to the trends, but also restrains him from a drastic approach. The ELU should be read in conjunction with other surveys carried out for the study, as it is a manifestation of the socio-economic forces of the urban dynamics existent in the city.

In the present task, as per the TOR requirements base map and Existing Land Use Map have been prepared using Remote Sensing data in the form of satellite imagery and aerial photographs procured from National Remote Sensing Agency (NRSA), Hyderabad and interpreted by experts at Space Application Center, Ahmedabad. The methodology of use of this data is described in the respective sections of this report. Care has been taken to incorporate features from revenue maps, depiction of wards and Prabhag Boundaries, incorporation of features missing in revenue maps and SMKMC maps. Ambiguity in assigning land uses has been clarified by discussions with the officials from the Office of the Deputy Director, Town Planning Dept and from that of SMKMC.

4.2 OBJECTIVES.

In order to prepare a development plan it is necessary to study the urban sprawl, existing land use, demographic pattern, socio-economic setting, and resources availability and constraints in a spatial format. It is helpful to create a computerized database for better storage and easy retrieval. Therefore the following tasks have been identified.

Complying to the T.O.R requirements of the WO no SMKMC/TP/153/2000-2001/`Preparation of Development Plan for SMKMC,'the following objectives were sought to be achieved in this task phase:

- to prepare a base map of the entire administrative area of Sangli-Miraj-Kupwad Municipal Corporation in a scale of 1:10000
- to prepare urban land use maps on 1:10000 Scale of the area(1:2000 scale for Gaonthan areas).
- To prepare contour maps of 10m interval
- To develop a user-friendly menu-driven database of the above output using GIS technology.

4.3 REMOTE SENSING AND GIS TECHNOLOGY

Planning practices in the past have shown certain shortcomings in regard to duration elapsed in acquisition and aggregation of requisite data by conventional surveys, limitations in processing of data due to absence of faster spatial-non spatial linkage processing devices and slow generation of graphic outputs. With advancement in the frontiers of Remote Sensing and Information Technology these shortcomings have been put at the back burner through tools such as Satellite Imagery and Geographical Information Systems. Use of these tools provides reliable, accurate, timely, periodic data and methods of integration of spatial and non-spatial data to create various planning scenarios for decision-making.

4.3.1 Remote Sensing

Remote Sensing is the science of making inferences about material objects from measurements, made at a distance, without coming into physical contact with the objects under study. Currently the term remote sensing is used more commonly to denote identification of earth features by detecting the characteristic electromagnetic radiation that is reflected and or emitted by the earth surface. Every object reflects/scatters a portion of the electromagnetic energy incident on it depending upon its physical properties. In addition objects emit radiation depending on their temperature and emissive. If we study the reflectance/emittance of any object at different wavelengths, we get a reflectance/emittance pattern, which is characteristic of that object – this is called 'Spectral signature'. It is like fingerprints. Just as we are able to use the fingerprints to identify a person, the spectral signatures enable, in principle, to identify the objects. Visual perception of objects is the best example of remote sensing. We see an object by the light reflected from the object falling on the human eye. Here, eye is the sensor and the nervous system carries information to the brain, which interprets the information in terms of the identification and location of the objects seen. Modern remote sensing is an extension of this natural phenomenon. However, apart from visible light, the electromagnetic radiation extending from the ultraviolet to the far infrared (IR) and the microwave regions are also used for remote sensing of the earth resources.

Large scale aerial photography are useful for urban planning. However considering logistic problems in acquiring data and obtaining the clearance and the need for mosaicing a large number of

photographs, they are not useful for perspective plan generation. Hence natural resources survey is largely dependent on orbital remote sensing data utilization.

Although Remote sensing lends the advantages of faster resourcing of authentic spatial data, it has the inherent limitation of non depiction of administrative units such as Revenue boundaries unless made visible by features on ground.

For the present task Remote Sensing applications have been used in the form of LIS III data procured from National Remote Sensing Agency, Bangalore and interpreted by experts at Space Application Center, Ahmedabad

4.3.2 GIS Technology

A Geographic Information System is an integration of computer hardware and software which can create, manipulate, and analyze a geographically referenced data base to produce new maps and tabular data. GIS includes the capabilities of Computer Aided Design (CAD) and Data Base Management Systems (DBMS), but is more than just a combination of those systems. In a GIS, a relationship between the graphic map data and the tabular data base is maintained so that changes to the map are reflected in the data base. GIS allows automatic determination of the relationships between maps, and can create new maps of those relationships.

GIS allows users to view, update, query, analyze, combine, and manipulate map data. It can take information from different map and tabular sources and register them to a desired base. It can manage large collections of natural resource and environmental data and the complex data sets needed for urban studies. It can overlay maps to eliminate or include areas based on multiple layers of tabular criteria. It can automatically generate buffers around features like sensitive land use types.

The traditional method of preparing and analyzing environmental and planning maps has been to overlay thematic maps manually to choose areas of coinciding constraints and opportunities. These spatial information compiled from various departments are usually in various scales and forms, creating problems in manual overlays. The more layers of maps included in the analysis and the more complex they are, the more the likelihood of human error entering the analysis and the longer the process takes. The GIS can take maps from different sources and register them easily and is consistent in its analysis of multiple layers of map data. It is also faster than manual methods of analysis, allowing the flexibility to try alternate variables in analysis. Due to the use of automated systems, the data can be stored in compact forms and the output generated easily on the requisite scales and graphic forms. The information generated can be for various heirarchial units such as districts, planning area etc. Rapid and analytical testing of conceptual models about geographic area can be carried out in less time. The ultimate goal of a GIS is to support decision making in natural resources and environment management, urban and regional planning, and any other activities which have a spatial context. The GIS technology's ability to carry out spatial operations, linking data sets together lends it the advantage to be employed for a multitude of tasks. It can answer queries on Location, Condition, Trends, patterns, Modelling, Aspatial questions, Spatial questions.

4.4 DATA USED

The data used for the task is listed below:

- 1 Remote Sensing and Aerial Photograph Data
3 scenes of satellite imagery and 4 aerial photographs of the area were procured from National Remote Sensing Agency. The False Colour Composite images (FCC) was of IRS

ID dated 17.5.2001 for 16°45'-17°00' North Latitudes and 74°30'-74°45' East Longitudes

Aerial photograph data consisted of IRS ID Geocoded PAN chromatic image was of 12-14.6.2001 corresponding to 16°45'-16°55' North Latitudes and 74°30'-74°40' East Longitudes

These scenes covered the entire study area.

2. Survey of India (SOI) topographic maps
SOI topographic maps on 1:50,000 scale (47 L/9) cover entire SMKMC area. These maps were prepared on the basis of survey conducted in the year 1972-73 and 78-79.
3. Revenue Maps
The Revenue maps covering the following areas, showing plot boundaries with survey numbers were also used in the study:
 - i. Mauje Sangalwadi
 - ii. Kasbe Sangli
 - iii. Mauje Kupwad
 - iv. Mauje Wanlesswadi
 - v. Kasbe Miraj
 - vi. Mauje Miraj 1
 - vii. Mauje Miraj 2
4. Map of SMKMC area prepared by SMKMC
5. Maps prepared in-house by Topographical Surveys of Gaothan areas
6. Maps prepared in-house by Topographical Surveys of Gunthewari areas
7. City Survey Maps of selected areas
8. Maps of Sanctioned D.P. (1978) from Town Planning Deptt
9. Maps of T.P. schemes from Town Planning Deptt
10. Soil map
District soil map prepared on 1:250000 scale and printed on 1:500000 scale was obtained from NBSS & LUP, Nagpur and data related to soil depth, soil texture, soil series etc. has been taken from this map for integrated analysis.
11. Hydro geomorphology maps of the district obtained from NBSS & LUP depicting geology, hydrology
12. Data on Land Values

4.5 SURVEY PERIOD

The in-house physical surveys for Gunthewari and Gaothan areas were conducted during June-October 2001.

The ground truthing and sample land use surveys were conducted during September 2001-January 2002.

4.6 METHODOLOGY

The methodology involved in the base map and Existing land Use map preparation tasks are outlined below:

4.6.1 Generation Of Spatial Framework

Grid coverage has been generated with the help of 20 registration (tic) points. Co-ordinate transformation has been done with respect to polyconic projection as SOI graticule has been adopted for the study area. Digitizing the SMKMC boundary has generated a mask. The mask has been integrated with the template. The template consisting of entire on a SOI map basis or grid basis. This spatial framework has 12 grids covering the entire SMKMC area along with its 5km buffer zone.

A digital database was created by digitizing all the thematic maps using the spatial framework. The primary and secondary (derived) data sets of the study area are presented in Table – 2. All the data set listed in Table 2 have been designed and organized properly. Integration analysis has been carried out by various GIS analysis modules like union, intersect, buffer, clip, erase, dissolve, statistics etc.

Table 4.1 : List of primary and secondary data sets.

No.	Item	Coverage Name	Feature type	Remarks
Primary data set				
1.	Hydro geomorphology	Hydro	Poly	NBSS &LUP
2.	Soil	Soil	Poly	NBSS &LUP
3.	Transportation Network	Road, Rail	Line	SOI map, RS data
4.	Drainage	Drain	Line	SOI map
5.	Surface Water body	water	Poly	RS data
6.	Elevation	Contour	Line, Point	SOI map
7.	Revenue Boundary	Revenue	Poly	Revenue maps
Secondary data set				
1	Slope map	Slope	Poly	Contour
2	Perspective view of the terrain	Contour	Poly	Contour
3	Flood hazard	Flood	Poly	Slope, Hydro,
4	Ground water prospects	Gwater	Poly	Hydro
6	Soil depth	Depth	Poly	Soil
7	Soil texture	Texture	Poly	Soil
8	Urban Sprawl	Sprawl	Poly	Luse 1971-82
9	Urban Suitability	Suitab	Poly	Entire data set

4.6.2 Base Map Preparation

The hard print/ammonia prints of maps obtained from different sources as indicated below were scanned and manually digitized. The maps used were as follows:

1. Survey of India (SOI) topographic maps
2. SOI topographic maps on 1:50,000 scale (47 L/9) cover entire SMKMC area. These maps were prepared on the basis of survey conducted in the year 1972-73 and 78-79.
3. Revenue Maps
4. The Revenue maps covering the following areas, showing plot boundaries with survey numbers were also used in the study:
 - a. Mauje Sangalwadi
 - b. Kasbe Sangli
 - c. Mauje Kupwad
 - d. Mauje Wanlesswadi
 - e. Kasbe Miraj
 - f. Mauje Miraj 1
 - g. Mauje Miraj 2
5. Maps of Sanctioned D.P. (1978) from Town Planning Deptt
6. Map of SMKMC area prepared by SMKMC
7. Maps of T.P. schemes from Town Planning Deptt
8. Maps prepared in-house by Topographical Surveys of Gaothan areas
9. Maps prepared in-house by Topographical Surveys of Gunthewari areas
10. City Survey Maps of selected areas

These drawings were created in AutoCAD software. The drawings obtained from revenue maps of individual settlements were joined together to form a map of the entire SMKMC area. In order to achieve a comprehensive spatial database, this drawing was subjected to incorporation of features present in other maps. Similarly Toposheets of Survey of India was also digitized and Ground Control Points identified for geo referencing with the satellite images. The digitized Sol Toposheets map was superimposed on the created comprehensive base map and matched for GCPs. This entailed iterative elimination of errors in edge matching and orientation, and matching of ground control features. Further the maps obtained by topographical surveys of Gaothan and Gunthewari were incorporated. Each area was inserted into the respective plot taking care to match with the roads and locations. Ground checking for corrections in other areas was also resorted to.

After carrying out all the requisite corrections, the drawings have been converted from AutoCAD to Arc Info for creating a GIS database. The Satellite imagery data obtained from NRSA is being interpreted at Space Application Center, Ahmedabad.

4.6.3 Edge matching and Error corrections

In order to minimize the errors creeping in at various stages of transfer of data and its conversion, the map preparation task involved error corrections of the following types:

- Scanning Errors: Care was taken to ensure prevention of distortion errors by incorporating measured geometric figures in the sheet and verifying the same in the image. Area corrections if any were suitably applied.
- Edge matching errors: Edge matching was done to remove errors in matching of revenue boundaries, when the available maps(which were made available in parts from Revenue Deptt), were joined to form the SMKMC area. To eliminate these errors the mask prepared from GCPs identified from satellite imagery and Sol toposheets were considered as the most

authentic and accordingly the boundaries were rectified, taking care to match on superimposition.

- Software corrections: These were applied during transportation of drawings from AutoCAD format to Arc Info/View formats. Various geometrical errors in the form of dangles, closing errors in polygons etc. were rectified by clean up tools.
- Other Corrections: These were applied for the traverses run by total station during Gunthewari surveys.

In spite of all these corrections, some minimal errors remain due to use of different forms of data and software. But these errors are brought to the permissible levels, to comply with the objectives of the task and usefulness of the output.

3.6.4 Satellite Image Interpretation

Generation of merged data product

IRS-1C & ID, LISS-III and PAN data were geometrically corrected using Ground /Control Points (GCP's) from Survey of India maps on 1:50,000 scale. The ground control points (Intersection of roads, road with railways, river confluences, lakes etc.) were selected in such a way that they are distributed throughout the study area. Registration of LISS-III image with Panchromatic image has been done by identifying common GCP's from both the images. After registration, red, green and blue (RGB) channels of LISS-III data converted in to intensity, Hue and Saturation from LISS-III data. Various enhanced techniques have been applied to improve the contrast between the features on this merged data. The products generated using Laplacian filtering technique (edge enhancement operation) were selected for the study employing visual interpretation techniques.

Thematic mapping

The methodology adopted for the preparation of thematic maps are:

- **Preliminary Interpretation**

Visual interpretation techniques have been used to study digitally enhanced products on the basis of the image characteristics such as tone, texture, shape, size, shadow, pattern as well as the associated elements viz. location and association. These elements of interpretation helped in identifying and delineating various types of features present in the urban environment and judge their significance in delineating thematic information related to urban land use/cover, hydro geomorphology, surface water bodies, flood/erosion hazard etc. The details of these elements in identifying and delineating boundaries of various features are:

Shape: Shape refers to the general form, configuration or outline of individual objects. Shape of an object seen from above is different from what one is accustomed to see on ground. However, each object has its own shape and this characteristic helps in identifying the object. Many objects are recognized by their two-dimensional shape or from three-dimensional view of stereoscopic models. Rail-roads may appear as narrow bands with smooth gradual curves when

compared to wider highways with sharper curves. Secondary roads may be relatively narrow with very sharp curves. Recreational areas such as play grounds and stadiums have definite shape.

Size : It helps in determining the size of an known object in relation to the size of a known object. Using this element of visual interpretation one can separate, tenements versus multi-storied buildings, run-ways versus road and railway line and rivers versus streams. A thorough understanding of the scale of the imagery and resolution provided by the sensor are essential in any size analysis.

Shadow : Shadows are extremely useful to the interpreter whey they are correctly interpreted. They give valuable clues to shapes and sizes of objects such as bridges, towns and high-rise buildings.

Pattern : It is spatial arrangement of objects. Patterns can be man made caused by farming practices, the development of cities, industrial complexes or they may be natural, caused by erosion and the general geology of an area. Pattern is a valuable tool in assessing land use type.

Tone : It is the combination of hue, chroma and saturation in a colour image or relative brightness of objects in black and white image. Objects of different qualities of light reflectance and appear in varying shades of gray on the image. Tone differences are most important of all these elements as they attract most of attention. Without the tonal differences, the shape and patterns could not be discerned.

Texture : Texture is the result of uniform tonal changes caused by objects which are too small to be clearly distinguished individually. Texture ranges from smooth or fine to coarse depending upon the scale of the image. As the scale of the image is reduced, the texture becomes diner. For example, Layout buildings versus slum areas.

Association : Association is a skill developed by the interpreter which involves a reasoning process which uses all the principles of interpretation to relate an object to its surroundings. For example, ravenous lands along the riverbed.

Location : Topographical location and relative elevation are helpful in identifying the objects.

Location and association are not object characteristics but denote its immediate surrounding. Deductive image interpretation is done while dealing with these two elements and familiarity with the ground conditions is essential in analyzing them.

Among the above-mentioned characteristics, shape, size, shadow and pattern are basically dependent on scale of the image. Where as tone and texture depend upon brightness, contrast and resolution of the image.

Finally an interpretation key has been generated for the interpretation of thematic details for use with remote sensing data. The interpretation key is presented in Table 3.

Table 4.2: Interpretation key for use with IRS merged (LISS-III + PAN) Data

Sr. No.	Urban Cover	Image characteristics						
		Tone	Texture	Size	Shape	Shadow	Pattern	Association
I	BUILT-UP LAND	Dark cyan	Coarse	Variable	Variable	Shadows seen	Regular roads/streets	Mixed with different rise building
	Residential							
	b) Multistoreyed	White	Medium	Variable	Variable	-	Regular roads/streets	A group of uniform
	c) Detached	White	Coarse	do	do	-	Regular roads/streets	A group of uniform
	d) Slums	Light cyan	Smooth	do	do	-	Irregular	Surrounded by a marsh & Along roads & railways
	e) Mixed	Mottled gray	Coarse	do	do	-	Unorganised	-
	Residential area without vegetation	White and cyan mixed with pinkish specks	Coarse	Variable	Variable	-	-	-
	Industrial	White	Medium	Variable	Rectangle	-	Regular	Interspersed with vegetation and open lands
	Recreational							
	a) Gardens/parks	Red	Medium	Variable	Variable	-	Dispersed	-
	b) Play grounds	Pinkish white	do	do	do	-	do	-
	c) Stadiums	Reddish	do	do	Definite	-	-	-
II	TRANSPORTATION							
	a) Roads	Dark gray	Medium	Variable	Straight with ends	-	Linear	Interspersed by pink tone
	b) Railways	Light gray	do	Fixed	Straight	-	do	-
	a) Cropped land	Pinkish red	Fine	Variable	Variable	-	Scattered	-
	b) Fallow land	Whitish blue	Coarse	do	do	-	do	-
	c) Plantations	Dark pink	Smooth	do	do	-	do	-
III	WATER BODIES							
	a) Clear water	Dark blue	Smooth	Variable	Variable	-	Scattered	-
	b) Turbid water	Light blue	Medium	do	do	-	do	-

4.6.5 Ground Truth Data Collection

These classes have been correlated with the held data for final interpretation. A reconnaissance visit was carried out in the entire study area and the information obtained from the preliminary interpretation has been correlated with the actual cover types on ground. Finally, an interpretation key was prepared and legend for delineation of different land use/cover categories finalized.

All the ambiguous areas were subjected to detailed land use surveys and field verification exercises. Use of land use details of Gaothan areas collected were also incorporated.

4.7 LAND USE COVER MAP

The final land use maps were prepared by synthesis of:

1. Satellite Image interpretation
2. Extensive sample ground surveys
3. Land use data collected during Gaothan and gunthewari surveys
4. Special surveys as reported in 'Report on Summary Survey Findings', viz:
 - a. **Khoka survey** was conducted October 2001 to identify location, type, size etc, of the khokas, which have a distinct presence in the study area. This survey was carried out in two parts. In first part, all the khokas in the study area were identified and mapped.
 - b. Mapping of location of **educational facilities**(Primary and high schools, Junior Colleges, Colleges and Technical Institutions). These have been also differentiated on the basis of Municipal schools, Govt. institutions and Private institutions etc.
 - c. Mapping of location of **health facilities** along with details of number of bed facilities was undertaken.
 - d. Mapping of location of other amenities such as **banks, markets, fire stations, police stations**, etc have also been included in the task

The detailed list of all these amenities has been included as Annexures.

The land use/cover information helps in formulation of policies and programme for urban development. Therefore, an attempt has been made here to adopt a suitable land use/cover classification system for use with high spatial resolution IRS-1D Panchromatic data as well as merged data products (LISS-III and PAN). The important points adopted in developing this classification system are:

A fair level of reliability of interpretation for the several categories included in the classification system was attained. Residential and recreational areas were recognized with a high degree of reliability but difficulty was experienced in differentiating commercial areas, which are within the residential localities. Therefore, extensive ground verification exercise was resorted to complement the imagery interpretations, to yield a fair level of reliability in interpretation.

Different interpreters obtained reproducible results. This was done on the basis of the assumption that many persons will be involved in the interpretative process. Hence, it is very important to have a classification system that can yield comparable results each time the monitoring exercise is repeated for a given area.

On the basis of the above-mentioned observations, the urban land use/land cover classification system of SMKC area was made for use with IRS-1C satellite data and is presented in Table 4. This classification system has three major urban lands use classes at level-I, 9 level-II classes

The classification system adopted for SMKMC area permits effective use of sub-categories that can be obtained from ground surveys or from the use of imagery available at a later date and on a large scale. The details of the sub-categories included under each urban land use/ land cover category and the definitions of these categories are summarized below

Table 4.3 : Urban land use/Cover classification system of urban agglomeration

Sr. No.	Urban land use/cover category		
	Level-I	Level-II	Level-III
1	Urban or Built-up land	Residential Industrial Recreational Transportation Public and semi public Open/vacant land	Parks/Gardens Stadium Roads/(Bus stands) Railways(Tracks/Yards)
2	Agricultural land	Crop land	
3	Water bodies	Rivers/streams nallahs	

4.8 TOPOGRAPHY ANALYSIS FROM CONTOUR MAPS

4.8.1 Preparation of Contour Map

Contour map at 10m interval has also been prepared using elevation formation derived from SOI topographical maps and GIS techniques. ARC/INFO Triangulated Irregular Network (TIN) and TOPOGRID programs were used to generate slope map.

The procedure adopted to prepare this is as follows:

A sampling method was used to extract representative points to build a surface model that approximates the actual surface. Various points were selected representing the plain areas, undulating terrain, depressions, etc. in the entire study area as well as from the adjoining 5 km. buffer areas. A point coverage has been generated in GIS environment for the preparation of percent slope maps and surface views. Using Survey of India topographic maps, contour map has been prepared for the study area. The slope map was prepared using both TIN and TOPOGRID methods.

4.8.2 Topography features

The area falls inside a crucible with land at altitudes of 560-580m MSL in all the directions except west and northwest. The relief of the land within the SMKMC boundaries is predominantly level with a gentle slope. The maximum slope is 1 in 100. While the land along the Krishna River has an altitude of 540m MSL, land in the northeastern part rises to 560m MSL, reaching a maximum of about 580m MSL in the fringes of Kupwad. In Sangliwadi almost the entire land has gradients less than 10m with most of the areas being at an altitude of 540m MSL. In Sangli, while the western part and southern area have level terrain at 540m MSL, there exists a gentle rise towards Kupwad (along northeastern part) reaching a peak of 560m MSL. Wanlesswadi has a very low north east-south west slope. Kupwad is situated a little higher than the rest of the areas at altitudes ranging between 560-580m MSL. Although the slope here too is predominantly northeast-southwest, the slope at a pocket in the northwestern extremity near Madhav Nagar Road (Plots with R.S no 339,340) has a north west-south east slopes. At the eastern part, near MIDC (R.S no 14,16,19,25,34,37,23,21, and 20) the land forms a prominence..

In Miraj the prominent slope is north south, with the southern areas near Krishna River being at 540m MSL, while the northern part (Mekhijbhawadi, part of Betal nagar, Kumbhar Marwari, Navnath nagar) is situated at 560m MSL.

4.9 SOIL

The soil map of the district obtained from NBSS & LUP (National Board of Soil Survey and Land Use Planning Board) depicts predominantly deep, moderately well drained, fine soils on gently sloping plains with moderate erosion, moderate salinity and moderate sodicity; associated with deep, well drained, fine calcareous soils with moderate erosion.

In the region to the eastern part of Kupwad and Northern part of Miraj, the soil is 'very shallow, well drained, loamy soils on gently sloping undulating lands with moderate erosion; associated with shallow, well drained, fine soils with moderate erosion'

The soil thickness increases towards the southern part of the SMKMC area. Areas along Kolhapur Road, parts of Vishram Bag, Miraj and Kupwad have murum soil. Wanlesswadi has Black Cotton Soil.

4.10 LAND USE COVER OVERVIEW

The figures on land utilization under various categories indicate the extent of use under the respective categories. The time series data on this aspect is useful to imbibe the changes brought about in the intervening period.

Hence this overview is compiled up in two parts:

1. Review of Land Use indicated in earlier Development Plan
2. Existing Land Use Analysis

Existing land utilization has been presented as an Existing Land Use Map with this report.

4.10.1 Review Of Land Use Indicated In Earlier Development Plan

4.10.1.1 Sangli Development plan (1971)

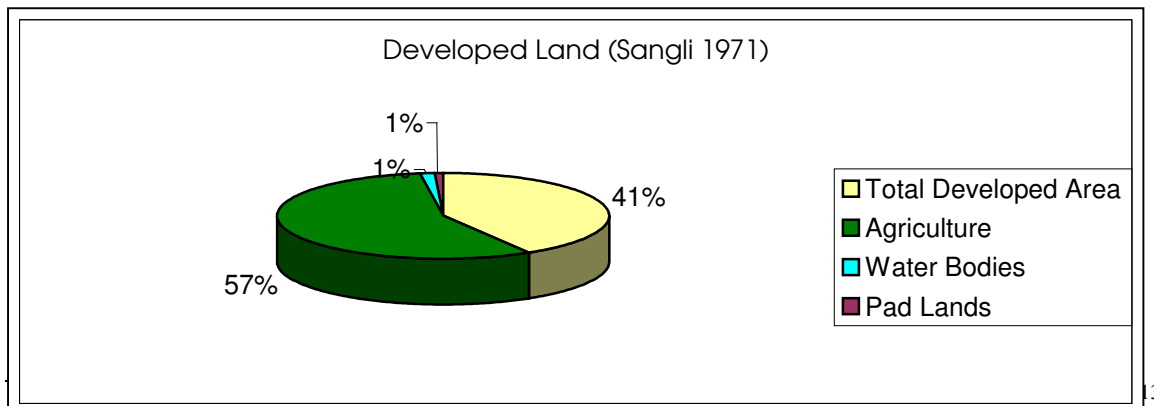
4.10.1.2 Existing land use (Sangli 1971):

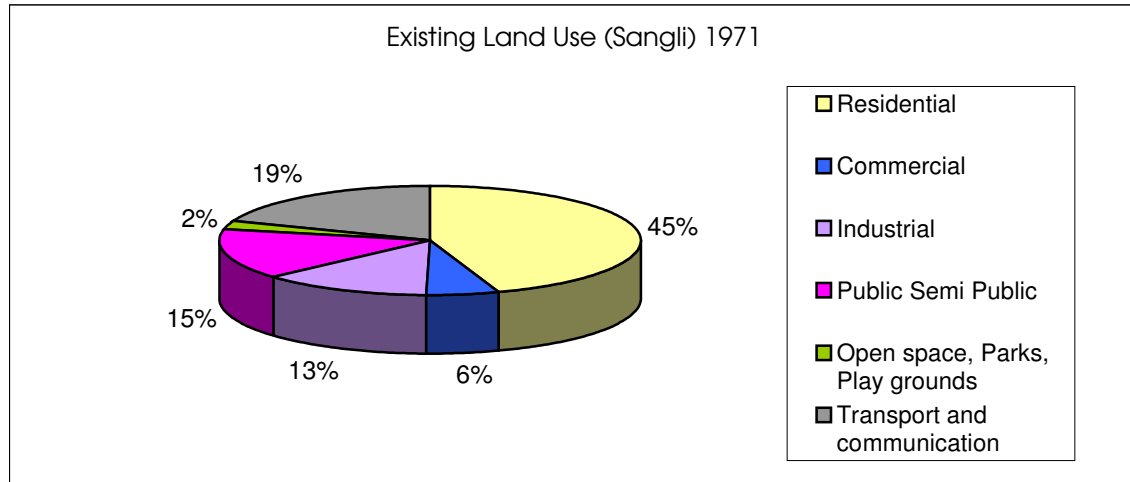
Out of total municipal area, 42% of land was under the developed area and remaining land was covered under agriculture area, water bodies and pad fields. Major agriculture took place along Dhamni road, Budhgaon road, Kolhapur road, along 100ft road and along Karnal road. In the first development plan for Sangli the land use was assigned to cater the population of 115504 persons. Total area under the Sangli municipal council for the preparation of development plan was 20.65 sq km. The distribution of land use area is as shown in following table:

Table 4.4: Existing Land Use (Sangli 1971)

S No.	Land Use	Area In Ha.	% of developed area	% of total Municipal Area	land use in Hect/1000 population
1	Residential	383	44.7	18.56	3.55
2	Commercial	48	5.63	2.33	0.45
3	Industrial	111	13.03	5.40	1.03
4	Public Semi Public	128	15.06	6.22	1.19
5	Open space, Parks, Play grounds	21	2.55	1.02	0.21
6	Transport and communication	163	19.03	7.92	1.52
Total Developed Area		858	100	41.45	7.95
7	Agriculture	1162	-	56.42	10.76
8	Water Bodies	29	-	1.43	0.27
9	Pad Lands	14	-	0.70	0.13
Total Undeveloped Area		1207	-	58.55	11.16
Total Area		2065	-	100	19.11

Source: Development Plan Sangli 1971





Out of total developed area 45 % is covering residential land use. Transport and communication follows the residential use by 19% and public and semi public use with 15% having major institutional areas. Commercial area is as low as 5.63% and scattered through out the city. Recreational area contributes only 2.55% of the total developed area. Industrial areas like Vasant Dada industrial area and timber market also constitute a considerable percentage (13%) of developed area.

4.10.1.3 Committed Land Use (Sangli 1991):

The committed or proposed land use was assigned to cater the projected population of 2,50,000 by 1991. Proposals/ commitments were done keeping in mind the future social and physical requirements of residents of the city. For the future development of the city the land area under pad fields and jirayat was used. With the proposed land use, developed area has increased by more than twice the area assigned in existing land use. As per the committed land use 87.22% of the land was total be developed by the end of the plan period. The increase in area as compared to existing (1971) land use is 46% of total municipal land. The distribution of various land use with increased area is depicted in the table 4.5.

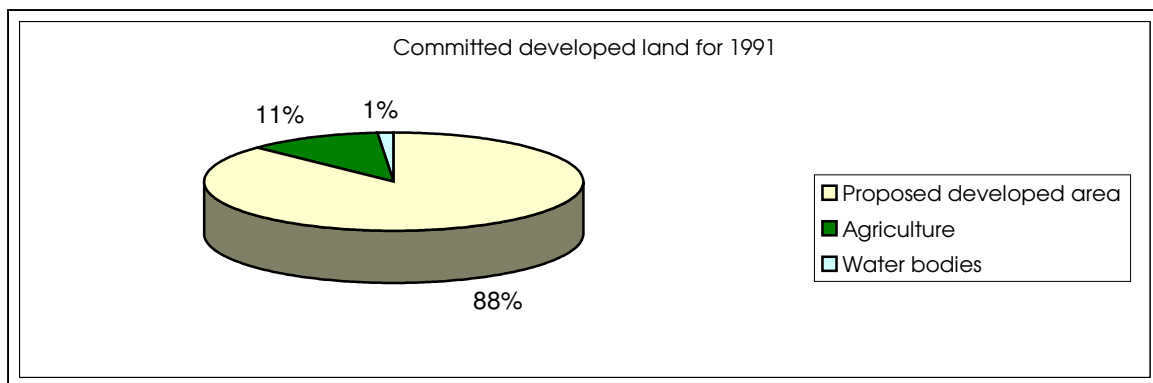
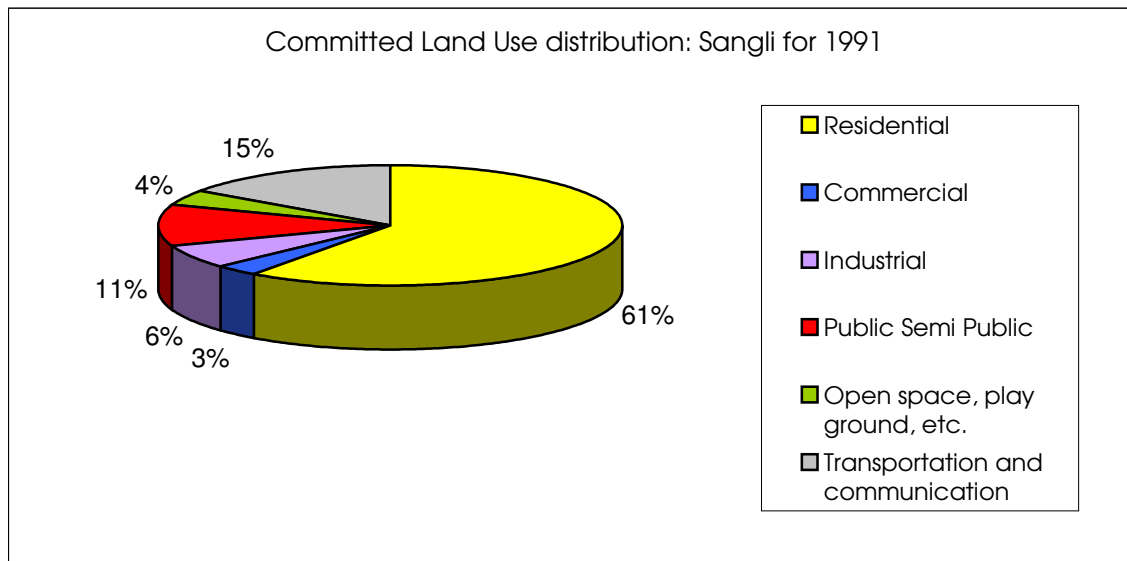


Table 4.5: Committed Land use Sangli (1991)

S.No	Land use	Area in Ha	% of developed area	% of total municipal area	Area of land use in hect/1000 pop.
1	Residential	1080	60	52.34	4.32
2	Commercial	55	3.09	2.70	0.22
3	Industrial	115	6.39	5.58	0.46
4	Public Semi Public	119	11.09	9.69	0.80
5	Open space, play ground, etc.	75	4.22	3.66	0.30
6	Transportation and communication	274	15.21	13.25	1.10
Total area proposed to be developed		1801	100	87.22	7.20
7	Agriculture	234	-	11.35	0.94
8	Water bodies	29	-	1.43	0.11
Total undeveloped area		264	-	12.78	1.05
Total area		2065	-	100	8.25

Source: Development Plan, Sangli



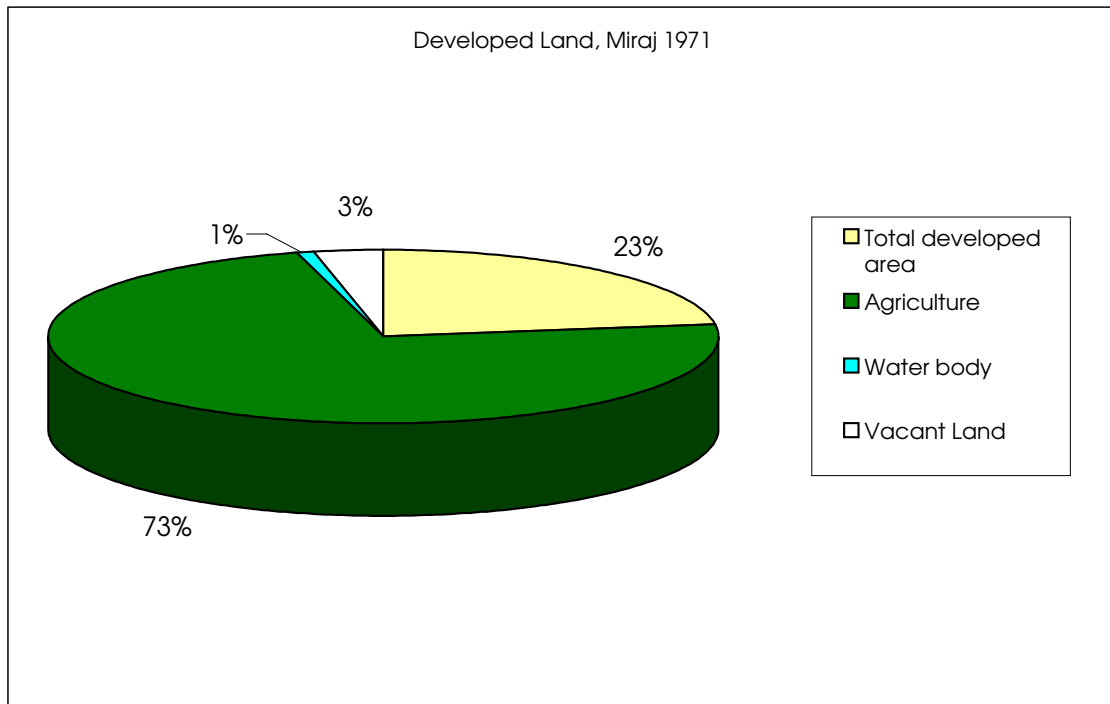
Residential use is increased by 16% of total developed area followed by 1.67% increase in open space, parks, play grounds. Land uses like commercial, industrial, public semi public, transportation were to be reduced as compared to percentage of developed area. But on the contrary percentage to total municipal area has increased for all land uses as compared to 1971 existing land use. All pad land and almost 45% of the agriculture land (Jirayat land) is to be used for the future development of the city. The overall density proposed to achieve by the plan period was 122 persons/ hectares.

As per the committed land use distribution the area per 1000 population has changed. For residential use it has increased to 4.32 as compared to 3.55 in 1971 and also for open spaces, parks and playgrounds that has increased by 0.09 ha only. Remaining areas for various land uses like commercial, industrial, public semi public, transportation, etc. has reduced considerably. Main reason for the reduction of these areas is due to increase in developed area of the city from 858 hecters to 1801 hecters.

4.10.2 Miraj Development Plan

4.10.2.1 Existing land use (Miraj 1971)

First development plan was prepared covering population of 77606 persons. Total land available with Miraj Municipal council is 21.63 sq km. Total developed area within the municipal limits was only 23% and remaining area was under agriculture, water bodies and vacant land. Agriculture activity was carried out along Miraj Dhamni road, Sangli road, Pandharpur road, Nilagi, Bijapur and Malgaon road.



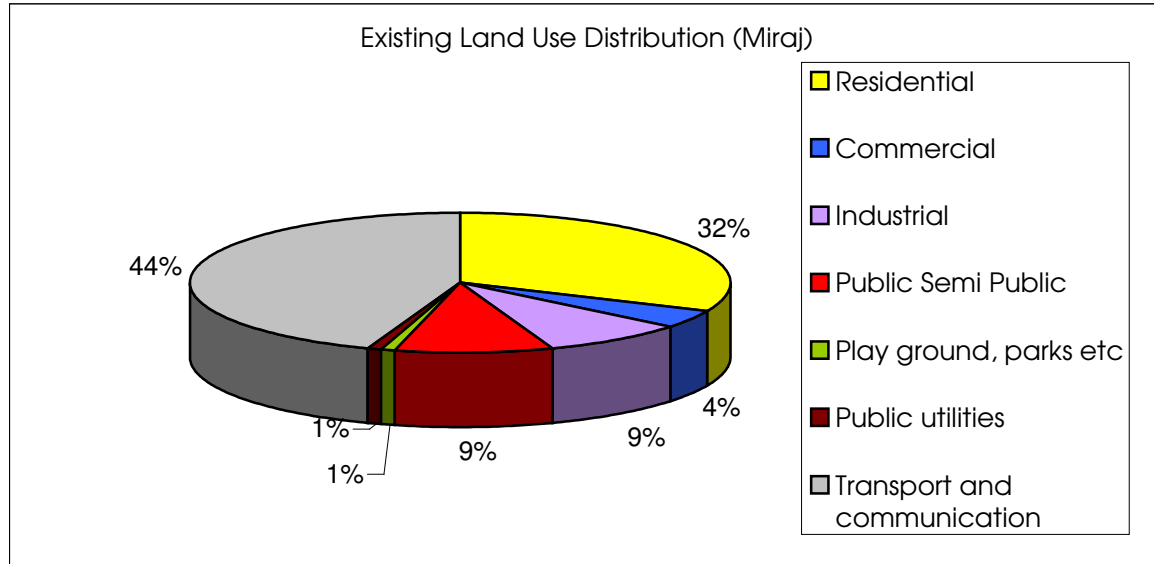
The developed area distribution in various land use categories are as shown in following table:

Table 4.6: Existing land use Miraj (1971)

S. No	Land Use	Area in Ha	% of developed area	% of total municipal area	Area of Land use in hect /1000 pop.
1	Residential	155	31.6	7.18	2
2	Commercial	20.20	4.11	0.94	0.26
3	Industrial	43.4	8.85	2.0	0.56
4	Public Semi Public	46	9.38	2.13	0.60
5	Play ground, parks etc	4	0.81	0.18	0.015
6	Public utilities	4.60	0.93	0.22	0.06
7	Transport and communication	217.4	44.32	10.02	2.80
Total developed area		490.6	100	22.66	6.31

S. No	Land Use	Area in Ha	% of developed area	% of total municipal area	Area of Land use in hect /1000 pop.
8	Agriculture	1580	-	73.04	20.36
9	Water body	18.4	-	0.86	0.23
10	Vacant Land	74	-	3.44	0.95
Total Undeveloped area		1672.4	-	77.37	
Total Municipal area		2163	-	100	21.54

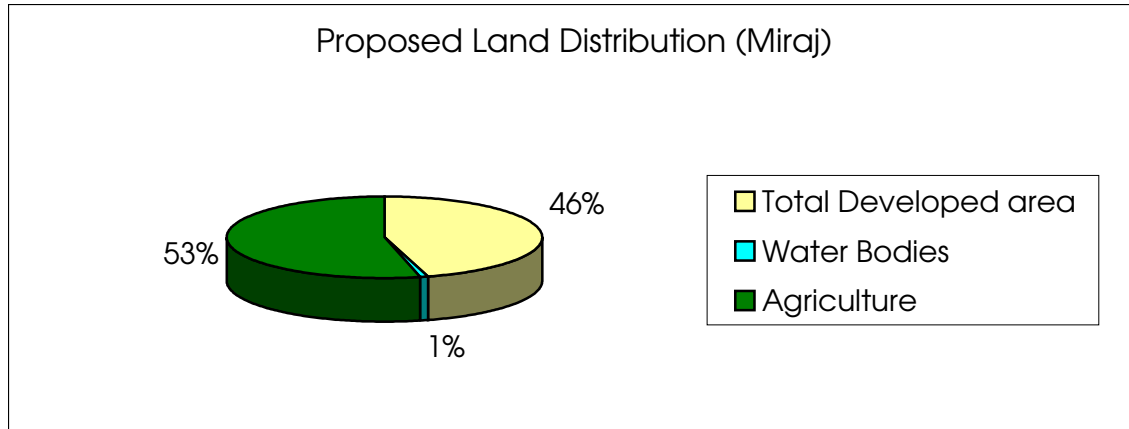
Source: Development Plan, Miraj



Out of total developed area, 44% of area is covered under transportation and communication; main reason for having such high percentage is presence of Miraj railway depot, Miraj bus depot etc. Almost 32% area is covered under residential use. The percentage of developed area covered under commercial land use is only 4.11%. Industrial land use covers about 9% of the developed area. Land uses like recreational and public utilities constitute 0.81% and 0.93% in existing land use analysis. Although in Miraj space is available with Dairy development authority and presence of hospitals like Mission hospitals the percentage of land use is very less.

4.10.2.2 Committed Land Use (Miraj 1991)

The land use proposal was given to accommodate population of 1,83,000 by the end of development plan. Vacant land and Jirayat land was taken for the future development of the city. Development area is increased to 987.74 hectares, which is approximately doubled as compared to 1971 developed area.



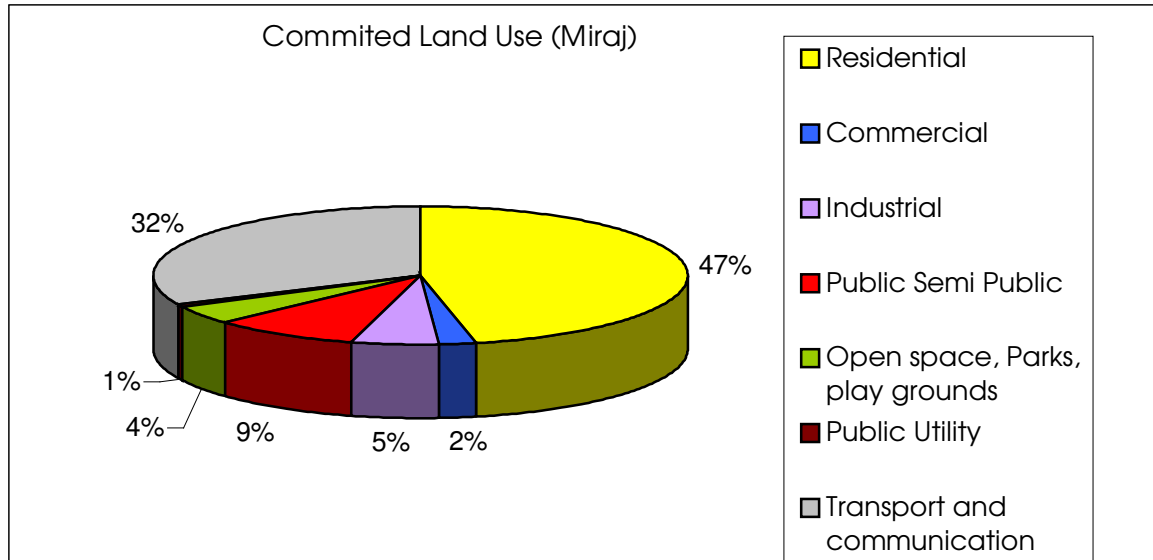
The area requirement was calculated on the basis of the projected population and distribution of land use is as shown in following table:

Table 4.7: Committed Land Use Miraj (1991)

S.No	Land Use	Area in Hect	% of developed Area	% of Total Municipal area	Area of land use in hect/1000 popu.
1	Residential	460.94	46.66	21.32	2.51
2	Commercial	21.40	2.16	0.99	0.12
3	Industrial	52	5.26	2.40	0.28
4	Public Semi Public	88.4	8.95	4.08	0.48
5	Open space, Parks, play grounds	44	4.45	2.03	0.24
6	Public Utility	6	0.62	0.27	0.03
7	Transport and communication	315.00	31.9	14.56	1.72
Total Developed area		987.74	100	45.65	5.38
8	Water Bodies	18.40		0.85	0.23
9	Agriculture	1156.86		53.50	6.32
Total undeveloped area		1175.26		54.35	6.55
Total area		2163		100	11.93

Source: Development Plan, Miraj

Out of total developed area 305.94 ha of land is increased for residential use only and remaining 191.2 ha of area is used for various other land uses like commercial, industrial, public semi public, transport and communication, gardens, play grounds etc. (Agriculture and vacant land is used for the development of the city) percentage of developed area for residential use is increased by 8.64 %. Open spaces, parks and playgrounds in the city have increased to 4.45% of developed area. The overall density of Miraj city is 84.6 persons/ hectors.



After formation of Municipal Corporation; Kupwad, Wanleswadi and Sangliwadi are part of corporation. There is no development plan available for these cities as these are small villages. A detailed land use survey for all these villages has been done to incorporate the existing land use in next proposed development plan.

4.11 EXISTING LAND USE ANALYSIS (2001)

To know the present scenario a detailed land use survey was carried out within the SMKMC area for Sangli, Miraj, Kupwad, Sangliwadi and Wanleswadi. Various land use were studied such as residential, commercial, industrial, public semi public, open spaces, parks, playgrounds, public utilities, transportation etc.

The land use has been classified into:

1. Residential
2. Commercial
3. Industrial
4. Public -Semi Public
5. Recreational (designated open spaces, Parks, Play grounds)
6. Public Utility
7. Transportation
8. Agriculture
9. Water Body
10. Vacant land

The distribution of the land use has been aggregated settlement wise with distribution in gaathan areas depicted separately.

4.11.1 Land use distribution in SMKMC, 2001

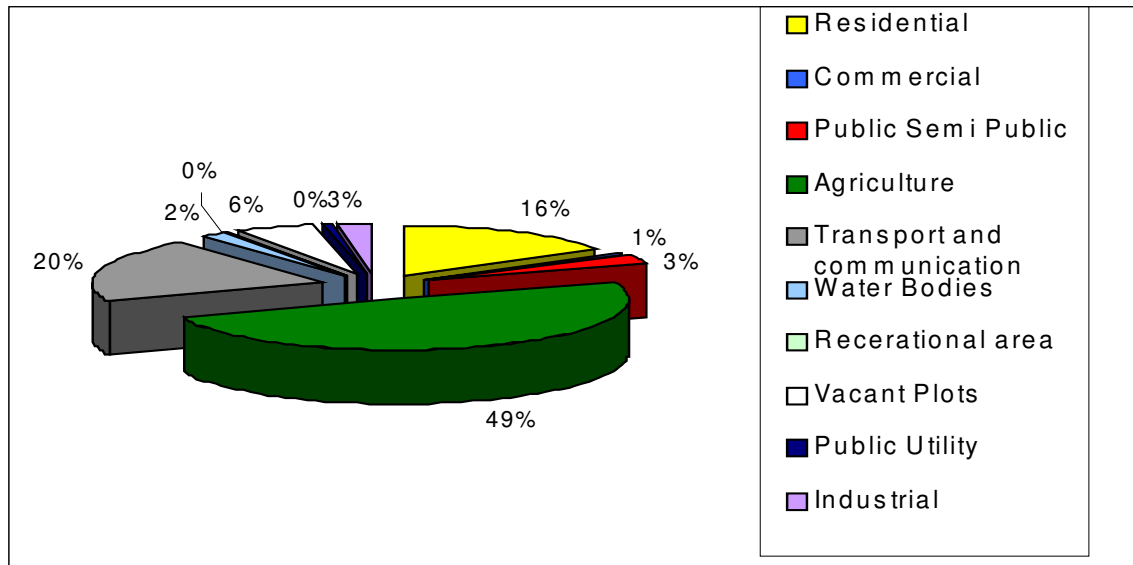
The land use distribution in SMKMC areas depicts one third of the total land to be developed, while the remaining land area is accounted for agriculture, water bodies and vacant land. As obvious, though the predominant land use in SMKMC is agriculture, which covers almost half of the total land, residential use predominates in the developed area. Commercial area accounts for 2.5% of the

developed area. This figure excludes area under commercial use in 'mixed' land use areas, which is common in SMKMC too as in other Indian towns. Land under transportation forms a significant share accounting for 27% of the developed area (9% of the total area). Area under recreational use comprising of designated open space, parks, playgrounds etc. comprises only 0.8% of the developed area. There are 28 parks, 1 zoo and 3 stadiums. Vacant land accounts for approximately 16% of the total area.

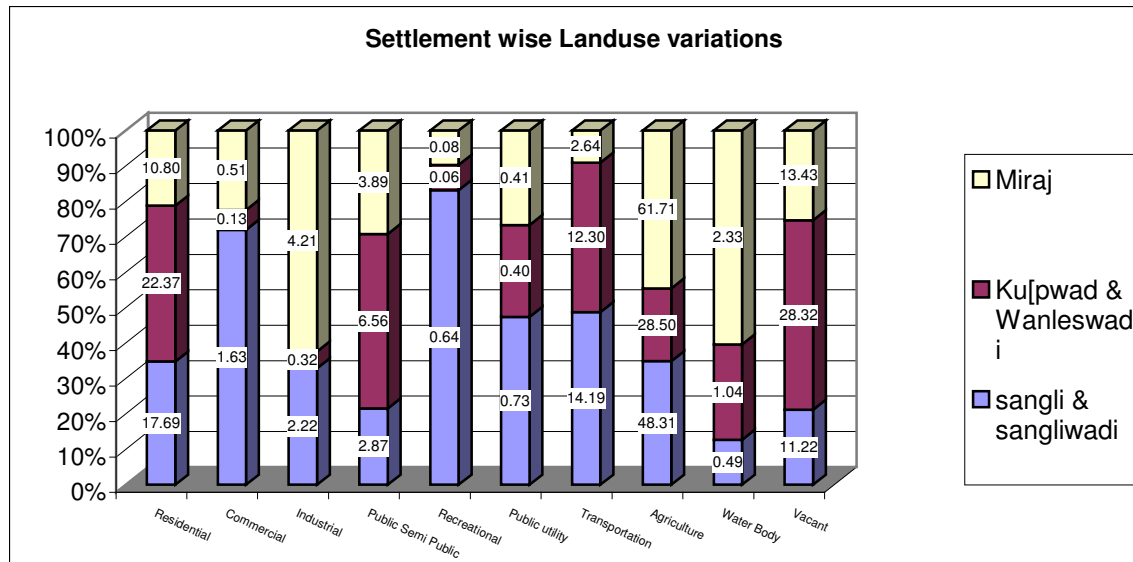
This figure includes large number of plots in 'transition' (at the time of surveys) wherein they are vacant due to amalgamation of small units for construction of larger buildings especially in the gaathan areas and land parcels which have been fenced and subdivided into plots, but have no structures built upon them in Gunthewari areas. Gunthewari areas with a coverage of 9.8 sq km account for one fourth of the developed area (8% of the total area). There are about 29 slums in SMKMC (though estimates from surveys conducted through an NGO by SMKMC puts this figure to 99 slum settlements).

Table 4.8: Land Use distribution in SMKMC area

		Sangli & Sangliwadi			Kupwad & Wanleswadi			Miraj			Total SMKMC		
S.No	Land Use	Area in Ha	% of developed Area	% of Total area	Area in Ha	% of developed Area	% of Total area	Area in Ha	% of developed Area	% of Total area	Area	% of total developed area	% of Total area
1	Residential	741.58	44.26	17.69	609.04	53.09	22.37	460.36	47.94	10.80	1810.98	47.87	16.21
2	Commercial	68.39	4.08	1.63	3.48	0.30	0.13	21.70	2.26	0.51	93.57	2.47	0.84
3	Industrial	92.92	5.55	2.22	8.74	0.76	0.32	179.19	18.66	4.21	280.85	7.42	2.51
4	Public Semi Public	120.33	7.18	2.87	178.62	15.57	6.56	165.81	17.27	3.89	464.76	12.29	4.16
5	Recreational (Open spaces, Parks, Play grounds))	27.02	1.61	0.64	1.50	0.13	0.06	3.21	0.33	0.08	31.74	0.84	0.28
6	Public utility	30.75	1.84	0.73	10.90	0.95	0.40	17.62	1.84	0.41	59.27	1.57	0.53
7	Transportation	594.58	35.49	14.19	334.86	29.19	12.30	112.45	11.71	2.64	1041.89	27.54	9.32
Total Developed area		1675.57	100.00	39.98	1147.15	100.00	42.14	960.35	100.00	22.54	3783.06	100.00	33.86
8	Agriculture	2024.67		48.31	775.68		28.50	2629.44		61.71	5429.78		48.59
9	Water Body	20.48		0.49	28.25		1.04	99.14		2.33	147.87		1.32
10	Vacant	470.28		11.22	770.93		28.32	572.08		13.43	1813.29		16.23
Total Undeveloped area		2515.43		60.02	1574.85		57.86	3300.65		77.46	7390.94		66.14
Total Area		4191.00		100.00	2722.00		100.00	4261.00		100.00	11174.00		100.00

**Table 4.9: Settlement wise land use distribution**

S.No	Land Use	Land use in %		
		Sangli & Sangliwadi	Kupwad & Wanleswadi	Miraj
		% of Total area	% of Total area	% of Total area
1	Residential	17.69	22.37	10.80
2	Commercial	1.63	0.13	0.51
3	Industrial	2.22	0.32	4.21
4	Public Semi Public	2.87	6.56	3.89
5	Recreational (Open spaces, Parks, Play grounds))	0.64	0.06	0.08
6	Public utility	0.73	0.40	0.41
7	Transportation	14.19	12.30	2.64
Developed land		39.98	42.14	22.54
8	Agriculture	48.31	28.50	61.71
9	Water Body	0.49	1.04	2.33
10	Vacant	11.22	28.32	13.43
Undeveloped land		60.02	57.86	77.46
Total		100	100	100

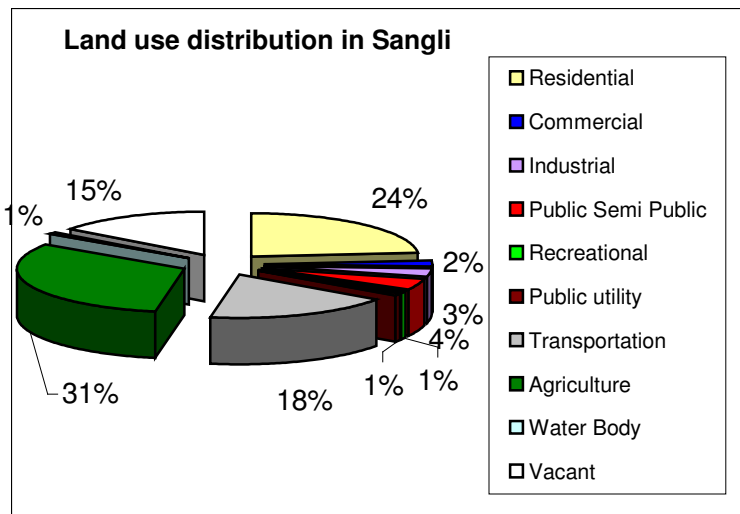


4.11.2 Land use distribution in Sangli

The land use distribution in Sangli reflects more than half of the area to be developed, comprising 52% of the total area under it. Of this, about 45% is residential. Commercial areas account for 2.2%, but would be higher as this figure takes into account fully devoted to commercial use, thereby excluding the mixed land use areas. Area under water bodies is accounted by Dagadi Khan tank and nallahs.

Residential areas are distributed through out the city, with the major residential areas being Gaobhag, Khanbhag, Vishrambag, Gulmohar Colony, Rama Mata Nagar and areas behind the Civil hospital, Ambedkar Nagar, Neminath Nagar, Ganeshnagar, Sanjay Nagar, Abhay Nagar, Vijay Nagar, etc., along the 100 ft road towards sugar factory and Vishrambag area joining the Sangli-Miraj road. The percentage of residential areas in the Gaothans is higher. A majority of the houses in Sangli are independent plotted bungalows or row houses. Due to scarcity of the land within the gaothan area, concept of multi storey building is gearing up and on the other hand the preference of independent bungalow would tend to use more fringe lands and also increase the spread of settlement in horizontal direction.

Commercial land use percentage (4 % developed area) has not changed much in the study area since the commercial centers have not been shifted and not much commercial establishments have come up in them. In the gaothan area of Sangli the percentage of commercial area has increased to 9.6%. The commercial center can be distinguished as formal and informal commercial centers. Major formal commercial centers in Sangli are concentrated in Vakharbagh, Harbhat Road, Tarun bhara stadium area, Maruti Mandir road, area around the ST stand. Rajwada chowk, Vasant dada market yards along the Sangli-Miraj road, timber market.



The informal commercial centers have spread all over the city near prominent residential areas and commercial centers in the form of “Khokas” or small stalls.

Industrial area is 5.8% in the developed area. It is seen that no new areas have been added (since the previous D.P) to the present one. The industrial areas are located at timber area and at Vasant Dada industrial area on Sangli-Madhavnagar road. The type of industries present in these area are miscellaneous small industries with or without power such as handloom or looms, toilet, medicinal or herbal preparations, manufacture of tapes and ropes, iron and steel processing industries, tobacco and turmeric refining, ginning and pressing of cotton, textile mills etc. **Public semi public** area is high (14.4%) in the gaathan area, which is 7.4% of total area. Major institutional areas are present at Rajwada chowk, Ram Mandir chowk, and along Sangli Miraj road.

The percentage of **recreational area** to total area is 1.7% Recreational area includes Amrai garden, Shivaji stadium, Tarun Bharat stadium, Pratap Singh Udyan, Shastri Udyan, Deshpande udyan, Sane Guruji Udyan and many small parks and playgrounds all over the city. Majority of these are in the gaathan areas.

There are two **drama theatres** in Sangli, viz Bhave Natya Mandir and Master Dinanath Mangeshkar Drama Theater. Apart from these there are eight cinema theatres in Sangli.



The Sangli gaathan area shows nearly 24% of the developed area being under **transportation** and communication. The overall percentage for transportation land use in the area is 34%.

Table 4.10 : Land use distribution in sangli

S.No	Land Use	% of developed Area	% of Total area
1	Residential	44.78	23.66
2	Commercial	4.27	2.26
3	Industrial	5.82	3.08
4	Public Semi Public	7.47	3.95
5	Recreational (Open spaces, Parks, Play grounds))	1.71	0.91
6	Public utility	1.67	0.88
7	Transportation	34.27	18.11
Developed area		100.00	52.84
8	Agriculture		31.73
9	Water Body		0.69

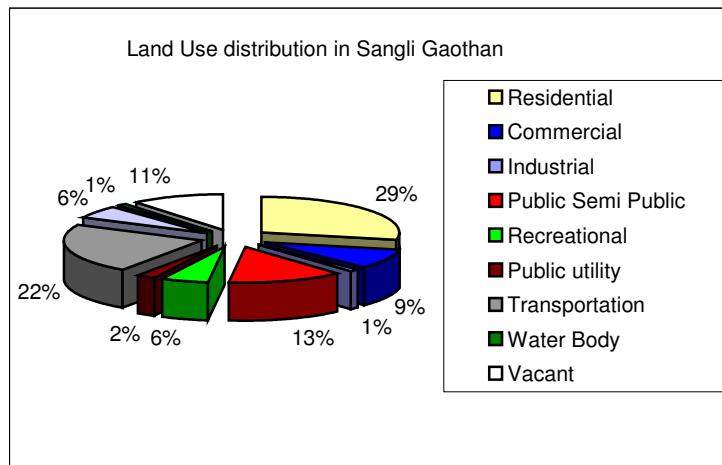
S.No	Land Use	% of developed Area	% of Total area
10	Vacant		14.74
	Undeveloped area		47.16
	Total		100.00

4.11.3 Land use distribution in Sangli Gaothan

As expected Sangli Gaothan reflects a higher share of commercial, public semi public and recreational uses than the entire settlement due to concentration of these uses in this part of the settlement. Vacant land is accounted by transitional plots as explained before and by some vacant plots along the river front areas.

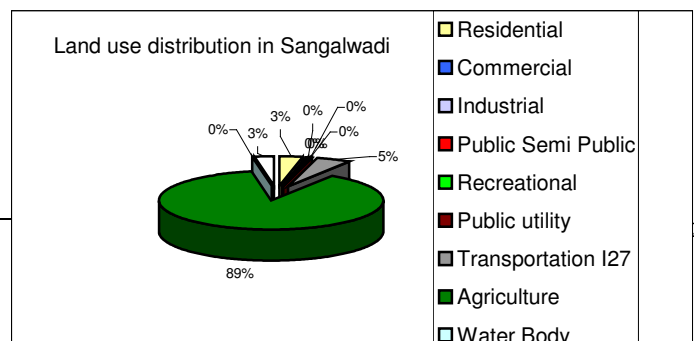
Table 4.11: Landuse of sangli gaothan

S.No	Land Use	% of developed Area	% of Total area
1	Residential	34.33	28.24
2	Commercial	10.96	9.01
3	Industrial	1.45	1.19
4	Public Semi Public	16.31	13.41
5	Recreational (Open spaces, Parks, Play grounds))	6.83	5.62
6	Public utility	2.85	2.35
7	Transportation	27.26	22.42
	Developed area	100.00	82.24
8	Agriculture		5.85
9	Water Body		1.15
10	Vacant		10.76
	Undeveloped area		17.76
	Total		100.00



4.11.4 Land use of Sangalwadi

In Sangalwadi the predominant land use is agricultural with almost 90% of the area under this use. Area under residential use is



only 3% while other uses excluding transportation are further low, Land under water body is depicted as nil, as the only significant water body is the River Krishna, flowing along its boundary. Sangalwadi depends on to the main city i.e. Sangli for uses such as commercial and public semipublic and hence has very small area under these uses.

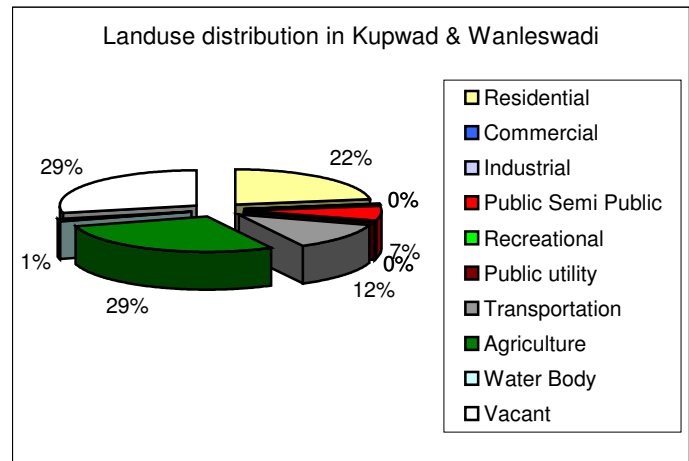


Table 4.12: Land use of Sangliwadi

S.No	Land Use	% of developed Area	% of Total area
1	Residential	36.97	3.35
2	Commercial	1.40	0.13
3	Industrial	1.70	0.15
4	Public Semi Public	3.07	0.28
5	Recreational (Open spaces, Parks, Play grounds))	0.20	0.02
6	Public utility	4.19	0.38
7	Transportation I27	52.48	4.75
Developed area		100.00	9.06
8	Agriculture		88.18
9	Water Body		0.00
10	Vacant		2.76
Undeveloped area			90.94
Total			100.00

4.11.5 Land use distribution in Kupwad & Wanleswadi

The land use distribution in Kupwad and Wanleswadi computed as a whole reflects about 60% of the area undeveloped, but only 28% of it is in agricultural use. An equivalent area comprises of vacant land in this settlement. Land under transportation has a relatively low share in comparison to Sangli and Miraj.



Residential area in Kupwad and Wanleswadi including gaothan comprises of residential colonies of Yashwant nagar, Vasant nagar, Vijay nagar, and areas behind MSEB, Hasni ashram and Wanleswadi. The gaothan area is mostly residential with commercial area along the Sangli – Kupwad road towards the MIDC. Land use under commercial use is very small constituting only 0.13% of the total area.

Although no major **industrial area** falls under Kupwad except for Bharat Sut Gimi (which is closed), MIDC's Kupwad industrial Area is situated just outside the municipal limits. This is a major work center for people of Kupwad and surrounding areas. **Public semipublic land** use area has a relatively higher share (about 15.5% of the developed area) due to existence of educational institutions such as colleges (Walchand Engineering college, Willingdon college, Chintamanrao Commerce college) and area under Sir Wanless T.B and Leprosy hospitals.

Area under **recreational** land use forms a meager 0.13% of the developed area. **Public utility areas** comprise 0.26 % of the total area, which includes MSEB area.

Table 4.13: Landuse of Kupwad & Wanleswadi

S.No	Land Use	Area in Ha	% of developed Area	% of Total area
1	Residential	609.0	53.09	22.37
2	Commercial	3.5	0.30	0.13
3	Industrial	8.7	0.76	0.32
4	Public Semi Public	178.6	15.57	6.56
5	Recreational (Open spaces, Parks, Play grounds)	1.5	0.13	0.06
6	Public utility	10.9	0.95	0.40
7	Transportation	334.9	29.19	12.30
Developed area		1147.1	100	42.14
8	Agriculture	775.7		28.50
9	Water Body	28.2		1.04
10	Vacant	770.9		28.32
Undeveloped area		1574.9		57.86
Total Area		2722.0		100

4.11.6 Land use distribution in Kupwad gaathan

Kupwad gaathan has half its area under residential land use, indicating concentration of the settlement in gaathan. No significant recreational area exists here. There are no water bodies inside the gaathan areas. Area under agriculture is also nil, here.

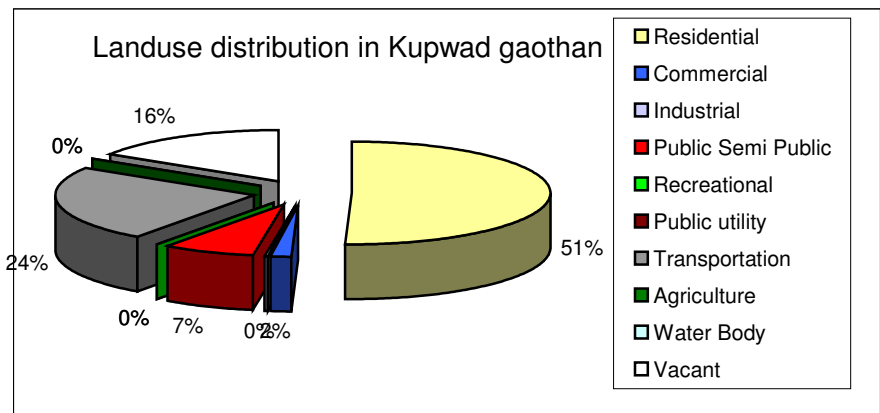


Table 4.14: Land use of kupwad gaathan

S.No	Land Use	% of developed Area	% of Total area
1	Residential	60.19	50.48
2	Commercial	2.06	1.72
3	Industrial	0.31	0.26
4	Public Semi Public	8.83	7.41
5	Recreational (Open spaces, Parks, Play	0.00	0.00

	grounds))		
6	Public utility	0.26	0.22
7	Transportation	28.35	23.77
Developed area		100.00	83.86
8	Agriculture		0.00
9	Water Body		0.00
10	Vacant		16.13
Undeveloped area			16.14
Total			100.00

4.11.7 Land use distribution in Miraj

Miraj exhibits lesser degree of development in terms of land utilization in comparison to Sangli. Almost 78% of its area is underdeveloped with 61% being under agriculture land use. Only 11% of its total area is under **residential use**, through it forms about half of its total developed area. Apart from residential areas in Gaothan, predominant residential areas in the outer of Miraj are Sanjay Gandhi nagar, Idgah nagar, areas along Sangli Miraj road along Pandharpur road and Malgaon road. **Commercial areas** account for only 2.26% of total developed area, and the prominent locations of it are Laxmi market area, area along Shaniwar peth road, timber market area, and area along the ST stand road. About 19% of its developed area (4% of its total area) is under **industrial use**. The industrial areas of MIDC and Marathe Industrial Area primarily contribute to it. MIDC industrial area, which has about 501 industrial plots in it, has 262 plots with functional industries.

Public-semi public land use accounts for 3.8% in the overall area (17% of the developed area). The major centers where public semi public facilities are available are Laxmi market chowk, fort area, Mission hospital, Dairy Development board (Shivaji nagar area), along Sangli Miraj road, Central Wear housing corporation etc. **Recreational** land use is low with only 0.3% of the development area. Major

parks and open spaces in Miraj are Mahatma Gandhi Udyan, Ambedkar Udyan, Shivaji ground, Killa Udyan, Gorde Udyan, Rungtha garden, and Jijamata Garden. There are two tanks Ganesh Talao and Tank in Sanjay Nagar, in this settlement contributing to 2.3% area under **Water bodies**

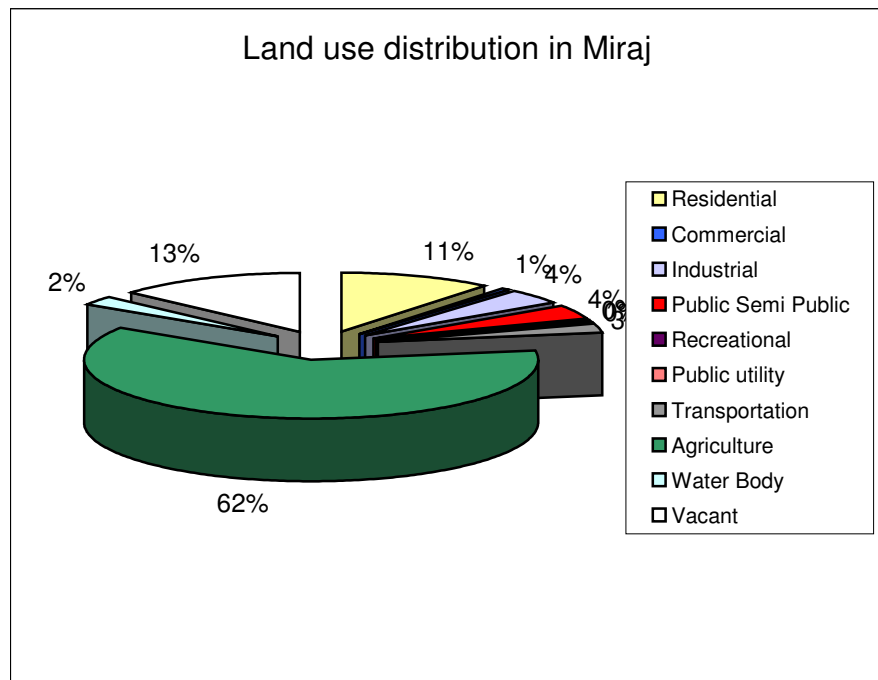


Table 4.15: Land use of Miraj

S.No	Land Use	Area in Ha	% of developed Area	% of Total area
1	Residential	460.36	47.94	10.80
2	Commercial	21.70	2.26	0.51

3	Industrial	179.19	18.66	4.21
4	Public Semi Public	165.81	17.27	3.89
5	Recreational (Open spaces, Parks, Play grounds))	3.21	0.33	0.08
6	Public utility	17.62	1.84	0.41
7	Transportation	112.45	11.71	2.64
Developed area		960.35	100.00	22.54
8	Agriculture	2629.44		61.71
9	Water Body	99.14		2.33
10	Vacant	572.08		13.43
Undeveloped area		3300.65		77.46
Total Area		4261.00		100.00

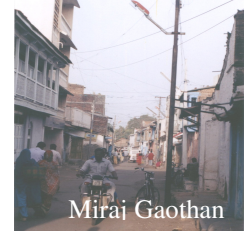
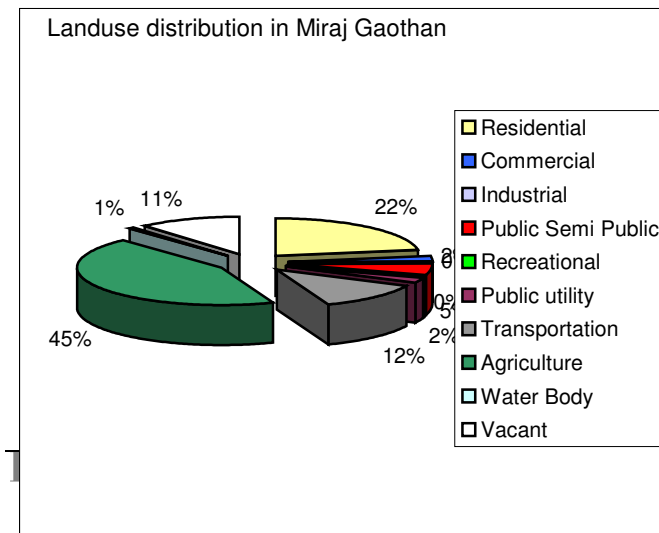
4.11.8 Land use distribution in Miraj gaothan

As other gaothans in the settlement, Miraj gaothan too has a concentration of commercial and residential activities of the Miraj settlement. About 75% of the land is developed, half of it being under residential use.

In Miraj, a small Gaothan settlement also exists near Krishna ghat along the banks of River Krishna in the Southern part. Apart from two temples, a school and few shops, the land use is predominantly residential.

Table 4.16: Landuse of Miraj gaothan

S.No	Land Use	% of developed Area	% of Total area
1	Residential	50.93	37.56
2	Commercial	5.26	3.88
3	Industrial	0.15	0.11
4	Public Semi Public	11.38	8.39
5	Recreational (Open spaces, Parks, Play grounds))	0.67	0.49
6	Public utility	4.78	3.52
7	Transportation	26.83	19.79
Developed area		100.00	73.74
8	Agriculture		6.31
9	Water Body		0.89
10	Vacant		19.10
Undeveloped area			26.31
Total			100.00



4.11.9 AREAS EXHIBITING SPATIAL GROWTH (1971-2001)

SANGLI

Sangli town originally formed of 6 lanes, which gave it its present name, has spread within a span of 200 years to over 5kms east west and 5 kms. to Southern side

Earlier around 1800 the Miraj Jehagir was split and Sangli gaon was chosen as its headquarters. The limits of the town were restricted with Krisna River in the west, the Maruti temple on the east, Maharwada on the South and towards north was the nala.

The growth began with the construction of Ganpati temple (around 1913) and area around it (presently the Pethbagh and the Kapad peth area), along with the Ganesh Durg(now the Rajwada). Thus the first 100 years saw development of Pethbagh as major commercial area along with the Rajwada area. The Khanbagh area became a residential area. Many works were carried out with the establishment of Municipal Council in 1876 like Sangli-Miraj meter gauge railway line, the Vakharbagh area for traders, etc. City started growing towards the eastern side with residential areas like Shivajinagar coming up. The population of town had increased from 12961(1871) to 16141(1911).

Around 1919 the Willingdon College began on the Sangli-Miraj road. The growth of the city thus began towards this side. The growth of the city up to 1950 was towards Vakarbhag and onwards in the northern but due to the presence of Sherinala it diverted to Northeast and eastern side (along Sangli-Miraj road). After 1950, with the establishment of Market Yard on Miraj road, the growth went beyond the kalikhan. Establishment of institutions like the Commerce College (1962) along Sangli-Miraj road, the growth got the impetus in the eastern side. The Civil Hospital(1963-64) in the northern part gave way for areas like Ganesh nagar, Ambedkar nagar developing as residential as well as major health centre with specialty hospitals and dispensaries coming up along the Ambedkar road.

The extent of municipal council thus increased from 11.42 sq.km.(1961) to 20.65 sq.km.(1962). The population had also increased by then from 73838(1961) to 195138 in 1971.

The growth along southern part of Miraj road continued with the making of parallel road to it. Residential developments in the form of colonies like Neminathnagar, Ramamata nagar were formed. The road terminated at Walchand College, which joined the Miraj road. During the same period Police headquarters (1965) came up on Miraj road along which a 100 feet wide road was proposed. With the establishment of Bharat Sut Girni(1972-73) it resulted in growth taking place towards northeastern part i.e. towards Kupwad.

The Sugar Factory (1960-61) and Shantiniketan Education complex along Madhavnagar road forced the development along this road with areas like Panchashila nagar coming up in this part.

Up to the 80's growth in western parts (Sangliwadi), along the Peth road and along the Kolhapur road did not take place largely due to large Krishna basin in the west and its spread resulting in loose soil along the Kolhapur-Ankli road. The growth towards Karnal and along Old-Budhgaon road was restricted up to the 90's due to the presence of Sherinala and water-logged soil.

Later in late 80's and early 90's there was a spurt of growth in all directions. Firstly the area along the 100 feet road connecting Kolhapur road started growing rapidly in the form of "Gunthewari" with residential colonies like Trimurti colony, Shamraonagar, Dattanagar, etc. Towards Kupwad along 100 feet road Adgonda Patil nagar, Jijamata nagar have come up. Small pockets like Nehrunagar, Mahatma Gandhi colony have come up along Sangli-Kupwad road. Towards northern side(Karnal road and Old-Budhgaon road) small pockets viz. Gayatri nagar, Sainath nagar, Dattnagar, Shiv nagar are coming up. Sangliwadi has also

Gunthewari development with colonies like Sainagar, Pant Balkundre nagar,etc. Small plotted growth along Kolhapur road with colonies like Arihant nagar,Bharat nagar,etc. are also growing up.

MIRAJ

Miraj, an ancient town dating back to 13th century which originated with the construction of fort (now in dilapidated condition),and the Mirasaheb Dargah. Later on the Jumma Masjid, Kali Masjid,etc were added. The town, thus comprised of the settlement developed around these structures. Miraj was earlier ruled by the Adilshahs and later the Patwardhans in the 19th century. The town grew and developed during the regime of the Patwardhans. The population during 1762 was 50,000, and by 1901 rose to 18425.

The Miraj Municipality established in 1875 saw the development of town with the construction of town hall (1880) and other prominent buildings. Laxmi market (1933) and the area in central gaothan became the major commercial centre. The growth of the town was inevitable with increase in population from 18425(1901) to 40224(1951).

The Mission hospital established in 1891 paved the way for growth in the western and northern parts of the town around Tasgaon ves and Kupwad ves with residential areas springing up in small pockets. Later the establishment of Willingdon college (1911), Industrial estate (1961) on Sangli-Miraj road gave way to the growth in its western part. Introduction of new broad gauge railway line (Kolhapur-Pune, 1971) also paved way for the growth in the western parts. Considering the growth in this part, Town Planning Scheme (1969) was sanctioned with provisions for Market yard, City bus terminus, etc. The edge defining the new development and the gaothan (western side) emerged as a major commercial spine.

The beginning of Wanless chest hospital along Sangli-Miraj developed the settlement of "Wanleswadi" with very small population. The residents depended on the adjoining major centres of Sangli and Miraj on its either sides for its growth.

The settlement along Sangli-Miraj thus grew with colony Shivajinagar coming up with an area also developed having large health facilities and dispensaries. Heavy industrialization in the western parts accelerated growth with rate of 45.47% during 1961-71 decade being the highest over the earlier decades.

The Sangli-Pandharpur road state highway passing through the town and the establishment of Mission Hospital, surged the growth of the town. This saw the establishment of large institutional buildings like Medical college and Salunkhe college. The settlements of Sanjay nagar, Adarsh colony thus formed around the institutions. Till around the 80's the town had not shown much growth in the eastern and the Southern parts as these areas had a preponderance of agriculture activities.

Since the late 80's all the surrounding areas grew in the agriculture belts, with the unauthorized transformation into residential use. The so formed Gunthewari was conspicuous in the eastern and northern parts of the town along Pandharpur road with residential colonies like SriLaxminagar, Navnathnagar and along Malgaon road (with residential areas like Dattnagar and Janhit colony). The eastern part grew towards Sangli and towards Kupwad with residential pockets of Suraj nagar, Vidyanagar. Lately the timber market area and the area around Shastri Chowk i.e. the towards southern side has also been growing towards Mhaisal and Bedag road with prominent residential pockets like Vetar nagar, Hajichand colony to name a few. The growth in Miraj has spread its way in all possible directions in form of small residential pockets.

KUPWAD

Kupwad was a small hamlet between Sangli-Miraj in the northern side with much of land under agriculture use. The growth of village began with the establishment of MIDC in the mid 70's and expanding along the main Sangli –Kupwad spine. Earlier the size of Kupwad was restricted to a 'gaothan' with the settlement around the gram panchayat and the Dargah.

Later with the establishment of Police Headquarters, Commerce College on Sangli-Miraj road and considering the spillover from Sangli, 100 feet road along the headquarters was made. This cleared way for the development along this road. Also around 1972-73 Bharat Sut Girni was started which paved way for the growth of Kupwad towards the western part of Kupwad. The growth along the road connecting Sangli-Kupwad road to Madhavnagar started up with residential colonies like Yashwantnagar, Vasant nagar. Growth along Kupwad –Madhavnagar was conspicuous as Sugar Factory had also come up in Madhavnagar with the residential colonies like Shalini nagar, Ahilyanagar in the northern parts of Kupwad coming up in the mid 80's. The population of then Kupwad village was 6798(1961) which became 11716 in 1981.



Growth accelerated in late 80's and early 90's in the form of residential pockets along Kupwad-Madhavnagar road. The population showed a tremendous increase, attaining a figure of 33313 persons in 1991. Development in the northern part that is along Tasgaon and Budhgaon road was less since these areas had much agriculture taking place.

Late 80's and early 90's showed growth in these areas in the form of small colonies like Bajrang nagar, Sharad nagar towards eastern side (towards MIDC) and Bamnoli road. Colonies like Shanti colony, Kapse plots have come up along Budhgaon road. New development is also visible in areas along Madhavnagar road with residential colonies like Ulhas nagar, Vijaynagar, Prakash nagar coming up. As evident from the above facts Kupwad though had an agricultural character, but since it fell in the urban complex of Sangli-Miraj, growth has started up in all directions predominantly the major spine being the Sangli-Kupwad road.

4.12 TO SUMMARIZE

Land use of an area reflects the socio-economic conditions and expected developments of the population in and around a natural land unit.

1. The land use distribution shows nearly 17% of area being the residential area with about half (49.4%) of the overall area still being under agricultural use. The commercial areas are less with only 0.72% in the SMKMC corporation area.
2. Land under industries is 2.8% of the total area under SMKMC, with MIDC Miraj and Vasantdada industrial estates being the major ones. The area in transportation is 25.42% while that for public-semipublic being 3.2%.
3. Residential land use is dispersed all over the Sanglicity with 17.4% (of the total area covering Sangli and Sangliwadi) under this use.
4. The percentage of residential areas in the Gaothans is higher in both Sangli and Sangliwadi 24.4% and 40.17 respectively. The Sangliwadi area shows higher area of residential since other land uses like commercial and public-semipublic areas remain to the main city i.e. Sangli.
5. In sangli and sangliwadi, Industrial area is 3.44% of the overall area.
6. The percentage of recreational area to total area is very less with only 1.59 % of to the total area. The Sangli gaathan area shows nearly 20% of the area going into the transportation and communication. The overall percentage for transportation in the area is 21%.

7. In Miraj,the gaathan is highly congested with plotted row housing type of housing and half of the landuse being the residential one(51.24%) .The overall area of Miraj shows only 15% of residential area
8. Commercial areas in Miraj account for only 0.44% of the total area.
9. Land use under commercial use is very small in Kupwad & wanleswadi area constituting only 0.02% of the total area