

Evaluating the Impact of Major Economic Generator on Change in Land Use of Peri-Urban Area Using Q-GIS: A Case Study Nagpur

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Abstract: *In this era of globalization, most developing countries are witnessing a shift away from an import substitution based development strategy to one based on export promotion policy. As part of their policy instruments to promote exports, many of these countries are vigorously promoting export processing zones (EPZs). In view of the importance of industrialization it is necessary that the mega developmental projects be implemented with faster speed so that the socio-economic difference between the different individuals of the population can be minimized. In view of the above, this study aims at examining the impact of Multi-modal International Cargo Hub and Airport at Nagpur (MIHAN an international cargo hub) on the change in land use, specifically in the peri-urban areas of Nagpur City where the MIHAN is established.*

Keywords: SEZ, Impact , Land use, Peri Urban.

1. Introduction

According to the Government's policy, the international cargo hub is expected to be a self contained and comprehensive vehicle to integrate country as a whole into the global economy. The cargo hub has transportation hub serving a Nation or a number of countries with convenient connections to key destinations and other hubs. Nagpur is identified because of its strategic location. Upon completion, this project would not only play a key role in the development of Nagpur region but will benefit the state and the country as a whole. Hence, in the backdrop of importance of the MIHAN project, it is necessary to conduct a focussed study to Evaluating the impact of this major economic generator on change in land use at the peri-urban area of Nagpur.

Objectives of the study

- 1.To study the nature and the development pattern of Nagpur urban and peri-urban area.
- 2.To identify of pockets in the peri urban areas that are influenced due to MIHAN

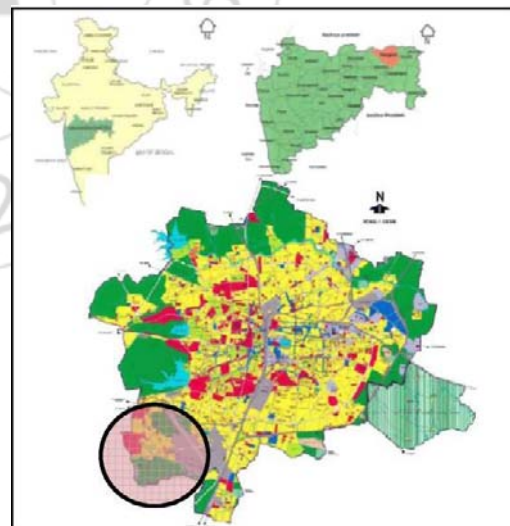
Study area and Methodology

In this study, the peri-urban area of the Nagpur City up to approximately 10 Kms from the city limits formed the universe of the study as per Nagpur Metropolitan Region Development Authority (NMRDA). According to NMRDA, the peri urban area is divided in four divisions i.e., East, West, North and South Fringe areas.

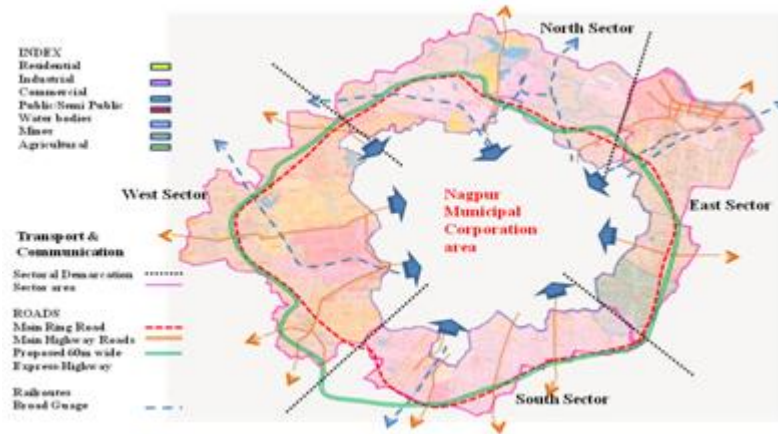
As the project MIHAN was introduced in 2007, and still the project is in the dormant stage, where no speedy developments are noticed, the study of change in Land use pattern was done for every two years intervals.

The Quantum GIS (Q-GIS) is the software used for the study along with Google maps. The footprints of the land use in all the four fringes are mapped by using Q-GIS. The CD analysis was done from 2007 to 2013 with the intervals of two years each i.e. year 2007, 2009, 2011, and 2013.

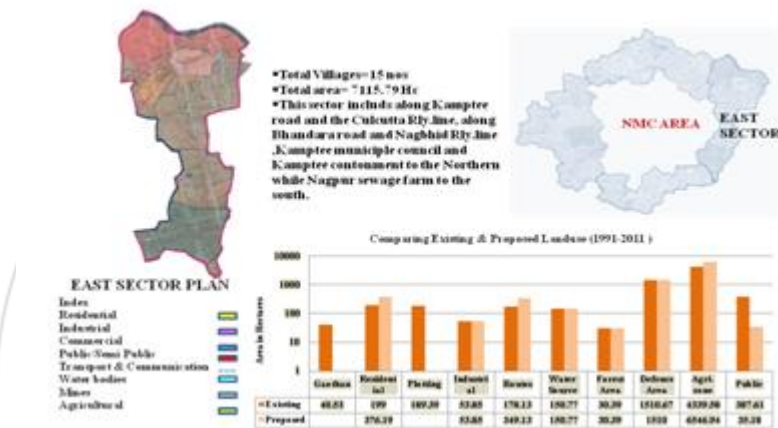
The change detection analysis is done and the major affected zone was finalised.



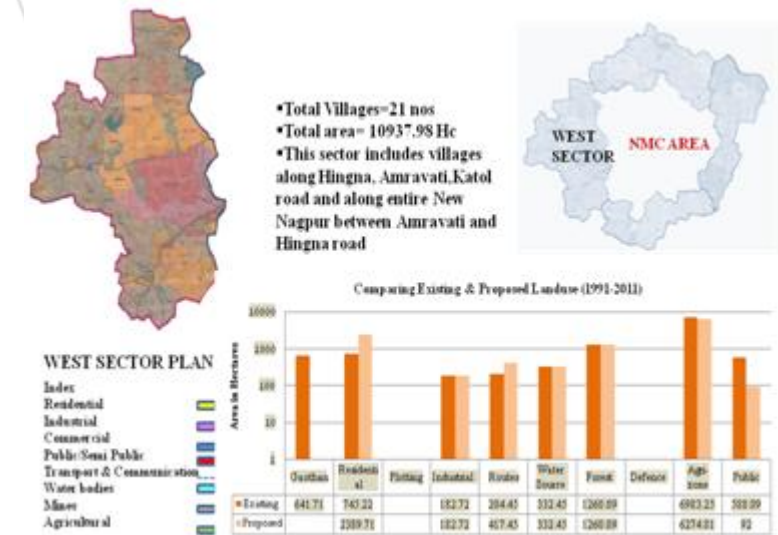
The map showing location of Nagpur and MIHAN



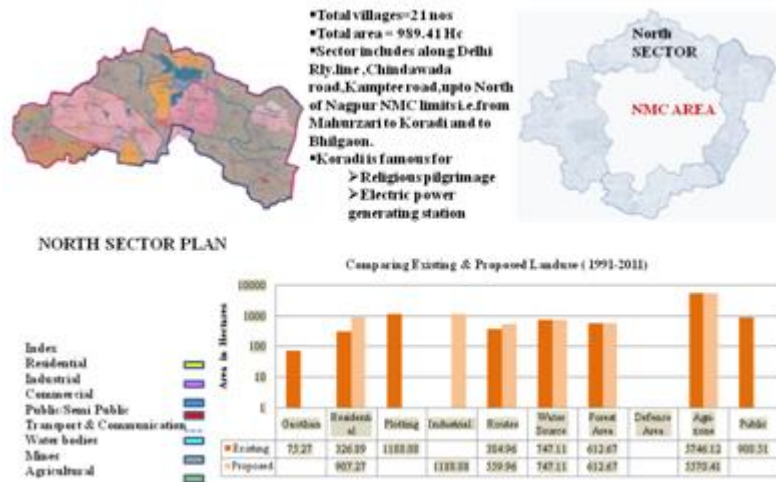
Study Area Showing All Sector Fringe area of Nagpur –Proposed Circulation Pattern (Source: Nagpur Regional Plan.)1991-2011



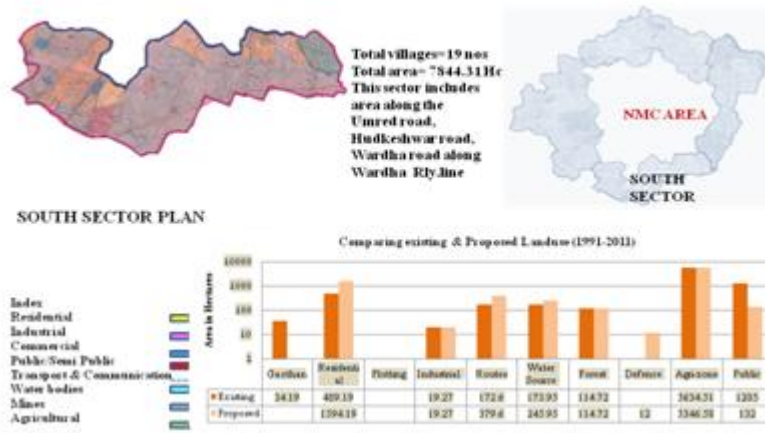
East Sector Fringe area of Nagpur – Proposed Land Use Plan (Source: Nagpur Regional Plan.) 1991-2011



West Sector Fringe area of Nagpur – Proposed Land Use Plan (Source: Nagpur Regional Plan.) 1991-2011

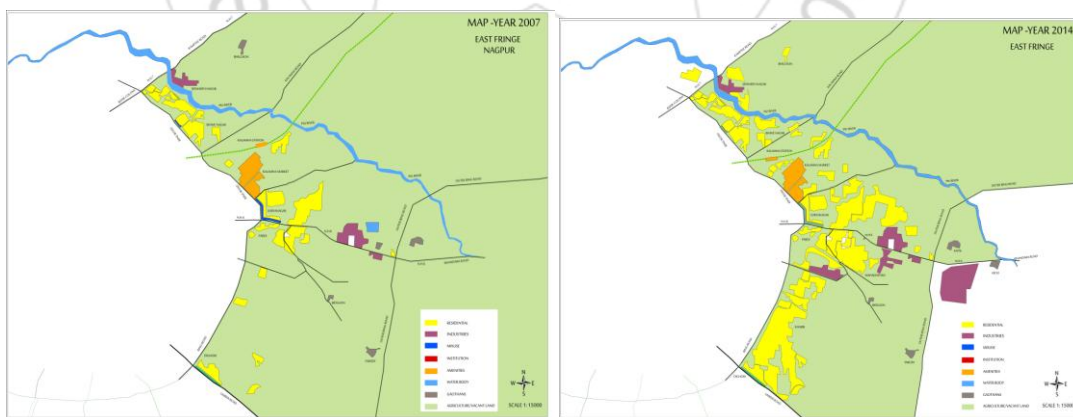


North Sector Fringe area of Nagpur – Proposed Land Use Plan (Source: Nagpur Regional Plan.) 1991-2011

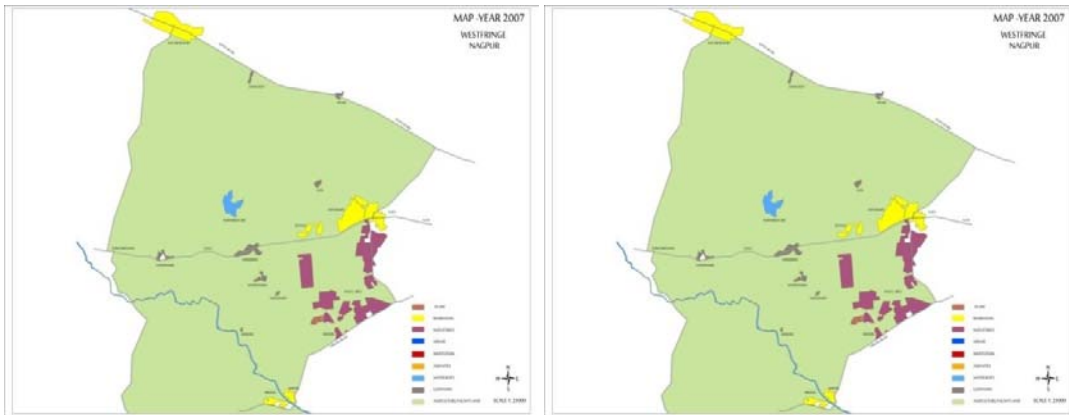


South Sector Fringe area of Nagpur –Proposed Land Use Plan (Source: Nagpur Regional Plan.) 1991-2011

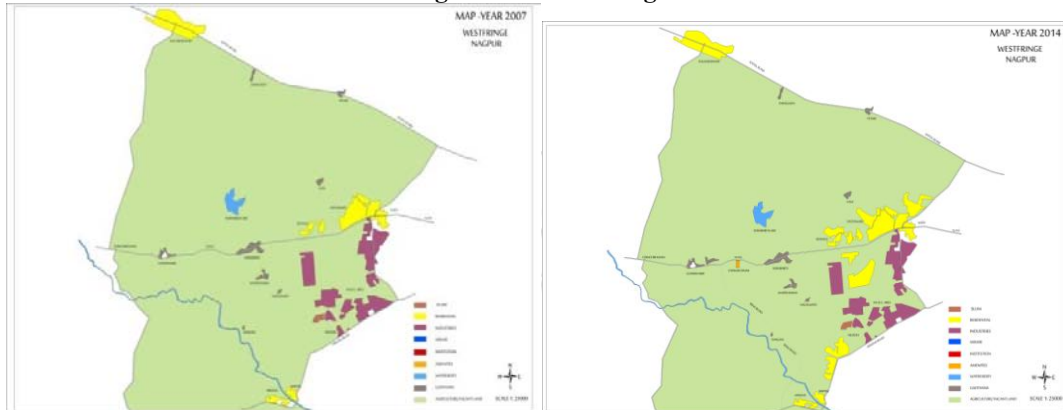
Following are the Images of footprints of each zone in software and areas of different land uses were calculated in respective year of study done using Google maps and Q-GIS using Open Office. .



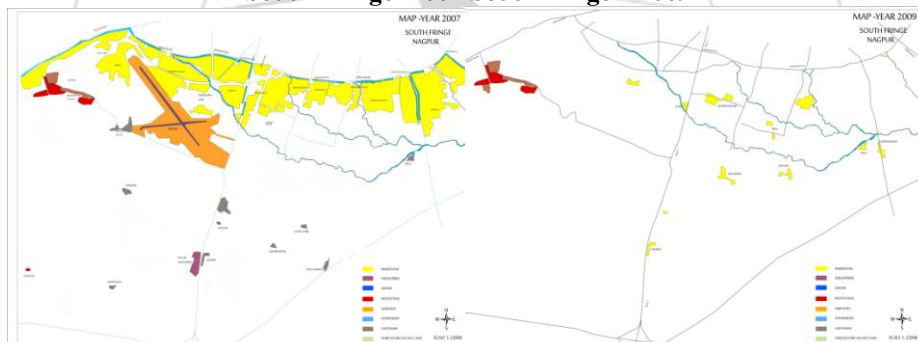
East Fringe- 2007 East fringe – 2014



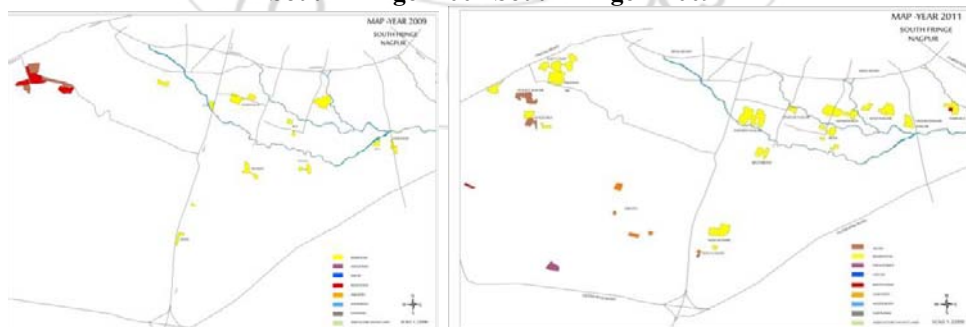
West Fringe- 2007 West fringe – 2014



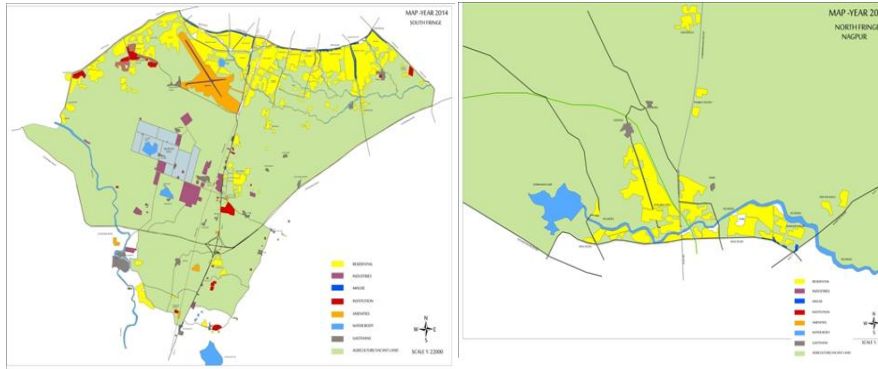
South Fringe- 2007 South fringe – 2009



South Fringe- 2007 South fringe – 2009



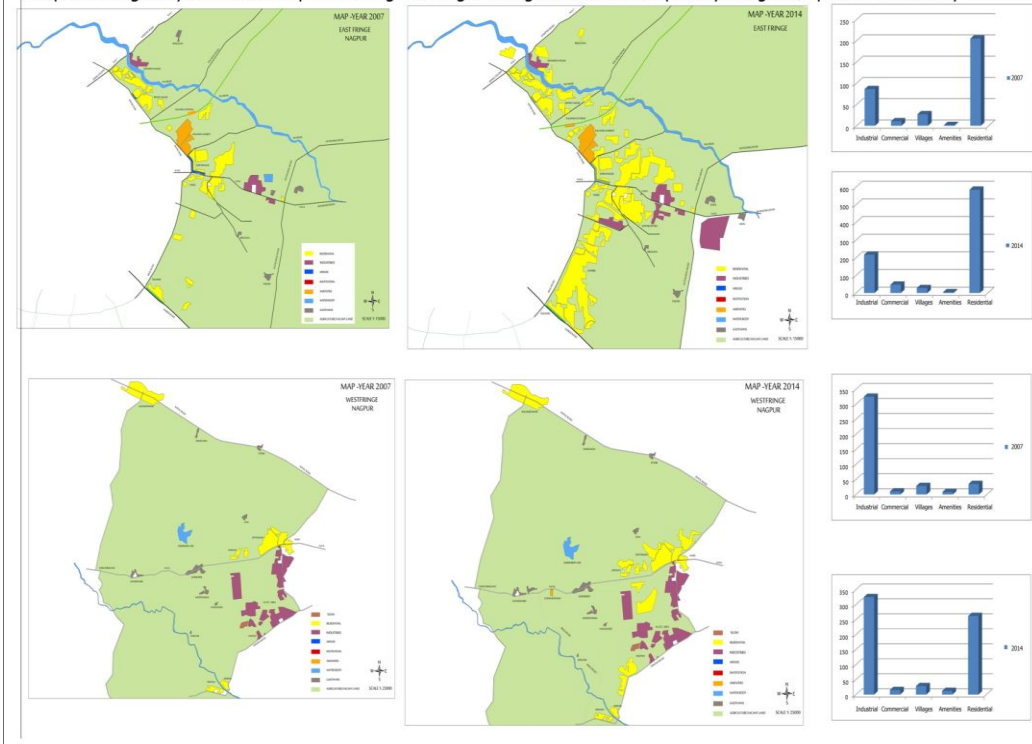
South Fringe- 2011 South fringe – 2014



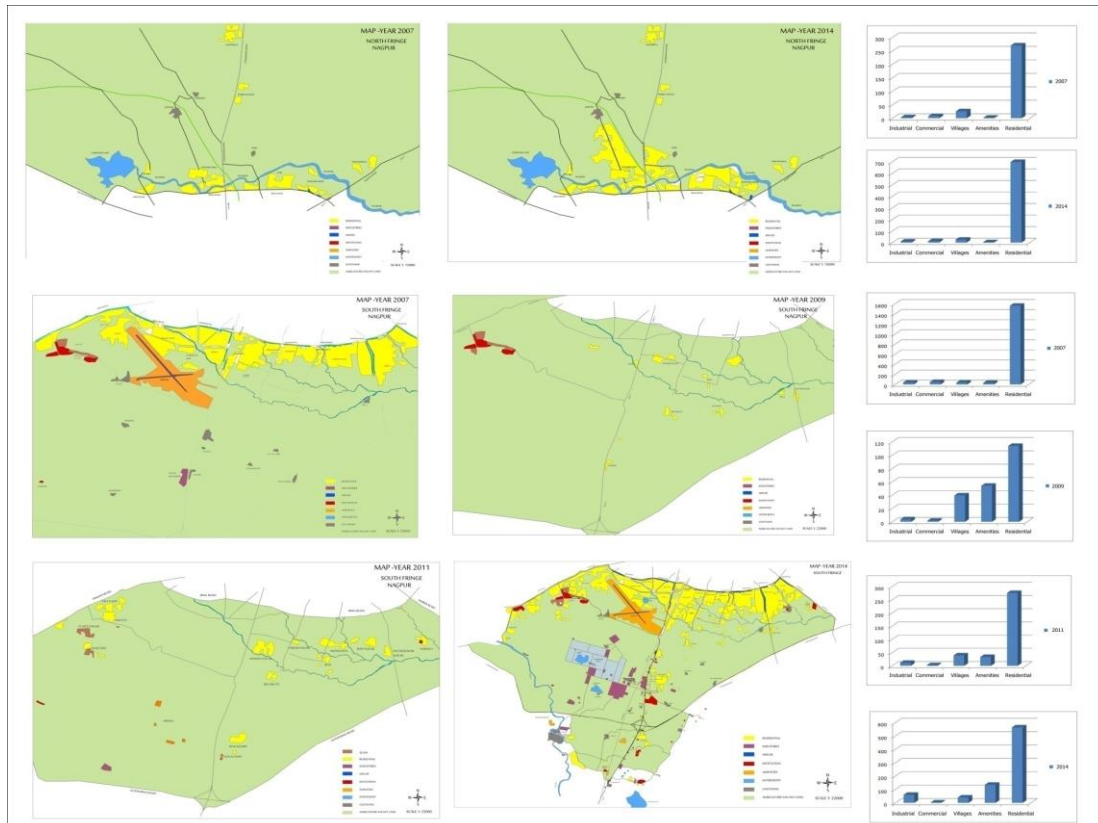
North Fringe 2007 North Fringe 2014

Comparative Assessment of all the fringes

Maps showing the yearwise development along the fringes at regular intervals to quantify the growth pattern of the city



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2. Data and Analysis

Land Use

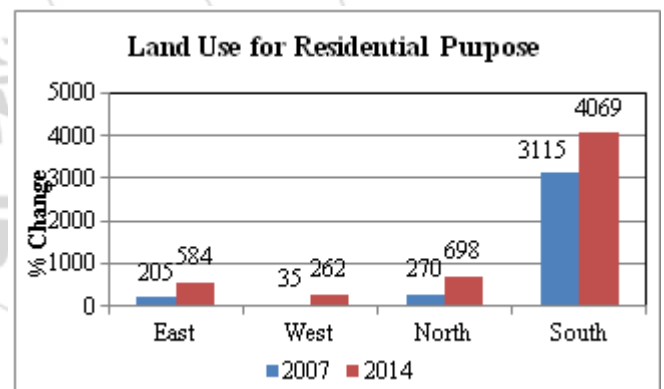
Change in Land use during 2007-2014

Land Use for Residential Purpose

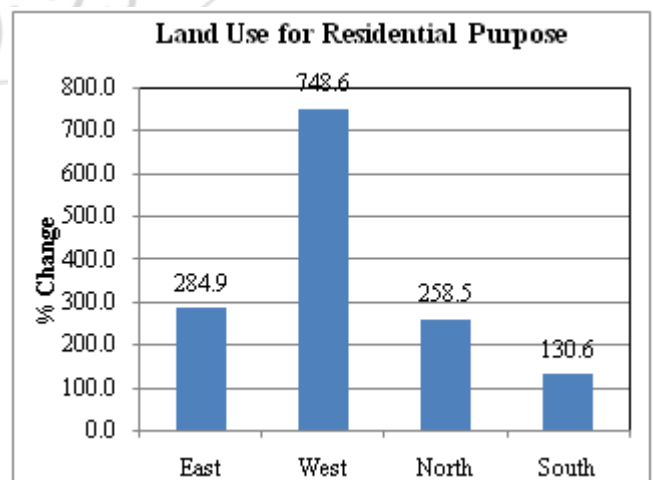
Table: Land Use for Residential Purpose

Area	Year		% Change
	2007	2014	
East	205	584	284.9
West	35	262	748.6
North	270	698	258.5
South	3115	4069	130.6

Above Table presents data regarding the land use changes for residential purpose in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is noticeable change in the land use pattern (for residential purpose). Specifically, in east side of the Nagpur City, the land use for residential purpose during the year 2007 was 205 Hectares, which during the year 2014 was 584 Hectares. The percent change was 284.9% i.e. the land use for residential purpose was double from the year 2007. The percent change in the land use (for residential purpose) at west, north and south sides of the City is 748.6, 258.5 and 130.6 respectively. The highest land use change was recorded at the west fringe while lowest was at south fringe. However, the actual land (in hectares) values were highest for the south fringe. Thus, from the study results it is concluded that the percent change in the land use for residential purpose is uneven in the different peri-urban areas of Nagpur City.



Land Use for Residential Purpose



Land Use for Commercial Purpose

Table: Land Use for Commercial Purpose

	2007	2014	% Change
East	10.32	46.42	449.8
West			
North	1	3.54	354.0
South	48	49.6	103.3

Above Table presents data regarding the land use changes for commercial purpose in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is noticeable change in the land use pattern (for commercial purpose). Specifically, in east side of the Nagpur City, the land use for commercial purpose during the year 2007 was 10.32 Hectares, which during the year 2014 was 46.42 Hectares. The percent change was 449.8% i.e. the land use for commercial purpose was double from the year 2007. The percent change in the land use (for commercial purpose) at, north and south sides of the City is 354.0, and 103.3 respectively. The highest land use change was recorded at the South fringe while lowest was at North fringe. However, the actual land (in hectares) values were highest for the south fringe. Thus, from the study results it is concluded that the percent change in the land use for commercial purpose is uneven in the different peri-urban areas of Nagpur City.

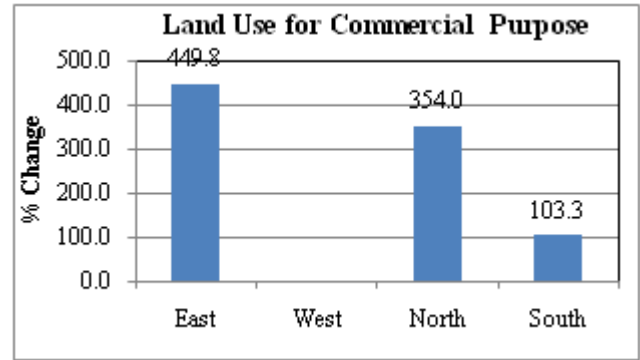


Figure: Land Use for Commercial Purpose

Land Use for Amenities Purpose

Table: Land Use for Amenities Purpose

	2007	2014	% Change
East	1.3	4.3	330.8
West	77.12	97.72	126.7
North			
South	30.85	253.18	820.7

Above Table presents data regarding the land use changes for Amenities purpose in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is noticeable change in the land use pattern (for Amenities purpose). Specifically, in east side of the Nagpur City, the land use for amenities purpose during the year 2007 was 1.3 Hectares, which during the year 2014 was 4.3 Hectares. The percent change was 330.8% i.e. the land use for Amenities purpose was double from the year 2007. The percent change in the land use (for amenities purpose) at, West, and south sides of the City is 126.7 and 820.7 respectively. The highest land use change was recorded at the West fringe while lowest was at East fringe. However, the actual land (in hectares) values were highest for the West fringe. Thus, from the study results it is concluded that the percent change in the land use for Amenities purpose is uneven in the different peri-urban areas of Nagpur City.

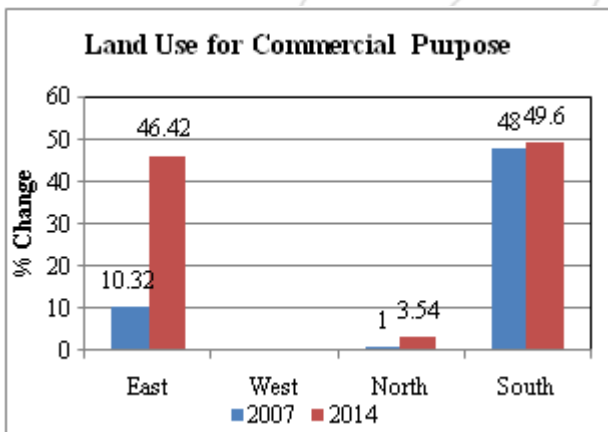


Figure: Land Use for Commercial Purpose

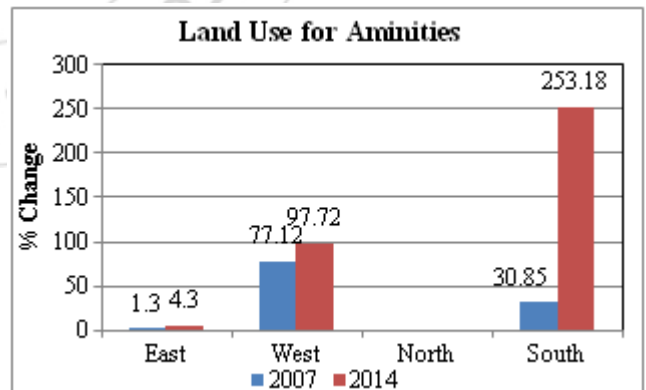


Figure: Land Use for Amenities Purpose

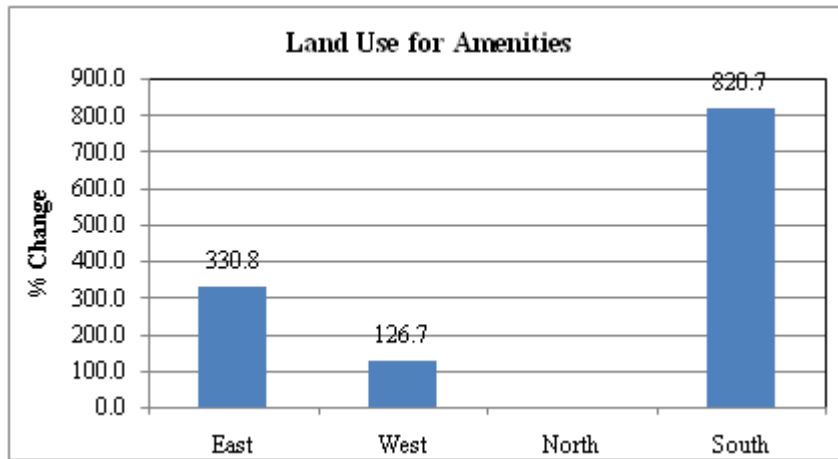


Figure: Land Use for Amenities

Land Use for Industrial Purpose

Table: Land Use for Industrial Purpose

	2007	2014	% Change
East	86	216.88	252.2
West	325	25	7.7
North	3	9.35	311.7
South	3.65	75.17	2059.5

Above Table presents data regarding the land use changes for industrial purpose in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is noticeable change in the land use pattern (for industrial purpose). Specifically, in east side of the Nagpur City, the land use for industrial purpose during the year 2007 was 86 Hectares, which during the year 2014 was 216.88 Hectares. The percent change was 252.2% i.e. the land use for industrial purpose was double from the year 2007. The percent change in the land use (for industrial purpose) at, West, North and south sides of the City is 7.7, 311.7, and 2059.5 respectively. The highest land use change was recorded at the South fringe while lowest was at North fringe. However, the actual land (in hectares) values were highest for the East fringe. Thus, from the study results it is concluded that the percent change in the land use for industrial purpose is uneven in the different peri-urban areas of Nagpur City.

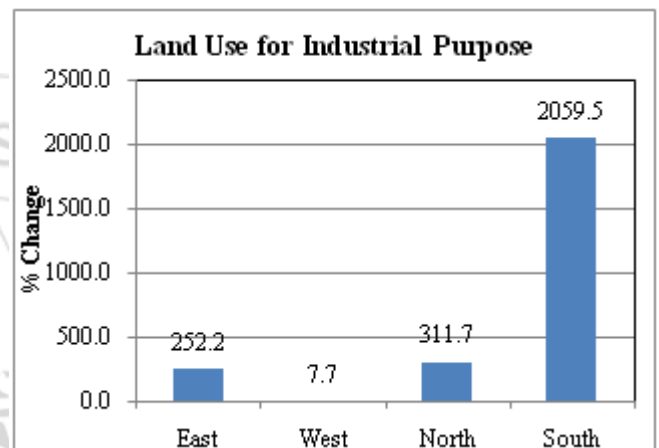


Figure: Land Use for Industrial Purpose

Land Use for Gaothan Purpose

Table: Land Use for Gaothan Purpose

	2007	2014	% Change
East	27	27	100.0
West	28	28	100.0
North	25.4	25.4	100.0
South	39.5	39.5	100.0

Above Table presents data regarding the land use changes for gaothan purpose in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is noticeable change in the land use pattern (for gaothan purpose). Specifically, in east side of the Nagpur City, the land use for gaothan purpose during the year 2007 was 27 Hectares, which during the year 2014 was 27 Hectares. The percent change was 100% i.e. the land use for gaothan purpose was same from the year 2007. The percent change in the land use (for gaothan purpose) at, West, North and south sides of the City is 100, 100, and 100 respectively. The highest land use change was recorded at the South fringe while lowest was at east fringe. However, the actual land (in hectares) values were highest for the East fringe. Thus, from the study results it is concluded that the percent change in the land use for gaothan purpose is uneven in the different peri-urban areas of Nagpur City.

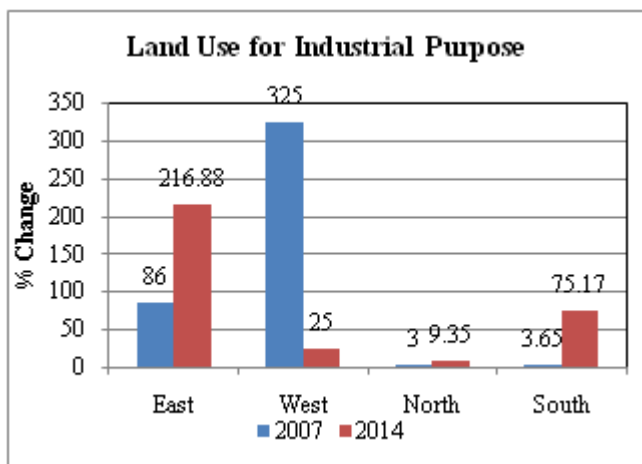


Figure: Land Use for Industrial Purpose

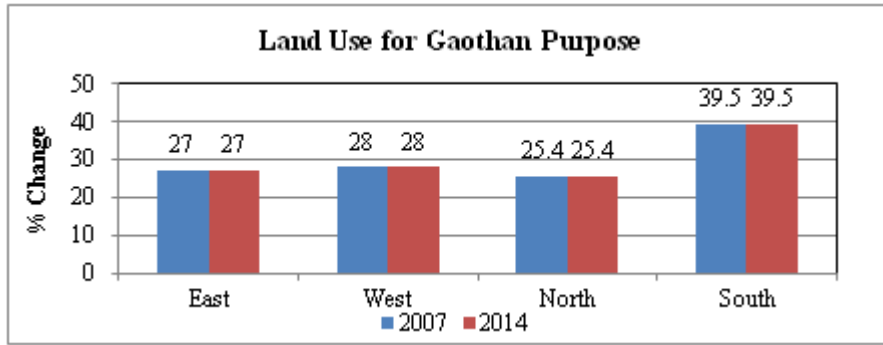


Figure: Land Use for Gaothan Purpose

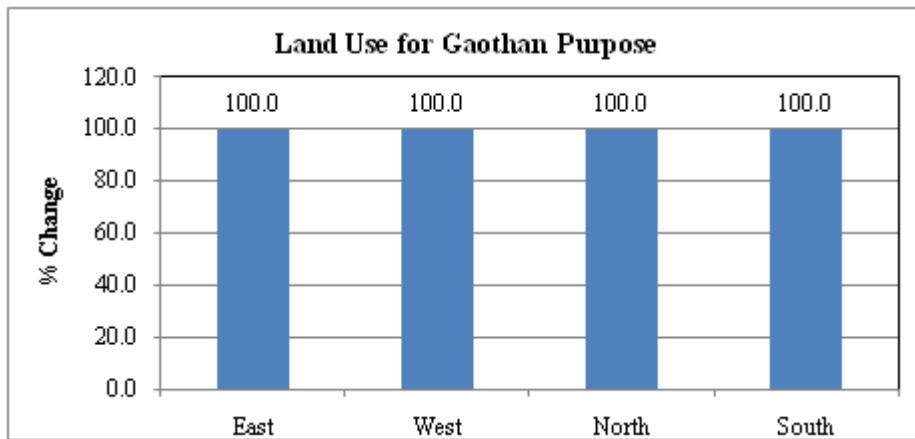


Figure: Land Use for Gaothan Purpose

Land Use for Lake/Water

Table: Land Use for Lake Purpose

	2007	2014	% Change
East			
West			
North			
South	1.9	1.9	100.0

Above Table presents data regarding the land use changes for lake in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is no noticeable change in the land use pattern (for lake purpose). Specifically, in east side of the Nagpur City, the land use for lake purpose during the year 2007 was 1.9 Hectares, which during the year 2014 was 1.9 Hectares. The percent change was 100% i.e. the land use for lake purpose was same from the year 2007. Thus, from the study results it is concluded that the percent change in the land use for lake purpose is uneven in the different peri-urban areas of Nagpur City.

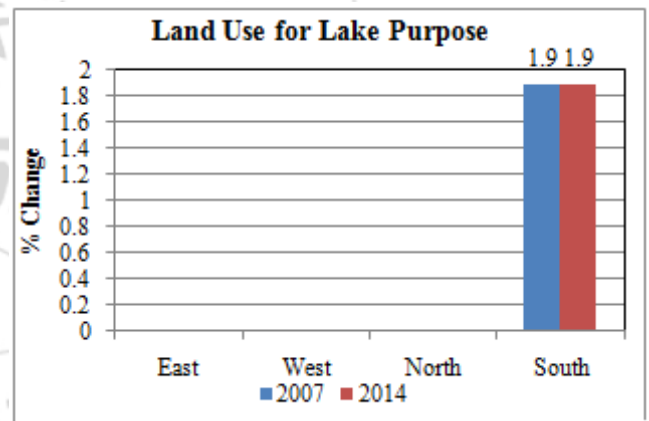


Figure: Land Use for Lake Purpose

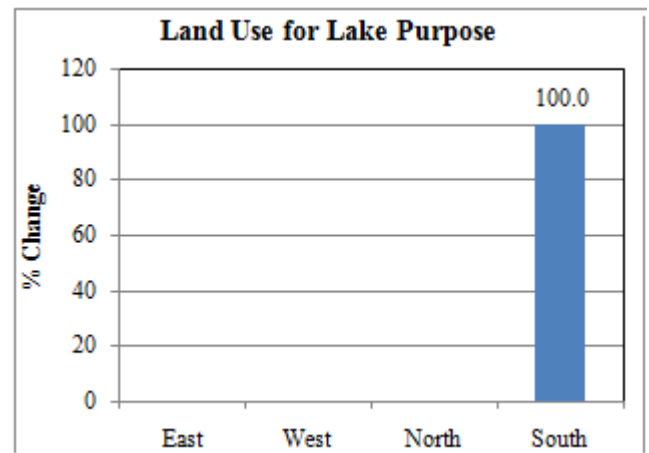


Figure: Land Use for Lake Purpose

Comparative study about the Residential, Commercial, Amenities, Industrial, Gaothan and Lake land use changes in the year 2007, 2009, 2011, 2014 in the peri-urban areas of Nagpur city.

	2007	2009	2011	2014
RESIDENTIAL	3115	3229 (96.5)	3505 (88.9)	4069 (76.6)
COMMERCIAL	48	49.6 (96.8)	49.6 (96.8)	49.6 (96.8)
AMENITIES	30.85	84.85 (36.4)	118.48 (26.0)	253.18 (12.2)
INDUSTRIAL	3.65	3.65 (100.0)	15.17 (24.1)	75.17 (4.9)
GAOTHAN	39.5	39.5 (100.0)	39.5 (100.0)	39.5 (100.0)
LAKE	1.9	1.9 (100.0)	1.9 (100.0)	1.9 (100.0)
TOTAL AREA	3238.9	3408.5 (95.0)	3729.65 (86.8)	4488.35 (72.2)

Above Table presents data regarding the land use changes for the residential, Commercial, Amenities, Industrial, Gaothan and Lake in the year 2007, 2009, 2011, and 2014 in the peri-urban areas of Nagpur City. The data was collected from all the areas i.e. East, West, North and South sides. The data indicates that there is noticeable change in the land use

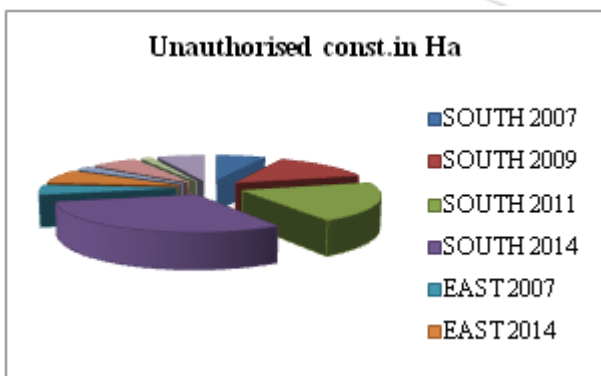
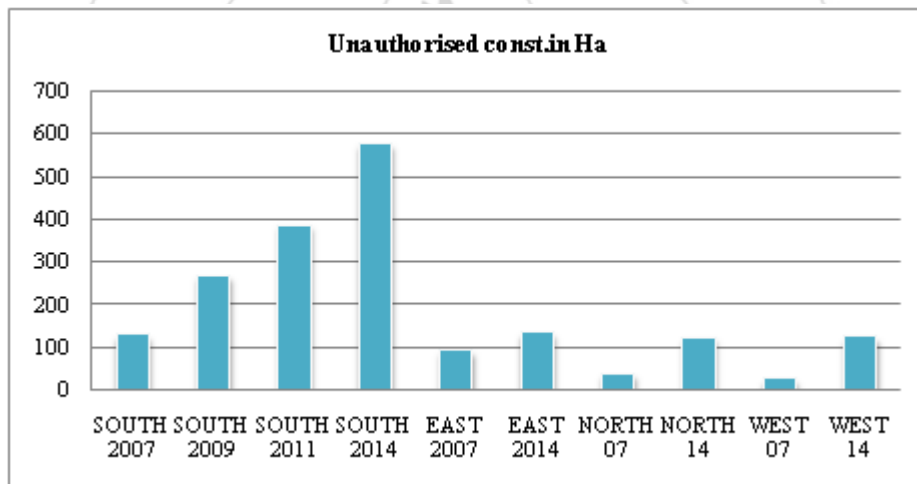
pattern for residential, amenities and industrial purpose in the peri-urban areas of Nagpur city. The land use changes for the commercial, goathan and lake purpose almost remained the same in these years.

Thus, from the study results it is concluded that the percent change in the land use for Residential, Commercial, Amenities, Industrial, Gaothan and Lake purpose is uneven in the different peri-urban areas of Nagpur City.

Study of Unauthorised construction

Sectors in peri-urban areas	Unauthorised const.in Ha
SOUTH 2007	128
SOUTH 2009	267
SOUTH 2011	385
SOUTH 2014	574
EAST 2007	92
EAST 2014	134
NORTH 2007	38
NORTH 2014	123
WEST 2007	26
WEST 2014	124

Table presents data regarding the total area In un authorised constructions and layouts in peri-urban areas of Nagpur City.



Land acquisition for MIHAN project

Sectors in peri-urban areas	Land acquisition (HA) for MIHAN project
SOUTH 2007	890
SOUTH 2009	1343
SOUTH 2011	2483
SOUTH 2014	2538
EAST 2007	0
EAST 2014	0
NORTH 07	0
NORTH 14	0
WEST 07	0
WEST 14	0

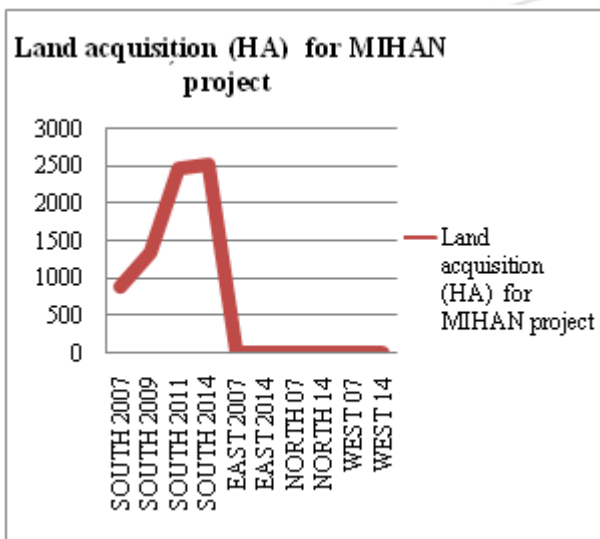
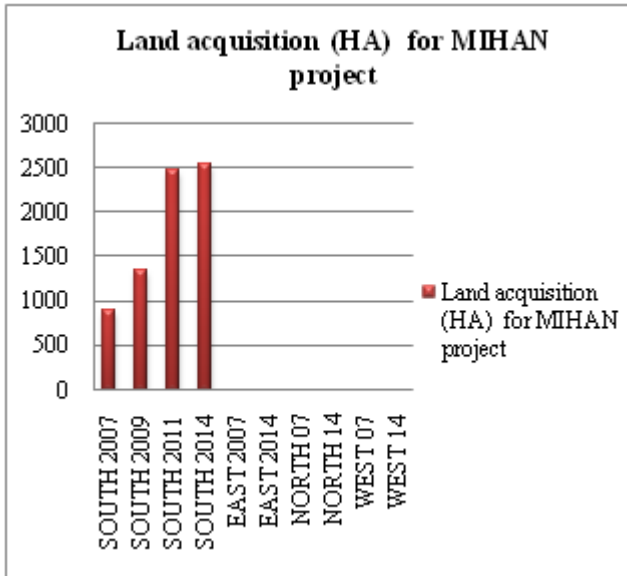


Table presents data regarding the total area in land acquisition from peri-urban areas of Nagpur City.

The data was collected from all the areas i.e. East, West, North and South sides based on primary survey, and also from the revenue department. The data indicates that there is more noticeable change in the south fringe throughout from 2007 to 2014.

Thus, from the study results it is concluded that the percent change in the land for unauthorised growth is prominent in the south fringe areas of Nagpur City. and it is uneven in the peri-urban area of Nagpur city.

3. Conclusions and Discussions

From the above study it is observed that

- 1) The change in the land use pattern over the period of seven years is noted and is not constant change.
- 2) There was a drastic change in initial years of announcement of the project latter on the change observed was very slow.
- 3) The slow rate of change in land use was may be because of the dormant stage of the project.

- 4) The major unauthorised construction was seen in the south-east fringe of the peri urban area and majorly it was the residential growth.
- 5) The major land acquisition was done in the south fringe and it is from the green agricultural fields.

References

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