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## Urban expansion and loss of agricultural land: A GIS based study of Jalgaon city (M.S.) India

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### Abstract

In This paper uses remote sensing (aerial photographs and satellite images) combined with field checks and surveys to measure the loss of agricultural land to urban expansion in Jalgaon City between 2006 and 2012. In this paper some techniques use a detailed mapping of land use changes and includes details of the location of the agricultural land losses, The agricultural land has continued to shrink due to rapid urbanization. The paper also describes nonagricultural land uses were responsible for agricultural land losses. Where urbanization is reducing the supply of high-quality agricultural land.

**Keywords:** Urban expansion, land use, agriculture, GIS

### Introduction

Urban expansion is the physical growth of urban areas, which leads to further development of towns or cities, population growth, increase of buildup area, high density of population and it's also psychological stage of the urban way of life. The early insight of some prescient scholars are how common understanding especially those of George Perkins Marsh in the nineteenth century who documented the pervasive nature of land modification by human activity.

Land use/cover is two separate terminologies which are often used interchangeably (Dimiyati *et al.*, 1996) [12]. Land cover refers to the physical characteristics of earth's surface, captured in the distribution of vegetation, water, soil and other physical features of the land, including those created solely by human activities e.g., settlements.

### Research Hypothesis

**Urban development impact has been noticed of land-use & land cover in Jalgaon city.**

### Aims & Objective

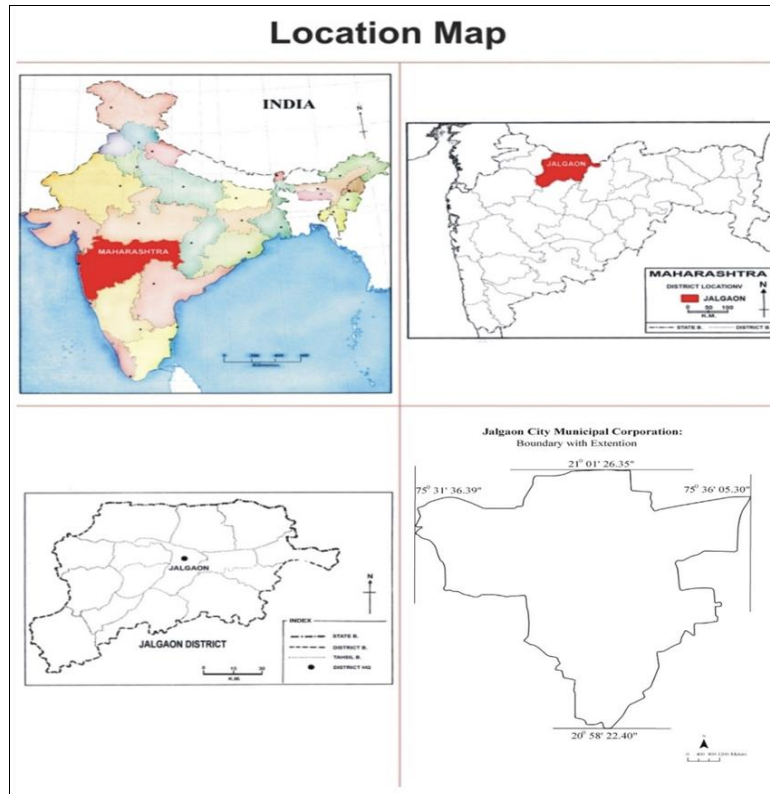
1. To study urban development status in Jalgaon city.
2. To investigate land-Use & Land Cover pattern in study area.
3. To find out measure changes in land-use pattern.
4. To analyze urbanization problems & solution in this study region

### Research Methodology

This project work has used secondary & tertiary data sources from Govt. & Non-govt. organization from Jalgaon city. We have applied various cartographic techniques for data analysis. Researcher has used computer cartographic tools for mathematical calculation and graph. Advance GIS & RS techniques are applied by researcher for preparation of various thematic maps of related study. Also, Cadastral maps & toposheets has been used for demarcation of ward & city boundaries our study region.

### Location and Extent

Jalgaon is a city in western India, north of Maharashtra in jalgaon district and in the agriculture region of Khandesh. Jalgaon geographical coordinates are 21°1'0" North, 75°34'0" East.



**Fig 1:** Jalgaon City Location Map



**Fig 2:** Jalgaon City Municipal Corporation Zone wise Map

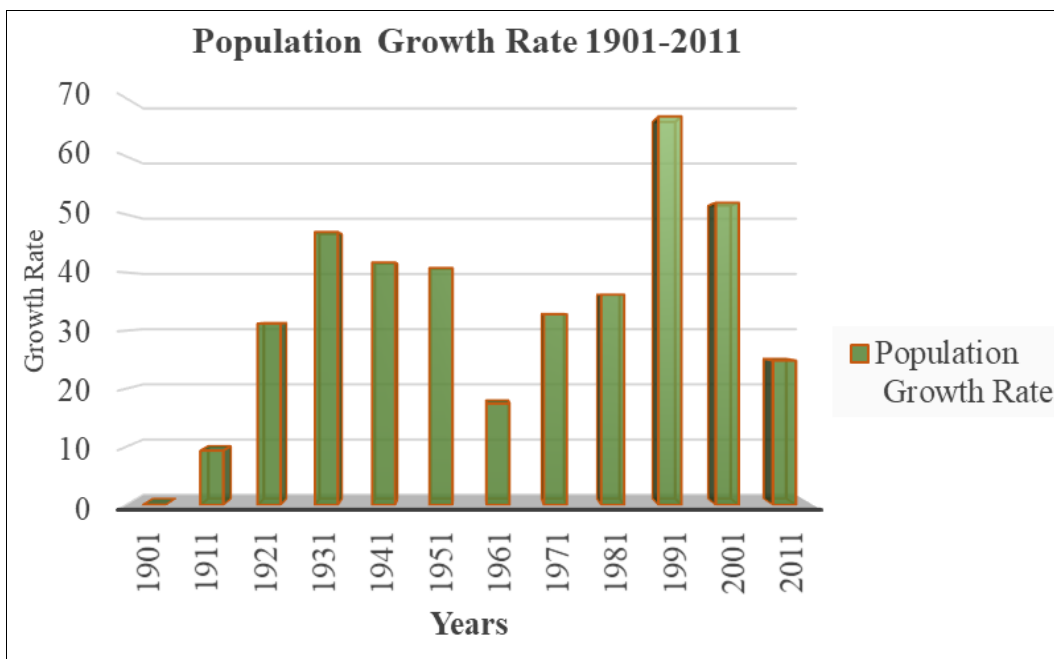
**Table 1:** Demography and Population Growth

Year	Population	Increase	Growth Rate
1901	16259	0	0
1911	17780	1521	9.4
1921	23329	5549	31.2
1931	34286	10957	46.7
1941	48596	14310	41.7
1951	68412	19816	40.8
1961	80351	11939	17.5
1971	106711	26360	32.8
1981	145335	38624	36.2
1991	242498	96863	66.6
2001	368618	126420	52.2
2011	460228	91610	24.9

Source: Census of India 2011

The growth rate of jalgaon city has been on the rise from 1951 to 2001. The city has registered a decadal growth rate

of about 51.91% and an average annual growth rate of 5.19% during 1991-2001.



Source: census of India 2011

**Fig 3:** Population Growth Rate 1901 to 2011

It is observed that out of total population of Jalgaon city of 460228 recorded in 2011 census, the male population is 240590 and female population is 219638 respectively. In 1901 population of Jalgaon 16259. The growth rate of Jalgaon city has been on the rise from 1971 to 1991. The city has registered a decadal growth rate of about 51.91% and an average annual growth rate of 5.19% during 1991-2001. As per my observation from 1901 to 2011 there was highest population growth rate (66.6) in the year 1991 as compared to other years. 3 Municipal Area and population Density.

The Jalgaon Municipal limit covers an area of 68.24 sq.km, out of which 11.45 sq.km is the old municipal limit and 56.79 sq.km extended additional area. This indicates that the

municipal territorial jurisdiction has increased more than four times i.e. from 11.45 sq.km to 68.24 sq.km. The overall population density of jalgaon city, according to 2001 census is 53.94 inhabitant/hectors.

**Growth Trends and Loss of Agriculture Area**

**Trade and commerce:** The Jalgaon region is well known for the production of jawar, dal bajra, cotton, groundnuts etc.

About 33.49% of total workers were engaged in spinning and weaving and about 21.38% of workers were engaged in ginning and weaving. It shows that, more than 54% of total industrial workers are engaged in textile-oriented industries and rest of it is agriculture oriented industrial workers.

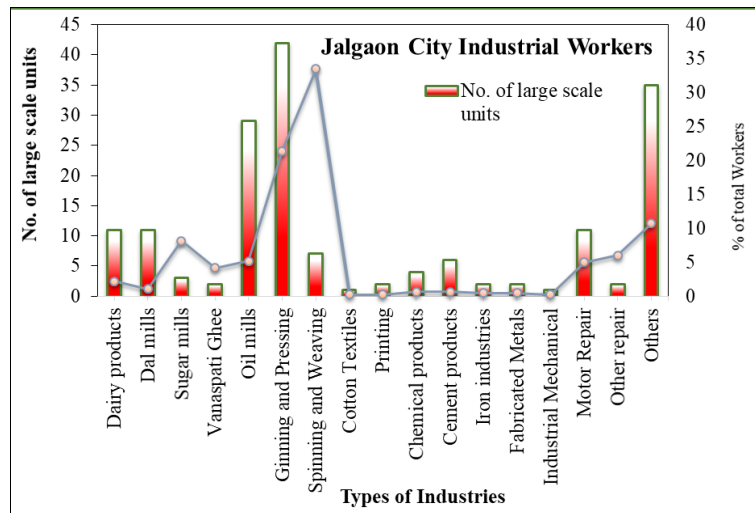


Fig 4: Jalgaon City Industrial Workers

Jalgaon is also emerging destination for small and medium scaled manufacturing, engineering and IT solutions, because of its proximity from four metros in the state i.e. Mumbai, Pune, Nashik and Aurangabad. There are major companies in the city like Raymond, Bosch, Jain Irrigation and Legrand etc.



Fig 5: Jalgaon Industries

**Municipality limit**

As the district headquarters jalgaon is the largest urban agglomeration of the jalgaon district. Jalgaon city ranks 16<sup>th</sup> amongst other cities in Maharashtra with a total population of 3.68 lacs and decadal growth rate of 51.9%. The municipal area consists of the old municipal limit, which covers an area of 11.45 sq.km. on additional area of

56.78 sq. km., which was included in the corporation limit.

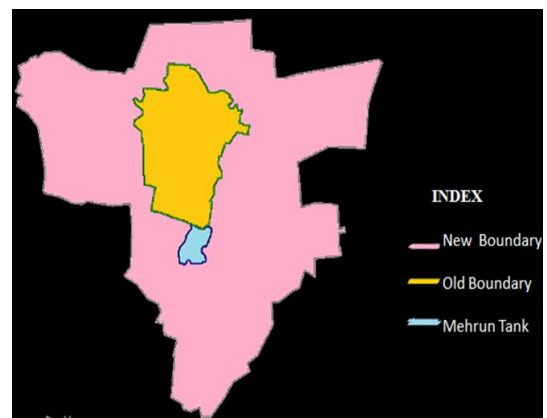


Fig 6: Expansion of Jalgaon City- Map

**Occupational Structure**

The workforce force participation rate in primary, secondary & tertiary sector is 4.7%, 3.2% & 92.10% respectively.

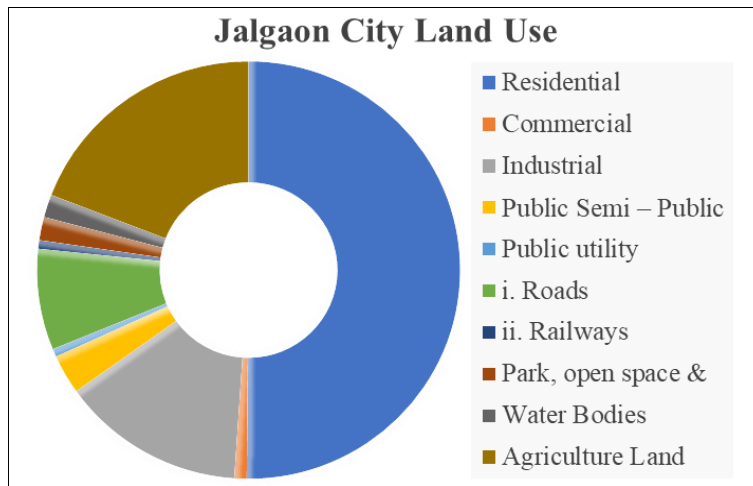
1. General Land Use Pattern.
2. Land use Analysis.

Land use assessment helps us to understand the development patterns of the city and its future growth directions.

Table 2: Land use 2011

Land Use	Proposed land Use - 2011		
	Area in Hectares	% Developed area	Proposed Land use %
Residential	2847.12	63.38	50.13
Commercial	53.45	1.19	0.94
Industrial	799.00	17.26	14.06
Public Semi - Public	173.61	3.86	3.05
Public utility	34.36	0.76	0.60
Transport & Communication	-	-	-
Roads	444.49	9.91	7.82
Railways	37.37	0.83	1.02
Park, open space & Playgrounds	102.21	2.31	1.79
Total Developed Area	4491.61	100.00	
Water Bodies	100.62	-	1.77
Agriculture Land	1086.62	-	18.82
Total	5678.85*	-	100.00

Source: City survey office Jalgaon



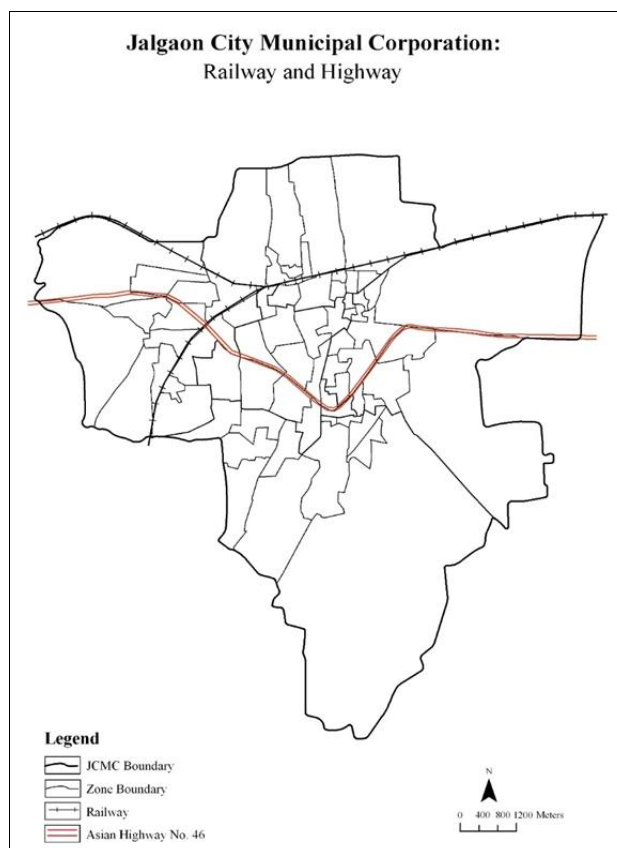
**Fig 7:** Proposed Agriculture land break-up

While 50 percent of the additional area is proposed for residential purposes, a significant 14.06% of the area is proposed for industrial uses. Each of the land use categories is further detailed below.

- 1. Residential:** An area of 2847.12 hectares/ 28.47 sq.km, about 51.13% has been reserved for residential purposes, with an average density of 200 persons per hectare.
- 2. Commercial:** An area of 53.45 hectares/ 0.53 sq.km, about 0.94% has been proposed for commercial purposes in the Development Plan.
- 3. Industrial:** Industrial activity mainly occurs in the MIDC area and Co-operative Industrial Estate on the eastern side of Jalgaon. An area of 799 hectares/ 7.99sq.km, 14.06% has been proposed for industrial uses considering an overall density of 45workers per

hectare.

- 4. Public and Semi-public:** An area of 173.61 hectares/ 1.74 sq.km, about 3.05% has been proposed for public purposes considering the land requirements of various Government/ Semi Government agencies.
- 5. Public Utility:** An area of 34.36 hectares/ 0.34 sq.km, about 0.60% has been proposed for public utilities.
- 6. Transport and Communication:** An area of 444.49 hectares/4.45 sq.km, about 7.82%has been proposed for Roads and the Railways have covered 37.37/0.37 sq.km, about 1.02%.
- 7. Park, open spaces, Playground and Greenbelts:** Areas of 102.21 hectares/ 1.02 sq.km, about 1.79% plus 1086.62 hectares/ 10.87 sq.km, about 18.82% have been proposed as Non-Development Zones.



**Fig 8:** Jalgaon growth directions



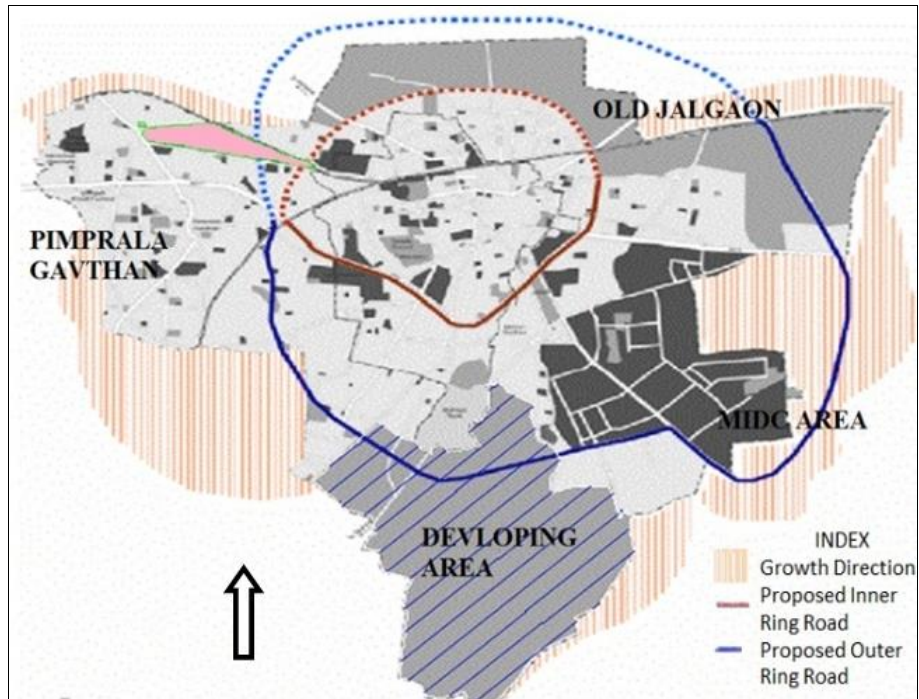


Fig 9: Jalgaon growth directions and future proposals

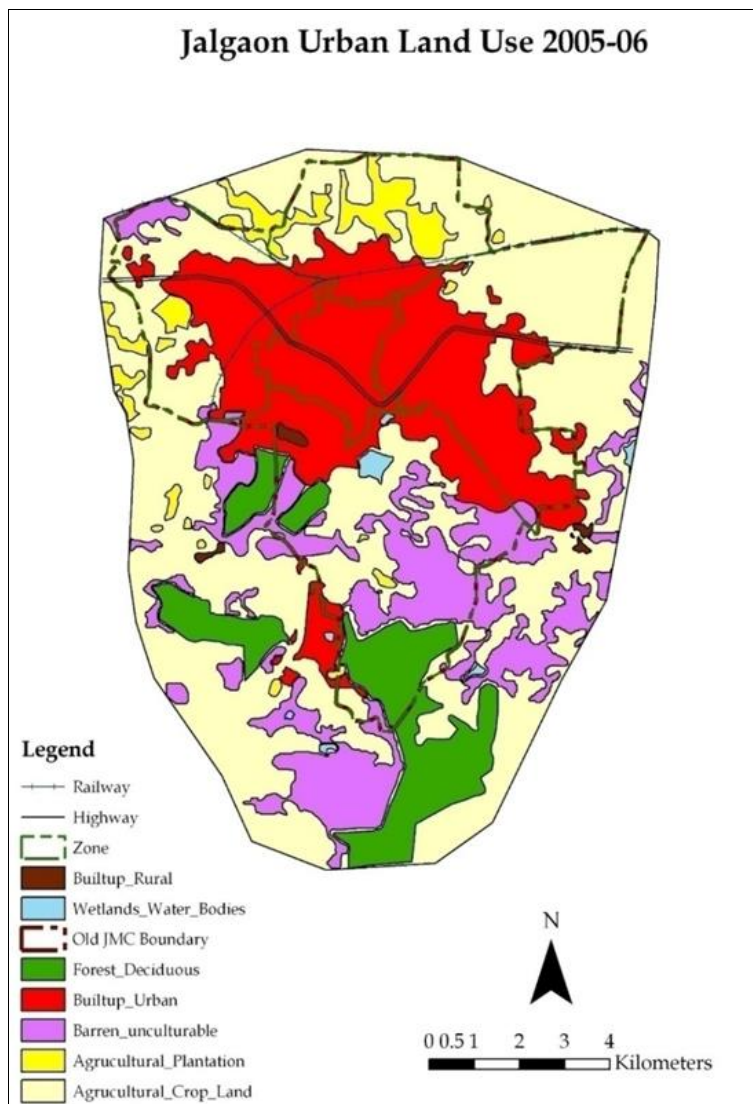


Fig 10: Jalgaon urban land use 2005-06

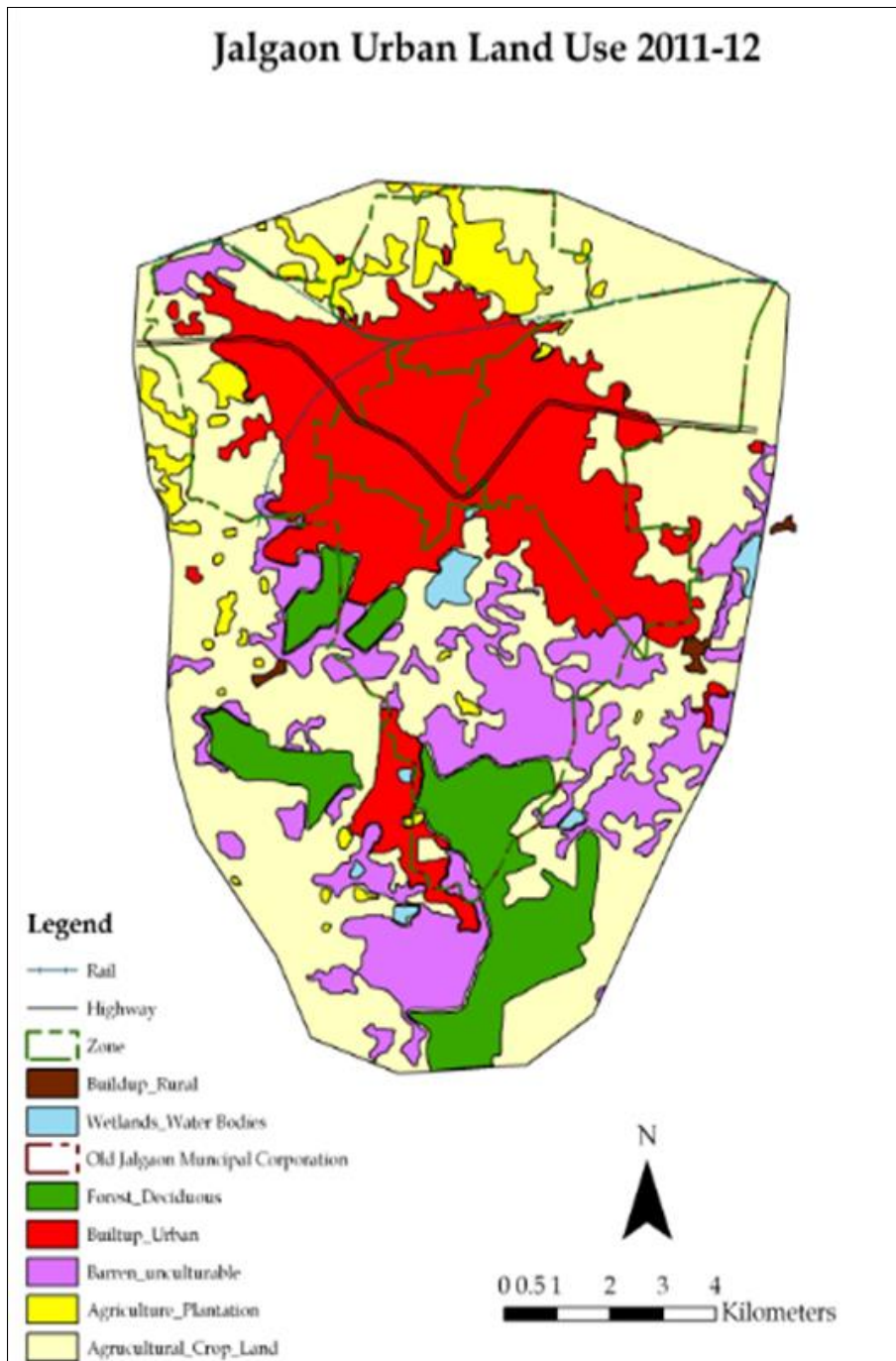


Fig 11: Jalgaon urban land use 2011-12

Table 3: Shows the classification of 2006-07 Area in Ha, 2011-12 Area in Ha and its Difference Area in Ha

Classification	2006-07 Area in Ha	2011-12 Area in Ha	Difference Area in Ha
Agricultural Crop Land	147.52	147.52	0
Agricultural Plantation	5.76	6.26	0.5
Barren uncultivable	21.8	20.9	-0.9
Builtup Rural	0.43	0.4	-0.03
Builtup Urban	33.32	35.46	2.14
Forest Deciduous	12.63	12.73	0.1
Highway	13.52	13.52	0
Old JMC Boundary	75.1	75.1	0
Railway	16.95	16.95	0
Wetlands Water Bodies	0.64	1.27	0.63
JMC Ward/Zone	75.1	75.1	0
Total	402.77	405.21	2.44

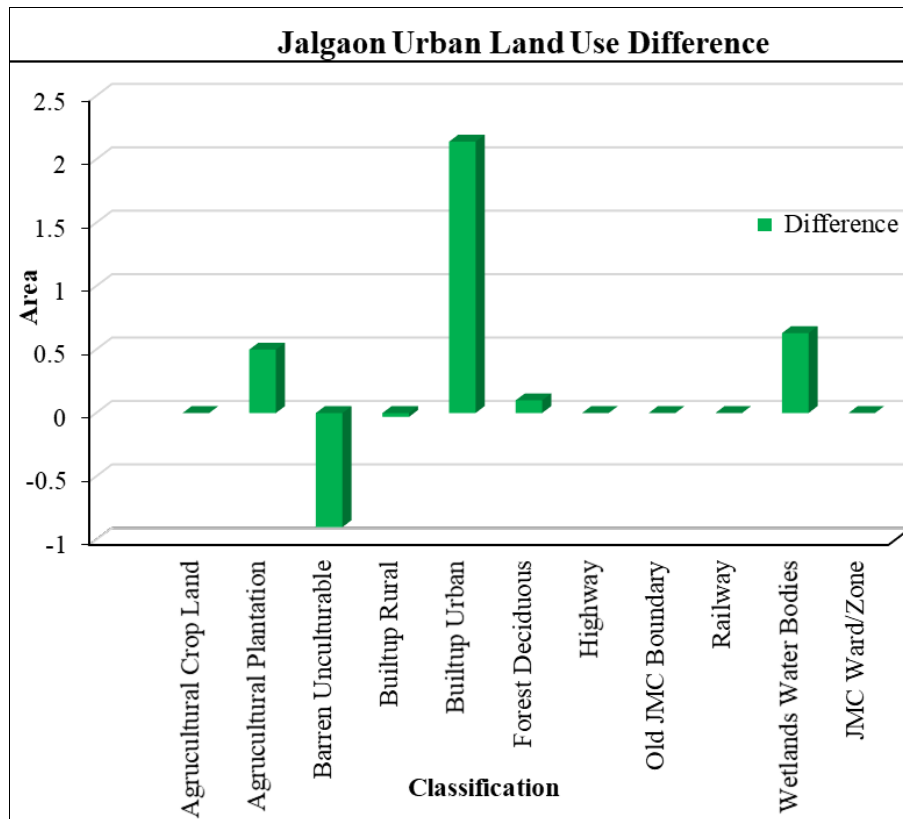


Fig 12: Jalgaon urban land use difference

**Conclusion**

1. Jalgaon city has experienced rapid urban expansion in the last decade and a half, with population growth and an increase in urbanized extent of the city.
2. Jalgaon faces other common challenges like accumulation of garbage, traffic congestion, deteriorating roads and pollution.

**Issues, Potential and Challenges in environment sector**

The most important environmental issue in Jalgaon is attributed to pollution.

**The various types of pollution are**

1. Water pollution.

2. Air pollution.
3. Noise pollution.
4. The population of the city is at a dynamic or self-motivated stage, it is expected to grow further in the coming decades. It reveals that very high growth rate in population occurred due to transition of city economy from agriculture to industrial.
5. In city loss of green cover and open spaces.
6. Urban expansion is really good for developing & processing city, but not for agriculture land, they have some limit
7. Continuous addition of household waste and sewage into the nallas renders the Mehrun and Ambedkar lakes to be polluted.



Fig 13: Mehrun Tank



**Suggestion**

- Ease communication and transport networks by designing proper road systems.
- Mass plantation program by the industries and adjoining local pollution will help to control the ambient air pollution levels.
- Awareness on pollution, health impacts of pollution and need for sustainable development amongst the industrial management, workers and population will help to improve the quality of environment in the area.
- The reason for the high growth rate is due to the influx of population from the rural areas in search of employment/ work/business/ education etc.
- Due to the urban expansion lots of damage ascends agricultural land.

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