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Impact of Land Use Changes in Florida Mega Region: Study of FDOT (D-5) from Year 2007-2015

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Abstract

The main objective of the paper is to study the land use change in the District 5 of Florida mega region to see how land use is changing from year 2007, 2009, 2010, 2012, 2014 & 2015. The study aims to look at the land use change from Agriculture open to development to various land attribute like residential, vacant residential, vacant nonresidential, industrial, institutional, ROW, Agriculture. The land use change study has become an important part of transportation planning initiative. The study uses land use data from university of Florida geo plan center for the year 2007, 2009, 2010, 2012, 2014 & 2015. The data is obtained as raster files which will be converted to vector for each attribute of land use parcels. The comparative analysis of the data considering year 2009 as base year will be used and statistical analysis. The statistical analysis will be used to see if the land use change is significant in comparison to base year. The similar data set will be created to using the ten miles buffer for the interstate and 5 miles buffer for the state highway. The study will help understand the land use change pattern over the year and predict future change.

Keywords

Land Use, Planning, Agriculture, Residential, Agriculture Open to Development

1. Introduction and Motivation

Over the past few decades, the urbanization has been done at unprecedented pace. Some of it is because of growth of population in the urban areas and others because of rapid growth and economic transformation in urban areas, allowing millions of people to migrate from rural agriculture areas to more productive activities.

Megaregions are network of metropolitan centers and their surrounding areas. They are spatially and functionally linked through environmental, economic and infrastructure interaction. Land use change plays a major role in transportation and urban planning. However, the change in land use results in growth pressure in urban-rural fringe. Therefore, a thorough analysis of land use change pattern and its ability to predict these changes are important for the sustainable growth (Carmen et al., 2009).

With the rise of Mega region as new economic unit. There is substantial change in the way policies are framed considering new trends in transportation and urban planning. There is substantial change in the way (**Figure 1**).

Labor and capital are reallocated by the economic process. In this new economic unit land use is of vital importance since the planning and policies are now not specific region of a city or county. However, this has been replaced by a major region encompassing wider area functionally interlinked.

To understand the land use change in the mega region. Of the various megaregions in United States FDOT district 5 of Florida mega region has been considered (**Figure 2**).

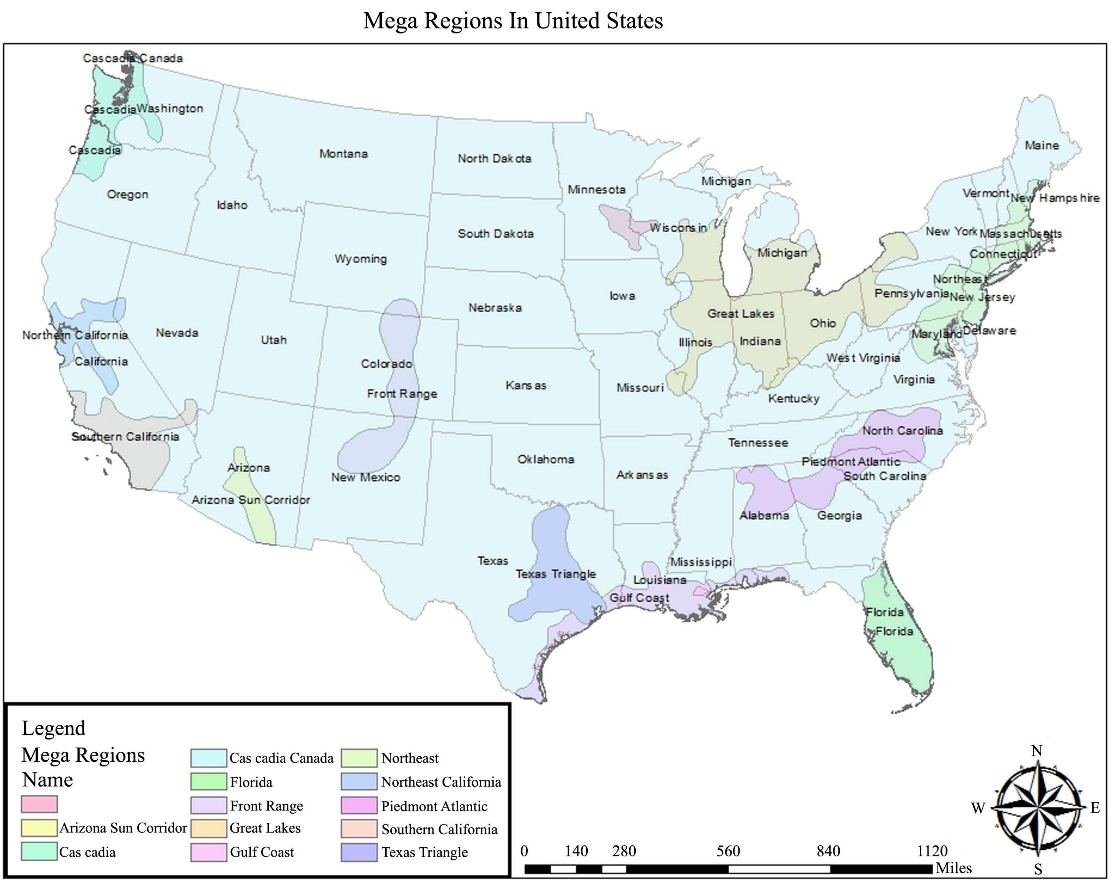

Figure 1. Mega regions in United States.

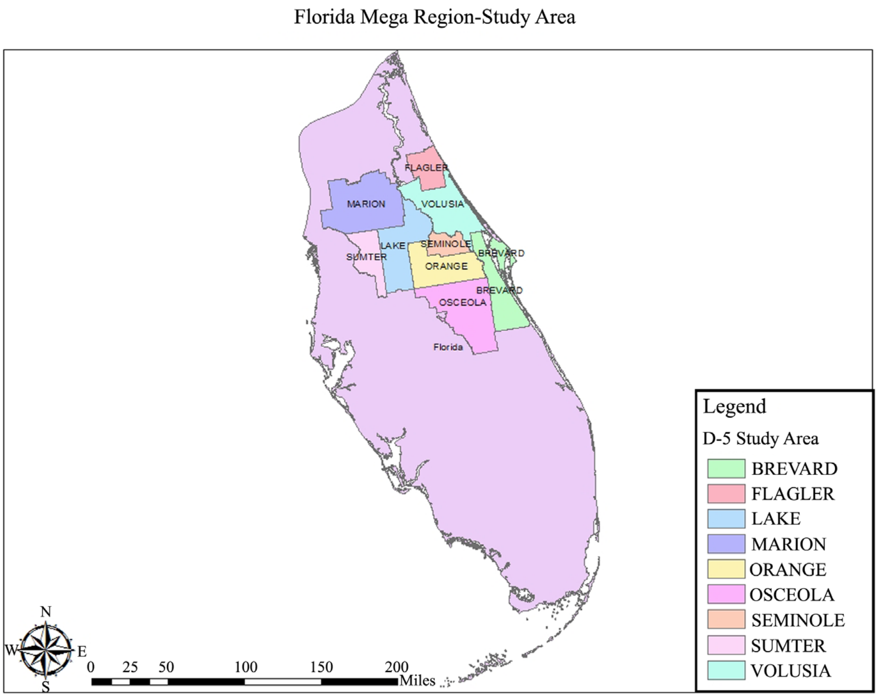

Figure 2. Florida mega region and D-5 study area.

The objectives of the research are listed below:

- To study the land use change pattern in FDOT (Florida Department of Transportation), District-5 (Part of Florida Mega region).
- To compare the land use change from one attribute to other for the year 2007, 2009, 2010, 2012, 2014, 2015 considering 2007 as the base year.
- Create different data set using the available attribute from the Land use data and conduct the statistical analysis to check if the land use change has been significant with base year or not. This model can be used to study the impact of land use change on various areas like population, road network, trip generation, transportation.
- The similar data set will be created for the parcels size within ten miles of interstate highway and within 5 miles of state highway. This analysis will be used to see if the land use change within interstate is more statistically significant or vice versa.

2. Literature Review

Land use change in past decades have led to increased conversion of rural land in many urban peripherals and exurban areas in US. The growth of the exurban area has outpaced the growth in urban and suburban areas, resulting in pressure on urban-rural fringe (Carmen et al., 2009). A multinomial discrete choice model with spatial dependence using parcels-level data from Medina County, Ohio was used. This model extends to binary choice "linearized logit model" of Klier and McMillen (2008).

Land-use planning is usually a very local Function and there is a greater coordination and collaboration among many local governments provides an opportunity to tackle larger scale issues around land use and transportation. Similarly, collaborative area/regional planning involving multiple stakeholders can be used to overcome resistance to mixed-use, higher-density, and transit-oriented development.

Hui Ca et al. (2017), in their research "Urban Expansion and Its Impact on the Land Use Pattern in Xishuangbanna China", talks about how urban expansion and land use pattern are linked. The study predicts that Urbanization will affect land use change especially along the urban-rural gradients and lead to problems related to land use, such as land changed into discrete land uses, conversion from native to designed land cover or development into a non-contiguous or "leap frog" pattern. The study finds that these consequences could then affect the ecosystem and environment properties, including ecosystem services, biodiversity, biogeochemical cycles, climate conditions, etc. As an example, the rapid urbanization will contribute to the direct loss of agricultural land and increased agricultural land use intensity and, finally, affect food production. In the study of urban expansion, a radar graph is commonly used as an effective way to reflect the orientation characteristics of urban expansion by summarizing urban expansion indexes (like area or distance to urban center) in different directions (Hui Ca et al., 2017).

The study concluded that the city proper could further expand through either developing Gasa town southwest of the city proper or converting rubber between Jinghong Industrial Park and the downtown area into urban land. For the urban development of Xishuangbanna, no more rubber should be planted around urban areas. Rubber plantations also threaten natural forest and biodiversity and lead to soil and water degradation. Therefore, there is an urgent need for sustainable measures on rubber management and reforestation, such as eco-compensation mechanisms and ecological governance, combining science and indigenous knowledge. Land fragmentation is another problem that will make land management more difficult and increase conflicts between humans and wildlife. Urban planners and policy makers should find solutions to balance urban development and biodiversity conservation (Hui Ca et al., 2017).

According to Wu et al. (2010), substantial reduction in the arable land due to rapid urbanization has created threat to the food security and impact on availability of the land for the projects related to infrastructure. A system based dynamic method for assessing the urbanization land use change in policy with reference to practices in china has been introduced in this research. In implementing urbanization in China four typical policy scenarios identified are: 1) planning driven by balanced development; 2) planning driving uneven development; 3) uneven and balanced development driven by market and use of dynamic system model to analyze the impact of land use change. To assess the impact of four different land use changes urbanization policies in china the system dynamic method has been used.

China's Jinyun County case study predicts that Scenario 1 or Scenario 2 of planning policies will lead to decreased agricultural land use, slight decrease in open land after 2010 and urban construction land areas slow growth. Scenario 3 or Scenario 4 of the market driven policies will boost urban construction land area until 2010 and decreased open and agricultural land afterwards. Study aim to help predict the likely consequences of their decisions by decision maker and policy implementation adjustment to be made. SD models, therefore, can be used as a decision-making tool and to monitor land use change for development of urbanization policy (Wu et al., 2010).

According to Bettinger and Merry (2019), there are 13 major land classes and their subclasses assessment of land occupied by them, estimates of the confidence interval developed, and rates of management activities annually were estimated. Increased commerce space of the southern landscape and human living observed was mainly at the expense of ecosystem covered of tree (generally exclusive of woodlands in Texas and Oklahoma), pastures and cropland areas. Only 1.5% of the represented south area in 2013 was developed. 1.6% of the area represented for transportation. During study period one land use classes gained area from other land use classes.

The land use pattern and land cover in Florida has changed substantially since 1900. Population and tourism increase were coincident with the development which was facilitated by highway, railroad and marketing campaign focusing on visitors and new residents to come to state (Derr, 1998). Development of transportation network like interstate system like I-4, I-75, Florida turnpike, tourism in metropolitan region like Orlando has been the reason for the major land use change (Volk et al., 2017).

Land use change models are central for urban feature forecasting. Various land use change Binomial and multinomial logit model of various legged explanatory variables offers land dynamics insight. Various variables like parcel shape and size, slope, CBD access andtransit, distance to the nearest highway, and zoning policies, as well as each parcel's "neighborhood" attributes are recognized by these models. substantial predictive powers are offered by Neighborhood conditions however beyond 2 miles such efforts seem inconsequential (Zhou & Kockelman, 2008).

According to Rodriguez et al. (2004), two phase study was developed. First phase was focused on conducting a literature review comprehensively on connection between land use and transportation. All the municipalities in the counties were selected in North Carolina and surveyed for the land use plan characteristics, their presence and adopted tools and policies for the management of land development as they relate to the transportation factors. The study examined planned investment for all the communities in the transportation area in the state of North Carolina for the period of 2004-2010. The second, phase of the study analyzed the content of land use plans selected from 30 local plans from communities used in the first phase of survey. A legal primer to be used by state and regional planners was developed to comprehend the potential inconsistencies and relationship between land use or comprehensive plans and zoning ordinances.

The survey result by planners and the content analysis of municipal plans of thirty counties selected randomly ensured that they are representative of the state and suggest that in spite of awareness regarding connection between land use and transportation issues, this connection is not visible in the land use plans. The results of both the studies suggested that land use plans implementation needs to be strengthened (Rodriguez et al., 2004).

According to Singh (2005) and Singh & Spainhour (2004) around 25 percent of the crashes in the study set data is not traditional ROR crashes but were crashes where the vehicle ran off the roadway at a gentle angle, then attempted to over-steered back onto the roadway, resulting in a loss of control and a subsequent crash either with another vehicle, a fixed object on the same or opposite side of the road, or due to overturning because of loss of lateral stability. The study also suggests the relationship between land use and its effect on crashes.

Das & Islam (2016), Hasan et al. (2016), Islam (2017, 2018, 2019), Singh & Islam (2020) presumed that ROR crashes can be stopped in autonomous vehicles with the implementation of standardized protocol both during and after construction. There is impact on the movement of autonomous vehicles in work zone due to land use constraints. Use of autonomous vehicles can reduce the work zone land requirement specially when acquiring land for construction is expensive and challenging.

3. Data Description

The current research involves the FDOT-District-5 as area of study in the Florida Mega regions. For the said research GIS data base for the land use plans for years 2007, 2009, 2010, 2012, 2014 and 2015 were procured as raster images from FGDL open source data. The available data has been created for FDOT, District-5 with total nine counties listed as, Marion, Volusia, Flagler, Sumter, Lake, Seminole, Orange, Brevard and Osceola. The initial data set had ninety-nine land use type which were classified in to fifteen categories. The land use data has been cleaned up for total sixteen attributes. These attributes are Agriculture, Agriculture open to development, Operating railroad property, Industrial, Institutional, Mining, No values available, others, Public/Semipublic, recreation, residential, retail/office, ROW, vacant residential, vacant nonresidential and water.

Since the data contained all these attributes in one raster image for each individual year. The first major step was the segregation of the each individual attribute data from each year raster image. Arc map was used as a tool to convert the raster image file in to shape files. Shape files of each year data was sorted by using command select by attribute feature, and individual shape files for each attribute was created. For extracting the data needed for the research 2007 was considered as the base year attributes like Agriculture, Agriculture open to development, vacant residential, vacant nonresidential were compared with selected attributes like residential, public/semipublic, retail/offices, Industrial, Institutional, ROW for year 2009, 2010, 2012, 2014 and 2015. The data showed the change in land use pattern each year from one attribute to other (Figure 3 and Figure 4).

4. Modeling Methodology

The main goal of the study is to understand the land use change based on various choices. The decision of parcel from one land use type to other depends on various factors such as type of land needed based on its end use, its accessibility to major road network, size of parcels, proximity of parcels from urban centers or central business district if close to city limits, population. The available land data shows that there are land use with agriculture open to development which can be converted to residential, retail/office, industrial, institutional based on the probable choices made by the developer.

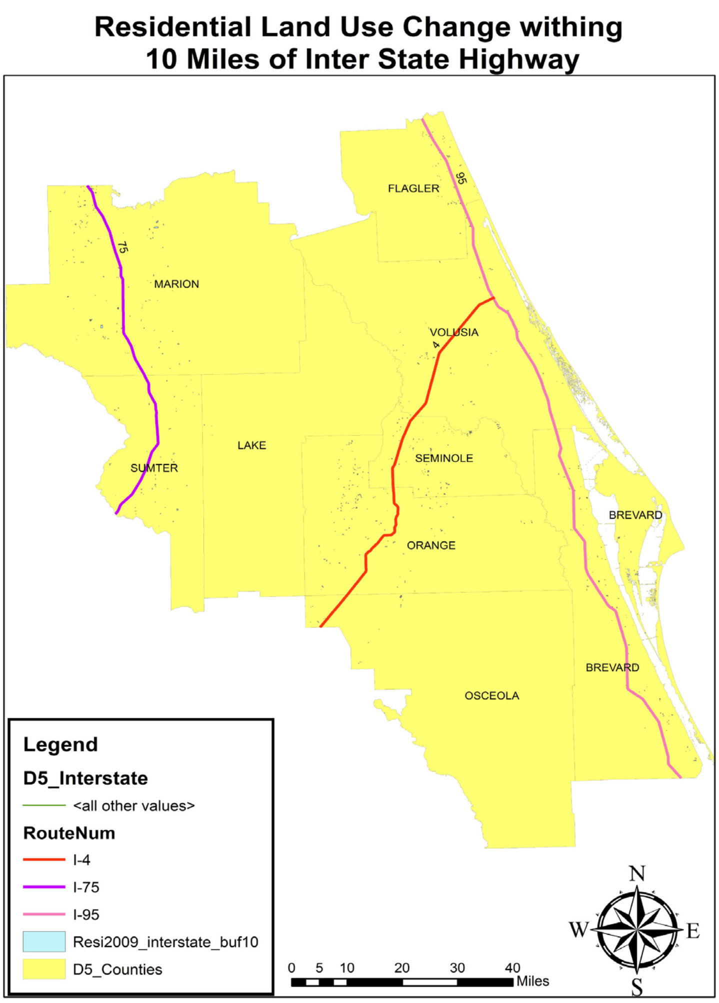

Figure 3. Residential parcels within 10 miles of interstate highway.

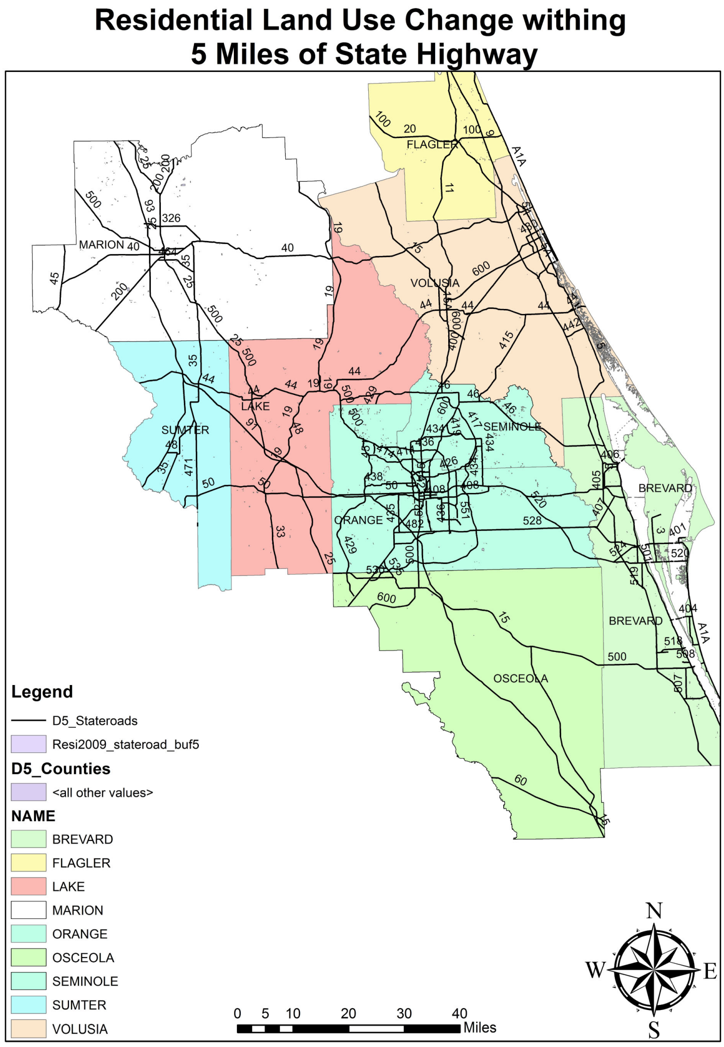

Figure 4. Residential land use change within 5 miles of state highway.

The intension of this research is to figure out the relationship between land use change and various factors associated with land use change. Statistical t test will be done between the data of year like 2009-2010, 2009-2012, 2009-2014, and 2009-2015. If the "t" stats is more than "tcritical" then the land use change is significant.

5. Analysis and Results

Data analysis is done for year 2007, 2009, 2010, 2012, 2014 and 2015 land use data. The data is available in the form of parcels. For the analysis total thirteen attributes have been considered. Table 1 shown that there is a decrease in the available land in agriculture from year 2007 to 2015. But for Agriculture open to development there is substantial decrease of 33% from 2007 to 2015.

Table 2 shown various land use change considering year 2007 as base year. In this study land use change from Agriculture open to development to agriculture, Industrial, Institutional, vacant residential has been considered to analyze the

Table 1. Land use area.

Land Use Type	Area (Acres)					
	Year					
	2007	2009	2010	2012	2014	2015
Agriculture	2,137,887.68	2,159,090.74	2,143,516.19	2,161,182.62	2,123,187.66	2,106,971.71
Ag. Open to Development	233,915.85	209,723.86	219,209.71	206,387.53	178,873.31	174,954.26
Mining	2232.35	3350.38	2440.74	3646.59	10,374.46	174,954.26
Residential	643,063.00	641,702.15	645,062.00	641,814.02	660,042.13	717,730.82
Vacant Residential	326,388.87	315,361.58	302,847.00	302,245.22	315,888.77	281,168.01
Vacant Non residential	69,861.17	68,295.79	66,561.21	67,317.57	68,610.47	70,365.24
No Value Available	335,198.86	195,341.74	514,796.83	68,342.17	121,672.24	112,179.20
Public/Semipublic	1,238,118.54	1,265,945.42	1,220,308.57	1,299,319.00	1,569,207.59	1,588,463.37
Others	35,536.32	35,231.65	37,481.44	36,026.08	33,296.97	32,201.01
Retail/office	77,923.25	83,974.04	84,380.30	83,253.44	85,476.17	86,665.28
Industrial	31,821.15	33,304.89	33,128.03	32,913.46	33,848.57	34,398.57
Institutional	34,522.76	32,882.88	33,128.03	34,115.85	35,922.39	34,437.36
ROW	7743.72	8289.63	7063.93	9088.82	10,166.16	8866.92

land use change with respect to year 2009, 2010, 2012, 2014 and 2015. The results show that land use change from agriculture open to development from year 2009 to 2015 changes from modest 1% to 5.17%. Similarly vacant residential also has land use change from 1.08% in 2009 to 11.28% in 2015. Land use change for public/semipublic also shows the similar results. On the contrary land use change from agriculture open to development to agriculture decreases from 18.04% in 2009 to 8.14% in 2015. The results for other attributes are not varying much from year 2009 to 2015.

The results justifies as year 2008-2009 was the period of economic slowdown and during this period there has been very slow growth rate in residential and commercial area but, this has picked up around 2015. During this period land use change to agriculture was very high and reduced as the economic growth picked up around 2015. The results can also be verified from Table 3 which shows that the land use change was significant during this period.

Table 3 below shows the statistical analysis of land use change from Agriculture open to development to land use attributes of residential, agriculture, vacant residential, residential, Industrial, Institution, ROW, Public/Semipublic, retail/offices. The statistical analysis justifies the results shown in Table 2.

Table 4 and Table 5 gives the statistical analysis of land use change within ten miles of interstate highway. Table 5 shows that percentage land use change with respect to actual land use change area.

The results in Table 6 and Table 7 shows that land use change within 5 miles of state highway is more consistent and significant then within ten miles of interstate highway.

Table 2. Land use change with 2007 as base year.

	Base Year Land Use and Area (Acres)	Land Use Change and Area (Acres)					
S. No.	2007		2015	2014	2012	2010	2009
1	**Agriculture open to Development**		**Land Use Change Area**	**Land Use Change Area**	**Land Use Change Area**	**Land Use Change Area**	**Land Use Change Area**
	233,915.85	Residential	12,097.60	9535.92	4532.20	3662.06	2334.33
		%	5.17	4.08	1.94	1.57	1.00
		Agriculture	19,041.10	26,503.59	34,754.24	40,520.20	42,194.53
		%	8.14	11.33	14.86	17.32	18.04
		Vacant Residential	26,382.16	27,430.46	6114.74	4520.63	2520.27
		%	11.28	11.73	2.61	1.93	1.08
		Vacant Non-residential	5497.84	4907.60	2860.97	2571.42	1949.36
		%	2.35	2.10	1.22	1.10	0.83
		Public/ Semipublic	30,683.00	26,842.01	13,124.52	7469.53	6012.34
		%	13.12	11.48	5.61	3.19	2.57
		Retail/Offices	963.79	699.41	327.83	357.54	291.47
		%	0.41	0.30	0.14	0.15	0.12
		Industrial	899.84	926.08	766.18	703.86	850.98
		%	0.38	0.40	0.33	0.30	0.36
		Institutional	1323.92	1284.49	842.73	412.05	295.36
		%	0.57	0.55	0.36	0.18	0.13
		ROW	409.39	362.52	248.46	182.72	323.61
		%	0.18	0.15	0.11	0.08	0.14

Table 3. Land use change comparative statistical analysis.

S. No.	Land Use for Year 2007	Variables	t Stat	P (T ≤ t) one-tail
		Residential		
1	**Agriculture open to Development**	**2009-2010**	−0.1011764	0.459714361
		2009-2012	0.25424191	0.399677923
		2009-2014	4.07497483	2.46506E−05
		2009-2015	3.63812487	0.000143638
		(2010-2009) and (2015-2009)	3.52580127	0.000219729

Continued

		Agriculture			
2	**Agriculture open to Development**		**2009-2010**	0.67986146	0.248402116
			2009-2012	0.57559911	0.282530351
			2009-2014	2.63488885	0.004296047
			2009-2015	2.66936219	0.003882851
			(2010-2009) and (2015-2009)	2.01862992	0.021942482
		Vacant Residential			
3	**Agriculture open to Development**		**2009-2010**	0.2354445	0.406969536
			2009-2012	0.65159699	0.257447549
			2009-2014	2.70934092	0.00346108
			2009-2015	1.66782652	0.047919668
			(2010-2009) and (2015-2009)	1.58017813	0.057280073
		Vacant Non-residential			
4	**Agriculture open to Development**		**2009-2010**	1.10513891	0.135349298
			2009-2012	1.55284008	0.061182895
			2009-2014	0.12337882	0.450978192
			2009-2015	1.67147336	0.048256133
			(2010-2009) and (2015-2009)	0.84618007	0.199335219
		Public/Semipublic			
5	**Agriculture open to Development**		**2009-2010**	0.27613266	0.391304113
			2009-2012	0.34020288	0.366953337
			2009-2014	1.58484459	0.056949797
			2009-2015	1.58484459	0.056949797
			(2010-2009) and (2015-2009)	1.33839557	0.090815684
		Retail/Offices			
6	**Agriculture open to Development**		**2009-2010**	0.8806665	0.190315651
			2009-2012	1.39472159	0.083110718
			2009-2014	2.19047303	0.015418521
			2009-2015	2.25362868	0.013212362
			(2010-2009) and (2015-2009)	1.71455809	0.0447776
7	**Agriculture open to Development**	Industrial			
			2009-2010	1.54447781	0.065733694

Continued

			2009-2012	1.37472126	0.088977931
			2009-2014	1.54542628	0.065619113
			2009-2015	1.54113864	0.066138373
			(2010-2009) and (2015-2009)	0.19864783	0.421843834
		Institutional			
			2009-2010	−0.1972147	0.422384383
			2009-2012	−0.0439591	0.482589967
8	**Agriculture open to Development**		**2009-2014**	1.18120845	0.122632417
			2009-2015	1.18165985	0.122543939
			(2010-2009) and (2015-2009)	1.47436565	0.074537583
		ROW			
			2009-2010	0.88253363	0.189791984
			2009-2012	0.95515713	0.170889402
9	**Agriculture open to Development**		**2009-2014**	2.18604906	0.015560897
			2009-2015	2.18738873	0.015510515
			(2010-2009) and (2015-2009)	1.55119428	0.061991542

Table 4. Land use change within 10 miles of interstate highway-comparative statistical analysis.

S. No.	Land Use For Year 2007	Variables		t Stat	P (T ≤ t) one-tail
1		Residential			
			2009-2010	−0.693098071	0.244236224
			2009-2012	−1.028407903	0.152052396
			2009-2014	−1.028407903	0.152052396
			2009-2015	2.387016323	0.008621979
3		Vacant Residential			
			2009-2010	−0.020833166	0.491693897
			2009-2012	−0.016335119	0.493487069
	Agriculture open to Development		**2009-2014**	1.577113737	0.057729138
			2009-2015	0.915153075	0.180295895
4		Vacant Non-residential			
			2009-2010	1.255948108	0.105620867
			2009-2012	1.425218531	0.078167825
			2009-2014	0.220436605	0.412927291
			2009-2015	2.150758435	0.016612345

Continued

5	Retail/Offices			
		2009-2010	0.735762545	0.23197471
		2009-2012	1.241203929	0.10901348
		2009-2014	1.857701121	0.033378789
		2009-2015	1.925779255	0.028777953
6	Industrial			
		2009-2010	1.325491486	0.099304483
		2009-2012	1.370579552	0.092164647
		2009-2014	1.46459391	0.078588323
		2009-2015	1.451142926	0.080425463
7	ROW			
		2009-2015	0.437606534	0.331648409

Table 5. Percentage land use change within 10 miles of interstate highway.

S. No.	Land Use	2009	2010	2012	2014	2015
1	Residential	1203.644	2385.15	2925.89	2925.9	8015.2
	Actual Residential Area	2334.332	3662.06	4532.2	9535.9	12098
	% of Actual residential Area	51.56267	65.1313	64.5579	30.683	66.255
2	Vacant Residential	1582.164	2800.87	3925.52	15748	15081
	Actual Vacant Residential Area	2520.274	4520.63	6114.74	27430	26382
	% of actual vacant residential area	62.77748	61.9574	64.1976	57.412	57.163
3	Vacant Non Residential	1720.816	2092.54	2335.72	4027.6	4592.4
	Actual Vacant Non Residential Area	1949.361	2571.42	2860.97	4907.6	5497.8
	% of Actual vacant Nonresidential area	88.2759	81.3768	81.6409	82.069	83.531
4	Retail/Offices	249.8471	314.371	273.951	480.64	735.01
	Actual Retail/Offices Area	291.4667	357.543	327.831	699.41	963.79
	% of Actual Retail/office Area	85.72061	87.9255	83.5646	68.721	76.262
5	Industrial	788.20295	640.6433	694.2306	731.445	681.34
	Actual Industrial Area	850.9849	703.863	766.182	926.08	899.84
	% of Actual Industrial Area	92.62243	91.0182	90.6091	78.983	75.718
6	ROW	162.62477	5.916976	6.998351	18.8919	116.09
	Actual ROW Area	323.6064	182.72	248.46	362.52	409.39
	% of Actual ROW	50.25387	3.23828	2.81669	5.2113	28.357

Table 6. Land use change within 5 miles of state highway-comparative statistical analysis.

S. No.	Land Use For Year 2007	Variables		t Stat	P (T ≤ t) one-tail
1	Agriculture open to Development	Residential			
			2009-2010	−0.061901647	0.475326413
			2009-2012	0.442606108	0.329070483

Continued

		2009-2014	3.780920046	8.24858E-05
		2009-2015	3.396026469	0.000354539
3	Vacant Residential			
		2009-2010	−0.266414442	0.395003677
		2009-2012	0.392459204	0.34742595
		2009-2014	2.097517933	0.018173132
		2009-2015	1.261059764	0.103877419
4	Vacant Non-residential			
		2009-2010	1.114619728	0.133317152
		2009-2012	1.474349289	0.071146491
		2009-2014	0.121204409	0.451838304
		2009-2015	1.643016772	0.051141878
5	Retail/Offices			
		2009-2010	0.881889331	0.189997298
		2009-2012	1.359673281	0.088526739
		2009-2014	2.195959179	0.015226923
		2009-2015	2.259657527	0.013028313
6	Industrial			
		2009-2010	1.546446945	0.065767043
		2009-2012	1.375926285	0.089055704
		2009-2014	1.532698942	0.067441008
		2009-2015	1.527708202	0.06805714
7	ROW			
		2009-2015	0.941977835	0.17461417

Table 7. Percentage land use change within 5 miles of interstate highway.

		2009	2010	2012	2014	2015
	Residential	2169.006	3438.74	4159.22	9013.2	11,450
1	Actual Residential Area	2334.332	3662.06	4532.2	9535.9	12,098
	% of Actual residential Area	92.9176	93.9019	91.7704	94.518	94.646
	Vacant Residential	2502.551	4418.26	5993	27077	26015
2	Actual Vacant Residential Area	2520.274	4520.63	6114.74	27430	26382
	% of actual vacant residential area	99.2968	97.7355	98.0091	98.712	98.609
	Vacant Non Residential	1949.042	2562.89	2852.57	4899	5487.7
3	Actual Vacant Non Residential Area	1949.361	2571.42	2860.97	4907.6	5497.8
	% of Actual vacant Nonresidential area	99.98365	99.6684	99.7064	99.825	99.815
	Retail/Offices	291.4112	357.487	327.775	698.94	961.89
4	Actual Retail/Offices Area	291.4667	357.543	327.831	699.41	963.79
	% of Actual Retail/office Area	99.98093	99.9845	99.983	99.932	99.803
	Industrial	842.66899	695.6273	757.9276	921.663	895.22
5	Actual Industrial Area	850.9849	703.863	766.182	926.08	899.84
	% of Actual Industrial Area	99.02279	98.8299	98.9226	99.523	99.486
	ROW	307.95769	148.066	190.4273	253.702	281.58
6	Actual ROW Area	323.6064	182.72	248.46	362.52	409.39
	% of Actual ROW	95.16427	81.0346	76.6431	69.983	68.781

6. Conclusion

The land use change from year 2007 to 2015 shows the economic growth during this period and shows that land use change is more significant within ten miles of interstate highway than within five miles of state highway. The land use change study is a valuable direction for the modeling of land use intensity, population, employment. Land use change study plays an important part in policy making, planning and other legislation.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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